

IB DP Business Management

BUSINESS MANAGEMENT TOOLKIT 50 WORKSHEETS PACK

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Author bios



Alric Chong has been a Business Management educator since 2004. His multifaceted professional journey spans roles as an author, editor, and examiner. For over a decade, he has taught at the Victoria Shanghai Academy in Hong Kong, where he also taught Economics and Individuals & Societies. Alric spent five years in Australia at the University of Sydney and Macquarie University where he earned his Bachelor's and Master's degrees in Commerce/ASCPA Associate. He has also held roles in various esteemed educational institutions in Singapore and China. Alric proudly holds a Cybersecurity Certificate from the Institute of Data, Australia, marking another milestone in his ongoing pursuit of professional development. Alric can be contacted via chong.alric@gmail.com or www.linkedin.com/in/alricchong/.



Lois Johnston-Walker studied for her Master's degree in International Management after completing her BA in Business Administration. She went on to complete a PGCSE in Business before starting her teaching career in the UK. She has over 18 years of teaching experience, including working as Head of Business Studies at a school in London. Lois started her international teaching career at the British International School of Shanghai, before moving to Haileybury Astana, Kazakhstan, to take on the role of Head of Business and CAS Coordinator. At the time of publication, Lois works at Tanglin Trust School, Singapore, where she is Assistant Head of Year 10, as well as a teacher of GCSE Business, A Level Business and IB Business Management. Lois can be contacted via her email address loisjw80@gmail.com.

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IB BUSINESS MANAGEMENT

50 WORKSHEETS PACK – BUSINESS MANAGEMENT TOOLKIT (BMT)

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Boutique Jewels

Carmen owns a business specializing in handmade jewellery, operating out of a small unit in the vibrant Kampong Glam neighbourhood of Singapore. Sales have been growing steadily since tourists returned to the country following the COVID-19 pandemic. Carmen is considering whether she should open a second store. She knows this is a risk, so she plans to use SWOT analysis to help make the decision.

Task 1: Fill in the blanks

SWOT analysis is a business management _____ used by firms to consider the internal strengths and _____ as well as the external opportunities and _____ of a given situation. Carmen has _____ over the strengths, such as the skill level of staff, and weaknesses, such as the _____ of the tools used during the production process. On the other hand, she has limited control over _____, such as the recovery of the _____, or threats such as rising inflation.

One of the key advantages of using SWOT analysis is that it is simple to use for small business owners, such as Carmen, which can also be created relatively _____. However, entrepreneurs and managers need to consider that SWOT analysis is only as good as the data used to complete the tool and it can become _____ very quickly. Ultimately, SWOT analysis is likely to support Carmen when deciding whether to expand using an organic growth _____, but the tool is less likely to be useful if it is used in isolation.

Missing words: control, economy, limitation, opportunities, outdated, quickly, threats, tool, strategy, weaknesses

Task 2: Multiple choice questions

- _____ are external factors that are not favourable to a business.
 - Opportunities
 - Strengths
 - Threats
 - Weaknesses

Worksheet 1
1.1 SWOT analysis - Boutique Jewels

2. The steady economic growth in India is a(n) _____ for businesses.
- A. Opportunity
 - B. Strength
 - C. Threat
 - D. Weakness
3. The use of SWOT analysis helps to reduce _____ associated with a business issue.
- A. Analysis
 - B. Decision making
 - C. Planning
 - D. Risk
4. Opportunities and threats in a SWOT analysis should stem from a _____ analysis.
- A. Break-even
 - B. Force field
 - C. Stakeholder
 - D. STEEPLE
5. SWOT analysis should not be used in _____.
- A. A recession
 - B. Combination with other business management tools
 - C. Isolation
 - D. Small businesses

Task 3: short answer questions

1. Arrange the following factors into the correct section or category of a SWOT analysis below.
Write your answers in Table 1.

- | | |
|-------------------------------|-------------------------------|
| a. Demotivated staff | g. Limited amounts of finance |
| b. Economic growth | h. Market growth |
| c. Experience of staff | i. Increasing market share |
| d. Improvements in technology | j. Pressure group action |
| e. Increased competition | k. Unsuitable location |
| f. Inflation | l. USP |

Worksheet 1
1.1 SWOT analysis - Boutique Jewels

Table 1: SWOT analysis

Strengths	Weaknesses
Opportunities	Threats

2. Suggest how this information might be useful to a Human Resources department.

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3. Construct a SWOT analysis in Table 2 for a small business that you are familiar with. Explain to a partner in class how the information might be useful to the business owner(s).

Table 2: SWOT Analysis for a small business

Strengths	Weaknesses
Opportunities	Threats

Answers

Boutique Jewels

Carmen owns a business specializing in handmade jewellery, operating out of a small unit in the vibrant Kampong Glam neighbourhood of Singapore. Sales have been growing steadily since tourists returned to the country following the COVID-19 pandemic. Carmen is considering whether she should open a second store. She knows this is a risk, so she plans to use SWOT analysis to help make the decision.

Task 1: Fill in the blanks

SWOT analysis is a business management **tool** used by firms to consider the internal strengths and **weakness** as well as the external opportunities and **threats** of a given situation. Carmen has **control** over the strengths, such as the skill level of staff, and weaknesses, such as the **limitation** of the tools used during the production process. On the other hand, she has limited control over **opportunities**, such as the recovery of the **economy**, or threats such as rising inflation.

One of the key advantages of using SWOT analysis is that it is simple to use for small business owners and it can also be created relatively **quickly**. However, entrepreneurs and managers need to consider that SWOT analysis is only as good as the data used to complete the tool and it can become **outdated** very quickly. Ultimately, SWOT analysis is likely to support Carmen when deciding whether to expand using an organic growth **strategy**, but the tool is less likely to be useful if it is used in isolation.

Missing words: control, economy, limitation, opportunities, outdated, quickly, threats, tool, strategy, weaknesses

Task 2: Multiple choice questions

1. _____ are external factors that are not favourable to a business.
 - A. Opportunities
 - B. Strengths
 - C. Threats**
 - D. Weaknesses

Worksheet 1
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| a. Demotivated staff | g. Limited amounts of finance |
| b. Economic growth | h. Market growth |
| c. Experience of staff | i. Increasing market share |
| d. Improvements in technology | j. Pressure group action |
| e. Increased competition | k. Unsuitable location |
| f. Inflation | l. USP |

Worksheet 1
1.1 SWOT analysis – Boutique Jewels

Table 1: SWOT analysis

Strengths	Weaknesses
<ul style="list-style-type: none"> • Experience of staff • Increasing market share • USP 	<ul style="list-style-type: none"> • Demotivated staff • Limited amounts of finance • Unsuitable location
Opportunities	Threats
<ul style="list-style-type: none"> • Economic growth • Improvements in technology • Market growth 	<ul style="list-style-type: none"> • Increased competition • Inflation • Pressure group action

2. Suggest how this information might be useful to a Human Resources department.

The HR department could look at ways to incentivize experienced employees to improve motivation and minimize labour turnover. They may need to consider non-financial rewards as the business has limited amounts of finance.

3. Construct a SWOT analysis in Table 2 for a small business that you are familiar with. Explain to a partner in class how the information might be useful to the business owner(s).

- Students' own answers.
- Ensure they are able to justify your choices and decisions in this question.
- As an alternative, ask students to present their findings to the class.

Fancy Dress Town

Fancy Dress Town (FDT) is based in Leeds, UK and specializes in fancy dress costume hire. With the largest range of costumes in West Yorkshire, *FDT* also supplies costumes to the entertainment industry. The economy is currently facing a recession and *FDT* is experiencing liquidity problems.

- a) Identify whether the following scenarios are categorized as a strength, weakness, opportunity, or threat of *FDT*. [4]
- A low number of rivals
 - An economic downturn
 - Liquidity problem
 - Value for money of the costume hire

Table 1: SWOT analysis for Fancy Dress Town

Strength	Weakness
Opportunity	Threat

- b) Define the term *SWOT analysis*. [2]
-
-
-

- c) Explain **one** advantage and **one** disadvantage for *FDT* of using SWOT analysis. [4]
-
-
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-
-

Answers

Fancy Dress Town

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- A low number of rivals
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 - Liquidity problem
 - Value for money of the costume hire

Table 1: SWOT analysis for Fancy Dress Town

Strength	Weakness
• Value for money of the costume hire	• Liquidity problem
Opportunity	Threat
• A low number of rivals	• An economic downturn

- b) Define the term *SWOT analysis*. [2]

SWOT analysis is a tool that businesses use to identify its internal strengths and weaknesses and the external opportunities and threats faced by the organization.

- c) Explain **one** advantage and **one** disadvantage for *FDT* of using *SWOT analysis*. [4]

An advantage for *FDT* of using *SWOT analysis* is that the business can use the tool to determine its current position in the fancy dress market to support the formulation of a strategy that can support its survival during the economic downturn.

A disadvantage of using *SWOT analysis* is that the tool is only useful if *FDT* is willing to act on its liquidity problems. However, the tool itself does not provide any strategies to deal with weaknesses of the firm.

Peloton

Peloton is an American multinational company that operates in the home fitness market. It sells stationary fitness bikes and treadmills, as well as offering a subscription service where customers have access to exclusive exercise programs. The business saw sales surge during the COVID-19 pandemic, but their position in the market has become more tenuous post-pandemic.

Table 1: SWOT analysis for Peloton in 2022

Strengths	Weaknesses
<ul style="list-style-type: none"> • Experienced CEO, John Foley • Subscription service is a USP • Sales revenue increase of 120% year-on-year • Users increased by 2.8 million year-on-year • Vertical integration through acquisition of manufacturer <i>Precor</i> 	<ul style="list-style-type: none"> • High variable and fixed costs • Large number of unsold units • Net loss of \$117 million • Exercise programs are outsourced
Opportunities	Threats
<ul style="list-style-type: none"> • Easing of lockdowns encouraging increased demand for exercise programs • Market development – <i>Peloton</i> currently only operates in the US, UK, Canada, and Germany 	<ul style="list-style-type: none"> • Post pandemic, demand predicted to decrease • Intensive competition due to reopening of gyms around the world

(a) Define the term *vertical integration*. [2]

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Answers

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(a) Define the term *vertical integration*. [2]

Vertical integration is an external growth strategy that takes place between businesses at different stages of the production process. In this case, *Peloton* is using backward vertical integration to acquire *Precor*, a manufacturer.

(b) Explain any **two** elements of *Peloton*'s SWOT analysis. [4]

- One of *Peloton*'s key **strengths** is its subscription service, which is a unique selling point. This is an example of gaining a first mover advantage, which enabled the business to stand out compared to other businesses selling stationary fitness bikes and treadmills during the COVID-19 pandemic.

- One of the key **opportunities** that *Peloton* was able to take advantage of was the lockdowns across the world due to the COVID-19 pandemic. This meant people were stuck at home with very few options to exercise effectively, resulting in surging sales for the company.

(c) Explain **two** potential issues for Peloton's managers of using this SWOT analysis. [4]

- One issue is that this SWOT analysis represents *Peloton's* position in 2022 and will become outdated quite quickly. This is especially true as almost all countries had reopened and relaxed all pandemic restriction by the end of 2022, as governments put in place plans to live with COVID-19, so the opportunities of global lockdowns are no longer applicable in the US, Canada, the UK, and Germany.
- Another issue is that the SWOT analysis will only be useful to managers if they are willing to act on some of the factors that are raised, such as dealing with the issue outsourcing of *Peloton's* exercise programs. Whilst the disadvantages of outsourcing the exercise programs might be acknowledged, the company might not have the time or resources to consider insourcing.

(d) Using the information provided in Table 1, recommend to Peloton what action the company should take to strengthen its position in the home fitness market. [10]

Possible recommendations could include:

- Identify emerging markets that can be pursued to sell the large number of units that remain unsold.
- Use the experience of John Foley to strategize a plan to reduce the company's fixed and variable costs, in order reduce the \$117 million net loss.

Balanced argument

- Market development involves a medium level of risk, so it is important that managers conduct thorough market research before entering a new market. The finance needed to support the market research also needs to be considered.
- The acquisition of *Precor* and manufacturing costs of the fitness equipment have likely contributed to the high costs and net loss faced by *Peloton* so the issue may only be short-term.

Weddings by Adriana

Weddings by Adriana (WA) has been operating a wedding planning service in London, UK, and the surrounding areas successfully since 2020. Adriana, the owner, wants to capitalize on its recent success, and she is looking at ways to grow the business organically. With family in the Republic of Ireland, she knows there is a gap in the market for a wedding planner. *WA* has differentiated its service by offering weddings modelled on those of well-known celebrities, but at a much more affordable price.

Task 1: Fill in the blanks

The Ansoff matrix is a tool used by businesses to identify _____ strategies based on whether a business wants to sell _____ or existing products in new or existing markets. Adriana's idea to expand her business abroad is an example of market _____, selling existing products in a new market, which is deemed to be a _____-risk growth strategy. She is a little nervous about this strategy as she knows she will have to do a large amount of primary and secondary market _____ before entering this market, to ensure she fully understands customer needs and wants. Alternatively, she could use market _____, which is a low-risk growth strategy as it involves selling existing products to existing customers.

Another growth strategy Adriana has considered is designing wedding outfits for brides and grooms, following a part-time clothing design course she recently completed. This is an example of _____ development, as Adriana would be offering a new product to her existing customers. The riskiest growth strategy in the Ansoff matrix is diversification, which involves offering new products to new _____. If Adriana was to start designing and selling swimwear, this would be an example of _____.

Missing words: customers, development, diversification, growth, medium, new, penetration, product, research.

Task 2: Multiple choice questions

1. The odd strategy out is _____ (as it does not appear in the Ansoff matrix).
 - A. Market development
 - B. Market diversification
 - C. Market penetration
 - D. Product development

Worksheet 4
2.1 The Ansoff matrix – Weddings by Adriana

2. _____ is not an example of market penetration.
- A. Change in price
 - B. Improved advertising
 - C. Loyalty scheme
 - D. Selling overseas
3. Innovation and research and development (R&D) are emphasized in _____.
- A. Diversification
 - B. Market development
 - C. Market penetration
 - D. Product development
4. Diversification involves _____ risk.
- A. High
 - B. Low
 - C. Medium
 - D. No
5. _____ is most likely to enable a business to spread its risks.
- A. Diversification
 - B. Market development
 - C. Market penetration
 - D. Product development

Task 3: short answer questions

(a) Complete the labels for the Ansoff matrix below.

		Products	
		Existing	New
Markets	Existing		
	New		

(b) Select a multinational company (MNC) and provide examples of how it has used all four of Ansoff's growth strategies. Explain how successful these strategies have been using substantiated data and information.

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Answers

Weddings by Adriana

Weddings by Adriana (WA) has been operating a wedding planning service in London, UK, and the surrounding areas successfully since 2020. Adriana, the owner, wants to capitalize on its recent success, and she is looking at ways to grow the business organically. With family in the Republic of Ireland, she knows there is a gap in the market for a wedding planner. *WA* has differentiated its service by offering weddings modelled on those of well-known celebrities, but at a much more affordable price.

Task 1: Fill in the blanks

The Ansoff matrix is a tool used by businesses to identify **growth** strategies based on whether a business wants to sell **new** or existing products in new or existing markets. Adriana's idea to expand her business abroad is an example of market **development**, selling existing products in a new market, which is deemed to be a **medium**-risk growth strategy. She is a little nervous about this strategy as she knows she will have to do a large amount of primary and secondary market **research** before entering this market, to ensure she fully understands customer needs and wants. Alternatively, she could use market **penetration**, which is a low-risk growth strategy as it involves selling existing products to existing customers.

Another growth strategy Adriana has considered is designing wedding outfits for brides and grooms, following a part-time clothing design course she recently completed. This is an example of **product** development, as Adriana would be offering a new product to her existing customers. The riskiest growth strategy in the Ansoff matrix is diversification, which involves offering new products to new **customers**. If Adriana was to start designing and selling swimwear, this would be an example of **diversification**.

Missing words: customers, development, diversification, growth, medium, new, penetration, product, research.

Task 2: Multiple choice questions

1. The odd strategy out is _____ (as it does not appear in the Ansoff matrix).
 - A. Market development
 - B. Market diversification**
 - C. Market penetration
 - D. Product development

Worksheet 4
2.1 The Ansoff matrix – Weddings by Adriana

2. _____ is not an example of market penetration.
- A. Change in price
 - B. Improved advertising
 - C. Loyalty scheme
 - D. Selling overseas**
3. Innovation and research and development (R&D) are emphasized in _____.
- A. Diversification
 - B. Market development
 - C. Market penetration
 - D. Product development**
4. Diversification involves _____ risk.
- A. High**
 - B. Low
 - C. Medium
 - D. No
5. _____ is most likely to enable a business to spread its risks.
- A. Diversification**
 - B. Market development
 - C. Market penetration
 - D. Product development

Task 3: short answer questions

(a) Students of pirateIB, complete the labels for the Ansoff matrix below.

		Products	
		Existing	New
Markets	Existing	Market Penetration	Product Development
	New	Market Development	Diversification

(b) Select a multinational company (MNC) and provide examples of how it has used all four of Ansoff's growth strategies. Explain how successful these strategies have been using substantiated data and information.

Exemplar response for McDonald's

- **Market penetration** - McDonald's *Monopoly Game* in the US with 724 million prizes given out since 2003 shows the promotion has created a high level of demand for its existing portfolio of products.
- **Market development** - McDonald's entry into Vietnam deemed to be unsuccessful. One reason was that the pricing strategy was not appropriate, with meals being twice as much as those supplied by local vendors of substitute food products.
- **Product development** - McDonald's introduces the *McVegan* in Sweden in 2018, selling 150,000 units in the first month.
- **Diversification** - McDonald's closes its hotel in Switzerland after just 2½ years. McDonald's *McWedding* services in Hong Kong 2011.

McDonald's

McDonald's is one of the most well-known and successful fast-food chains in the world with around 40,000 restaurants across more than 100 countries. To maintain its position as a market leader, it is important that the business continues to identify growth strategies that will meet the evolving needs and wants of its customers.

(a) In the context of *McDonald's*, describe the Ansoff matrix as a business management tool. [2]

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(b) Complete the Ansoff matrix in diagram below. [4]

		Products	
		Existing	New
Markets	Existing		
	New		

(c) Identify whether the following examples should be categorized as market penetration, market development, product development, or diversification for *McDonald's*. [4]

No.	Example	Growth strategy
1.	In 2011, <i>McDonald's</i> started to offer <i>McWeddings</i> at some restaurants in Hong Kong.	
2.	In 2003, <i>McDonald's</i> launched an advertising campaign featuring Justin Timberlake singing a jingle that promoted the 'I'm Lovin It' slogan.	
3.	In 1997, the <i>McFlurry</i> was first introduced to the <i>McDonald's</i> menu.	
4.	In 2016, <i>McDonald's</i> opened its first restaurant in Kazakhstan.	

Worksheet 5
2.2 The Ansoff matrix – McDonald's

Answers

McDonald's is one of the most well-known and successful fast-food chains in the world with around 40,000 restaurants across more than 100 countries. To maintain its position as a market leader, it is important that the business continues to identify growth strategies that will meet the evolving needs and wants of its customers.

(a) In the context of *McDonald's*, describe the Ansoff matrix as a business management tool. [2]

The Ansoff matrix is a management tool used to identify growth strategies and whether a business should sell new or existing products in new or existing markets. The four growth options are market penetration, market development, product development, and diversification.

(b) Complete the Ansoff matrix in the diagram below. [4]

		Products	
		Existing	New
Markets	Existing	Market penetration	Product development
	New	Market development	Diversification

(c) Identify whether the following examples should be categorized as market penetration, market development, product development, or diversification for *McDonald's*. [4]

No.	Example	Growth strategy
1.	In 2011, <i>McDonald's</i> started to offer <i>McWeddings</i> at some restaurants in Hong Kong.	Diversification
2.	In 2003, <i>McDonald's</i> launched an advertising campaign featuring Justin Timberlake singing a jingle that promoted the 'I'm Lovin It' slogan.	Market penetration
3.	In 1997, the <i>McFlurry</i> was first introduced to the <i>McDonald's</i> menu.	Product development
4.	In 2016, <i>McDonald's</i> opened its first restaurant in Kazakhstan.	Market development

Super Sonic Sourdough (SSS)

During the COVID-19 pandemic, Alfeus had to work from home. He also spent more time pursuing one of his favourite pastimes, baking. He spent hours perfecting his sourdough loaves, which were in high demand from friends and family. This correlated with growth in the health and wellness market, with people willing to spend more money on products that promote healthy living.

Having conducted primary and secondary research, Alfeus concluded that he should give up his career in game development and open his own bakery. Although he knew this was a huge risk, he felt ready for a new challenge, after experiencing burnout in his previous job.

Twelve months on, *Super Sonic Sourdough (SSS)* is booming. Alfeus is looking at ways to expand SSS in order to capitalize on the high level of demand. He is considering the following options.

Option A

In an attempt to entice his existing customers to use the bakery more frequently, Alfeus is considering a customer loyalty scheme, where customers get their 10th product free of charge.

Option B

To further meet the needs of his existing customers, Alfeus is considering adding new products to the menu, such as matcha sourdough loaves.

- (a) Identify the least risky and the riskiest growth strategies identified in the Ansoff matrix. [2]

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- (b) Explain **two** methods of primary research that Alfeus may have used before starting his own business. [4]

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Worksheet 6
2.3 The Ansoff matrix – Super Sonic Sourdough

(c) Use the Ansoff matrix to explain the growth strategies in Option A **and** Option B. [4]

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(d) Using the information above, recommend to Alfeus whether Option A **or** Option B should be selected to help the business grow. [10]

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Answers

Super Sonic Sourdough (SSS)

During the COVID-19 pandemic, Alfeus had to work from home. He also spent more time pursuing one of his favourite pastimes, baking. He spent hours perfecting his sourdough loaves, which were in high demand from friends and family. This correlated with growth in the health and wellness market, with people willing to spend more money on products that promote healthy living.

Having conducted primary and secondary research, Alfeus concluded that he should give up his career in game development and open his own bakery. Although he knew this was a huge risk, he felt ready for a new challenge, after experiencing burnout in his previous job.

Twelve months on, *Super Sonic Sourdough (SSS)* is booming. Alfeus is looking at ways to expand SSS in order to capitalize on the high level of demand. He is considering the following options.

Option A

In an attempt to entice his existing customers to use the bakery more frequently, Alfeus is considering a customer loyalty scheme, where customers get their 10th product free of charge.

Option B

To further meet the needs of his existing customers, Alfeus is considering adding new products to the menu, such as matcha sourdough loaves.

(a) Identify the least risky and the riskiest growth strategies identified in the Ansoff matrix. [2]

- Market penetration is the least risky growth strategy.
- Diversification is the riskiest growth strategy.

(b) Explain **two** methods of primary research that Alfeus may have used before starting his own business. [4]

- Alfeus may have used the Internet to conduct primary research on the degree of local competition. He could have used a search engine, such as Google, to identify how many bakeries operate in the same town that specialize in sourdough bread.
- He could have used a focus group to bring a small number of potential customers together to gain qualitative feedback on his business idea and the quality of the bread products he was making.

Worksheet 6
2.3 The Ansoff matrix – Super Sonic Sourdough

- Alfeus could have also used questionnaires to find out what prices potential customers are willing to pay so that he can capitalize on the growth in the health and wellness market.
- (c) Use the Ansoff matrix to explain the growth strategies in Option A **and** Option B. [4]
- Option A is an example of market penetration, which is a low-risk growth strategy that involves SSS offering existing products to existing customers. This approach should encourage customers to buy sourdough products more frequently, by offering them their 10th loaf free of charge.
 - Option B is an example of product development, which is a medium-risk growth strategy that involves SSS offering new products to existing customers. By offering matcha sourdough bread, the bakery can better meet the preferences of customers by offering them a wider range of products.
- (d) Using the information above, recommend to Alfeus whether Option A **or** Option B should be selected to help the business grow. [10]

Discussion points could include:

- Option A is less risky as SSS can sell the same sourdough breads to its existing customers, without having to spend time identifying a new target market or developing new products for the bakery.
- However, Option A does not generate a significant increase in profit for SSS as there is no guarantee that offering customers a loyalty card scheme will be sufficient to encourage them to buy more bread and more often from SSS. Not all customers will be enticed by receiving a free loaf of bread on their 10th purchase. This will also increase costs for the bakery.
- Option B might be more effective given the growth in the health and wellness market, with people willing to spend more money on products that promote healthy living, such as matcha sourdough bread.
- Option B is riskier, and it could result in a significant increase in costs for SSS. Alfeus should conduct further research to identify if there is sufficient demand for the new matcha sourdough product.
- Additional research may be required to ensure any final recommendations are financially affordable and sustainable for the business. This will prevent SSS wasting expenditure and resources on creating and launching a new product for which demand is not sufficiently high to generate any profits.

Worksheet 7
3.1 STEEPLE analysis – Tesla's entry into Singapore

Tesla's entry into Singapore

Singapore is well known for being one of the most expensive places worldwide to own a car. In 2021, Tesla's basic Model 3 was priced at nearly S\$200,000 (US\$148,300), which is partly due to an ownership levy. Despite the high prices for Singaporean residents, Tesla sales rose 10-fold in 2021 for a number of reasons. When entering Singapore, Tesla had to consider a number of opportunities and threats, which can be illustrated through STEEPLE analysis.

Task 1: Fill in the blanks

STEEPLE analysis is a tool used to identify external and threats in relation to the following factors: Social, Technological, Economic, Environmental, Political, Legal, and As they are factors, they are beyond the control of any individual business. However, businesses can use this tool to consider strategic options, such as entering new

In 2020, the Singaporean government announced plans to eliminate internal combustion engine vehicles by 2040, as well as offering a of up to S\$45,000 to buyers of electric cars. This acts as an opportunity for Tesla when operating in the city state. One of the major legal threats of selling vehicles in Singapore is the cost of a Certificate of Entitlement (COE) needed to register a Tesla, which can the number of units sold. The Singaporean government presented Tesla with a technological when it announced it is planning to set up 60,000 battery charging points by 2030, which will likely encourage further sales of Tesla vehicles.

STEEPLE analysis is a simple tool that can help Tesla to make better management decisions. However, the external environment is continually, so opportunities and threats can also change rapidly. Hence, the successful application of this tool will depend largely on the ability of Tesla's team.

Missing words: changing, ethics, external, management, markets, opportunities, opportunity, reduce, subsidy

Task 2: Multiple choice questions

1. Quicker product development time through computer aided design represents a(n) _____ opportunity.
 - A. Economic
 - B. Political
 - C. Social
 - D. Technological

2. A recession is likely to present a(n) _____ threat for most businesses.
 - A. Economic
 - B. Political
 - C. Social
 - D. Technological

3. A well-educated workforce represents a(n) _____ factor.
 - A. Economic
 - B. Political
 - C. Social
 - D. Technological

4. Inflation of 7% is likely to be a(n) _____ threat for businesses.
 - A. Economic
 - B. Political
 - C. Social
 - D. Technological

5. Language barriers represent a(n) _____ threat.
 - A. Economic
 - B. Political
 - C. Social
 - D. Technological

Worksheet 7
3.1 STEEPLE analysis – Tesla's entry into Singapore

Task 3: short answer question

Create a STEEPLE analysis for any multinational company entering a new market. Identify at least one opportunity and one threat for each aspect of the STEEPLE analysis.

This is a STEEPLE analysis for _____ entering _____ .

Social	Opportunity:
	Threat:
Technological	Opportunity:
	Threat:
Economic	Opportunity:
	Threat:
Environmental	Opportunity:
	Threat:
Political	Opportunity:
	Threat:
Legal	Opportunity:
	Threat:
Ethical	Opportunity:
	Threat:

Answers

Tesla's entry into Singapore

Singapore is well known for being one of the most expensive places worldwide to own a car. In 2021, Tesla's basic Model 3 was priced at nearly S\$200,000 (US\$148,300), which is partly due to an ownership levy. Despite the high prices for Singaporean residents, Tesla sales rose 10-fold in 2021 for a number of reasons. When entering Singapore, Tesla had to consider a number of opportunities and threats, which can be illustrated through STEEPLE analysis.

Task 1: Fill in the blanks

STEEPLE analysis is a tool used to identify external **opportunities** and threats in relation to the following factors: Social, Technological, Economic, Environmental, Political, Legal, and **Ethics**. As they are **external** factors, they are beyond the control of any individual business. However, businesses can use this tool to consider strategic options, such as entering new **markets**.

In 2020, the Singaporean government announced plans to eliminate internal combustion engine vehicles by 2040, as well as offering a **subsidy** of up to S\$45,000 to buyers of electric cars. This acts as an opportunity for Tesla when operating in the city state. One of the major legal threats of selling vehicles in Singapore is the cost of a Certificate of Entitlement (COE) needed to register a Tesla, which can **reduce** the number of units sold. The Singaporean government presented Tesla with a technological **opportunity** when it announced it is planning to set up 60,000 battery charging points by 2030, which will likely encourage further sales of Tesla vehicles.

STEEPLE analysis is a simple tool that can help Tesla to make better management decisions. However, the external environment is continually **changing**, so opportunities and threats can also change rapidly. Hence, the successful application of this tool will depend largely on the ability of Tesla's **management** team.

Missing words: changing, ethics, external, management, markets, opportunities, opportunity, reduce, subsidy

Task 2: Multiple choice questions

1. Quicker product development time through computer aided design represents a(n) _____ opportunity.
A. Economic
B. Political
C. Social
D. Technological
2. A recession is likely to present a(n) _____ threat for most businesses.
A. Economic
B. Political
C. Social
D. Technological
3. A well-educated workforce represents a(n) _____ factor.
A. Economic
B. Political
C. Social
D. Technological
4. Inflation of 7% is likely to be a(n) _____ threat for businesses.
A. Economic
B. Political
C. Social
D. Technological
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A. Economic
B. Political
C. Social
D. Technological

Worksheet 7
3.1 STEEPLE analysis – Tesla's entry into Singapore

Task 3: short answer question

Create a STEEPLE analysis for any multinational company entering a new market. Identify at least one opportunity and one threat for each aspect of the STEEPLE analysis.

This is an opportunity for students to conduct some secondary research. The following is an example for a MNC entering India.

Social	Opportunity: A large potential market of over 1.4 billion people.
	Threat: Possible language barriers for foreign MNCs.
Technological	Opportunity: Growth in the number of people who use smartphones and e-commerce.
	Threat: Technologies can be copied easily due to the lack of legislation and intellectual property protection.
Economic	Opportunity: Rising levels of disposable incomes.
	Threat: A large number of people live in poverty.
Environmental	Opportunity: A lack of environmental laws can result in lower costs.
	Threat: Government taking a more proactive approach to environmental protection.
Political	Opportunity: Few constraints on business activity.
	Threat: India is perceived to be politically unstable.
Legal	Opportunity: A lack of legislation can result in lower costs for foreign MNCs.
	Threat: Penalties for tax evasion.
Ethical	Opportunity: Options to be a market leader in ethical business activity.
	Threat: Corruption in India is widespread.

Inward FDI for the UK

In 2022, *The Guardian* newspaper reported that investment companies based in Qatar had bought high rise offices and other commercial properties in London valued at £40 billion (\$50 billion). This is an example of inward foreign direct investment (FDI) for the UK. With more Qatari organizations thinking about investing in the UK, several opportunities and threats would need to be considered.

(a) For businesses looking to invest in the UK, explain whether the following examples would be categorized as opportunities or threats, and whether they should be classified as Social, Technological, Economic, Environmental, Political, Legal, or Ethical factors.

i. A cut in the rate of corporation tax. [2]

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ii. A rise in the national minimum wage. [2]

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iii. The UK no longer being part of the European Union (the world's largest trading bloc). [2]

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iv. Life expectancy of males rising to 81 years old. [2]

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(b) Define the term *STEEPLE analysis*. [2]

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Answers

Inward FDI for the UK

In 2022, *The Guardian* newspaper reported that investment companies based in Qatar had bought high rise offices and other commercial properties in London valued at £40 billion (\$50 billion). This is an example of inward foreign direct investment (FDI) for the UK. With more Qatari organizations thinking about investing in the UK, several opportunities and threats would need to be considered.

(a) For businesses looking to invest in the UK, explain whether the following examples would be categorized as opportunities or threats, and whether they should be classified as Social, Technological, Economic, Environmental, Political, Legal, or Ethical factors.

i. A cut in the rate of corporation tax. [2]

Political opportunity.

ii. A rise in the national minimum wage. [2]

Legal threat.

iii. The UK no longer being part of the European Union (the world's largest trading bloc). [2]

Political opportunity (or threat - depending on circumstances).

iv. Life expectancy of males rising to 81 years old. [2]

Social opportunity (or threat - depending on the business context).

(b) Define the term *STEEPLE analysis*. [2]

STEEPLE analysis is a business management tool that can be used by managers to identify opportunities and threats in relation to social, technological, economic, environmental, political, legal, and ethical factors. The tool should allow managers to make informed and logical strategic business decisions.

Orange farmers in India

Vir is a sole trader in India who grows oranges, most of which are exported to America, France, and Germany. Working in the primary sector is not very lucrative and incomes have reduced further recently. He has conducted a STEEPLE analysis and found that two key issues include more modern and efficient machinery used in Brazil by another orange producer and an increasing number of droughts in India due to climate change.

(a) State **two** elements of a STEEPLE analysis. [2]

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(b) Explain how these issues resulted in lower incomes for the orange farmers in India. [4]

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(c) Explain **two** potential drawbacks of Vir using STEEPLE analysis to make business decisions. [4]

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(d) Using the information above, recommend to Vir how he can overcome the issues identified in the STEEPL analysis. [10]

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Answers

Orange farmers in India

Vir is a sole trader in India who grows oranges, most of which are exported to America, France, and Germany. Working in the primary sector is not very lucrative and incomes have reduced further recently. He has conducted a STEEPLE analysis and found that two key issues include more modern and efficient machinery used in Brazil by another orange producer and an increasing number of droughts in India due to climate change.

(a) State **two** elements of a STEEPLE analysis. [2]

- Social
- Technological
- Economic
- Environmental
- Political
- Legal
- Ethical

(b) Explain how these issues resulted in lower incomes for the orange farmers in India. [4]

Brazilian orange farmers using more modern and efficient machinery is an example of a *technological external threat* for Vir and his business. This is likely to lead to importers buying oranges from Brazil as they are likely to be cheaper.

The increasing number of droughts in India is an example of an *environmental external threat*. This will result in Vir being able to grow fewer oranges, meaning a lower income.

(c) Explain **two** potential drawbacks of Vir using STEEPLE analysis to make business decisions. [4]

- One drawback is the STEEPLE analysis could become outdated very quickly. For example, climate change has resulted in climates being very unpredictable, which could mean the droughts can end for a sustained period of time, resulting in Vir producing far more oranges, rendering the STEEPLE analysis unnecessary.
- Another disadvantage is that although STEEPLE analysis is a simple tool to use, it can be very time consuming to find the relevant information and assess it effectively. This may be time consuming for Vir, especially if he does not have the time available as a sole trader working in labor-intensive orange farming.

Worksheet 9
3.3 STEEPLE analysis – Orange farmers in India

- (d) Using the information above, recommend to Vir how he can overcome the issues identified in the STEEPLE analysis. [10]

Possible solutions could include a discussion about any of the following points:

- As rival orange producers in Brazil are more competitive due to the use of more productive technologies, Vir could consider investing in new and similar technologies too. This would make his farm more competitive against Brazilian farmers, as well as local farmers in India.
- However, it is unlikely that Vir has the finance available to invest in any new technology. It will be much harder for him to access a suitable source of finance, such as a bank loan, due to the unpredictable nature of the orange market in India.
- To deal with the erratic rainfall in India, Vir could invest in better water storage systems so that a large amount of rainfall can be stored when it does rain, such as during the monsoon or heavy rain season.
- However, in addition to the cost of this new storage, if the droughts continue to be severe, the investment may not be worthwhile as he may not be able to collect enough water to get a sufficient return.
- *Accept any other valid argument, written in the context of the case study.*

Very Vegan

Very Vegan (VV) is a British company that has been making a range of vegan products for the past 10 years, including yogurts, ice creams, butter, cheeses, and creams. The yogurts are very popular in the plant-based market and its success has provided funding for one of VV's newer products, Pouring Cream, which has seen substantial growth over the past 12 months. VV has recently introduced a sugar-free ice cream, but sales have been slow, despite market research showing there is growing demand for such a product. The manager hopes sales will start to pick up with more effective advertising. However, she is concerned that the ice cream may go in the same direction as a coconut butter VV recently withdrew due to low sales during the past two years.

Task 1: Fill in the blanks

The Boston Consulting Group (BCG) _____ is a management tool used by businesses to categorize their products in terms of market _____ and market share. A business would classify its products as _____ marks if market share is low and it is unclear whether the product has _____ for growth in the future. A product is classified as a _____ if market share and market growth are high. The hope is that these products will eventually become cash _____ i.e., the market growth rate is low, but market share is high, so these products can be 'milked' to fund other products of the business. _____ are products that have a low market _____ and very little potential, if any, for further growth. Managers need to decide whether to _____ these products from the market so that products with more potential can take priority.

Missing words: cows, dogs, growth, matrix, potential, question, share, star, withdraw

Task 2: Short answer question

Use the Boston Consulting Group Matrix below and the information above to decide how to classify Very Vegan's products.

- Butter _____
- Creams _____
- Ice creams _____
- Yogurts _____

Task 3: Multiple choice questions

1. The BCG matrix is named after the _____ that developed the marketing tool.
 - A. Company
 - B. Management consultancy group
 - C. Retailer
 - D. University

2. An advantage of having a wide product portfolio is it helps a business to _____.
 - A. Adhere to legislation
 - B. Decrease costs
 - C. Identify customer needs
 - D. Spread risk

3. In which quadrant of the BCG matrix are products with low market share and high market growth rate placed?
 - A. Cash cows
 - B. Dogs
 - C. Question marks
 - D. Stars

4. According to the BCG matrix, what is the main objective of a firm managing its cash cows?
 - A. Divest or discontinue (withdrawal) them
 - B. Harvest their profits to fund other products in the portfolio
 - C. Invest in them to increase market share
 - D. Maintain their position as market leaders

5. Which of the following is not a limitation of the BCG matrix as a management decision making tool?
 - A. It assumes that market growth rate is the only factor affecting profitability
 - B. It does not consider changes in the external environment
 - C. It is not suitable for businesses with multiple products
 - D. It oversimplifies complex business structures and markets

Answers

Very Vegan

Very Vegan (VV) is a British company that has been making a range of vegan products for the past 10 years, including yogurts, ice creams, butter, cheeses, and creams. The yogurts are very popular in the plant-based market and its success has provided funding for one of VV's newer products, Pouring Cream, which has seen substantial growth over the past 12 months. VV has recently introduced a sugar-free ice cream, but sales have been slow, despite market research showing there is growing demand for such a product. The manager hopes sales will start to pick up with more effective advertising. However, she is concerned that the ice cream may go in the same direction as a coconut butter VV recently withdrew due to low sales during the past two years.

Task 1: Fill in the blanks

The Boston Consulting Group (BCG) **matrix** is a management tool used by businesses to categorize their products in terms of market **growth** and market share. A business would classify its products as **question** marks if market share is low and it is unclear whether the product has **potential** for growth in the future. A product is classified as a **star** if market share and market growth are high. The hope is that these products will eventually become cash **cows** i.e., the market growth rate is low, but market share is high, so these products can be 'milked' to fund other products of the business. **Dogs** are products that have a low market **share** and very little potential, if any, for further growth. Managers need to decide whether to **withdraw** these products from the market so that products with more potential can take priority.

Missing words: cows, dogs, growth, matrix, potential, question, share, star, withdraw

Task 2: short answer question

Use the Boston Consulting Group matrix below and the information above to decide how to classify *Very Vegan's* products.

- Butter **Dog**
- Cream **Star**
- Ice cream **Question mark**
- Yogurts **Cash cow**

Task 3: Multiple choice questions

- The BCG matrix is named after the _____ that developed the marketing tool.
 - Company
 - Management consultancy group**
 - Retailer
 - University
- An advantage of having a wide product portfolio is it helps a business to _____.
 - Adhere to legislation
 - Decrease costs
 - Identify customer needs
 - Spread risk**
- In which quadrant of the BCG matrix are products with low market share and high market growth rate placed?
 - Cash cows
 - Dogs
 - Question marks**
 - Stars
- According to the BCG matrix, what is the main objective of a firm managing its cash cows?
 - Divest or discontinue (withdrawal) them
 - Harvest their profits to fund other products in the portfolio**
 - Invest in them to increase market share
 - Maintain their position as market leaders
- Which of the following is not a limitation of the BCG matrix as a management decision making tool?
 - It assumes that market growth rate is the only factor affecting profitability
 - It does not consider changes in the external environment
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 - It oversimplifies complex business structures and markets

Apple

Apple has a large range of products including smartwatches, the MacBook, and Apple TV. With a variety of products, it is important that marketing managers remove goods that are not likely to generate sufficient sales, such as the iPod in 2022, but to invest in new product innovations to ensure changing customer preferences are being met. To manage the portfolio effectively, the BCG matrix can be used to ensure the product range is thoroughly analyzed.

(a) For the Apple products mentioned above, use any appropriate resource to identify how they are likely be categorized in the BCG matrix (as of 2023/24). [4 marks]

(i) Apple iPod _____

(ii) Apple MacBook _____

(iii) Apple smartwatch _____

(iv) Apple TV _____

(b) Define the *BCG matrix*. [2 marks]

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(c) Explain **two** advantages for Apple of understanding the BCG matrix. [4 marks]

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Answers

Apple

Apple has a large range of products including smartwatches, the MacBook, and Apple TV. With a variety of products, it is important that marketing managers remove goods that are not likely to generate sufficient sales, such as the iPod in 2022, but to invest in new product innovations to ensure changing customer preferences are being met. To manage the portfolio effectively, the BCG matrix can be used to ensure the product range is thoroughly analyzed.

(a) For the Apple products mentioned above, use any appropriate resource to identify how they are likely to be categorized in the BCG matrix (as of 2023/24). [4 marks]

- (i) Apple iPod Dog
- (ii) Apple MacBook Cash cow
- (iii) Apple smartwatch Star
- (iv) Apple TV Question mark

(b) Define the *BCG matrix*. [2 marks]

The BCG matrix is a tool used to analyze a business's product portfolio in relation to market growth and market share. Question marks have a low market share of a fast-growing market, stars have a high market share of a fast-growing market, cash cows have a high market share of a low growth market, and dogs have a low market share of a slow growing market.

(c) Explain **two** advantages for Apple of understanding the BCG matrix. [4 marks]

One advantage for Apple of using the BCG matrix is it will allow marketing managers to identify when a product should be removed from the product portfolio, because market share and growth are low, such as the Apple iPod, which was discontinued in 2022.

Another advantage is that the BCG matrix can help Apple to allocate its resources more efficiently. By understanding which of its products or services fall into which quadrant of the matrix, Apple can determine where to allocate its resources to maximize its profitability.

Singapore Straws

Singapore Straws has been manufacturing single-use plastic straws for several decades, but with many other countries putting laws in place to become free of single-use plastics and the growing demand from customers that businesses consider their environmental impact, the company is considering whether it should withdraw the product from its portfolio. Its bamboo straws currently have a low market share, but the growth of the market shows there is good potential. *Singapore Straws* is considering two possible options to deal with this situation.

Option 1: Stop manufacturing plastic straws.

Option 2: Increase spending on the promotion of bamboo straws.

(a) Identify **two** elements of the Boston Consulting Group (BCG) matrix. [2]

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(b) Explain how *Singapore Straws* could make use of the BCG matrix. [4]

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(c) Explain **two** potential drawbacks for *Singapore Straws* of striving to have a balanced product portfolio. [4]

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Worksheet 12
4.3 Boston Consulting Group (BCG) matrix – Singapore Straws

(d) Using the BCG matrix, discuss the **two** options being considered by *Singapore Straws*. [10]

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Answers

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Option 1: Stop manufacturing plastic straws.

Option 2: Increase spending on the promotion of bamboo straws.

(a) Identify **two** elements of the Boston Consulting Group (BCG) matrix. [2]

- Cash cows
- Dogs
- Stars
- Question marks

(b) Explain how *Singapore Straws* could make use of the BCG matrix. [4]

Singapore Straws could use the BCG matrix to help improve its marketing strategy and hence potentially increase its overall profitability. By identifying products that are draining the firm's cash, such as the single-use plastic straws, the company could free up that money to invest in other products in its portfolio. *Singapore Straws* could also use the tool to effectively manage its product portfolio if it becomes more diverse, e.g., having a number of straw products made from different materials, such as bamboo. If, for example, *Singapore Straws* uses the BCG matrix and identifies a cash cow, it can actively milk that product to support the development of stars in its portfolio.

(c) Explain **two** potential drawbacks for *Singapore Straws* of striving to have a balanced product portfolio. [4]

If *Singapore Straws* has a balanced product portfolio, one of the drawbacks will be the high costs needed for research and development (R&D), especially if the business needs to invest a significant amount of money into finding more sustainable materials for its straw products.

Furthermore, if *Singapore Straws* does succeed in achieving a balanced portfolio, the firm could find that its resources are spread too thinly to manage a number of different products, especially if it has to invest in a variety of different materials, such as bamboo, stainless steel, silicone, and glass.

(d) Using the BCG matrix, discuss the **two** options being considered by *Singapore Straws*. [10]

- The single-use plastic straws can be classified as a dog for *Singapore Straws*. If the company removes these plastic straws from its portfolio, it can use the freed-up cash and resources to invest in other products in its portfolio.
- However, this is a risk, as there could still be a number of loyal customers (such as restaurant chains) who have been purchasing these single-use plastic straws for several decades.
- The bamboo straws can be classified as a question mark in *Singapore Straws*' product portfolio as market share is currently low but there is potential for growth. This suggests the bamboo straws could be profitable in the future, which would justify an investment, including additional promotional activity.
- However, promotional activities can be expensive, so the decision will depend on the ability of *Singapore Straws* to fund such a project. This may be more practical if the business has a cash cow that can be milked.
- *Accept any other relevant discussion, written in the context of the case study.*

The Cat Café

School friends Amelie, Annalise, Dorothy, and Tyler are passionate about cats. So, they decided to start their very own business called *The Cat Café*, having identified a gap in the market in their local area. Having studied Business Management in the IB Diploma Programme, they knew how important it was to create a comprehensive business plan if they wanted to have a higher chance of securing a commercial loan from the local bank.

Task 1: Fill in the blanks

A business plan is a formal _____ compiled by entrepreneurs, which typically includes the goals and _____ of the business, its _____ status, personnel details, product details, _____ plan, finance plan, and market analysis. As well as helping entrepreneurs to secure _____, a business plan can be used to identify strategies that the business can adopt in the future. It is a simple management _____ that can be used to ensure resources are organized effectively when a business is first created, which can help entrepreneurs to avoid business _____.

A business plan can also be used by established businesses to identify future _____ opportunities and strategies. However, a business plan will only ever be as good as the data used to create it. If, for example, the _____ size used for _____ market research is too small, the results may not allow for an accurate _____.

Missing words: analysis, document, failure, finance, growth, legal, marketing, objectives, primary, sample, tool

Task 2: Multiple choice questions

1. Which of the following would *not* be included in a business plan?
 - A. Goals and objectives
 - B. Market analysis
 - C. Market research
 - D. Personnel appraisals

2. Which of the following is a valid advantage of creating a business plan?
 - A. It is an inexpensive to conduct primary market research
 - B. It is not too time consuming to produce
 - C. It does not quickly become outdated
 - D. It provides direction for employees of the organization

3. Having an effective business plan can help an organization with _____.
 - A. Exchange rate fluctuations
 - B. Planning
 - C. Shortlisting candidates in the recruitment process
 - D. Trade union disputes

4. Which stakeholder group is least likely to be interested in an organization's business plan?
 - A. Board of Directors
 - B. Business angels
 - C. Commercial banks
 - D. The local community

5. Which of the following is unlikely to be included in a business plan?
 - A. Break-even analysis
 - B. Business cycle
 - C. Cash flow forecast
 - D. SWOT analysis

6. A new business should include a _____ in its business plan.
 - A. Balance sheet
 - B. Cash flow statement
 - C. Profit and loss account
 - D. Ratio analysis

Answers

The Cat Café

School friends Amelie, Annalise, Dorothy, and Tyler are passionate about cats. So, they decided to start their very own business called *The Cat Café*, having identified a gap in the market in their local area. Having studied Business Management in the IB Diploma Programme, they knew how important it was to create a comprehensive business plan if they wanted to have a higher chance of securing a commercial loan from the local bank.

Task 1: Fill in the blanks

A business plan is a formal **document** compiled by entrepreneurs, which typically includes the goals and **objectives** of the business, its **legal** status, personnel details, product details, **marketing** plan, finance plan, and market analysis. As well as helping entrepreneurs to secure **finance**, a business plan can be used to identify strategies that the business can adopt in the future. It is a simple management **tool** that can be used to ensure resources are organized effectively when a business is first created, which can help entrepreneurs to avoid business **failure**.

A business plan can also be used by established businesses to identify future **growth** opportunities and strategies. However, a business plan will only ever be as good as the data used to create it. If, for example, the **sample** size used for **primary** market research is too small, the results may not allow for an accurate **analysis**.

Missing words: analysis, document, failure, finance, growth, legal, marketing, objectives, primary, sample, tool

Task 2: Multiple choice questions

- Which of the following would *not* be included in a business plan?
 - Goals and objectives
 - Market analysis
 - Market research
 - D. Personnel appraisals**

2. Which of the following is a valid advantage of creating a business plan?
- A. It is an inexpensive to conduct primary market research
 - B. It is not too time consuming to produce
 - C. It does not quickly become outdated
 - D. It provides direction for employees of the organization**
3. Having an effective business plan can help an organization with _____.
- A. Exchange rate fluctuations
 - B. Planning**
 - C. Shortlisting candidates in the recruitment process
 - D. Trade union disputes
4. Which stakeholder group is least likely to be interested in an organization's business plan?
- A. Board of Directors
 - B. Business angels
 - C. Commercial banks
 - D. The local community**
5. Which of the following is unlikely to be included in a business plan?
- A. Break-even analysis
 - B. Business cycle**
 - C. Cash flow forecast
 - D. SWOT analysis
6. A new business should include a _____ in its business plan.
- A. Balance sheet
 - B. Cash flow statement**
 - C. Profit and loss account
 - D. Ratio analysis

Football Frenzy

Eva has been coaching girls' football in her spare time for several years. She has been contemplating whether to give up her day job as a Human Resources manager and start her own football academy. Inspired by England winning the UEFA European Women's Football Championship in 2022, Eva decided it was the right time to go ahead. However, due to the risk of giving up her well-paid job, Eva wants to ensure her idea is thoroughly considered by creating a business plan for *Football Frenzy*.

(a) State **four** elements of a business plan that Eva should include. [4]

- 1. _____
- 2. _____
- 3. _____
- 4. _____

(b) Define the term *business plan*. [2]

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(c) Explain **one** advantage and **one** disadvantage for Eva of preparing a business plan. [4]

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Football Frenzy

Eva has been coaching girls' football in her spare time for several years. She has been contemplating whether to give up her day job as a Human Resources manager and start her own football academy. Inspired by England winning the UEFA European Women's Football Championship in 2022, Eva decided it was the right time to go ahead. However, due to the risk of giving up her well-paid job, Eva wants to ensure her idea is thoroughly considered by creating a business plan for *Football Frenzy*.

(a) State **four** elements of a business plan that Eva should include. [4]

Possible answers could include:

- Goals and objectives
- Details of the product (service)
- Details of the market, e.g., existing competitors, potential market size, and customer trends
- Finance, e.g., sources of finance
- Personnel plan
- Market research findings
- Marketing plan.

(b) Define the term *business plan*. [2]

The business plan is a formal document used to show a firm's proposals used to meet its goals and objectives. It is typically used when entrepreneurs set up new businesses (start-ups), providing a roadmap for the organization, or when existing business seek to expand.

(c) Explain **one** advantage and **one** disadvantage for Eva of preparing a business plan. [4]

One advantage of using a business plan is that it will allow Eva to consider the financial aspect of starting *Football Frenzy*, the football academy. It will encourage her to carefully consider the sources of finance she has available to pay for coaches and training equipment.

One disadvantage is that information in the business plan can become outdated very quickly, such as findings from market research. For example, if Eva surveys girls in the local community who might be interested in being coached immediately after the Women's Euros in 2022, there might be a high level of interest at that time, but by the time the football academy actually opens, this level of enthusiasm may no longer exist.

The Meditation & Wellness Centre (MWC)

Gigi, Lowa, and Natasha met in a yoga class where they discovered they had a shared passion for meditation. After several years of discussing their dream to open their own meditation and wellness centre, the friends decided to go ahead by opening *The Meditation & Wellness Centre (MWC)* after hearing the market is predicted to grow to \$66 billion this year. *MWC*'s key goal is to provide members with the opportunity to improve their health and wellbeing. *MWC* offers all its members access to yoga, meditation, and coaching sessions. Through one of Gigi's contacts, *MWC* was able to set up a pitch with a business angel, which went well. The owners were asked to go away and create a business plan before meeting with the business angel again next month.

(a) Outline what should be included in the executive summary of a business plan. [2]

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(b) Explain **two** financial tools that *MWC* could use as part of its business plan. [4]

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(c) Explain **two** reasons why a business angel might be interested in looking at *MWC*'s business plan. [4]

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Answers

The Meditation & Wellness Centre (MWC)

Gigi, Lova, and Natasha met in a yoga class where they discovered they had a shared passion for meditation. After several years of discussing their dream to open their own meditation and wellness centre, the friends decided to go ahead by opening *The Meditation & Wellness Centre (MWC)* after hearing the market is predicted to grow to \$66 billion this year. *MWC*'s key goal is to provide members with the opportunity to improve their health and wellbeing. *MWC* offers all its members access to yoga, meditation, and coaching sessions. Through one of Gigi's contacts, *MWC* was able to set up a pitch with a business angel, which went well. The owners were asked to go away and create a business plan before meeting with the business angel again next month.

(a) Outline what should be included in the executive summary of a business plan. [2]

The executive summary is included at the start of a business plan and typically summarises the main findings contained in the full document, including the key objectives of the organization and an outline the organization's business strategy for achieving success.

(b) Explain **two** financial tools that *MWC* could use as part of its business plan. [4]

- *MWC* could include a cash flow forecast, showing the prediction of cash inflows and outflows over a specific period of time. *MWC* would need to include all its costs including the purchase costs of equipment such as yoga mats. The business also needs to include cash inflows such as sales from selling meditation packages and the investment from the business angel, if secured.
- A second financial tool that can be included in the business plan is a break-even chart, which shows how many units (membership accounts) need to be sold to cover all costs of the business. Using a break-even chart could help *MWC* to identify how many meditation, yoga, and coaching packages need to be sold before the owners can expect to earn a profit.

(c) Explain **two** reasons why a business angel might be interested in looking at *MWC*'s business plan. [4]

- The business angel is risking their own funds in the wellness venture so will want to ensure the entrepreneurs have thoroughly considered their business idea to minimize any risk of failure. They could do this by surveying potential customers on whether they would be interested in buying a package that includes access to yoga, meditation, and coaching services.

Worksheet 15
5.3 The Business Plan – The Meditation & Wellness Centre (MWC)

- The business angel will also want to try and ensure there is likely to be a return on investment (ROI), which is more likely if the entrepreneurs have created an accurate cash flow forecast. This may help to reassure the business angel that *MWC*'s finances will be managed effectively and that the owners are not just relying on the \$66 billion growth forecast for the market this year.

(d) Discuss the value of creating a business plan for *MWC*. [10]

- *MWC*'s business plan should outline the goals, objectives, and strategies for the relatively new business, helping to establish a clear sense of direction for the business owners.
- A business plan allows for market research and market analysis to help the owners identify the target market segment(s) and understand their customers' needs and preferences.
- The three business partners are more likely to be able to convince the business angel to invest in *MWC* if they spend time creating a carefully considered business plan.
- The document can be used to measure *MWC*'s performance and degree of success, e.g., 6 or 12 months after the business first starts trading.
- If the entrepreneurs have no experience creating a business plan or cash flow forecast, the information and data they include may be inaccurate so could be misleading.
- If the owners use the business plan to measure performance after 6 or 12 months and find their predictions were mostly inaccurate, this could become demotivating for them.
- Uncertain market conditions mean that market trends and customer preferences in the wellbeing and meditation industry can change rapidly, even if the market is predicted to grow to \$66 billion this year. This makes it challenging to accurately predict and plan for changes in the external business environment.
- As new entrepreneurs, it may be challenging to find or have access to meaningful data about the industry. The availability of industry-specific data and benchmarks for the wellbeing and meditation market may be limited and/or expensive to access, making it difficult for *MWC* to conduct thorough market research and analysis to complete the business plan.
- *Accept any other discussion point, written in the context of the case study.*

A balanced discussion, with clear evidence of evaluation, must be demonstrated in order to reach the 9–10 mark band.

Jumbo Cha Chaan Teng

Jumbo Cha ChaanTeng (Jumbo) is a cafe located in Aberdeen, Hong Kong. *Jumbo* serves local milk tea, egg tarts, and other Cantonese-style meals. With a rapidly ageing population in Hong Kong, *Jumbo* has decided to introduce a “silver-hour” promotion for senior residents (aged 60 and above) to fulfil its corporate social responsibilities. However, the main challenge is selecting the best hour when discounts are offered to senior residents. Avoiding peak hours is important to escape cutting into *Jumbo’s* profits. *Jumbo’s* management is contemplating using a quantitative decision making tool for its investigation into the best “silver-hour”.

Task 1: Fill in the blanks

An example of a quantitative decision making tool is a _____ tree. This is a _____ or visual representation of different _____ or feasible options that are available for the business in the context of a decision to be made. In the tree-like diagram, each option is depicted as a _____. Following each branch, the probable _____ or outcome is determined. This is done by calculating the _____ value of each branch. Usually the branch with the _____ figure in terms of financial outcome indicates the best option to proceed. However, this is purely a _____ approach to decision making.

Missing words:

alternatives, branch, consequence, decision, diagrammatic, expected, highest, quantitative

Task 2: Multiple choice questions

- The following are quantitative decision-making tools except for _____.
 - Contribution analysis
 - Decision tree
 - Force-field analysis
 - SWOT analysis
- Which one of the following is not a feature in a decision tree?
 - Chance node
 - Decision node
 - Outlier
 - Probability

3. Which of the following is not a valid advantage of using decision trees?
 - A. Decision trees allow an objective choice to be made
 - B. It only considers quantitative factors to inform decision making
 - C. The possible outcomes of a decision are visually represented
 - D. The risks involved in each possible outcome are considered

4. Which of the following is not a valid disadvantage of using decision trees?
 - A. Liquidity issues are not considered
 - B. Qualitative factors are ignored
 - C. The outcomes of each branch are only estimates
 - D. The probabilities used could be subjective

5. Which of the following is not observed in the construction of a decision tree?
 - A. A circle is used to depict a chance node for each possible outcome
 - B. An unwanted branch is depicted by drawing two parallel lines
 - C. The diagram is constructed starting from the right
 - D. Where a decision is to be made, a square is drawn to represent the decision node

Task 3: Short answer questions

Jumbo carried out market research, which included conducting observations in four similar Hong Kong-style cafes. The data collected from the research are presented in Table 1.

Table 1: Findings from *Jumbo's* market research

"Silver-hour" period	Probability of success	Estimated profit/loss (\$)	Probability of failure	Estimated profit/loss (\$)
9 - 10 am	0.5	2,100	A	(500)
10 - 11 am	0.5	2,300	B	(1,200)
3 - 4 pm	0.7	1,500	C	(900)
6 - 7 pm	0.8	1,100	D	(700)

(a) Calculate the missing figures *A* to *D*. Enter your answers in Table 2.

Table 2: Calculations of missing figures (A to D)

“silver-hour” period	Probability of success	Estimated profit/loss (\$)	Probability of failure	Estimated profit/loss (\$)
9 - 10 am	0.5	2100		(250)
10 - 11 am	0.6	2300		(600)
3 - 4 pm	0.7	1500		(270)
6 - 7 pm	0.8	1100		(280)

(b) Calculate the expected value for each considered “silver-hour” period. Enter your answers in Table 3.

Table 3: Calculations of expected value

“Silver-hour” period	Expected value (\$)
9 - 10 am	
10 - 11 am	
3 - 4 pm	
6 - 7 pm	

(c) Based on the quantitative results above, suggest which “silver-hour” period *Jumbo* should undertake.

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Answers

Jumbo Cha Chaan Teng

Jumbo Cha ChaanTeng (Jumbo) is a café located in Aberdeen, Hong Kong. *Jumbo* serves local milk tea, egg tarts, and other Cantonese-style meals. With a rapidly ageing population in Hong Kong, *Jumbo* has decided to introduce a “silver-hour” promotion for senior residents (aged 60 and above) to fulfil its corporate social responsibilities. However, the main challenge is selecting the best hour when discounts are offered to senior residents. Avoiding peak hours is important to escape cutting into *Jumbo’s* profits. *Jumbo’s* management is contemplating using a quantitative decision making tool for its investigation into the best “silver-hour”.

Task 1: Fill in the blanks

An example of a quantitative decision making tool is a **decision** tree. This is a **diagrammatic** or visual representation of different **alternatives** or feasible options that are available for the business in the context of a decision to be made. In the tree-like diagram, each option is depicted as a **branch**. Following each branch, the probable **consequence** or outcome is determined. This is done by calculating the **expected** value of each branch. Usually the branch with the **highest** figure in terms of financial outcome indicates the best option to proceed. However, this is purely a **quantitative** approach to decision making.

Task 2: Multiple choice questions

- The following are quantitative decision-making tools except for _____.
 - Contribution analysis
 - Decision tree
 - Force-field analysis
 - SWOT analysis**
- Which one of the following is not a feature in a decision tree?
 - Chance node
 - Decision node
 - Outlier**
 - Probability
- Which of the following is not a valid advantage of using decision trees?
 - Decision trees allow an objective choice to be made
 - It only considers quantitative factors to inform decision making**
 - The possible outcomes of a decision are visually represented
 - The risks involved in each possible outcome are considered

4. Which of the following is not a valid disadvantage of using decision trees?
- A. Liquidity issues are not considered**
 - B. Qualitative factors are ignored
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5. Which of the following is not observed in the construction of a decision tree?
- A. A circle is used to depict a chance node for each possible outcome
 - B. An unwanted branch is depicted by drawing two parallel lines
 - C. The diagram is constructed starting from the right**
 - D. Where a decision is to be made, a square is drawn to represent the decision node

Task 3: Short answer questions

“silver-hour” period	Probability of success (\$)	Estimated profit/loss	(a) Probability of failure	Estimated profit/loss (\$)	(b) Expected value (\$)
9 - 10 am	0.5	2,100	0.5	(500)	800
10 - 11 am	0.5	2,300	0.5	(1200)	550
3 - 4 pm	0.7	1,500	0.3	(900)	780
6 - 7 pm	0.8	1,100	0.2	(700)	740

- (c) Based on the quantitative results above, suggest which “silver-hour” period *Jumbo* should undertake.

Based on the quantitative results above, *Jumbo* should choose 9am - 10am to be the “silver-hour” period for its café. This is because it has the highest expected value.

Sedap Fruit Farm (SFF)

Ahmad owns *Sedap Fruit Farm* (SFF), covering 1,000 acres of plantation on the outskirts of Johor, Malaysia. He is considering which fruits to plant in the coming season before allocating how much land to be used.



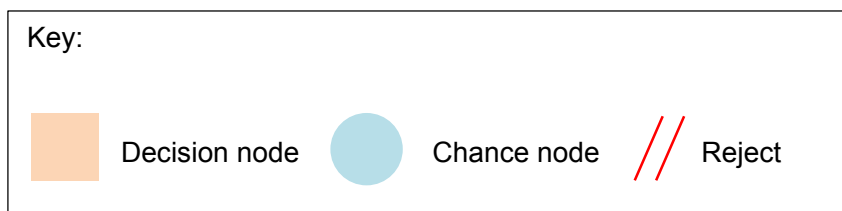
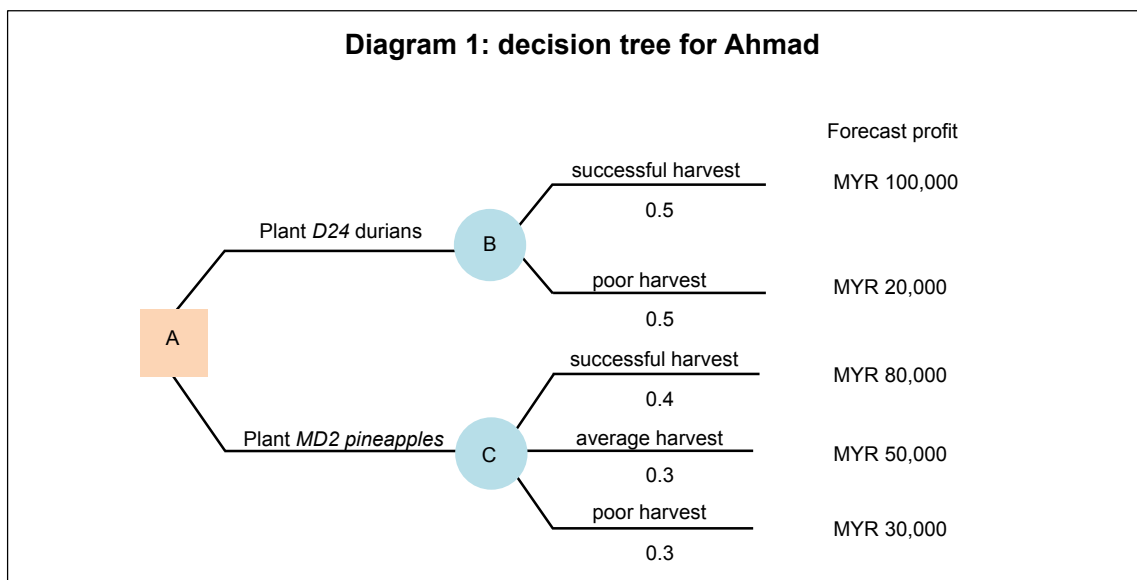
D24 durians, also known as *Sultan durians*, are a famous Malaysian variety and a local favourite. These fruits (see left photo) are known for their signature creamy and sweet, but at times bitter, taste.

Among all the regular pineapple varieties, *MD2 golden pineapples* are the sweetest. *MD2 pineapples* are a favourite among local growers in Malaysia because they grow to a uniform size, ripen evenly, and have a long shelf life compared to the regular varieties of pineapples.

Ahmad thinks that planting *D24 durians* carries substantial risks. As with any agriculture produce, the harvest is heavily dependent on factors such as the climate and rainfall. For a successful harvest, Ahmad estimates a profit of 100,000 Malaysian ringgits (approximately \$21,550). For a poor harvest, he expects to make only 20,000 Malaysian ringgits (approximately \$4,310). There is a 50:50 chance of either a successful or poor harvest for the durians.

If Ahmad plants *MD2 golden pineapples*, the probability of a successful harvest is 40% and he estimates a profit of 80,000 Malaysian ringgits (MYR). The probability of having an average harvest in the coming season is 30% and the resulting profit would be MYR 50,000. The probability of a bad harvest is 30% and the expected profit would be only MYR 30,000.

Diagram 1 below shows a decision tree illustrating the information gathered by Ahmad.



Worksheet 17
6.2 Decision Trees – Sedap Fruit Farm & ByeGone

- (a) With reference to *SFF* and Diagram 1, explain the difference between a decision node and chance node. [4]

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- (b) With reference to **Diagram 1**, calculate the expected values for nodes B and C. [4]

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- (c) Based on financial grounds, suggest which fruit *SFF* should plant. [2]

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- (d) Annotate on Diagram 1 the branch that *SFF* should reject. [1]

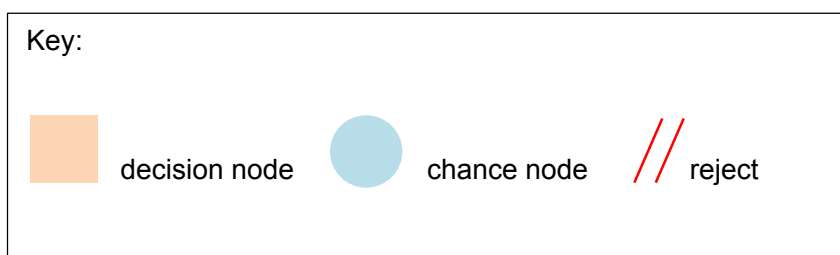
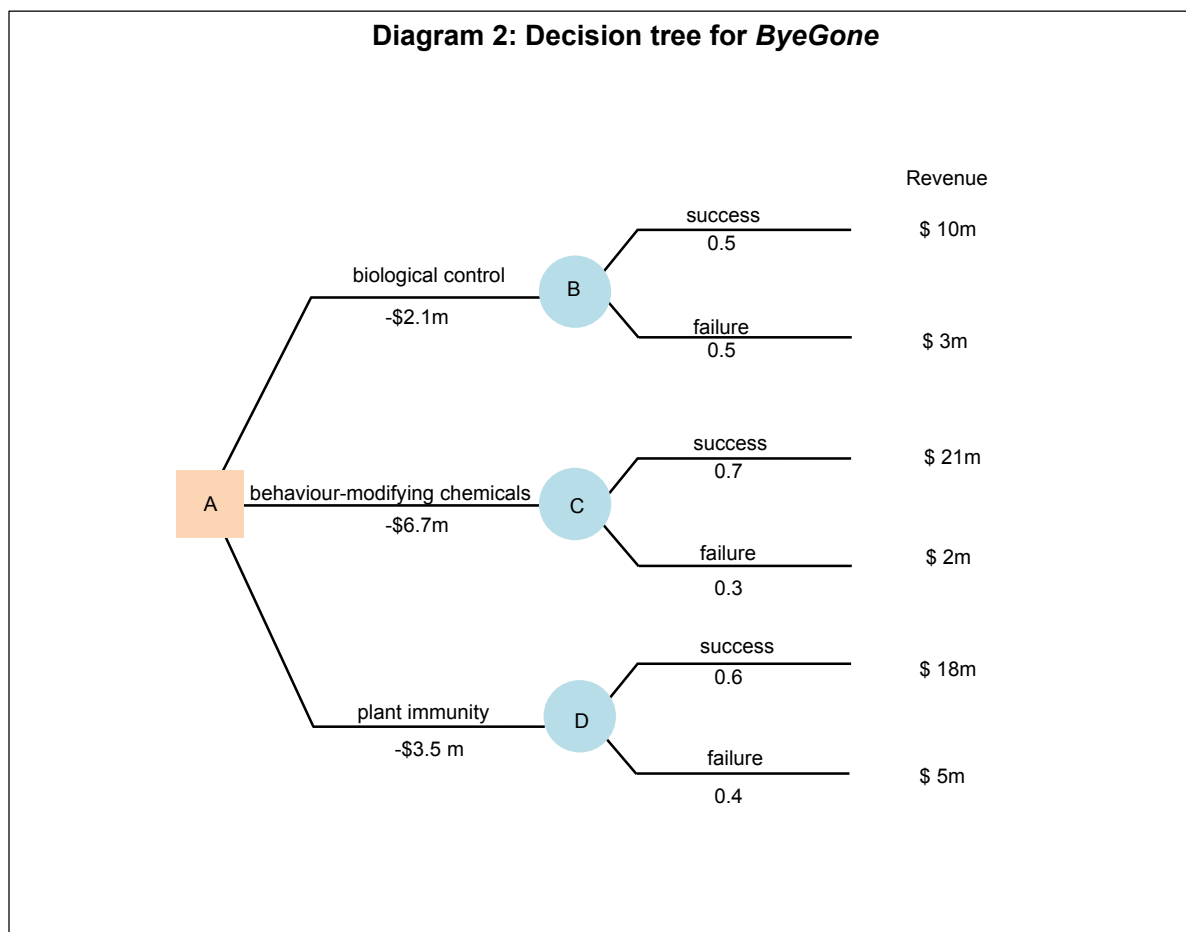
ByeGone

ByeGone has been in the pest control market for more than 60 years, protecting consumers from bugs in different environments. *ByeGone* is looking into three areas of growth for its pest control services, namely biological control, pest behaviour-modifying chemicals, and plant immunization.

- Biological control involves the use of natural enemies to suppress pest populations.
- Research into chemical signals used in living organisms could potentially evoke or modify the behaviour of pests such as their ability to breed.
- Plants can increase their resistance to pests through further research into plant immunity.

ByeGone is contemplating which pest control technique it should invest in for its research and development (R&D).

Diagram 2 illustrates the cost of investment, probabilities of the outcomes, and estimated returns.



Worksheet 17
6.2 Decision Trees – Sedap Fruit Farm & ByeGone

(a) With reference to **Diagram 2**, calculate the expected values for each pest control technique. [4]

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(b) Based on financial grounds, suggest which pest control technique *ByeGone* should invest in. [2]

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(c) Annotate in **Diagram 2** the branch that *ByeGone* should reject. [1]

Answers

Sedap Fruit Farm

- (a) With reference to *SFF* and Diagram 1, explain the difference between a decision node and chance node. [4]

A decision node is represented by a square in a decision tree diagram. In this case, Ahmad has to make a decision whether to plant *D24 durians* or *MD2 golden pineapples*.

A chance node is represented by a circle in a decision tree diagram. Chance nodes B and C are used to represent the two possible outcomes of either planting *D24 durians* or *MD2 golden pineapples*. At chance node B, there are two possible outcomes, either a successful or poor harvest. At chance node C, there are three possible outcomes: a successful, average, or poor harvest.

- (b) With reference to **Diagram 1**, calculate the expected values for nodes B and C. [4]

At node B:

Expected value = $(0.5 \times \text{MYR } 100,000) + (0.5 \times \text{MYR } 20,000) = \text{MYR } 60,000$

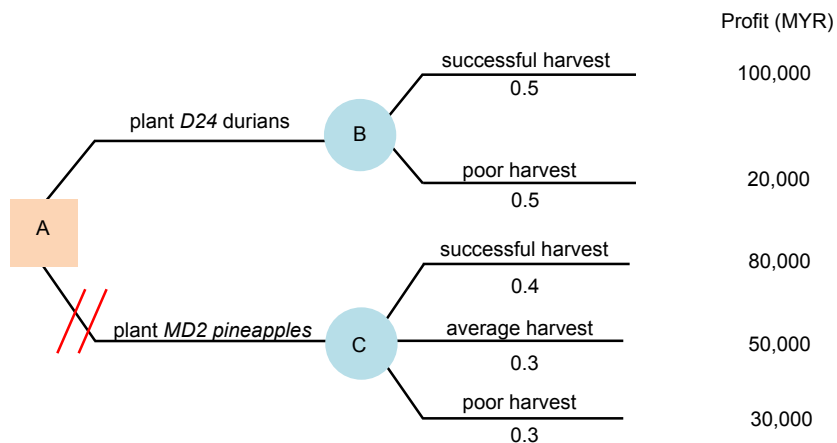
At node C:

Expected value = $(0.4 \times \text{MYR } 80,000) + (0.3 \times \text{MYR } 50,000) + (0.3 \times \text{MYR } 30,000) = \text{MYR } 56,000$

- (c) Based on financial grounds, suggest which fruit *SFF* should plant. [2]

Since node B has the higher expected value ($\text{MYR } 60,000 > \text{MYR } 56,000$), Ahmad should plant *D24 durians* instead of the pineapples.

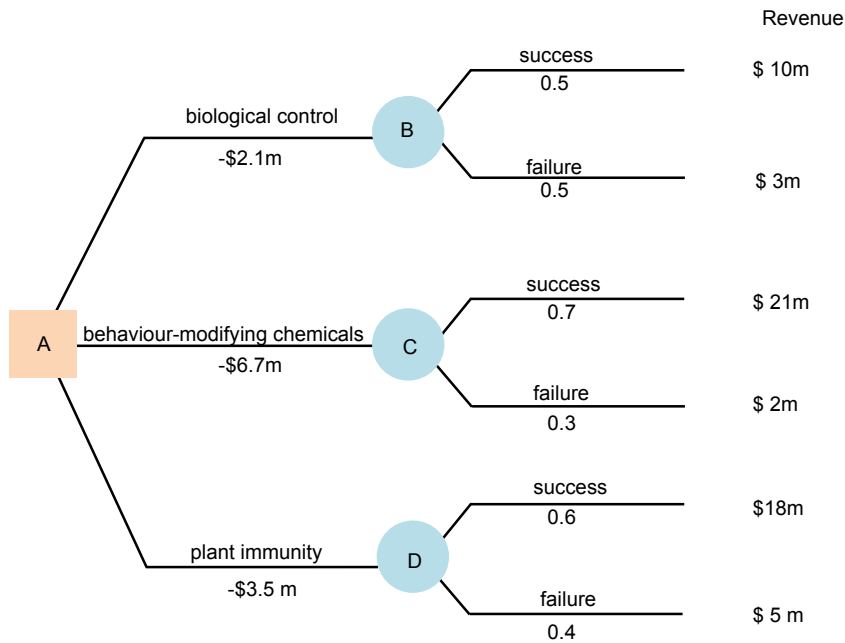
- (d) Annotate on Diagram 1 the branch that *SFF* should reject. [1]



Worksheet 17
6.2 Decision Trees – Sedap Fruit Farm & ByeGone

ByeGone

(a) With reference to **Diagram 2**, calculate the expected values for each pest control technique. [4]



At node B:

$$\text{Expected value} = (0.5 \times \$10\text{m}) + (0.5 \times \$3\text{m}) - \$2.1\text{m} = \$4.4\text{m}$$

At node C:

$$\text{Expected value} = (0.7 \times \$21\text{m}) + (0.3 \times \$2\text{m}) - \$6.7\text{m} = \$8.6\text{m}$$

At node D:

$$\text{Expected value} = (0.6 \times \$18\text{m}) + (0.4 \times \$5\text{m}) - \$3.5\text{m} = \$9.3\text{m}$$

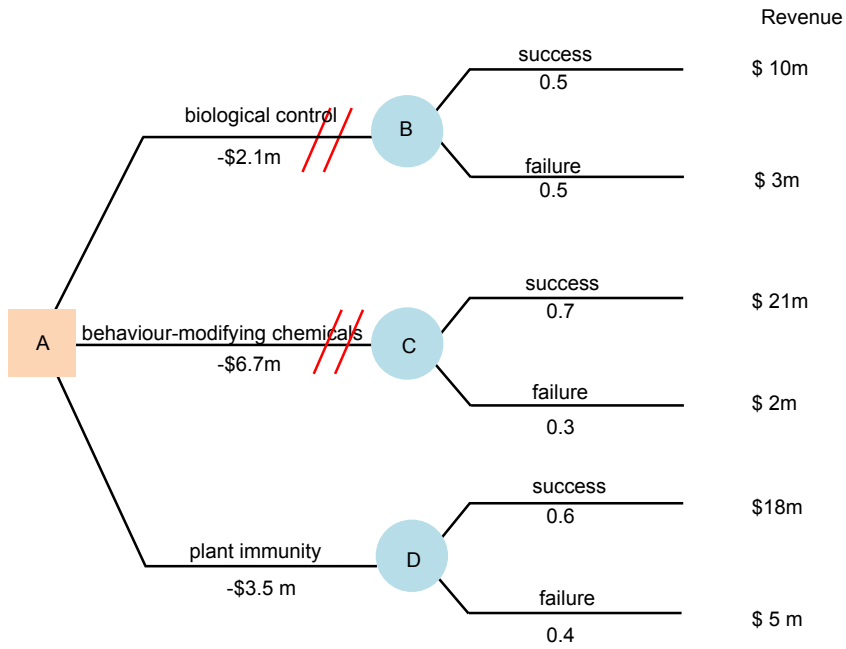
(b) Based on financial grounds, suggest which pest control technique *ByeGone* should invest in. [2]

Since node D has the highest expected value ($\$9.3\text{m} > \$8.6\text{m} > \$4.4\text{m}$), *ByeGone* should invest in plant immunity.

(c) Annotate in **Diagram 2** the branch that *ByeGone* should reject.

[1]

Diagram 2: Decision tree for *ByeGone*



Home First

Home First (HF) designs and sells hanging lights, cage lamps, spider lights, and café lights. As part of *HF*'s sustainability practices, including lowering its carbon footprints, the firm is considering the introduction of new energy-saving LED models of lighting lamps.

HF needs to decide whether to proceed with product testing and trial sales of these new LED models. To do so, *HF* will need to commit \$300,000. The probability of success and failure are 0.8 and 0.2 respectively. If the trial sales fail to reach a target amount, the project will be abandoned but *HF* will still receive a government subsidy of \$50,000. If the trial sales are a success, the estimated revenue at different levels of consumer reviews are shown in **Table 1**. Should *HF* decide to scrap the product testing and trial sales, it can salvage \$60,000.

Table 1: Estimated returns if trials are a success

Level of reviews	Probability	Sales revenue
Good	0.7	\$750,000
Average	0.15	\$400,000
Poor	0.15	(\$200,000)

(a) Using information from the stimulus and **Table 1**, construct a decision tree in the box below. [4]

(b) Calculate the expected values of *HF*'s product testing and trial sales. [4]

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(c) Based on your answer for part (a) and (b), recommend which decision *HF* should make. [2]

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Worksheet 18
6.3 Decision Trees – Home First & Atlantis Cruise

Atlantis Cruise

Atlantis Cruise (AC) has been operating its fleet since 1990 providing family vacations and romance getaways. AC is known for its wide choice of gourmet delights, great entertainment, and recreational activities. The business is seeking to grow and is investigating a new cruise destination to expand into in Asia Pacific.

Table 1 shows the probabilities of outcomes and projected revenues for the 3 proposed destinations. The revenue is expected to be affected by how well the economy is doing in each of the locations.

Table 1: AC's 3 proposed destinations

Destination	Economic growth	Probability	Sales revenue
Bali, Indonesia	High	0.4	\$12.0m
	Medium	0.5	\$9.0m
	Low	0.1	\$5.5m
Penang, Malaysia	High	0.6	\$16.0m
	Medium	0.2	\$7.4m
	Low	0.2	-\$1.4m
Malé, Maldives	High	0.5	\$20.0m
	Medium	0.3	\$12.8m
	Low	0.2	\$6.3m

The cost of investment for each destination is shown in Table 2 below.

Table 2: Costs of AC's 3 proposed destinations

Destination	Cost
Bali, Indonesia	\$3.2m
Penang, Malaysia	\$4.8m
Malé, Maldives	\$5.6m

Worksheet 18
6.3 Decision Trees – Home First & Atlantis Cruise

- (a) Using information from the stimulus and **Table 2**, construct a decision tree for AC in the box below. [4]

- (b) Calculate the expected values of AC's proposed destinations. [4]

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Worksheet 18
6.3 Decision Trees – Home First & Atlantis Cruise

(c) Based on your answers for part (a) and (b), state what decision AC should choose. [1]

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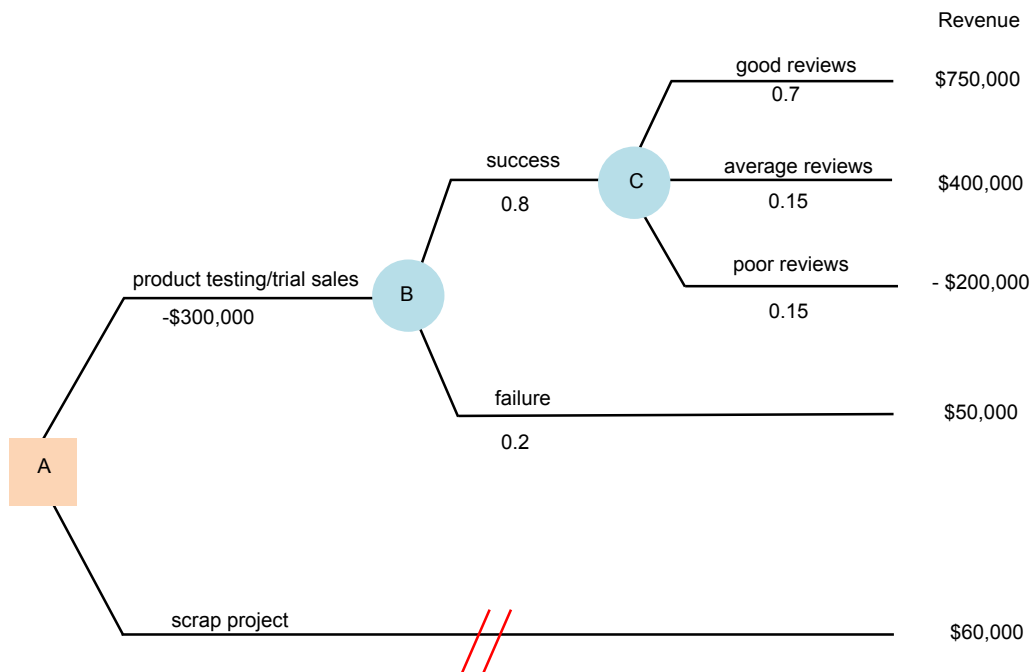
(d) Explain **two** qualitative factors AC should consider before making a final decision. [4]

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Answers

Home First

(a) Using information from the stimulus and **Table 1**, construct a decision tree in the box below. [4]



Key:

decision node
 chance node
 reject

(b) Calculate the expected values of *HF*'s product testing and trial sales. [4]

At node C:

$$\text{Expected value} = (0.7 \times \$750,000) + (0.15 \times \$400,000) + [0.15 \times \$(-200,000)] = \$555,000$$

At node B:

$$\text{Expected value} = (0.8 \times \$555,000) + (0.2 \times \$50,000) - \$300,000 = \$154,000$$

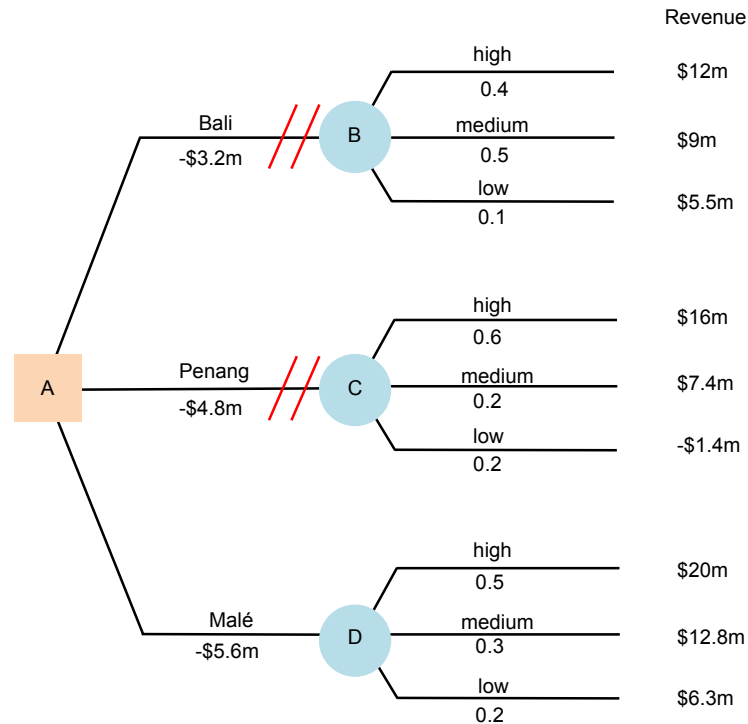
(c) Based on your answer for part (a) and (b), recommend which decision *HF* should make. [2]

Since node B has an overall higher positive expected value, *HF* should proceed with product testing/trial sales rather than scrapping the project.

Worksheet 18
6.3 Decision Trees – Home First & Atlantis Cruise

Atlantis Cruise

(a) Using information from the stimulus and **Table 2**, construct a decision tree for AC in the box below. [4]



Key:

decision node
 chance node
 // reject

(b) Calculate the expected values of AC's proposed destinations. [4]

At node B:

Expected value = $(0.4 \times \$12m) + (0.5 \times \$9m) + (0.1 \times \$5.5m) - \$3.2m = \$6.65m$

At node C:

Expected value = $(0.6 \times \$16m) + (0.2 \times \$7.4m) + [0.2 \times (-\$1.4m)] - \$4.8m = \$6m$

At node D:

Expected value = $(0.5 \times \$20m) + (0.3 \times \$12.8m) + (0.2 \times \$6.3m) - \$5.6m = \$9.5m$

(c) Based on your answers for part (a) and (b), state what decision AC should choose. [1]

AC should expand to Malé, Maldives based on the highest expected value.

(d) Explain **two** qualitative factors AC should consider before making a final decision. [4]

Qualitative factors could include an explanation of any two of the following:

- Consumer preferences, such as the length of stay on a cruise.
- Competition from other cruise companies in the three locations.
- Seasonality in passenger demand.
- Destination attractiveness, i.e., the appeal of cruise itineraries and ports of call including cultural, historical, or natural attractions.
- Safety and security issues related to the different destinations.
- *Accept any relevant qualitative factor relating to changes in the external environment, explained in the context of the case study.*

Barang Kampung

Barang Kampung (BK) is a lifestyle retail store. The *BK* brand is associated with creativity and a good sense of humour. *BK* turns everyday objects ranging from accessories to furniture into extraordinary collectors' items. A short time after the lifting of COVID-19 lockdown restrictions, *BK* experienced growth in its sales, so is now considering alternative growth options.

Option 1: Opening a new outlet

This is the most straight forward growth strategy for *BK*. A number of new malls have sprung up in fringe city centres and new residential areas. The cost of investment in opening a new outlet is estimated to be \$1m. The various outcomes and pay-offs are shown in **Table 1** below. *BK*'s friendly customer services and successful marketing have helped it build its brand. It is understood that *BK*'s management team prefers quick returns from investments.

Table 1: Opening a new outlet

Outcome	Probability	Sales revenue
Success	0.4	\$6m
Average success	0.3	\$4m
Failure	0.3	-\$2m

Option 2: Franchising

Another method under consideration is franchising its brand. This is viewed as a faster option by *BK*'s management team, but it would cost \$0.2m in legal and admin fees. **Table 2** presents information showing the predicted pay-offs. Market research reveals that *BK* has built up strong brand loyalty.

Table 2: Franchising

Outcome	Probability	Sales revenue
Success	0.6	\$7.8m
Failure	0.4	-\$3.8m

Option 3: Acquiring (taking over) an existing furniture workshop

A furniture workshop, *Mandai Green (MG)*, is an ideal target for *BK*. *MG* uses a circular business model. The workshop recollects discarded furniture, recycles this, and reproduces "new" furniture. The predicted revenue from this option depends on the acceptance or demand for re-made furniture. *BK* believes that with its creative designs, sales of re-made furniture using its brand name will improve customer loyalty. *MG* has an established network for collection of discarded furniture. The decision needs approval from *MG*'s board of directors. There is a 50% chance of failure in which case, *BK* loses \$400,000 in administrative and legal fees. *BK* is proposing \$2m for the acquisition of *MG*. **Table 3** shows the pay-offs for this option.

Table 3: Acquisition

Demand	Probability	Sales revenue
High	0.5	\$12m
Medium	0.4	\$6.5m
Low	0.1	-\$4m

(a) Using information from the stimulus, construct a decision tree in the box below. [4]

(b) Calculate the expected values for each of *BK*'s growth options. [4]

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(c) Explain **one** limitation with the use of decision trees. [2]

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(d) Recommend which option is the most suitable growth strategy for *BK*. (*You may choose to continue your answer on an additional answer sheet*). [10]

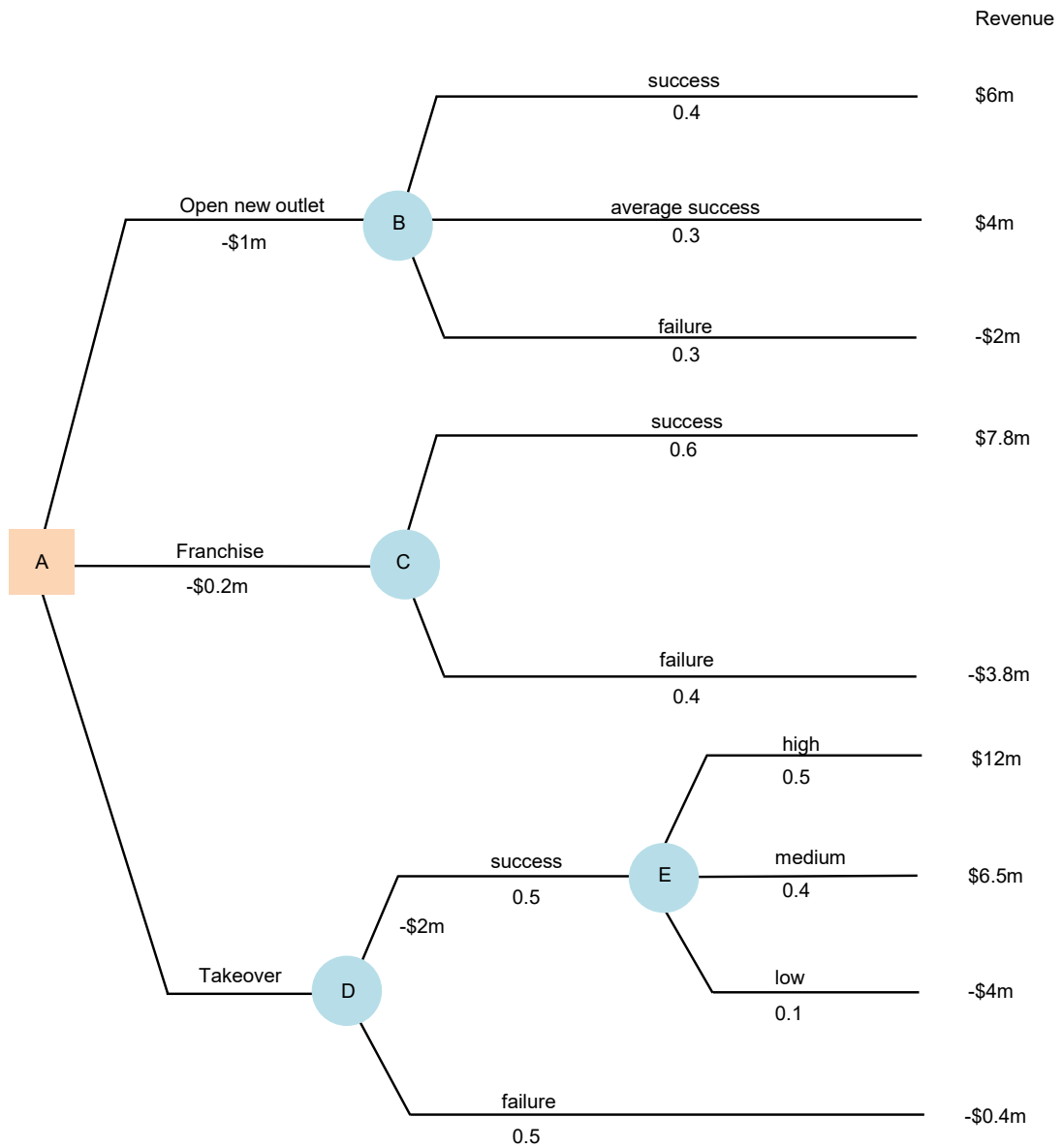
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Worksheet 19
6.4 Decision Trees – Barang Kampung

Answers

Barang Kampung

(a) Using information from the stimulus, construct a decision tree in the box below. [4]



Key:

decision node
 chance node
 reject

(b) Calculate the expected values for each of *BK*'s growth options. [4]

At node B (open new outlet):

$$\text{Expected value} = (0.4 \times \$6\text{m}) + (0.3 \times \$4\text{m}) + [0.3 \times \$(-2\text{m})] - \$1\text{m} = \$2\text{m}$$

At node C (franchise):

$$\text{Expected value} = (0.6 \times \$7.8\text{m}) + [0.4 \times \$(-3.8\text{m})] - \$0.2\text{m} = \$2.96\text{m}$$

At node E (takeover success):

$$\text{Expected value} = (0.5 \times \$12\text{m}) + (0.4 \times \$6.5\text{m}) + [0.1 \times \$(-4\text{m})] = \$8.2\text{m}$$

At node D (takeover failure):

$$\text{Expected value} = (0.5 \times \$8.2\text{m}) - \$2\text{m} + [0.5 \times \$(-0.4\text{m})] = \$1.9\text{m}$$

(c) Explain **one** limitation with the use of decision trees. [2]

The limitations of decision trees include:

- Decision trees are a quantitative tool, so do not take qualitative factors into account, such as consumer preferences or cultural differences in different parts of the world. Qualitative factors are particularly important for a lifestyle retail store like *BK*.
- The sales revenue figures are based on predictions and estimates using past data. Such figures could become out of date by the time a strategic decision is made, e.g., the state of the economy may affect the sales of businesses such as *BK*, yet the outcome of such scenarios are difficult to predict.
- The probabilities used in the decision tree might be subjective and be either overly optimistic or pessimistic with regards to unpredictable changes in the external environment. For example, there might be changes in the level of competition as new businesses enter the market.

(d) Recommend which option is the most suitable growth strategy for *BK*. (You may choose to continue your answer on an additional answer sheet). [10]

Option 1:

Reasons for:

- The opening of a new outlet is considered an organic growth strategy. This would improve *BK*'s distribution channels by having an additional outlet, i.e., it allows *BK*'s products to be more easily available to its customers.
- Opening a new outlet / internal growth is considered to be less risky. The risk of failure is the lowest among the 3 growth options. As an internal growth strategy, *BK* is building on the strengths of its brand, established corporate culture, and customer loyalty.

Reasons against:

- It has the lowest expected return at \$2m based on the decision tree, despite this option being the least risky.
- It requires an initial cost of investment of \$1m. This could mean that *BK* has to consider additional sources of finance.
- Expansion through a new outlet is a relatively slow growth strategy and *BK*'s management team prefers a quick return from investments.

Option 2:

Reasons for:

- This growth option would mean that *BK* gets to license its franchisees with the right to distribute its products using the *BK* brand in exchange for a fee and a share of the sales (paid as an annual royalty).
- This requires the least cost for investment, so *BK* does not have to risk huge cash payments since the franchisee pays for setting up new franchised outlets.
- *BK* can benefit from faster growth (than internal growth) without having to commit too much capital expenditure.
- On financial grounds, this option has the highest expected pay-off, valued at an estimated \$2.96m.

Reasons against:

- *BK* may lose control over the day-to-day operations of its franchised operations, such as control of the quality of services provided to its customers.
- *BK*'s brand image may be adversely affected if there is negative publicity from any one of the franchised outlets, especially if a franchisee fails to meet the company's high standards.

Option 3:

Reasons for:

- By taking over (acquiring) *MG*, *BK* gains further economies of scale, particularly in terms of the relative ease of collecting more discarded furniture for its designs.
- *BK* can gain quick access into the circular economy, especially when *MG* has an established network for the collection of discarded furniture. This might take a lot longer if *BK* needs to start from scratch (as in the case of Option 1 in particular).
- On financial grounds, this option has the second highest expected pay-off, valued at \$1.9m
- *BK* can improve its brand image by acquiring *MG*. By having a closed-loop recycling model, less waste is produced and this helps to reduce the need for more forests to be cleared for wood and other materials needed to produce its furniture.

Reasons against:

- The initial cost of investment is the highest compared to the other two growth options. *BK* needs to raise \$2m for the acquisition of *MG*.
- There might be organizational cultural clashes after the acquisition of *MG*. For example, staff at *MG* might need to adapt to a change in management and leadership styles.
- There might be staff redundancies following the takeover due to synergies and other efficiency gains. This might adversely affect staff morale and productivity in the enlarged *BK*.

Overall:

On financial grounds, Option 2 has the highest expected pay-off. However, in terms of qualitative factors, *BK* could consider Option 3 since the expected pay-off is only marginally less than Option 2 (\$1.9m versus \$2m). In the long term, the acquisition of *MG* allows *BK* to incorporate a circular business model and possibly give *BK* a clear unique selling point over its competitors.

Mannings

With more than 350 branches all across Hong Kong and Macau, *Mannings* is a well-known health and beauty retail household brand. *Mannings* sells everyday essential items such as men's grooming products, ladies' beauty products, baby food, personal care products, health supplements, and medications. To encourage customer loyalty and repeat purchases, *Mannings* uses a loyalty card programme for its members. Loyalty points are earned each time members shop at its outlets, with the reward points being accumulated for rewards redemption including exclusive in-store offers.

Task 1: Fill in the blanks

Mannings can analyse _____ statistics to make _____ and well-informed decisions. In this way, *Mannings* can _____ the _____ associated with its strategies, such as adjustments to its _____ mix.

For example, measures in _____ can be used by *Mannings* to identify how many of its customers fall under a certain age group. Measures of _____ tendency, such as the _____ (the arithmetic average), _____ (the most frequent value that occurs in a data set), and _____ (the _____ value in a data set when the values are arranged in _____ order), would be useful for *Mannings* to identify who most of *Mannings*' loyal customers are.

Measures of _____ can be used to identify the _____ in, for example, the age of *Mannings*' customers. Measures of _____ such as _____, can be used to compare _____ of *Mannings*' customers based on particular traits.

Missing words:

central, descriptive, dispersion, frequency, marketing, mean, median, middle, minimize, mode, numerical, objective, position, quartiles, risks, segments, variation

Task 2: Multiple Choice Questions

The following questions are based on the information below.

On a particular day, new members signed up for *Manning's* customer loyalty card programme at several outlets. The raw data regarding the age of these members is shown in **Table 1** overleaf:

Table 1: Raw data for *Manning's customer loyalty card programme*

Store location	Raw data (age of new members)
Admiralty	41, 49, 27, 24, 28, 45, 27
Sham Shui Po	25, 39, 24, 24, 50, 24
Tsim Sha Tsui	42, 32, 19, 36, 37
Yau Ma Tei	33, 34, 22, 22, 26, 24, 34, 34

- The mean age for new members at the Yau Me Tei outlet is _____.
 - 27.8 years
 - 31 years
 - 28.6 years
 - 29 years
- The mode age for new members at the Admiralty outlet is _____.
 - 24 years
 - 44 years
 - 31 years
 - 27 years
- The median age for new members at the Tsim Sha Tsui outlet is _____.
 - 19 years
 - 36 years
 - 42 years
 - 37 years
- The median age for new members at the Sham Shui Po outlet is _____.
 - 24.5 years
 - 25 years
 - 24 years
 - 29.5 years

5. The median age allows *Mannings* to obtain an important single indicator of the age distribution of its customers because _____.
- A. It indicates the oldest age among its customer population
 - B. It indicates which age occurs most frequently among its customer population
 - C. It provides the arithmetic average age of its customer population
 - D. It provides the age 'midpoint' of its customer population

Task 3: Short answer questions

U-herb

A competitor of *Mannings*, *U-herb*, also sells health and beauty products but online. Clarence, the marketing manager, is considering adjusting *U-herb*'s marketing mix. The sales data for the past 12 months are shown in **Table 2** below. To make more well-informed decisions, Clarence would like to use descriptive statistics to support the analysis.

Table 2: Sales data for *U-herb* (\$'000)

Product	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ladies' beauty products	85	80	85	85	80	70	70	40	30	40	25	60
Men's grooming products	45	55	65	30	45	55	45	70	35	75	40	64
Baby food	60	90	50	70	65	60	35	30	60	70	95	56
Personal care products	50	50	70	90	95	90	80	80	60	30	20	50
Health supplements	60	65	85	60	30	78	70	37	30	90	60	85

- (a) Calculate the mean of sales in ladies' beauty products for *U-herb*.

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(b) Calculate the mode of sales in men's grooming products for *U-herb*.

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(c) Students of pirateIB, calculate the median of baby food sales for *U-herb*.

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(d) Describe **one** benefit to *U-herb* for using the mean sales in descriptive statistics analysis.

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(e) Describe **one** limitation of using the mean sales in descriptive statistics analysis.

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Answers

Task 1: Fill in the blanks

Mannings can analyse **descriptive** statistics to make **objective** and well-informed decisions. In this way, *Mannings* can **minimize** the **risks** associated with its strategies, such as adjustments to its **marketing** mix.

For example, measures in **frequency** can be used by *Mannings* to identify how many of its customers fall under a certain age group. Measures of **central** tendency, such as the **mean** (the arithmetic average), **mode** (the most frequent value that occurs in a data set), and **median** (the **middle** value in a data set when the values are arranged in **numerical** order), would be useful for *Mannings* to identify who most of *Mannings*' loyal customers are.

Measures of **dispersion** can be used to identify the **variation** in, for example, the age of *Mannings*' customers. Measures of **position** such as **quartiles**, can be used to compare **segments** of *Mannings*' customers based on particular traits.

Task 2: Multiple Choice Questions

- The mean age for new members at the Yau Me Tei outlet is _____.
 - 27.8 years
 - 31 years
 - 28.6 years**
 - 29 years
- The mode age for new members at the Admiralty outlet is _____.
 - 24 years
 - 44 years
 - 31 years
 - 27 years**
- The median age for new members at the Tsim Sha Tsui outlet is _____.
 - 19 years
 - 36 years**
 - 42 years
 - 37 years

4. The median age for new members at the Sham Shui Po outlet is _____.
- A. 24.5 years**
B. 25 years
C. 24 years
D. 29.5 years
5. The median age allows *Mannings* to obtain an important single indicator of the age distribution of its customers because _____.
- A. It indicates the oldest age among its customer population
B. It indicates which age occurs most frequently among its customer population
C. It provides the arithmetic average age of its customer population
D. It provides the age 'midpoint' of its customer population

Task 3: Short answer questions

- (a) Calculate the mean of sales in ladies' beauty products for *U-herb*.
Answer: \$62,500
- (b) Calculate the mode of sales in men's grooming products for *U-herb*.
Answer: \$45,000
- (c) Calculate the median of baby food sales for *U-herb*.
Answer: \$60,000
- (d) Describe **one** benefit to *U-herb* for using the mean sales in descriptive statistics analysis.
- It allows *U-herb* to identify if there are any cyclical patterns in demand, such as ladies' beauty products.
 - The use of the mean sales will also be useful to *U-herb* for budgeting its expenses and sales forecasting.
 - Clarence can use the mean sales in determining the success of *U-herb's* sales strategies and marketing campaigns.
- (e) Describe **one** limitation of using the mean sales in descriptive statistics analysis.
- Using the mean average can be misleading. The mean figure can be affected by outliers in the data set. Clarence needs to consider any extreme high or low values in sales.
 - Descriptive statistics do not take into account any qualitative factors such as the changes in the external environment that occur as one-off events.

Midland Realty

Midland Holdings Limited (Midland Realty) is an established real estate agency in Hong Kong and is listed on the Hong Kong Stock Exchange. It has over 400 branches across the territory.

There has been a lot of interest in the property market in Kai Tak, the former airport site which was notoriously famous for the challenges pilots faced in navigating the passenger airplanes to land at the Kai Tak runway. It is an ambitious plan by the Hong Kong government to convert the city's most historic and iconic landmark into a commercial, recreational, and residential precinct in an effort to tackle Hong Kong's housing shortage.

Table 1 shows the sales price of two-bedroom properties in Kai Tak, sold by *Midland Realty* real estate agents in a recent month.

Table 1: Sales price of two-bedroom apartments in Kai Tak

Address	Price (HK\$m)	Price (US\$m)
Tower 2A, One Victoria	10.4	1.34
Tower 1A, Monaco Marine 1	8.68	1.12
Block H3, De Novo	13.25	1.70
Tower 1B, Monaco Marine1	8.68	1.12
Tower 1A, Monaco Marine 1	8.68	1.12
Tower 2A,Vibe Centro	13.28	1.71
Tower 1B, One Victoria	11.6	1.49
Tower 1B, Monaco Marine 2	11.39	1.46
Tower 1A, One Victoria	10.86	1.40
Block C, Kai Long House	6.9	0.89
Tower 3A, The Henley II	9.2	1.18
Tower 1 The Henley II	9.31	1.20
Tower 2B, One Victoria	11.27	1.45
Tower 1C, Monaco Marine 2	17.53	2.25
Block H6, De Novo	13.23	1.70
Tower 1C, Monaco Marine 3	17.47	2.25
Tower 1D, Monaco Marine 3	18.08	2.32

Source: adapted from Midland Realty

Worksheet 21
7.2 Descriptive statistics – Midland Realty

- (a) Calculate the mean selling price (in HK dollars, to 2 d.p.) of properties in Kai Tak sold by *Midland Realty* based on the data in **Table 1**. [2]

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- (b) Calculate the modal average selling price of properties in Kai Tak sold by *Midland Realty*. [2]

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- (c) Calculate the median average selling price of properties in Kai Tak sold by *Midland Realty*. [2]

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- (d) Comment on the usefulness of the mean selling price of properties in Kai Tak sold by *Midland Realty*. [2]

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- (e) Comment on the usefulness of the modal average selling price of properties in Kai Tak sold by *Midland Realty*. [2]

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Worksheet 21
7.2 Descriptive statistics – Midland Realty

(f) Comment on the usefulness of the median average selling price of properties in Kai Tak sold by *Midland Realty*. [2]

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Figure 1 shows the profit/loss for *Midland Realty* for the years 2010 to 2021 (figures in HK\$).

Figure 1: Profit/loss for 2010 – 2021



(g) Comment on the usefulness of bar charts to businesses such as *Midland Realty*. [2]

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(h) Using **Figure 1**, comment on the profitability of *Midland Realty* for the period shown. [4]

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(i) Outline how shareholders of *Midland Realty* might make decisions using **Figure 1**. [2]

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(j) Outline how real estate agents of *Midland Realty* might make decisions using **Figure 1**. [2]

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Answers

- (a) Calculate the mean selling price (in HK dollars, to 2 d.p.) of properties in Kai Tak sold by *Midland Realty* based on the data in **Table 1**. [2]

Mean selling price = $\$199.81\text{m} / 17 = \11.75m

- (b) Calculate the modal average selling price of properties in Kai Tak sold by *Midland Realty*. [2]

Modal average selling price = $\$8.68\text{m}$ (three of the 17 properties were sold at this price).

- (c) Calculate the median average selling price of properties in Kai Tak sold by *Midland Realty*. [2]

Median selling price = $\$11.27\text{m}$ (there were 8 properties sold at a higher price, and 8 sold at a lower price).

- (d) Comment on the usefulness of the mean selling price of properties in Kai Tak sold by *Midland Realty*. [2]

The calculated mean price of accommodation sold in Kai Tak allows *Midland Realty's* real estate agents to inform their clients what they can expect to spend on an apartment in the vicinity.

- (e) Comment on the usefulness of the modal average selling price of properties in Kai Tak sold by *Midland Realty*. [2]

The calculated modal average selling price allows *Midland Realty's* real estate agents to inform their clients which type of apartments are most popular. In this case, *Monaco Marine 1* has the most number of sales transactions.

- (f) Comment on the usefulness of the median average selling price of properties in Kai Tak sold by *Midland Realty*. [2]

The calculated median average selling price allows *Midland Realty's* real estate agents to give their clients a better idea of the “typical” apartment price, since the median is less affected by outliers (such as apartment Tower 1D, *Monaco Marine 3* which sold for over $\$18\text{m}$) unlike the mean average selling price.

- (g) Comment on the usefulness of bar charts to businesses such as *Midland Realty*. [2]

Bar charts provide a visual representation of numerical data. For a business such as *Midland Realty*, bar charts are an effective visual tool in the annual reports for shareholders. They allow the reader to identify any trends or patterns far more easily compared to reading rows and columns of numbers.

- (h) Using **Figure 1**, comment on the profitability of *Midland Realty* for the period shown. [4]

The bar chart suggests that *Midland Realty's* profitability has been on a downward trend. Its profit plummeted significantly between 2012 and 2013, when the firm experienced huge losses. Despite reversals of losses for 3 of the years shown, *Midland Realty's* profits continued to be on a downward trend for the period shown.

Internally, perhaps *Midland Realty* may find it challenging to sell more properties. Externally, this could be attributable to the cyclical nature of the property market in Hong Kong. Other factors such as the rise of interest rates (which increases the cost of borrowing and therefore discourages purposes). There might also be increased competition in Hong Kong's real estate market.

- (i) Outline how shareholders of *Midland Realty* might make decisions using **Figure 1**. [2]

Shareholders may make decisions about whether to invest or divest. Shareholders are interested to know the future growth potential and profitability of *Midland Realty*. Dividends are paid out of profits. The share price of *Midland Realty* will affect the value of each shareholder's investment. Typically share prices will factor in the future financial prospects of *Midland Realty*. As shown in Figure 1, the bar chart indicates declining profitability so this could put off shareholders.

- (j) Outline how real estate agents of *Midland Realty* might make decisions using **Figure 1**. [2]

Real estate agents are employees of *Midland Realty*. They make decisions based on perceptions of job security and prospects for progression in their careers at the firm. As shown in Figure 1, the bar chart indicates that it is getting more challenging selling properties for *Midland Realty*. Hence, employees may try to find opportunities in other organizations.

Bonjour Holdings Limited

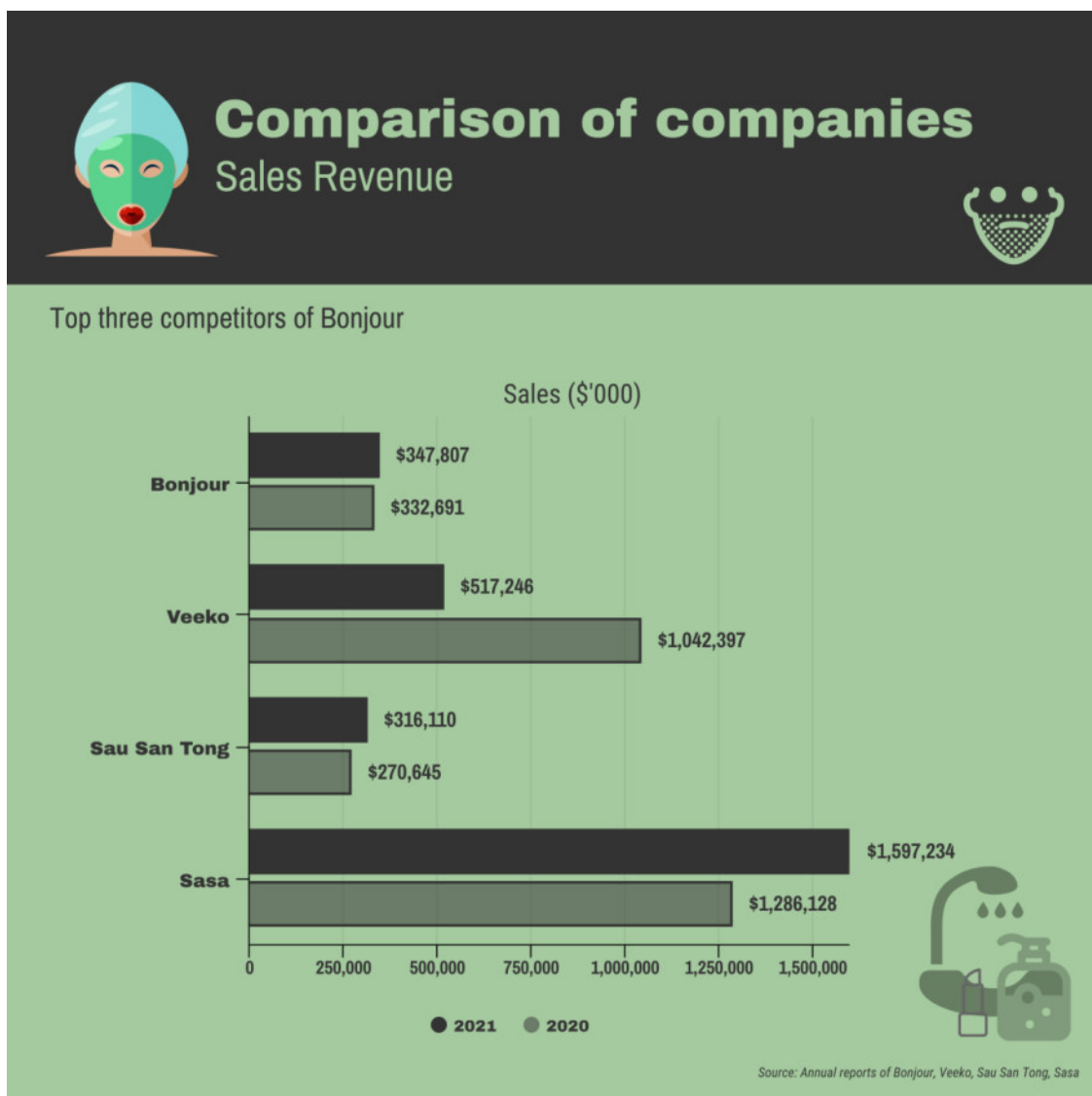
Bonjour Holdings Limited (Bonjour) is an established retailer of cosmetics, beauty care, and lifestyle products in Hong Kong. The company's products include skincare products, hair care products, fragrances, and general merchandise.

The year 2021 was a difficult one for all retailers in Hong Kong due to the strict enforcement of social distancing restrictions and later lockdowns due to the widespread outbreak of COVID-19. There was a relaxation of some rules in 2022, which were later abolished in 2023.

Bonjour's three major competitors are *Veeko*, *Sau San Tong*, and *Sasa*. *Veeko* is a retailer that sells a broad and diverse range of trendy skincare products, prestige perfumes, and branded cosmetics. Its professional beauty consultants provide free personalized consultations for customers. *Sau San Tong* is known for its cosmetics, skincare, and slimming products. *Sasa* offers more than 400 famous brands of beauty products and sells these at discounted prices.

Figure 1 shows the comparison of *Bonjour's* sales revenue with its major competitors. Figures are in Hong Kong dollars.

Figure 1: Comparison of sales revenue



(a) Using **Figure 1**, identify the market leader. [1]

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(b) Describe the changes in sales revenue of the three retailers shown in **Figure 1**. [4]

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(c) Using information from the stimulus and **Figure 1**, comment on the importance of branding for *Bonjour*. [4]

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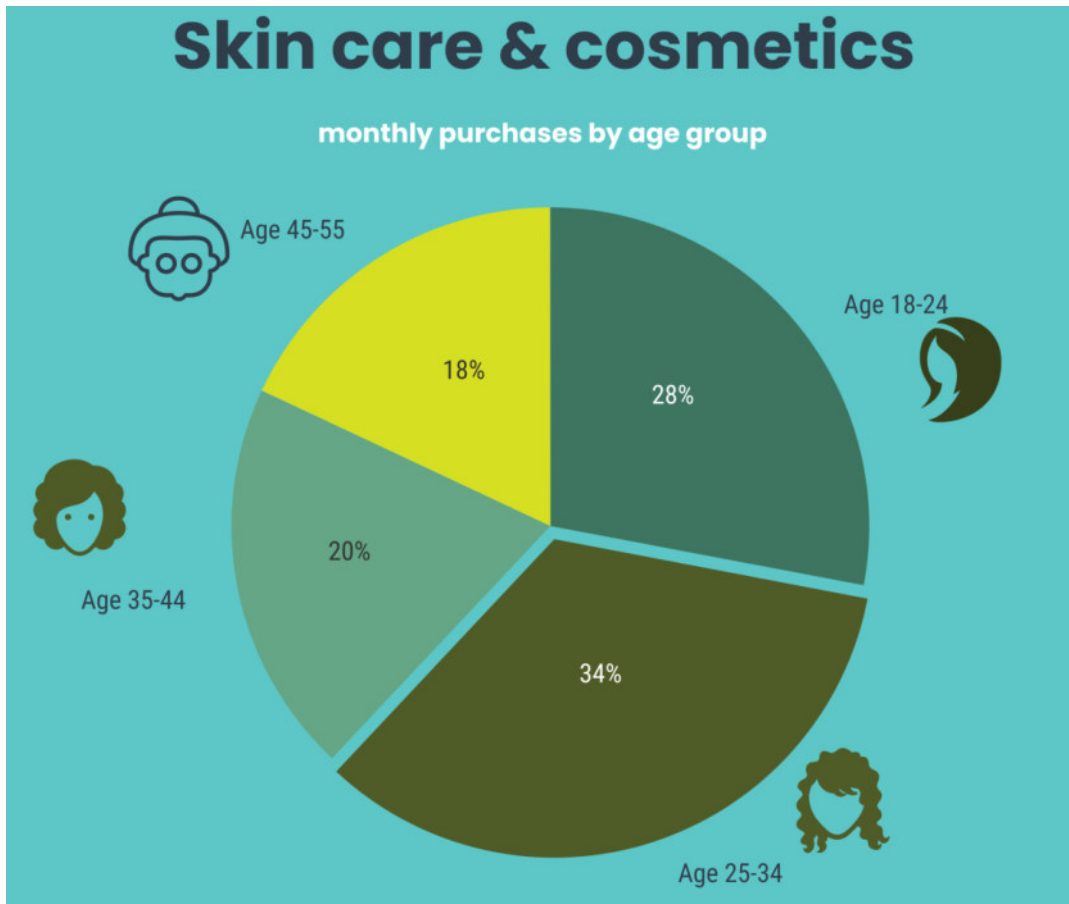
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Hong Kong's Cosmetic Consumer Association recently conducted market research on female shoppers in Hong Kong. **Figure 2** shows skincare and cosmetics product purchases by age group. In the same study, **Figure 3** shows the average spending of female shoppers by age group.

Figure 2: Female skincare and cosmetic shoppers



(d) Using **Figure 2**, identify which age group of female shoppers made the least and most monthly purchases of skincare and cosmetics. [2]

Most monthly purchases:

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Least monthly purchases:

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Hong Kong’s Cosmetic Consumer Association also found that 95% of female consumers in Hong Kong use skincare or cosmetic products, spending an average of HK\$4,200 (US\$536.50) per year. **Figure 3** shows the breakdown of the spending on skincare and cosmetics products by different age groups.

Figure 3: Skincare and cosmetics spending by female shoppers based on age groups



(e) Using **Figure 3**, comment on the spending behaviour of female shoppers of skincare and cosmetics products. [2]

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The infographics in **Figures 4** and **5** provide additional statistics and insights into the cosmetics, beauty care, and lifestyle products in Hong Kong, based on market research from other studies.

Figure 4: Marketing statistics for Hong Kong’s beauty care market



Figure 5: Product trends in Hong Kong's beauty care market



- (f) Using the infographics in **Figure 4** and **Figure 5**, suggest **one** extension strategy that beauty care and cosmetics firms could use for marketing their products in Hong Kong. [4]

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- (g) Explain how the infographics in **Figures 2 – 5** can help beauty care and cosmetics firms to make decisions about marketing opportunities in Hong Kong. [4]

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Answers

(a) Using **Figure 1**, identify the market leader. [1]

Sasa is the leader in the market in terms of sales revenue for both years.

(b) Describe the changes in sales revenue of the three retailers shown in **Figure 1**. [4]

- *Bonjour and Sau San Tong have the lowest market share due to their relatively low sales revenue. In 2021, their combined sales were dwarfed by the largest competitor, Sasa.*
- *The sales revenue of Bonjour and Sau San Tong both increased marginally in 2021, which could be considered as highly successful performance, given the widespread impacts of the COVID-19 pandemic.*
- *Despite having significantly higher sales revenue than Bonjour and Sau San Tong, the sales of Veeko more than halved during the same period (perhaps due to a lack of having an online presence during the period of COVID-19 lockdowns).*
- *Sasa seemed to rely on its market dominance to survive the pandemic as it continued to be the market leader for both years. Its sales improved noticeably, suggesting the company's use of discounted prices proved successfully during a time when the economy struggled due to the COVID-19 pandemic.*

(c) Using information from the stimulus and **Figure 1**, comment on the importance of branding for *Bonjour*. [4]

- *Branding refers to how a business like Bonjour portrays itself to the public and differentiates itself from its competitors.*
- *Based on Figure 1, Bonjour seems to have lost its market share to its main competitors. Sau San Tong appears to brand itself in the niche market for slimming products. Veeko's customers seem to associate the brand with customized personal services and consultations.*
- *Without a unique or distinctive selling proposition, it seems that Bonjour has struggled to maintain its position in the market.*
- *Sasa's brand association of low prices seemed to have worked as shown in Figure 1. It achieved the highest sales for both years and its sales even grew in 2021.*

(d) Using **Figure 2**, identify which age group of female shoppers made the least and most monthly purchases of skincare and cosmetics. [2]

- *Across all age groups, females aged 25-34 made the most monthly purchases of skincare or cosmetic products.*
- *Female shoppers aged 45-55 made the least monthly purchases, according to the study in question.*

(e) Using **Figure 3**, comment on the spending behaviour of female shoppers of skincare and cosmetics products. [2]

- *Female customers aged 35-44 are the highest spenders in this market. Hence, it can be inferred that women in this age bracket represent the most significant target market for retailers of skincare and cosmetics products.*
- *By contrast, the youngest age bracket (18-24) spend the least amount. This is likely to correlate with average earnings for this target market.*

- (f) Using the infographics in **Figure 4** and **Figure 5**, suggest **one** extension strategy that beauty care and cosmetics firms could use for marketing their products in Hong Kong. [4]

Examples of extension strategies that could prolong the life of beauty care and cosmetics brands include:

- Advertising – Some beauty care firms have spent millions of dollars on promotions of slimming products, for example.
- Brand extension – Some beauty care products could be upgraded (improved) or modified for home treatment by professional consultants.
- Redesign – The production of some cosmetics products could be switched to using organic and natural ingredients.
- Product differentiation – Beauty care products that aid slimming, for example, can help the brand or product to stand out from the others sold by competitors. Alternatively, some beauty care products could be modified with anti-aging properties that suit all skin types to cater for a larger customer base.
- *Accept any other relevant extension strategy that is answered in the context of the case study.*

- (g) Explain how the infographics in **Figures 2 – 5** can help beauty care and cosmetics firms to make decisions about marketing opportunities in Hong Kong. [4]

- The infographics in Figure 4 suggests strong competition in the beauty care and cosmetics market in Hong Kong. Hence, focusing on niche markets could provide benefits for beauty care and cosmetics firms in Hong Kong.
- In Figure 5, there are five product trends that emerge. Thus, using a mass marketing strategy that targets all consumers in the market would not be effective.
- Figure 5 also suggests well-defined market segments relating to distinct groups of consumers with similar characteristics (such as shown in Figures 2 and 3) and needs (such as those looking for anti-ageing, organic natural product, professional home treatment, slimming, and/or nail care products and services).
- For example, beauty care and cosmetics firms can target female consumers in the 35-44 age segment, which has the highest average spending power.
- Another opportunity is providing specific products targeted at female consumers in the age segment 45-55, such as launching new anti-ageing products.
- Niche marketing strategies can help beauty care and cosmetics firms to increase repeat purchases and thereby lead to improved brand loyalty.
- *Accept any other relevant answers, explained in the context of the stimulus materials provided.*

XAOH

Julian Ignatius is so passionate about men’s leather shoes that he started *XAOH*, a men’s shoe shop, in 2010. He is convinced that men’s leather shoes should not just be worn formally for work but also for casual wear. *XAOH*’s mission is to promote the culture of wearing men’s leather shoes in Hong Kong.

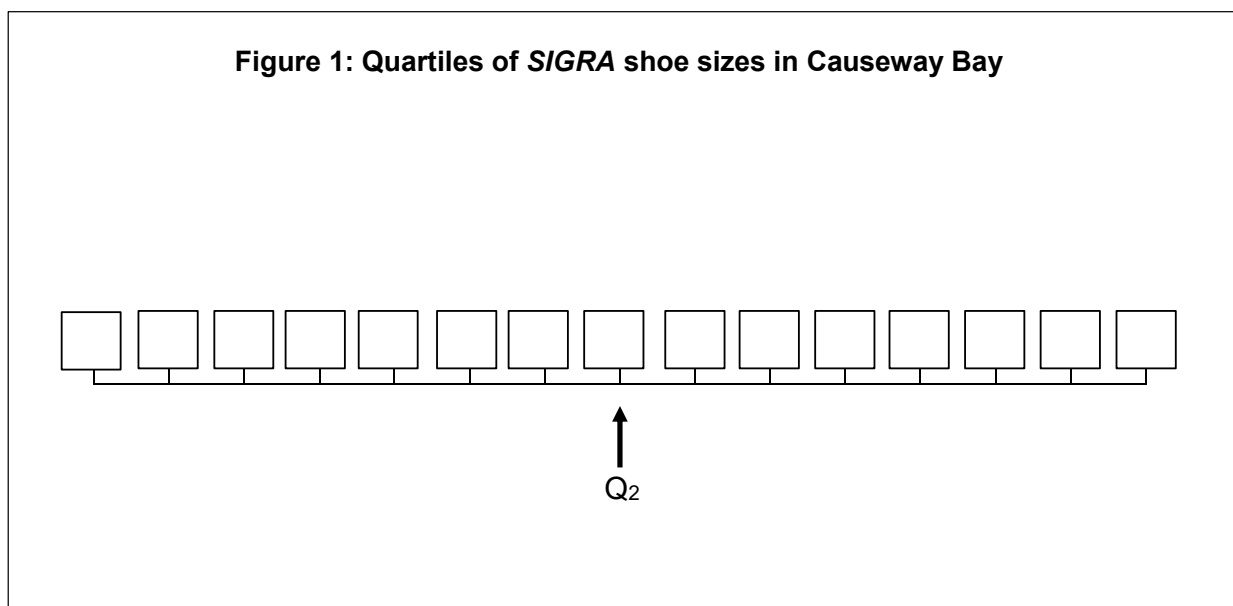
XAOH owns exclusive rights for Japanese leather shoe brands such as *SIGRA*, British classic brands such as *Brother Buddy*, and Italian handmade leather shoe brands such as *EKOAL*.

XAOH’s retail outlet in Causeway Bay, Hong Kong, recorded the shoe sizes of one of its Japanese brands, *SIGRA* sold over a week.

Table 1: Shoe sizes (in EU) of *SIGRA* sold over a week in Causeway Bay

42	41	41	39	40
40	43	44	45	42
38	38	40	38	45

- (a) Using **Table 1**, complete the boxes in **Figure 1** below by sorting out the shoe sizes in ascending order. Q_2 or the second quartile has been indicated. Annotate the first quartile (Q_1) and third quartile (Q_3) in **Figure 1**. [4]



- (b) Using **Figure 1**, calculate the interquartile range. [2]

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- (c) Using information from the stimulus and **Figure 1**, outline how quartiles can be used as a tool for managing XAOH. [2]

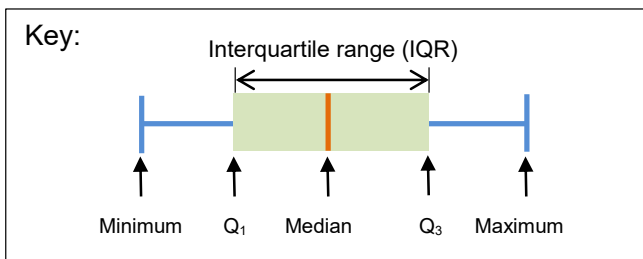
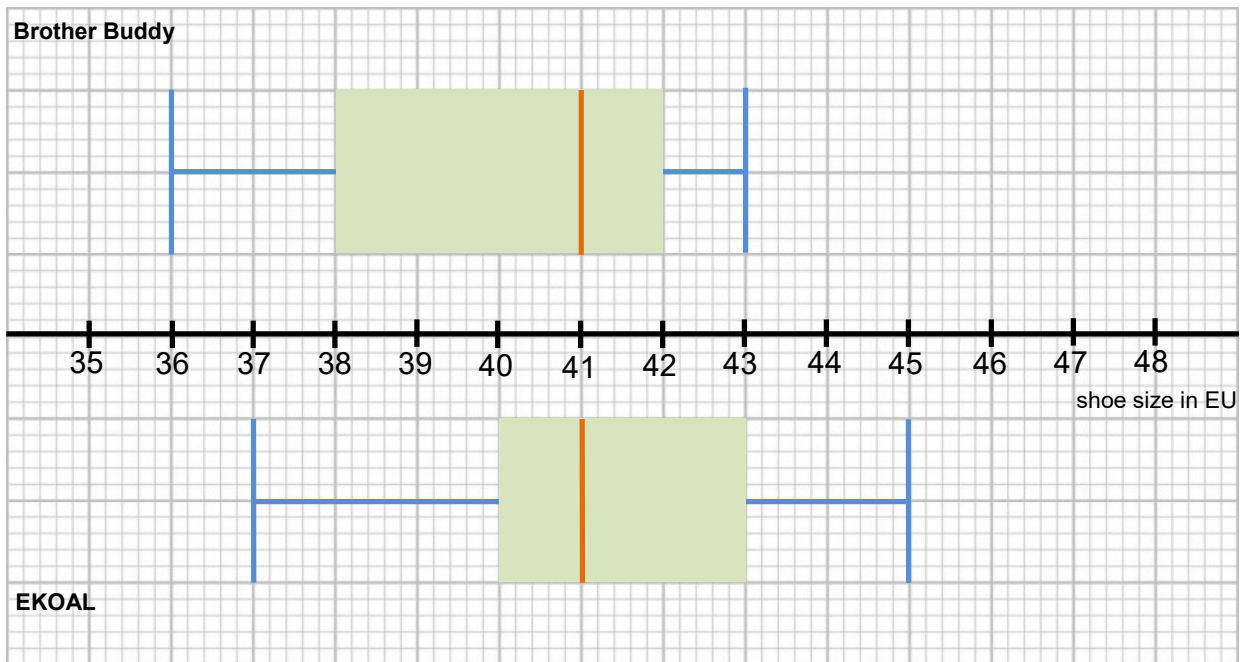
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Figure 2 below shows the comparison of sales in shoe sizes by quartiles for *Brother Buddy* and *EKOAL* brands of leather shoes sold by XAOH in a recent week.

Figure 2: Comparison of quartiles



- (d) Explain the findings in **Figure 2**. [4]

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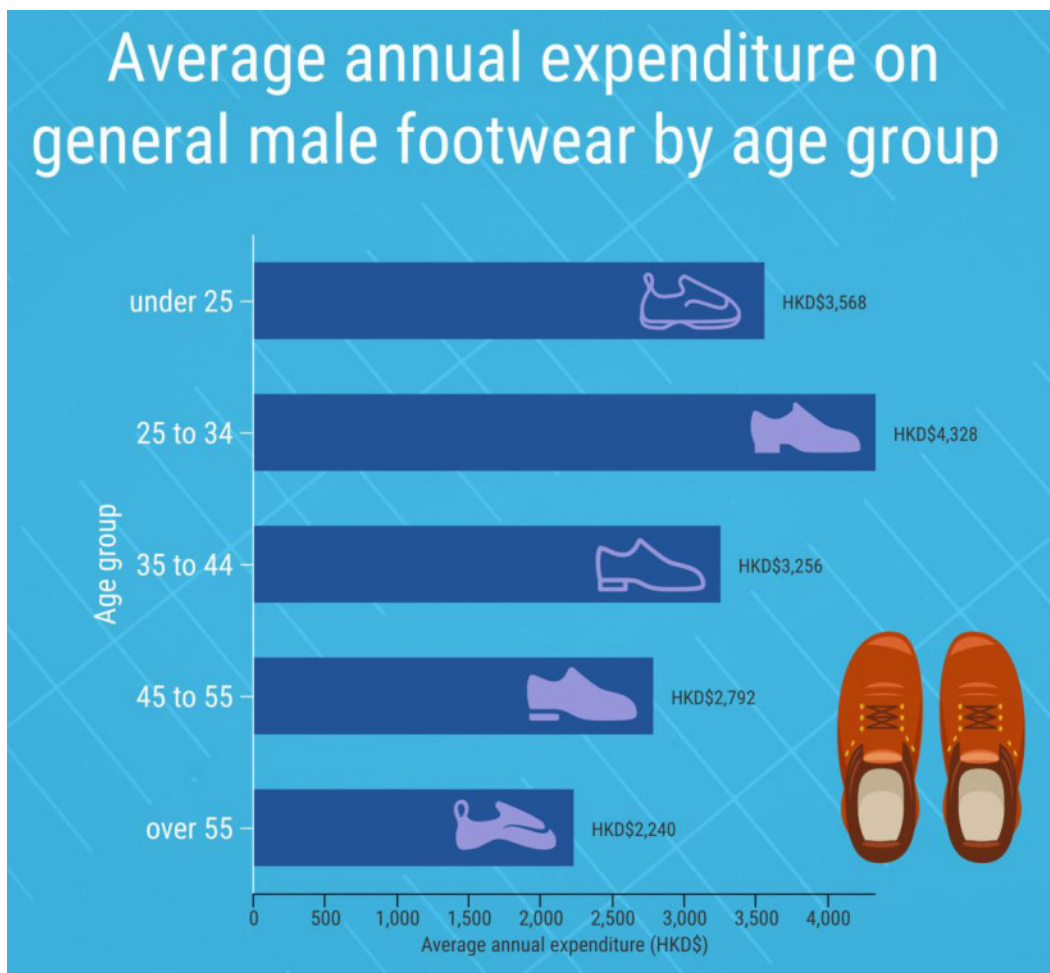
Worksheet 23
7.4 Descriptive statistics – XAOH

Julian Ignatius has been using a mass marketing approach. According to a government report in 2022, sales revenue in the leather footwear market totaled nearly US\$4 billion and is expected to grow by about 3% annually for the next five years. However, the new marketing manager, Clarence Wong, proposes the use of a differentiation strategy in marketing for each individual age segment instead. He believes that emphasis of different product characteristics in the various shoe brands as well as providing professional after-sales services for leather shoe care/repairs could serve individual market segments.

SIGRA leather shoes has propriety cushioning and offers great comfort. *Brother Buddy* offers elegance and stylish designs. *EKOAL* offers tailor-made, trendy leather shoes. The mean price of a pair of leather shoes sold at *XAOH* is HK\$2,000 (approximately US\$255).

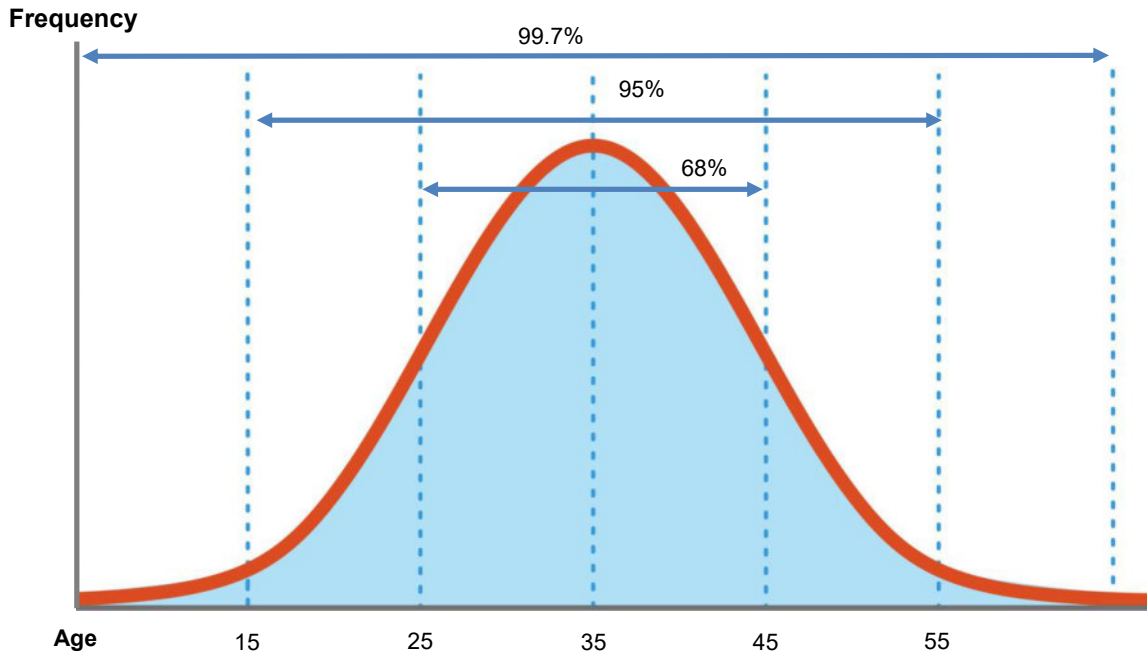
In a private study conducted by a consulting agency, the average annual expenditure on general footwear by males in Hong Kong is shown in **Figure 3**. The study also showed that design, style, material, elegance, comfort, and convenience are important considerations when customers purchase shoes. Younger customers tend to favour comfort over style or design.

Figure 3: Average annual expenditure on general male footwear, by age group



Clarence Wong also conducted primary research consisting of 100 customer surveys. One of the key findings is presented in **Figure 4**, showing a normal distribution of the age of XAOH's male customers.

Figure 4: Age distribution of XAOH's male customers



- (d) Using information from the stimulus, **Figure 3** and **Figure 4**, discuss Clarence Wong's proposal to use a differentiated marketing strategy. (You may continue your answer using an additional answer sheet). [10]

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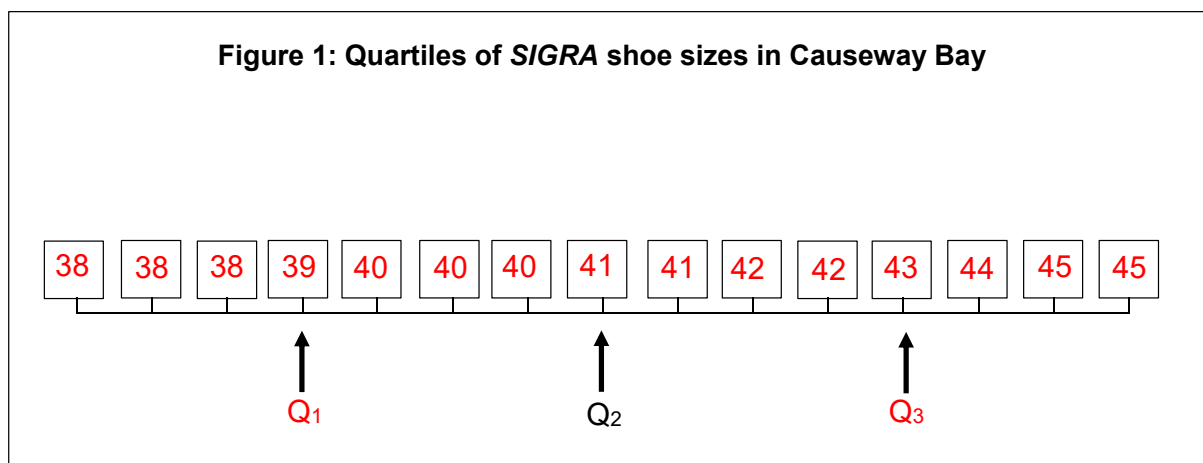
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Answers

- (a) Using **Table 1**, complete the boxes in **Figure 1** below by sorting out the shoe sizes in ascending order. Q_2 or the second quartile has been indicated. Annotate the first quartile (Q_1) and third quartile (Q_3) in **Figure 1**. [4]



First, determine the value of Q_2 , the second quartile or the median value in the data set. In this case, as there are 15 data points, the 8th data value (or size 41) is the second quartile.

Next, to determine the value of the first quartile (Q_1), find the middle observation of the lower half of the data values. In this case, Q_1 is the 4th data point (or size 39).

Likewise, the third quartile (Q_3) is the middle observation of the upper half of the data values (or size 43).

- (b) Using **Figure 1**, calculate the interquartile range. [2]

- The interquartile range (IQR) is the difference between the upper and lower median values, i.e., $Q_3 - Q_1$.
- $IQR = 43 - 39 = 4$.

- (c) Using information from the stimulus and **Figure 1**, outline how quartiles can be used as a tool for managing XAOH. [2]

Possible responses could include:

- Management of shoe inventories – By calculating the IQR, Julian Ignatius can estimate the volume of different shoe sizes he needs to order from XAOH's suppliers so that the store does not overstock (or understock) on certain shoe sizes.
- Understanding the profiles of XAOH's customers – Julian Ignatius can find out what kind of customers wear the Japanese brand of SIGRA leather shoes.
- *Accept any other relevant suggestion, written in the context of the case study.*

(d) Explain the findings in **Figure 2**.

[4]

Brother Buddy:

- Minimum data value = 36
- Maximum data value = 43
- IQR = $42 - 38 = 4$
- Median = 41

EKOAL:

- Minimum data value = 37
- Maximum data value = 45
- IQR = $43 - 40 = 3$
- Median = 41

The median value for both brands is EU shoe size 41. More than 50% of *Brother Buddy* shoes sold are smaller than size 41. More than 50% of *EKOAL* shoes sold are larger than size 41.

However, the IQR for *Brother Buddy* indicates a slightly broader range than *EKOAL*.

(e) Using information from the stimulus, **Figure 3** and **Figure 4**, discuss Clarence Wong's proposal to use a differentiated marketing strategy. (You may continue your answer using an additional answer sheet). [10]

With a mass marketing approach, there is undifferentiated marketing to every market segment. In this case, Julian Ignatius is trying to appeal to potential customers of all age segments. To tap into the growing leather market in Hong Kong quickly, mass marketing is a relatively low cost method to reach out to the entire market audience using one marketing message that leather shoes can be worn both for work and casual wear. A limitation of this mass marketing approach is that *XOAH* has ignored the differing needs of customers in each age segment. Another limitation of mass marketing is the lack of customer loyalty it creates for *XOAH*.

Clarence Wong has proposed using a differentiated marketing strategy to appeal to separate and individual market segments. With this type of marketing strategy, *XOAH* focuses on the quality of its products and services to gain a competitive advantage over its competitors in the footwear industry. The statistics in Figure 3 reveal different spending characteristics in each age segment. Customers in the 25 to 34 age bracket have the highest spending pattern on footwear. In Clarence Wong's survey, the results in Figure 4 show that 68% of *XOAH*'s male customers are in the 25 to 45 age segment. However, it seems that *XOAH* does not appeal so much to the under 25 age bracket which represents the second highest group of footwear spenders. This further suggests the limitations of a mass marketing approach for *XOAH*.

Advantages of Clarence Wong's proposal:

- Differentiated marketing allows *XOAH* to initiate effective marketing campaigns to selected age segments based on their common characteristics in order to entice sales.
- The exclusivity of its brands allow *XOAH* to charge premium prices. The mean price of its shoes, HK\$2,000 represents almost half of the annual expenditure of male shoppers.

- It allows *XOAH* to target the appropriate leather shoes to the right people. *SIGRA* leather shoes has propriety cushioning and offers great comfort which may appeal to the under 25 age bracket. *Brother Buddy*, which offers great elegance and stylish designs, may appeal to the 25 to 45 age segment, which has the highest spending power. Meanwhile *EKOAL*'s tailor-made trendy leather shoes may appeal to the 45-55 age bracket which tend to opt for fine taste, in terms of high quality and excellence.
- It enables *XOAH* to fulfil the needs of its customers better, especially the under 25 age bracket which values comfort over stylish designs. Under a quarter of its customers are in this age segment but they have high potential spending power.

Advantages of Clarence Wong's proposal:

- *XOAH* may have to increase its expenditure on promotions to reach out to (and appeal to) each age segment. This could harm its profitability, especially if customers do not respond positively to the new marketing campaigns.
- The response of *XOAH*'s customers may differ from what the statistics suggest. The habits, tastes, and preferences of male shoppers are not reflected in Figure 3.
- *XOAH* might be operating in a narrow scope of the footwear market, specializing in leather shoes at premium prices targeted at male customers. There is a high level of competition in the broader footwear market, which may include sports shoes, boots, flip-flops, and sandal. These products are available to consumers at a lower price, so could create further untapped opportunities.
- *Accept any other relevant suggestions, written in the context of the case study.*

Food Mama (FM)

Food Mama (FM) is an online delivery service platform that serves a variety of meals and menu choices for locals in Singapore. Customers make purchases using *FM*'s app. However, it faces competition from other food delivery businesses like *Deliveribee*.

Billy Cheong, the director of *FM* is reviewing descriptive statistics to better understand the intensity of competition. **Table 1** and **2** show the number of food deliveries made by *FM* and *Deliveribee* in a local neighbourhood made in a typical week.

Table 1: Food deliveries by Food Mama

Day	Number of deliveries (B)	Mean (C)	B – C	(B – C) ²
Mon	220			
Tue	210			
Wed	240			
Thu	260			
Fri	276			
Sat	278			
Sun	308			

(a) Calculate the mean and complete column 3 in **Table 1** above. [2]

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(b) Complete columns 4 and 5 in **Table 1** in order to calculate the standard deviation of the food deliveries made by *Food Mama*. [2]

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Table 2: Food deliveries by *Deliveribee*

Day	Number of deliveries (B)	Mean (C)	B – C	(B – C) ²
Mon	131			
Tue	134			
Wed	196			
Thu	256			
Fri	305			
Sat	357			
Sun	413			

(c) Calculate the mean and complete column C in **Table 2**. [2]

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(d) Complete columns 4 and 5 in **Table 2**. Calculate the standard deviation of the food deliveries made by *Deliveribee*. [4]

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(e) Comment on the standard deviations of *Food Mama* and *Deliveribee*. [4]

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FM plans to expand by introducing grocery deliveries. It has approached local vegetable farmers and suppliers and identified 5 possible physical warehouses. Findings from market research recently conducted by FM are shown in **Figure 1**. The research also revealed the likelihood of online shopping for groceries in the next twelve months, as shown in **Figure 2**.

Figure 1: Breakdown of consumers spending the same or more on online shopping for selected product categories

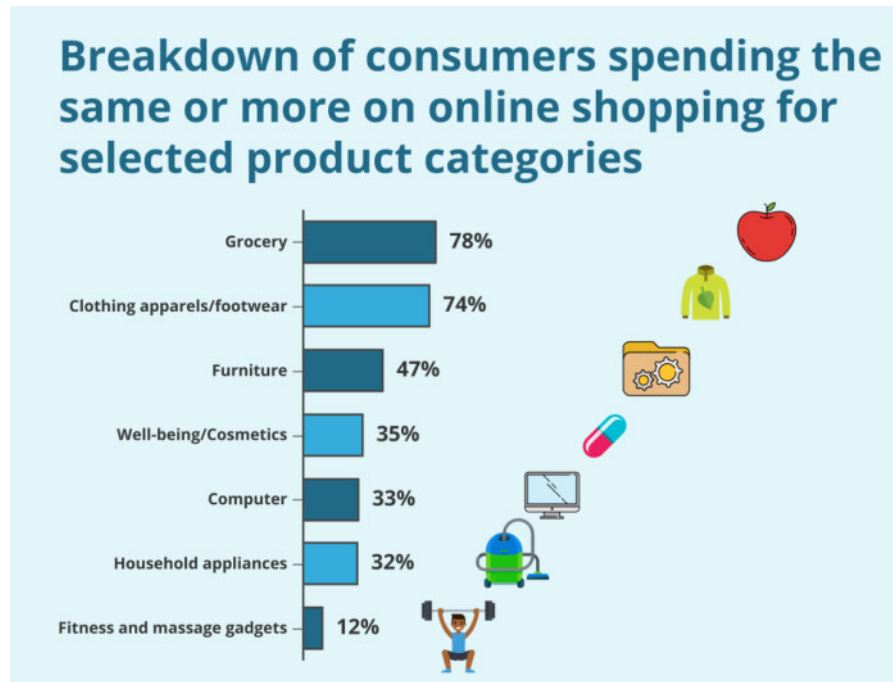
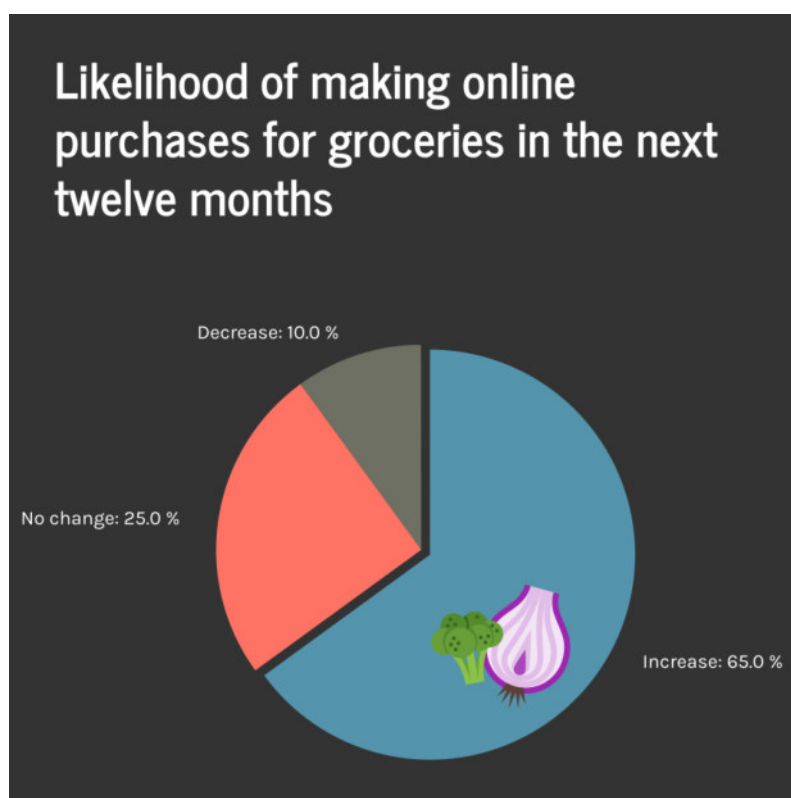


Figure 2: Likelihood of online shopping for groceries in the next 12 months



The initial cost of the expansion plan is estimated to cost \$2,300,000. **Table 3** shows the forecast of net cash flow from the new grocery delivery service over the next five years. *FM* would need a bank loan to finance the expansion. The current interest rate is 2%, however there are indications of further rises in interest rates over the next two years. Competition is expected to be intense as new businesses are entering the market.

Table 3: Net cash flow (NCF) estimates of investment in grocery delivery service

Year	Net cash flow (NCF) (\$'000)
1	700
2	650
3	470
4	380
5	270
6	250

- (f) Using information from the stimulus, **Figures 1** and **2**, and **Table 3**, evaluate *FM*'s expansion plan to introduce a grocery delivery service. (you can continue your answer on a separate sheet). [10]

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Answers

Food Mama (FM)

Table 1: Food deliveries by *Food Mama*

(A)	(B)	(C)	(D)	(E)
Day	Number of deliveries	Mean	B – C	(B – C) ²
Mon	220	256	-36	1,296
Tue	210	256	-46	2,116
Wed	240	256	-16	256
Thu	260	256	4	16
Fri	276	256	20	400
Sat	278	256	22	484
Sun	308	256	52	2,704
Total				7,272

(a) Calculate the mean and complete column 3 in **Table 1** above. [2]

- Total deliveries = $220 + 210 + 240 + 260 + 276 + 278 + 308 = 1,792$
- Average (mean) = $1,792 \div 7 \text{ days} = 256 \text{ deliveries per day}$

(b) Complete columns 4 and 5 in **Table 1** in order to calculate the standard deviation of the food deliveries made by *Food Mama*. [2]

Steps for calculating the standard deviation:

1. Calculate the mean.
2. Subtract the mean from each data value (column D).
3. Square the results from step 2 (column E).
4. Aggregate the results in column 5.
5. Divide the total amount from by 7 (the number of data sets)
6. Calculate the square root of the result in step 5.

- Standard deviation = $\sqrt[2]{(7,272 \div 7)}$
- SD = 32.23 (2 d.p.)

Worksheet 24
7.5 Descriptive statistics – Food Mama

Table 2: Food deliveries by *Deliveribee*

Day	Number of deliveries	Mean	B – C	(B – C) ²
Mon	131	256	-125	15,625
Tue	134	256	-122	14,884
Wed	196	256	-60	3,600
Thu	256	256	0	0
Fri	305	256	49	2,401
Sat	357	256	101	10,201
Sun	413	256	157	24,649
Total				71,360

(c) Calculate the mean and complete column C in **Table 2**. [2]

- Total deliveries = 131 + 134 + 196 + 256 + 305 + 357 + 413 = 1,792
- Average (mean) = 1,792 ÷ 7 days = 256 deliveries per day

(d) Complete columns 4 and 5 in **Table 2**. Calculate the standard deviation of the food deliveries made by *Deliveribee*. [2]

- Standard deviation = $\sqrt{(71,360 \div 7)}$
- SD = 100.97 (2 d.p.)

(e) Comment on the standard deviations of *Food Mama* and *Deliveribee*. [4]

The mean for both *Food Mama* and *Deliveribee* are the same value of 256 (number of deliveries per day).

However, the standard deviation (SD) for *Food Mama* is 32.34 (2 d.p.) and for *Deliveribee* it is 100.97 (2 d.p.). The larger standard deviation value for *Deliveribee* indicates that the data values have a much larger spread around the mean of 256 (number of deliveries per day).

In the case of *Food Mama*, the smaller standard deviation indicates that the data values are more closely clustered around the mean.

One implication from this is that the data values might be less reliable for *Deliveribee*. There could be existence of outliers that could result in a data range that are not fully representative of the spread in data values.

Worksheet 24
7.5 Descriptive statistics – Food Mama

- (f) Using information from the stimulus, **Figures 1** and **2**, and **Table 3**, evaluate *FM*'s expansion plan to introduce a grocery delivery service. (you can continue your answer on a separate sheet).
[10]

FM's plan to introduce a groceries delivery service can be described as product development according to Ansoff's matrix. This common growth strategy can be evaluated in terms of the different risks involved.

Advantages include:

- Providing this service can be considered as a market-oriented approach to marketing. This plan allows *FM* to fulfil the needs and wants of customers. Figure 1 shows that "groceries" is the top category of items for online shopping for customers in Singapore.
- This plan allows *FM* to adapt to changes in consumer preferences for online shopping. Figure 2 shows that 65% of consumers plan to increase their online spending on groceries over the next 12 months. Thus, there is growth potential for *FM* to enter this market.

Year	Net cash flow (NCF) (\$'000)
0	(2,300)
1	700
2	650
3	470
4	380
5	270
6	250
Total NCF	2,720
Total profit	$2,720 - 2,300 = 420$

- Average annual profit = $(420,000 / 6) = 70,000$
- The average rate of return (ARR) = $(70,000 / 2,300,000) \times 100 = 3.04\%$
- The expected ARR is higher than the current interest rate of 2%, which suggests this growth option is financially viable.

Worksheet 24
7.5 Descriptive statistics – Food Mama

However, product development also carries risks.

Disadvantages include:

- There is a high initial cost of investment of \$2,300,000. *Food Mama* will be taking on a long-term loan from banks for financing this growth strategy. According to the stimulus, the current interest rate is 2% but is expected to rise over the next two years. This could mean higher interest rate repayments for *FM*.
- Also, with interest rates expected to rise, the ARR at 3.04% may not seem to offer sufficient returns to *FM* over the next six years.

Year	Net cash flow (\$'000)	Cumulative net cash flow (\$'000)
1	700	700
2	650	1,350
3	470	1,820
4	380	2,200
5	270	2,470
6	250	2,720

- The payback period falls within the 5th year, when the NCF > Cost of investment.
- By the end of Year 4, there is a shortfall of \$2.3m – \$2.2m = \$100,000.
- In Year 5, the average monthly NCF = \$270,000 / 12 = \$22,500
- \$100,000 / \$22,500 = 4.44 months
- Hence, the payback period is 4 years and 4.44 months (accept 4 year and 5 months).
- Given that competition is rather intense with new entrants to the market, a payback period of about 4 years and 5 months is a fairly long period of time for *Food Mama* for the next six years. There is a risk that rising competition and higher interest rates in the economy may lower *FM*'s expected sales revenue.
- *Accept any other relevant quantitative or qualitative factor, discussed in the context of the case study.*

TRIA

The “Take, make, throw” mentality has driven the world’s businesses for a long time. This is known as the *linear business model* where raw materials are consumed, converted into products, and ultimately thrown away as waste. The linear economy consumes the planet’s resources at a rate that is faster than it can regenerate these. This includes food waste and plastic waste.

To address this global problem, Ng Pei Kang and Tan Meng Chong founded *TRIA* in Singapore. They developed a closed-loop system called *Bio24*. In what is termed the “table-to-farm” innovation, *Bio24* transforms single-use dining foodware and food waste into compost within 24 hours using their proprietary plant-based material named *NEUTRIA*. *TRIA*’s zero waste initiative has helped them to win awards such as the ASEAN-Korea Excellent Design Award and Singapore Packaging Star Awards.

Task 1: Fill in the blanks

At the height of the COVID-19 pandemic, Singapore enforced a two-month “circuit breaker” which effectively locked down the entire country. One major side effect was the additional thousands of tonnes in plastic _____ discarded from deliveries of takeaway foods and groceries. The waste equated to the weight of 92 double-decker buses in just two months.

The *World Economic Forum (WEF)* urges governments, businesses, and global citizens to take up the Circular Economy Challenge by addressing the “take-make-dispose” approach in consumption and production. The *WEF* advocates that circularity is the solution for the ills of the traditional _____ model. Circular business models (CBMs) promote the elimination of waste. They focus on the _____ consumption of natural resources. In a _____ economy, sharing, _____ (as a form of waste _____) re-using, restoration, and regeneration are important considerations for business activities as well.

According to the *WEF*, by embracing CBMs, the global circular economy could yield new _____ streams of up to \$4.5 trillion before the end of 2030. The circular economy offers enormous _____ opportunities for investors, entrepreneurs, and _____ in industries ranging from healthcare to consumer staples. In essence, CBMs drive changes in the way businesses operate. These positive changes drive value not just in terms of returns to investors but also help to improve the _____ of the planet in the future.

Missing words:

circular, growth, linear, management, recycling, revenue, start-ups, sustainable, waste, well-being

Task 2: Multiple Choice Questions

Bio24 is the world's first closed-loop system designed for single-use foodware and food waste. It is an industry-wide programme developed by *TRIA* where partners collaborate to ensure single-use foodware and food waste are renewed, directly taken from the table and returned back to the farm. It is a win-win situation for consumers and businesses in the food and beverages (F&B) industry. *Bio24* allows consumers to experience the conveniences of single-use foodware without passing on additional costs to F&B businesses for achieving zero-waste targets.

1. *Bio24* is an example of a circular business model called a _____.
- A. Circular supply model
 - B. Product life extension model
 - C. Resource recovery model
 - D. Sharing model

TRIA has developed an exclusive *driCAST* process which allows food grade paper to be moulded into 3D forms. From a single sheet of paper, this technology allows creativity in design for environmentally-friendly disposable foodware without any trace of plastics. Consumers can enjoy their food knowing that the disposable foodware will go back to nature in the same way it was derived.

2. The above is an example of a circular business model called _____.
- A. Circular supply model
 - B. Product life extension model
 - C. Resource recovery model
 - D. Sharing model

Mobile devices have become part of our daily lives. However, they have short product life cycles as each manufacturer competes with new versions, resulting in undesirable and excessive levels of discarded mobile devices in landfills. *HYLA Mobile* seeks to work with many major manufacturers and mobile service providers to salvage such devices. These devices, or their components, are then repurposed and given a second life.

3. *HYLA Mobile* uses an example of a circular business model known as _____.
- A. Circular supply model
 - B. Product life extension model
 - C. Resource recovery model
 - D. Sharing model

Worksheet 25
8.1 Circular business models – TRIA

Didi is China's version of *Grab* and *Uber*. *Didi* provides smartphone-based services that include social ride-sharing, private car hailing, and taxi hailing. *Didi* has been investing aggressively in self-driving autonomous cars, or "robotaxis" since 2020. There is a widespread belief that autonomous, shared vehicles will become a mainstream mode of transportation in the future rather than individual car ownership.

4. *Didi's* business model is an example of a circular business model called _____.
- A. Circular supply model
 - B. Product life extension model
 - C. Resource recovery model
 - D. Sharing model

In the healthcare industry, *Philips* established leasing relationships with clients for its medical services equipment. This means there is no customer ownership and *Philips* reclaims the leased equipment and upgrades it when necessary. Upgraded and reused equipment are as good as new, so warranties are provided.

5. The above is an example of a circular business model called _____.
- A. Product life extension model
 - B. Product service system model
 - C. Resource recovery model
 - D. Sharing model
6. Which of the following best describes a circular economy?
- A. It is a different approach from the traditional linear economy where resources are extracted for production and consumption, resulting in waste being generated, but focuses on eliminating waste and allows for the recovery and reuse of all materials
 - B. It is a different approach from the current linear economy, where resources are extracted for production and consumption, resulting in waste being generated but recycling being done through the recovery of materials.
 - C. In a circular economy, sustainable products made from recycled materials are consumed
 - D. In a circular economy, the consumption of products is reduced by reusing them whenever possible

7. Which of the following is not a characteristic of a circular business model?
- A. Minimizing waste
 - B. Improving quality
 - C. Recycling of products
 - D. Regenerating the ecosystem
8. A business can expedite maintenance and repair through its product design, that _____.
- A. Has multiple components and pieces
 - B. Increases the number of electrical connections to enhance customer engagement
 - C. Facilitates access to differentiated components for easy exchange of spare parts
 - D. Involves disposable components
9. Which of the following statements is false?
- A. Introducing a marketplace where businesses can display their unused finished goods is a method of redistributing products that facilitates reuse
 - B. Recycling is the most important element when it comes to implementing a circular business model
 - C. Recycled products refer to those that can be collected and remanufactured into new products
 - D. By promoting renting rather than buying, fewer raw materials are used and less waste is generated as products can be designed to be recovered and rented in future
10. Which of the following statements is not a valid benefit of extending a product's life?
- A. It reduces the cost of ownership as the consumer does not need to buy another new product to replace it
 - B. It requires more materials to be used in the design of sustainable products
 - C. The planet's resources are preserved
 - D. It reduces the generation of waste products

Answers

Task 1: Fill in the blanks

At the height of the COVID-19 pandemic, Singapore enforced a two-month “circuit breaker” which effectively locked down the entire country. One major side effect was the additional thousands of tonnes in plastic waste discarded from deliveries of takeaway foods and groceries. The waste equated to the weight of 92 double-decker buses in just two months.

The *World Economic Forum (WEF)* urges governments, businesses, and global citizens to take up the Circular Economy Challenge by addressing the “take-make-dispose” approach in consumption and production. The *WEF* advocates that circularity is the solution for the ills of the traditional linear model. Circular business models (CBMs) promote the elimination of waste. They focus on the sustainable consumption of natural resources. In a circular economy, sharing, recycling (as a form of waste management) re-using, restoration, and regeneration are important considerations for business activities as well.

According to the *WEF*, by embracing CBMs, the global circular economy could yield new revenue streams of up to \$4.5 trillion before the end of 2030. The circular economy offers enormous growth opportunities for investors, entrepreneurs, and start-ups in industries ranging from healthcare to consumer staples. In essence, CBMs drive changes in the way businesses operate. These positive changes drive value not just in terms of returns to investors but also help to improve the well-being of the planet in the future.

Task 2: Multiple choice questions

1. *Bio24* is an example of a circular business model called _____.

 - A. Circular supply model
 - B. Product life extension model
 - C. Resource recovery model**
 - D. Sharing model

2. The above is an example of a circular business model called _____.

 - A. Circular supply model**
 - B. Product life extension model
 - C. Resource recovery model
 - D. Sharing model

3. *HYLA Mobile* uses an example of a circular business model known as _____.
- A. Circular supply model
 - B. Product life extension model**
 - C. Resource recovery model
 - D. Sharing model
4. *Didi's* business model is an example of a circular business model called _____.
- A. Circular supply model
 - B. Product life extension model
 - C. Resource recovery model
 - D. Sharing model**
5. The above is an example of a circular business model called _____.
- A. Product life extension model
 - B. Product service system model**
 - C. Resource recovery model
 - D. Sharing model
6. Which one of the following best describes a circular economy?
- A. It is a different approach from the traditional linear economy where resources are extracted for production and consumption, resulting in waste being generated, but focuses on eliminating waste and allows for the recovery and reuse of all materials**
 - B. It is a different approach from the current linear economy, where resources are extracted for production and consumption, resulting in waste being generated but recycling being done through the recovery of materials.
 - C. In a circular economy, sustainable products made from recycled materials are consumed
 - D. In a circular economy, the consumption of products is reduced by reusing them whenever possible

7. Which of the following is not a characteristic of a circular business model?
- A. Minimizing waste
 - B. Improving quality**
 - C. Recycling of products
 - D. Regenerating the ecosystem
8. A business can expedite maintenance and repair through its product design that _____.
- A. Has multiple components and pieces
 - B. Increases the number of electrical connections to enhance customer engagement sophistication
 - C. Facilitates access to differentiated components for easy exchange of spare parts**
 - D. Involves disposable components
9. Which of the following statements is false?
- A. Introducing a marketplace where businesses can display their unused finished goods is a method of redistributing products that facilitates reuse
 - B. Recycling is the most important element when it comes to implementing a circular business model**
 - C. Recycled products refer to those that can be collected and remanufactured into new products
 - D. By promoting renting rather than buying, fewer raw materials are used and less waste is generated as products can be designed to be recovered and rented in future
10. Which of the following statements is not a valid benefit of extending a product's life?
- A. It reduces the cost of ownership as the consumer does not need to buy another new product to replace it
 - B. It requires more materials to be used in the design of sustainable products**
 - C. The planet's resources are preserved
 - D. It reduces the generation of waste products

G-Star

G-Star is a designer clothing company, founded by Jos van Tilburg in Amsterdam, Netherlands. The brand specializes in fashion clothing made from unwashed and untreated denim. Inspirations for *G-Star's* designs are drawn from vintage military garments from across the world.

Fashion brands have traditionally used linear business models. However, *G-Star* sets a precedent by adopting a circular business model. In 2020, *G-Star* became the world's pioneer in the use of **cradle-to-cradle (C2C) manufacturing** of its denim clothing. The C2C materials were introduced in its best-selling brands of jeans and jackets for the 2020 Spring collection. Each denim product made in this collection used only renewable energy sources and no harmful chemicals in the dyeing, making, and washing of the fabric. Moreover, the fabrics are 100% recyclable.

To stay relevant as a denim brand, *G-Star* backs its future on having **closed-loop recycling** designs. The company pledges to source sustainable materials and design ways to reuse its garments. It also recovers oceanic plastic pollutants and recycles them into wearable fibres by mixing cotton in its denim materials. Its ultimate goal is to use wholly recycled, organic, bio-based, or compostable fabrics by 2030.

(a) State **two** characteristics of linear business models. [2]

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(b) Define the term **cradle-to-cradle manufacturing**. [2]

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(c) Outline **one** advantage of using closed loop recycling. [2]

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(d) Explain how *G-Star* might be adopting a resource recovery circular business model. [4]

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Fairphone

Initiated as an ecological and ethical awareness campaign, *Fairphone* steadily grew to become a company that is committed to reducing waste. It was estimated that there were over 700 million discarded smartphones hibernating in households across the European Union (EU). Each year, it is predicted that e-waste amounts to 50 million tons.

To reduce e-waste, *Fairphone* reused and recycled over 17,000 working smartphones in 2020. Customers can obtain a quotation for the value of their old devices on *Fairphone's* website. After they accept the quotation, customers can receive the value in the form of a gift card. For the usable smartphones that are collected, *Fairphone* performs simple repairs like repairing the screen or replacing the battery before selling them through trusted distributors. Returned phones that are deemed dysfunctional or beyond repair fetch a lower price and are sent to a recycling facility to extract valuable metals, such as gold.

Fairphone manufactures its own brand of smartphones using recycled materials and adopts Fairtrade Gold standards in its supply chain. This is to ensure that rare metals used in smartphones are extracted in a responsible way. *Fairphone* also pledges e-waste neutrality in its production processes. For every *Fairphone* sold, the company recycles or refurbishes one old phone to give it a new life. To facilitate repair and reuse of its devices, *Fairphone's* smartphones can be easily taken apart with a basic screwdriver. This design allows users to access the battery and make repairs at home. *Fairphone's* spare parts are labelled for easy replacement and assembly and are sold separately on its website at affordable prices.

Fairphone's founder, Bas Van Abel, has a strong conviction that making products that are reused and recycled repeatedly can reduce e-waste. By researching recycling designs and working with various like-minded partners in the community, *Fairphone* seeks to establish a circular smartphone economy. Growth in the global circular economy is expected to reach \$4.5 trillion by 2030 according to market research by *GreenBiz*, a media company that advocates the transition to a clean economy.

(e) Identify **two** characteristics of a circular business model. [2]

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(f) Suggest how *Fairphone* uses a circular business model. [2]

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(g) Using information from the stimulus above, explain how *Fairphone* demonstrates the use of a product life extension model for its phones. [4]

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(h) With reference to *Fairphone*, explain **one** benefit of a product life extension model. [2]

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Answers

G-Star

(a) State **two** characteristics of linear business models. [2]

- Follows the traditional “take-make-throw” method or approach to operations management.
- Mass consumer culture in terms of manufacturing and consuming as many products as possible.
- Generation of excessive waste, such as single-use plastics or fast fashion.
- Production methods that are ultimately harmful to the environment.
- Production methods that are unsustainable.
- *Accept any other relevant answer.*

(b) Define the term **cradle-to-cradle manufacturing**. [2]

Cradle-to-cradle manufacturing refers to the sustainable approach of design and production whereby products at the end of their useful life can be repurposed for other uses instead of becoming waste.

(c) Outline **one** advantage of using closed loop recycling. [2]

- Reduction of waste generation (environmental sustainability).
- Better publicity (improved public relations).
- Improved brand image (or better corporate image).
- *Accept any other relevant answer.*

(d) Explain how *G-Star* might be adopting a resource recovery circular business model. [4]

In a resource recovery model, a business like *G-Star* strives to recover waste materials into secondary raw materials for making new products. In this model, *G-Star* avoids the need to acquire new or virgin raw materials in the production process.

The use of cradle-to-cradle denim designs is a key feature of *G-Star's* resource recovery model, whereby used denim can be repurposed for manufacture of new fashionwear instead of it being disposed as waste.

Another characteristic of a resource recovery model is the use of closed-loop recycling, whereby *G-Star* recovers waste, such as plastic pollutants, for reuse in the manufacture of wearable fibres. These wearable fibres are then used to make new denim fashion wear.

(e) Identify **two** characteristics of a circular business model. [2]

- The use of existing materials and products as inputs or raw materials for the generation of new products.
- It involves designing products that are durable so that last as long as possible and/or products that can be repaired, reused, or recycled with relative ease.
- Its represents a fundamentally different way of producing and consuming goods and services, with specific focus on waste reduction for environmental sustainability without compromising economic sustainability.
- *Accept any other relevant answer.*

- (f) Suggest how *Fairphone* uses a circular business model. [2]

In a circular business model, organizations like *Fairphone* seek to reuse, repair, as well as recycle products so as to reduce waste. For example, *Fairphone* reuses and recycles working smartphones in an effort to reduce e-waste. Old phones that can be repaired are sold to trusted distributors.

- (g) Using information from the stimulus above, explain how *Fairphone* demonstrates the use of a product life extension model for its phones. [4]

A product life extension model refers to the prolonging of the useful life of goods and services so that they last longer. By extending the life cycle of products, less waste is generated. This also reduces the need to use new resources to produce new products.

Fairphone's phones are designed to be easily disassembled using a screwdriver. This allows consumers to perform simple repairs such as changing the battery. The components (spare parts) are also conveniently labelled and sold separately on the company's website in order to facilitate repairs. This helps to prolong the useful life of *Fairphone's* devices.

- (h) With reference to *Fairphone*, explain **one** benefit of a product life extension model. [2]

Possible benefits could include an explanation of any one of the following:

- It reduces an organization's reliance on raw materials, lower its energy use, and manufacturing costs – all of which help to improve *Fairphone's* profitability.
- There is growth potential in the global smartphone circular economy, thus leading to increased profitability for *Fairphone*.
- There could be increased customer loyalty as they are discouraged from changing to other brands of smartphones.
- It could help to enhance the brand image for *Fairphone* as customers become increasingly more environmental conscious.
- *Accept any other relevant answer.*

Coconut Master (CM)

Coconut Master (CM) made its debut in Thailand in 2003, introducing its delightful coconut ice creams. Over time, *CM's* offerings expanded to include refreshing coconut shakes. The soaring demand for *CM's* products can be attributed to the growing number of health-conscious individuals actively seeking healthier ice cream alternatives. Notably, coconut is abundant in five essential electrolytes, making it a favoured choice among consumers looking for nutritious options. Moreover, the popularity of coconut water in Thailand has surged, as it is now regarded as a promising isotonic beverage for sports enthusiasts.

CM's brand thrives on superior quality, ethics, and its environmentally friendly values. Though not focused on being the lowest cost provider, *CM* creates its core ice cream products by hand with a unique secret recipe. Every order includes toppings and a complimentary coconut drink served in a coconut husk with coconut flesh. *CM* proudly uses vegan, dairy-free ingredients sourced ethically from premium Fair Trade coconuts.

To stand out from competitors in a throw-away society, *CM* embraces environmentally-friendly practices by using coconut husks as serving cups for its ice cream. *CM* also implements a recycling programme, collecting used coconut husks from customers and repurposing them into water filters, stationery holders, and household accessories in order to minimize waste. All of *CM's* cutlery and serving utensils are fully biodegradable. As part of its corporate social responsibility (CSR), a portion of *CM's* revenue is dedicated to carbon footprint reduction. *CM* also actively contributes to tree planting for a sustainable economy.

(a) Describe what is meant by a *disposable society*. [2]

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(b) Comment on **two** features of the circular business model used by *CM*. [4]

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(c) Explain **two** benefits to *CM* by adopting a circular business model. [4]

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CM has developed the world’s first robotic self-serve coconut ice cream machine. Using an interactive touch-screen, customers can select their choice of flavour and customize different toppings. As part of its growth strategy, *CM* is considering whether to adopt a product service system model by leasing out this patented robotic self-serve coconut ice cream machine to franchisees.

As part of this plan, *CM* would provide workforce training and marketing support to its franchisees. *CM* would also provide free repairs and upgrades for the first 2 years. In return, franchisees would pay 10% royalties to *CM* based on sales revenues. The cost of making each of these robotic self-serve coconut ice cream machines is \$250,000.

Market research by *CM* has revealed the following:

- Competition has increased in the food and beverages (F&B) industry. For example, a large number of bubble-tea outlets have opened in the last 6 months.
- There has not been any significant increase in consumer awareness of green business practices (such as the use of biodegradable packaging). Consumers remain indifferent to F&B outlets that continue to use plastic cutlery and disposable plastics. The supply of biodegradable packaging to *CM*’s franchisees would cost an additional 50 cents per unit.

(d) Using the information in the initial stimulus as well as the information above, evaluate *CM*’s growth strategy. [10]

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Worksheet 27
8.3 Circular business models – Coconut Master

A series of horizontal dotted lines for writing.

Answers

Coconut Master (CM)

(a) Describe what is meant by a *disposable society*. [2]

A disposable society refers to the notion influenced by consumerism whereby society uses items once only and are then thrown away after use. A disposable society leads to excessive consumption and excessive generation of waste.

(b) Comment on **two** features of the circular business model used by CM. [4]

- Closed-loop recycling: CM collects discarded coconut husks from consumers. These are then recycled and reproduced to make new products.
- Cradle-to cradle: Instead of producing waste, CM converts or reprocesses coconut husks which are made into water filters, stationery holders, and accessories.

(c) Explain **two** benefits to CM by adopting a circular business model. [4]

- Conservation of the planet's limited resources – Instead of using more resources to produce cutlery, the use of coconut husks to serve drinks helps to conserve scarce resources on the planet.
- Saving waste landfill space – Through recycling and reprocessing, CM helps to reduce the production of waste.
- Reduces the risks of environmental degradation – In a circular business model, CM ensures sustainability, e.g., CM's cutlery and serving utensils are wholly bio-compostable, which also helps to reduce its carbon footprint.
- *Accept any other relevant answer, written in the context of the case study.*

(d) Using the information in the initial stimulus as well as the information above, evaluate CM's growth strategy. [10]

CM's growth strategy involves the adoption of a product service model and franchising. A product service model is a circular business approach whereby a business such as CM offers the use of its product (such as the robotic self-serve coconut ice cream machine) instead of purchasing the physical product itself. This means CM's franchisees do not need to own the machines. Franchising is a form of external growth strategy where the franchisor, such as CM, sells its brand license to franchisees, who in return pays a license fee to CM. The response should include an evaluation of both the advantages and disadvantages of CM's proposed growth strategy.

Advantages of this growth strategy include:

- The use of a product service model allows CM's franchisees to pay for use of an asset instead of buying (owning) it. Its franchisees are not responsible for maintenance, with upgrades provided by CM. This allows CM to provide more sustainable business operations and provides more incentives to innovate and design greener machines that are more durable.
- The use of a product service model allows CM to differentiate itself from other F&B competitors. The robotic self-serve coconut ice cream machine itself is patented and this provides a unique selling point for CM.
- The use of a product service model allows CM to fulfil its corporate social responsibility (CSR) and its mission through the use of a circular business model.
- Franchising allows CM to grow faster without the need for additional capital since the franchisees pay for this, such as purchasing new retail outlets.

Disadvantages of this growth strategy include:

- The cost of making each robotic self-serve coconut ice cream machine is \$250,000 and presents an enormous initial cash outlay. In addition, *CM* is responsible for maintenance and future upgrades. This would further increase *CM*'s operating expenses.
- Franchising still presents an element of risk to *CM*. Franchisees could ruin the brand image of *CM* if they do not adhere to green practices, including the use of biodegradable packaging (which cost an additional 50 cents per unit).
- Competition is intense in the F&B industry. Consumers have a number of choices such as the growing number of bubble tea outlets. Coconut ice cream does not appeal to everyone as some people may not like coconuts or coconut-flavoured ice creams.
- Despite the many merits of the use of a product service model, consumers may not directly experience them. As reported in the market research, consumer awareness of green practices is not prevalent and this means that *CM* may not gain customer loyalty.
- *Accept any other relevant advantage or disadvantage, discussed in the context of the case study.*

Herbs N' Stuff

James has been running an e-commerce business for several years, selling natural herbs such as ashwagandha (or winter cherry). Due to the rising demand for herbal remedies, sales have increased substantially over the last 12 months, leading to James making the decision to rent a small retail space. The premises have not been used for several years so he will need to spend several weeks refurbishing and decorating the space. James has decided to use a Gantt chart to plan the refurbishment to minimize costs.

Task 1: Fill in the blanks

A Gantt chart is a _____ tool that can be used by businesses to illustrate the schedule and sequences of all the tasks involved in a specific _____. James has identified all the tasks involved in the refurbishment in _____ order as well as identifying which activities can be done _____. Doing this should allow him to _____ the overall time the project takes as well as giving him a realistic idea of the _____ amount of time it will take to complete. This will help him to ensure his _____ is accurate, as he is worried about the business being in a financial _____ over the duration of the refurbishment.

Missing words:

cash flow forecast, concurrently, chronological, deficit, minimum, planning, project, reduce

Task 2: Multiple choice questions

1. A Gantt chart helps managers to identify _____ that will be needed for a given project.
 - A. Competition
 - B. Market Share
 - C. Motivation
 - D. Resources

2. The use of a Gantt chart should allow businesses to be more _____.
 - A. Centralized
 - B. Decentralized
 - C. Efficient
 - D. Hierarchical

3. Gantt charts are _____ tools to use.
- A. Complex
 - B. Expensive
 - C. Inexpensive
 - D. Simple
4. Gantt charts need to be monitored and _____ regularly.
- A. Modernized
 - B. Outdated
 - C. Refreshed
 - D. Updated

Task 3: short answer questions

You should use a separate sheet to address the tasks below.

1. You are organizing a surprise 21st birthday party for your best friend, and you plan to use a Gantt chart to ensure the planning goes smoothly.
 - a. Identify a minimum of 10 tasks that need to be completed e.g., selecting a venue and sending out invitations.
 - b. Identify the order that these tasks need to be done.
 - c. Identify any of the tasks that can be done concurrently.
2. Put this information into a fully labelled Gantt chart.

Answers

Herbs N' Stuff

James has been running an e-commerce business for several years, selling natural herbs such as ashwagandha (or winter cherry). Due to the rising demand for herbal remedies, sales have increased substantially over the last 12 months, leading to James making the decision to rent a small retail space. The premises have not been used for several years so he will need to spend several weeks refurbishing and decorating the space. James has decided to use a Gantt chart to plan the refurbishment to minimize costs.

Task 1: Fill in the blanks

A Gantt chart is a **planning** tool that can be used by businesses to illustrate the schedule and sequences of all the tasks involved in a specific **project**. James has identified all the tasks involved in the refurbishment in **chronological** order as well as identifying which activities can be done **concurrently**. Doing this should allow him to **reduce** the overall time the project takes as well as giving him a realistic idea of the **minimum** amount of time it will take to complete. This will help him to ensure his **cash flow forecast** is accurate, as he is worried about the business being in a financial **deficit** over the duration of the refurbishment.

Missing words:

cash flow forecast, concurrently, chronological, deficit, minimum, planning, project, reduce

Task 2: Multiple choice questions

1. A Gantt chart helps managers to identify _____ that will be needed for a given project.
 - A. Competition
 - B. Market Share
 - C. Motivation
 - D. Resources**

2. The use of a Gantt chart should allow businesses to be more _____.
 - A. Centralized
 - B. Decentralized
 - C. Efficient**
 - D. Hierarchical

3. Gantt charts are _____ tools to use.
- A. Complex
 - B. Expensive
 - C. Inexpensive
 - D. Simple**
4. Gantt charts need to be monitored and _____ regularly.
- A. Modernized
 - B. Outdated
 - C. Refreshed
 - D. Updated**

Task 3: short answer questions

- **Students own answers**

TikTok TopView

Ruben is the manager of a successful game publishing business, which is looking to create a TikTok TopView advert for the Gen Z market. This is the advert that users first see when they open the app. Before the launch, there are a number of different activities that need to be done, so he plans to use a Gantt chart to schedule all tasks that need to be completed.

(a) Place the tasks below in the correct sequence in the Gantt chart beneath. [4]

- A. Conduct a focus group to gain feedback on the TikTok TopView advert
- B. Create the advert
- C. Conduct secondary market research on current TikTok trends and adverts used by rival firms
- D. Conduct a survey with the target market to gain feedback about the advert

Table 1: Gantt Chart for TikTok TopView

TikTok TopView			
1	2	3	4

(b) Define the term *Gantt chart*. [2]

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(c) Explain **one** advantage and **one** disadvantage for Ruben of using a Gantt Chart. [4]

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Answers

TikTok TopView

Ruben is the manager of a successful game publishing business, which is looking to create a TikTok TopView advert for the Gen Z market. This is the advert that users first see when they open the app. Before the launch, there are a number of different activities that need to be done, so he plans to use a Gantt chart to schedule all tasks that need to be completed.

(a) Place the tasks below in the correct sequence in the Gantt chart beneath. [4]

- A. Conduct a focus group to gain feedback on the TikTok TopView advert
- B. Create the advert
- C. Conduct secondary market research on current TikTok trends and adverts used by rival firms
- D. Conduct a survey with the target market to gain feedback about the advert

Table 1: Gantt Chart for TikTok TopView

TikTok TopView			
1	2	3	4
C			
	B		
		A	
		D	

(b) Define the term *Gantt chart*. [2]

A Gantt chart is a tool that can be used by businesses to illustrate the schedule and sequences of all the tasks involved in a specific project. If used properly, it can reduce the overall time it takes to complete a project.

(c) Explain **one** advantage and **one** disadvantage for Ruben of using a Gantt Chart. [4]

One advantage is that Ruben will be able to identify which tasks can run concurrently in order to create the TikTok TopView advert, such as the focus group and survey asking for feedback from the target market to gain feedback about the TikTok Top View advert.

A disadvantage might be that Ruben has not identified all tasks that need to be completed before the advertising campaign directed at the Gen Z market launched on TikTok. This could mean that the launch of the advertising campaign could be delayed.

Tanglin Trust School (TTS)

Tanglin Trust School (TTS) is a private British-based international school in Singapore, operating in the private sector. The Assistant Head of Year 7 is looking to introduce a mindful meditation course as part of the curriculum. She plans to use a Gantt chart to illustrate the schedule of all the different tasks she needs to complete before the initiative is launched.

Table 1: Gantt chart for mindful meditation course

Mindful Meditation						
Week	1	2	3	4	5	6
Research						
Teacher feedback						
Design mindful meditation course						
Train teachers						
Introduce mindful meditation course						
Student feedback						

(a) Define the term *private sector*. [2]

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(b) Describe **two** elements of the Gantt chart in Table 1. [4]

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(c) Explain **two** potential issues for the Assistant Head of Year 7 of using the Gantt chart. [4]

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(d) Using the information provided in **Table 1**, recommend whether the Assistant Head of Year 7 should use a Gantt chart as a planning tool to support the launch of the mindful meditation course at *TTS* . *(You can choose to continue your answer on a separate sheet of paper)* [10]

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Answers

Tanglin Trust School (TTS)

Tanglin Trust School (TTS) is a private British-based international school in Singapore, operating in the **private sector**. The Assistant Head of Year 7 is looking to introduce a mindful meditation course as part of the curriculum. She plans to use a Gantt chart to illustrate the schedule of all the different tasks she needs to complete before the initiative is launched.

Table 1: Gantt chart for mindful meditation course

Mindful Meditation						
Week	1	2	3	4	5	6
Research						
Teacher feedback						
Design mindful meditation course						
Train teachers						
Introduce mindful meditation course						
Student feedback						

(a) Define the term *private sector*. [2]

The private sector consists of businesses that are owned and operated by private individuals, usually aiming to make a profit e.g., sole traders, partnerships, as well as privately and publicly held companies.

(b) Describe **two** elements of the Gantt chart in Table 1. [4]

The Head of Year 7 has identified that the task of researching the mindful meditation course can be conducted during the first two weeks and that she can concurrently start to gain feedback from teachers during week 2. She has also identified that she can start to design the course during week 2, while she is still gathering feedback from the teachers, i.e., there are tasks that can be conducted concurrently.

(c) Explain **two** potential issues for the Assistant Head of Year 7 of using the Gantt chart. [4]

Possible issues might include an explanation of any two of the following points:

- The Gantt chart only shows the predicted duration of each task. The Assistant Head of Year 7 may find that it may take longer than 1 week to train the teachers, for example.
- Delivering a completely new course to students may be more complicated than the initial plans might suggest. In reality, the plans may need to be tweaked based on the feedback from teachers and students.
- Furthermore, if there is a delay in the time it takes to train teachers, perhaps due to more questions than expected or further matters that need to be discussed, it will cause a delay to the launch of the course in Week 5.
- Gantt charts do not account for resource allocation, such as staffing and rooming needs to run the course. Without considering resource availability and constraints, the Gantt chart may schedule tasks without considering whether the required resources at TTS are available, leading to unrealistic plans and potential bottlenecks.
- *Accept any other issue, written in the context of the case study.*

(d) Using the information provided in **Table 1**, recommend whether the Assistant Head of Year 7 should use a Gantt chart as a planning tool to support the launch of the mindful meditation course at TTS. (*You can choose to continue your answer on a separate sheet of paper*) [10]

- Using the Gantt chart may help the Assistant Head of Year 7 in creating a visual identification of all the tasks that she needs to complete before the launch of the new mindful meditation course, which is more effective than just mentally thinking about what she may need to do.
- Using the Gantt chart allows her to identify which activities can be completed concurrently, such as launching the course and gaining initial student feedback, which may result in her becoming more efficient and the course to be implemented more effectively.

Balanced argument:

- Although using a Gantt chart visually represents all the tasks she plans to complete, there is no guarantee that all necessary activities will be included. For example, she may overlook the fact she needs feedback from a number of different stakeholders, including parents or the school governors, before designing the course.
- Although the use of research, feedback, and the program design can take place concurrently during week 2, if research takes longer than 2 weeks, this may delay the start date of the mindful meditation course meaning it cannot be launched in week 5.

Worksheet 30
9.3 Gantt chart (HL only) – Tanglin Trust School

- While Gantt charts provide a clear view of the project timeline for implementing the new mindful meditation course at TTS, the tool may lack detailed information about the individual tasks. Complex tasks, such as curriculum changes, may require additional information such as task descriptions, dependencies, or resource assignments, which are not adequately represented in the chart itself.
- *Accept any other argument, discussed in the context of the case study.*

IKEA

Nooris recently graduated and is working as an intern in the operations department at IKEA. He is fascinated to see what he learnt at university about Porter's generic strategies is so relatable at IKEA.

Task 1: Fill in the blanks

Porter's generic strategies is a management tool that allows an organization to identify what it can do to ensure a _____ advantage, assuming the business idea is not one that can be easily _____. Porter suggested there are 3 different _____ that businesses can consider to ensure they stand out when compared to their _____. The three strategies are:

- Cost leadership
- Differentiation
- _____

Cost leadership involves a business having the _____ costs in the industry. This allows IKEA to charge lower _____ than its rivals. One way in which the furniture store has achieved this is through an integrated _____ chain, now owning over 136,000 acres of forests in the USA alone.

Missing words:

competitive, copied, focus, lowest, prices, rivals, strategies, supply

Task 2: Multiple choice questions

1. _____ is a strategy used by businesses with products that stand out when compared to rival ones in the market.
 - A. Branding
 - B. Cost leadership
 - C. Differentiation
 - D. Focus

Worksheet 31
10.1 Porter's generic strategies (HL only) – IKEA

2. Using a differentiation strategy should allow a business to charge a _____ price for its goods and services.
- A. Cost plus
 - B. Penetration
 - C. Predatory
 - D. Premium
3. Cost focus involves a business competing on price to target a _____ market.
- A. Mass
 - B. New
 - C. Niche
 - D. Saturated
4. An advantage of cost leadership is a business can achieve higher profit _____ than rivals.
- A. Centres
 - B. Margins
 - C. Per unit
 - D. Ratios
5. Differentiation focus involves a business emphasizing a _____ market with a product that stands out compared to those offered by rivals.
- A. Mass
 - B. New
 - C. Niche
 - D. Small

Answers

IKEA

Nooris recently graduated and is working as an intern in the operations department at IKEA. He is fascinated to see what he learnt at university about Porter's generic strategies is so relatable at IKEA.

Task 1: Fill in the blanks

Porter's generic strategies is a management tool that allows an organization to identify what it can do to ensure a **competitive** advantage, assuming the business idea is not one that can be easily **copied**. Porter suggested there are 3 different **strategies** that businesses can consider to ensure they stand out when compared to their **rivals**. The three strategies are:

- Cost leadership
- Differentiation
- **Focus**

Cost leadership involves a business having the **lowest** costs in the industry. This allows IKEA to charge lower **prices** than its rivals. One way in which the furniture store has achieved this is through an integrated **supply** chain, now owning over 136,000 acres of forests in the USA alone.

Missing words:

competitive advantage, copied, focus, lowest, prices, rivals, strategies, supply

Task 2: Multiple choice questions

1. _____ is a strategy used by businesses with products that stand out when compared to rival ones in the market.
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 - B. New
 - C. Niche**
 - D. Small

Tailoring by Krish

Krish owns and runs a successful retail business near Oxford Street in Central London, where he produces high quality tailored suits for men. He has successfully been exporting products to Singapore for over 3 years, where the 'Made in Britain' tag still commands a sense of high quality and a high price tag for affluent customers of *Tailoring by Krish (TK)*. Krish plans to grow the business by spending on foreign direct investment (FDI) in Singapore, by setting up a retail outlet near Orchard Road, Singapore's bustling shopping area and a famous tourist attraction.

Task: Fill in the blanks

Krish has started to research Singapore before finalizing plans for the retail outlet. One area he is keen to investigate in further depth is the difference between the British and Singaporean _____, as he knows this will have an impact on the _____ culture within the new retail store. To do this, Krish has decided to use Hofstede's cultural _____, which is a _____ business management tool used to consider the differences within and between organizations and _____. Therefore, Krish believes the tool will help him to gain a better understanding of the _____ who will work in the Singapore retail outlet. He realizes that due to cultural differences, the corporate culture will be very different to the one found in the London store.

There are 6 elements to Hofstede's cultural dimensions that include:

- Power distance refers to the degree to which _____ and status are respected.
- Individualism v. Collectivism refers to the value placed on the individual over a _____.
- Masculinity v. Femininity refers to male and female stereotypes e.g., competitiveness is deemed to be _____ whereas caring for others tends to be deemed as _____.
- Uncertainty avoidance refers to the extent to which _____ and vagueness is accepted.
- Long term v. Short term orientation refers to the degree to which cultures and traditions are valued or whether a society focuses more on the _____.
- Indulgence v. Restraint refers to the extent to which a country tries to suppress people's needs and desires through strict social _____ and self-regulation.

Krish believes _____ distance will be important as Asian countries, such as Singapore, tend to accept and expect a more hierarchical approach to employee-employer relations. He is also keen to investigate individualism v. collectivism as he believes _____ tends to be much higher in the UK than in Singapore.

Missing words: ambiguity, authority, corporate, countries, cultures, dimensions, employees, feminine, future, individualism, masculine, situational, team, norms, power

Answers

Tailoring by Krish (TK)

Krish owns and runs a successful retail business near Oxford Street in Central London, where he produces high quality tailored suits for men. He has successfully been exporting products to Singapore for over 3 years, where the 'Made in Britain' tag still commands a sense of high quality and a high price tag for affluent customers of *Tailoring by Krish (TK)*. Krish plans to grow the business by spending on foreign direct investment (FDI) in Singapore, by setting up a retail outlet near Orchard Road, Singapore's bustling shopping area and a famous tourist attraction.

Task: Fill in the blanks

Krish has started to research Singapore before finalizing plans for the retail outlet. One area he is keen to investigate in further depth is the difference between the British and Singaporean **cultures**, as he knows this will have an impact on the **corporate** culture within the new retail store. To do this, Krish has decided to use Hofstede's cultural **dimensions**, which is a **situational** business management tool used to consider the differences within and between organizations and **countries**. Therefore, Krish believes the tool will help him to gain a better understanding of the **employees** who will work in the Singapore retail outlet. He realizes that due to cultural differences, the corporate culture will be very different to the one found in the London store.

There are 6 elements to Hofstede's cultural dimensions that include:

- Power distance refers to the degree to which **authority** and status are respected.
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- Uncertainty avoidance refers to the extent to which **ambiguity** and vagueness is accepted.
- Long term v. Short term orientation refers to the degree to which cultures and traditions are valued or whether a society focuses more on the **future**.
- Indulgence v. Restraint refers to the extent to which a country tries to suppress people's needs and desires through strict social **norms** and self-regulation.

Krish believes **power** distance will be important as Asian countries, such as Singapore, tend to accept and expect a more hierarchical approach to employee-employer relations. He is also keen to investigate individualism v. collectivism as he believes **individualism** tends to be much higher in the UK than in Singapore.

Missing words: ambiguity, authority, corporate, countries, cultures, dimensions, employees, feminine, future, individualism, masculine, situational, team, norms, power

Solar Sea Bot (SSB)

Ayush and Han spent several years working on a prototype for a solar powered robot that can be used to clear up waste in rivers, lakes, and oceans. After successfully pitching it to a business angel, they have been successfully operating *Solar Sea Bot (SSB)* in the UK, with more recent plans to move production to China. They have conducted research on cultural norms in China, which they aim to use to ensure the plans to offshore run smoothly.

Ayush and Han's research found the following cultural norms in China:

- i. Traditional hierarchies where people are expected to respect those who have a higher status (rank).
- ii. People tend to think of the needs of others before their own.
- iii. Achievement is highly valued in China.
- iv. Structure, stability, and clear plans of action are preferred.

(a) Identify how the above cultural norms should be categorized according to Hofstede's cultural dimensions. [4]

- i.
- ii.
- iii.
- iv.

(b) Explain how power distance could impact *Solar Sea Bot (SSB)*. [4]

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Answers

Solar Sea Bot (SSB)

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- iii. Achievement is highly valued in China.
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(a) Identify how the above cultural norms should be categorized according to Hofstede's cultural dimensions. [4]

- i. Power distance
- ii. Individualism v. Collectivism
- iii. Masculinity v. Femininity
- iv. Uncertainty avoidance

(b) Explain how power distance could impact *Solar Sea Bot (SSB)*. [4]

According to Hofstede, power distance refers to the extent to which there is acceptance (by employees) of the unequal distribution of power between the highest and lowest ranked members in an organization. The cultural norms in China where traditional hierarchies are common suggest that Chinese employees lower down the chain of command will be more compliant than staff who work in the factories that manufacture robots in the UK. This may mean that a more autocratic leadership style will be expected in the Chinese production unit of the solar powered robots, which could result in faster decision making.

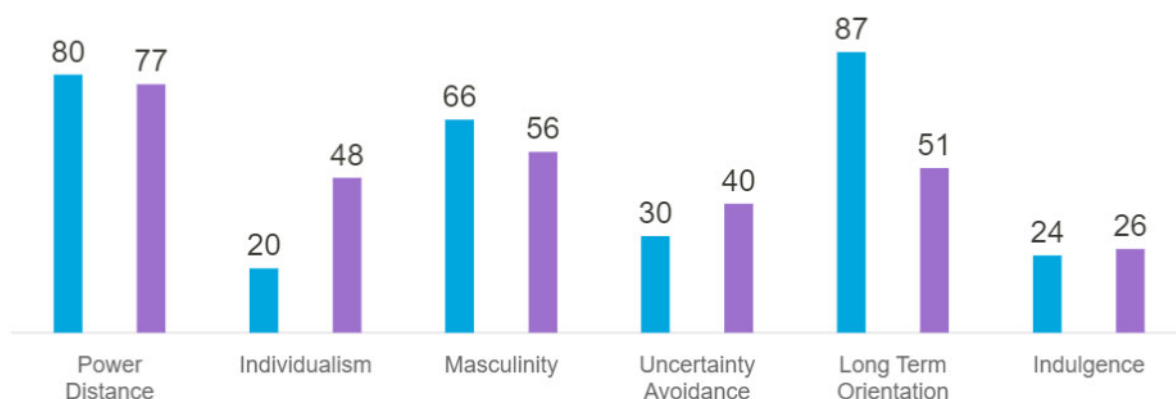
Wembley Bikes

Wembley Bikes saw a significant increase in sales during the COVID-19 pandemic as people avoided using public transport and spent more time exercising individually as gyms remained closed in the UK. *Wembley Bikes* struggled to keep up with demand during the peak of the 'bike boom', but in the latter part of 2021, as COVID-19 cases started to drop, so did bike sales for all retailers in the UK.

Furthermore, *Wembley Bikes* has seen costs rise, meaning some tough decisions need to be made. Offshoring has taken place in China for several years, where production costs are significantly lower than in the UK, but even China has experienced higher costs as the middle class grows and labour costs rise

Managers at *Wembley Bikes* are currently considering changing the location of production to India, where costs will be lower, but one important consideration is the cultural differences that exist. When production first moved to China, there were several cultural norms that were difficult to navigate, and managers were worried about the impact this would have on labour productivity. They have used the Hofstede's Insight website to compare and contrast the two countries to try and help them make a decision.

Figure 1: Comparison of China and India



(Hofstede, 2021)

Worksheet 34
11.3 Hofstede's cultural dimensions (HL only) – Wembley Bikes

(a) Define the term *offshoring*. [2]

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(b) Define the term *power distance*. [2]

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(c) Define the term *uncertainty avoidance*. [2]

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(d) Explain **two** potential advantages for managers at *Wembley Bikes* of using Hofstede's cultural dimensions. [4]

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Answers

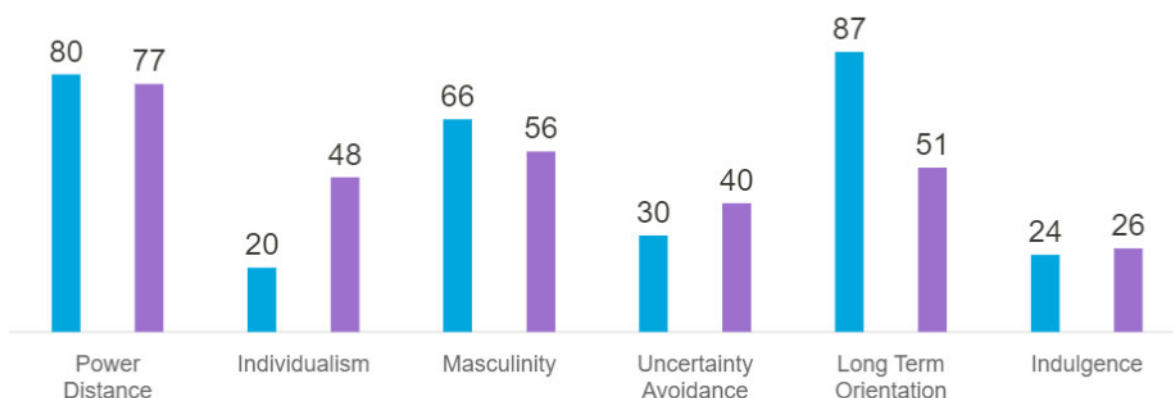
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Figure 1: Comparison of China and India



(Hofstede, 2021)

Worksheet 34
11.3 Hofstede's cultural dimensions (HL only) – Wembley Bikes

- (a) Define the term *offshoring*. [2]

The term offshoring refers to an organization relocating specific functional tasks abroad. This is often done so that a business can reduce its costs.

- (b) Define the term *power distance*. [2]

Power distance refers to organizations or countries that value authority and status. Where there is a high degree of power distance, people are more likely to accept an autocratic leadership style.

- (c) Define the term *uncertainty avoidance*. [2]

Uncertainty avoidance refers to organizations or countries where people are accepting of risks, the unknown, and uncertainty. Where there is a low degree of uncertainty avoidance, there is a more relaxed approach to risk taking.

- (d) Explain **two** potential advantages for managers at *Wembley Bikes* of using Hofstede's cultural dimensions. [4]

- *Wembley Bikes* can minimize risks. For example, if production is changed from China to India, managers will have a better understanding of cultural norms (and differences) and how to best communicate with staff. Uncertainty avoidance is lower in China so there is relatively high tolerance for risk-taking. By contrast, India tends to rely more on their set rules and ways of doing things.
- It may help *Wembley Bikes* to gain a better understanding of its Indian customers, which they will have easier access to if the location of production changes. As the individualism index is more than double that of China's (by 28 index points), it may suggest that a large number of Indians focus on personal goals relative to people in China. This may more likely result in people being motivated to spend their disposable income on a bike to improve their own health and well-being.

- (e) Using the information above, recommend to *Wembley Bikes* whether it should change the production location to India. [10]

- *Wembley Bikes* could change its production location to India because the degree of power distance in India is very similar in China, where the figures are 77 and 80 respectively. This will mean a similar chain of command can be used in the new factory, but the business would gain from lower production costs.

Worksheet 34
11.3 Hofstede's cultural dimensions (HL only) – Wembley Bikes

- China is a more collectivist society (according to the data), with a 28-point difference when compared to India. This may suggest to managers that personal targets should be applied in an Indian factory, which could result in employees being more productive.
- *Accept any other argument in favour of change in location that uses the data in Figure 1.*

Balanced argument

- However, there is still a difference of 3 index points in power distance between India and China, which may suggest there are more nuanced differences that need to be made within the chain of command.
- However, a collectivist society may be more beneficial for *Wembley Bikes*, as employees may be more likely to work towards the common good of the business as a whole, as opposed to only considering their own personal needs.
- *Accept any other argument against changing the production location to India that uses the data in Figure 1.*

The Eggxer

Utsav has been manufacturing his 'Eggxer' kitchen gadget in the UK for the past 12 months, but he is considering offshoring production to Vietnam. As a sole trader, he has no partners to discuss his ideas with. He is also finding it hard to make a final decision. He knows there are plenty of reasons for the change, but he is fearful that it is too risky. To help aid his decision making, Utsav has decided to use force field analysis.

Task 1: Fill in the blanks (use the words in the box below)

Force field analysis is a business tool that was devised by psychologist Kurt Lewin, used by businesses to consider the _____ forces for change and the restraining forces against change. Driving forces are factors that support _____ whereas restraining forces do not support change.

Utsav starts by listing all the factors he believes there are that are for and against _____ production to Vietnam. He assigns a numeric value to each force to highlight its relative importance.

Driving forces:

- Lower production costs (5)
- Ability to charge lower prices (6)

Restraining forces:

- Lack of knowledge of the Vietnamese market (8)
- Recruitment costs in Vietnam (4)

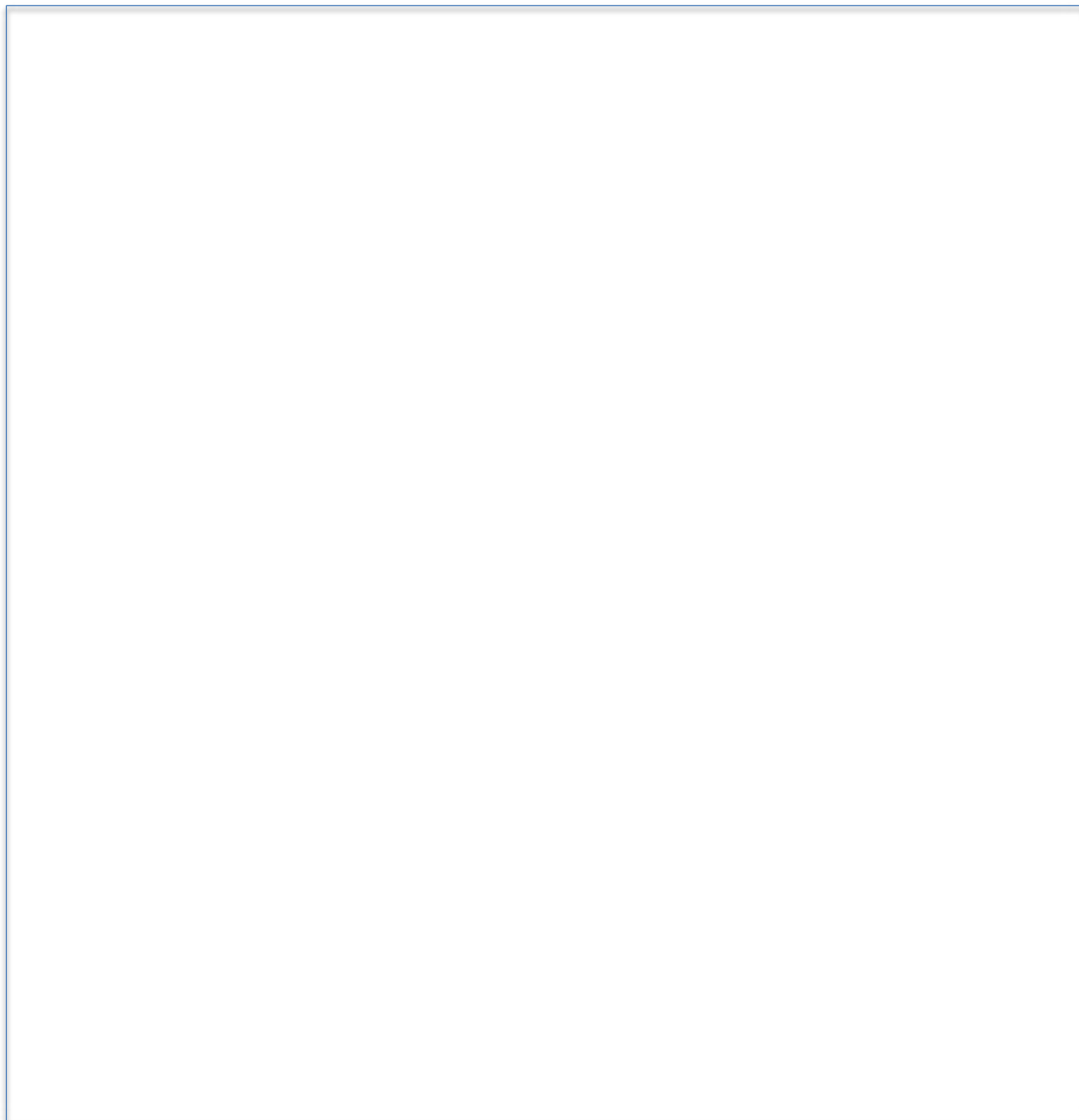
Utsav is keen to use force field analysis as it has the potential to offer him an easy to interpret _____ of what he is finding difficult in terms of decision making. However, once he starts creating the force field analysis, he realizes that there is a good chance he has missed some key driving and restraining forces. He is also worried that the _____ values he has assigned to different factors could be inaccurate, making the entire task _____. He wonders if the problem he is dealing with is too _____ to assess using force field analysis.

Missing words:

change, complex, driving, illustration, imprecise, numerical, offshoring

Task 2: Force Field Analysis for Eggxer

Use the information above to illustrate the force field analysis for Eggxer, calculating the total driving and restraining forces. Advise Utsav what he should do based on this analysis.



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Answers

The Eggxer

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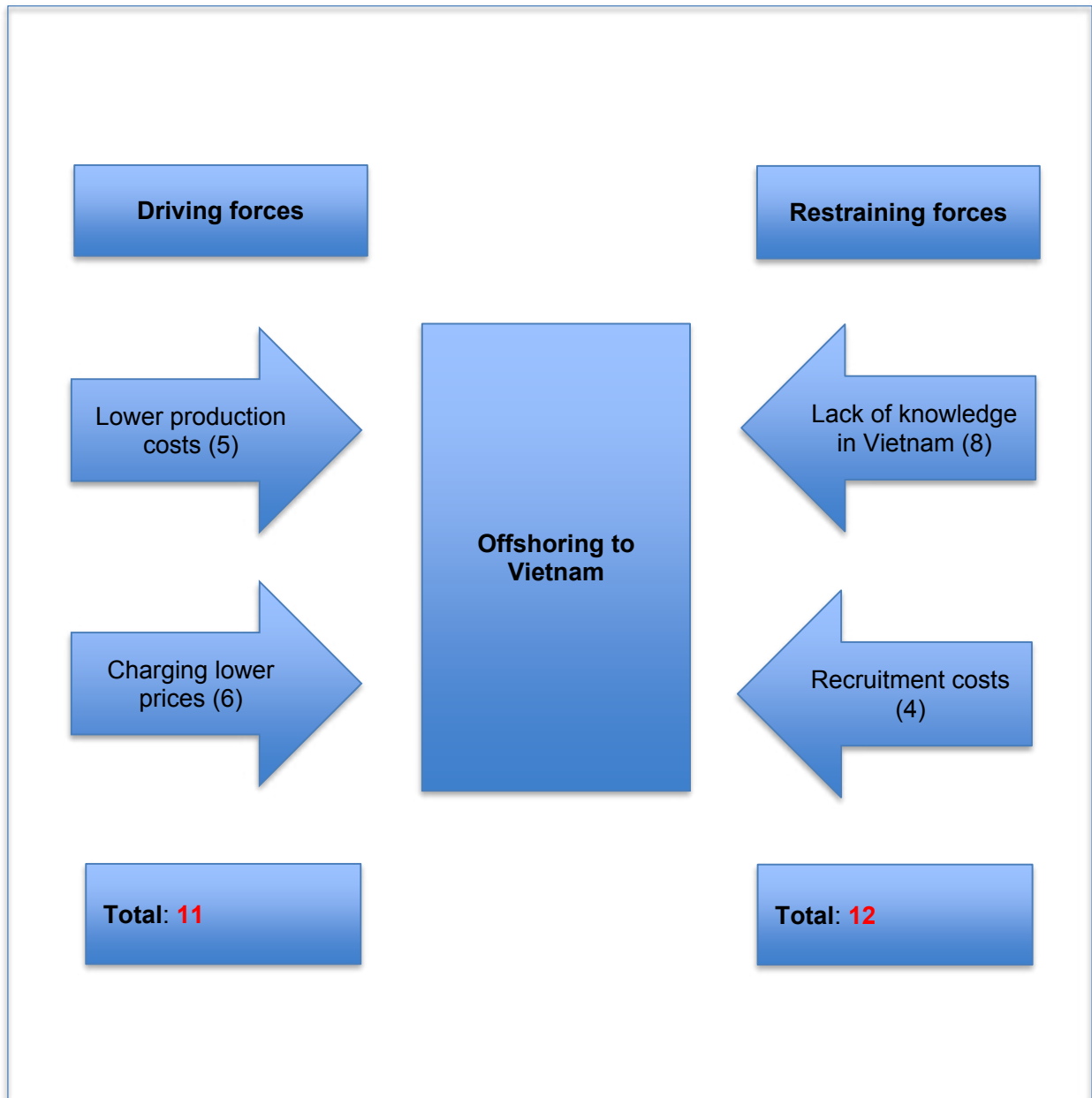
Utsav is keen to use force field analysis as it has the potential to offer him an easy to interpret **illustration** of what he is finding difficult in terms of decision making. However, once he starts creating the force field analysis, he realizes that there is a good chance he has missed some key driving and restraining forces. He is also worried that the **numerical** values he has assigned to different factors could be inaccurate, making the entire task **imprecise**. He wonders if the problem he is dealing with is too **complex** to assess using force field analysis.

Missing words:

change, complex, driving, illustration, imprecise, numerical, offshoring

Task 2: Force Field Analysis for Eggxer

Use the information above to illustrate the force field analysis for Eggxer, calculating the total driving and restraining forces. Advise Utsav what he should do based on this analysis.



According to the results of the force field analysis, Utsav should *not* offshore production to Vietnam. This is because the value (or weights) of the total restraining forces is greater than the value of the driving forces by 1 point. However, as the results are very close in value, it is worth Utsav considering the use of other decision-making tools, such as decision trees, to assist decision making further.

International Dating

Chaz runs *International Dating*, an international dating agency that gives people the opportunity to find their soulmate around the world. The business has been thriving and Chaz is keen to implement internal growth strategies to capitalize on the current success. He thinks that he can differentiate the service by adding a video function to member profiles so that they can introduce themselves more comprehensively and authentically.

(a) Identify whether the following factors are driving or restraining forces. [4]

- The costs of a new advertising campaign for *International Dating*.
○ _____
- The video function could act as a unique selling point (USP) for *International Dating*.
○ _____
- Reviewing videos to ensure they are appropriate for the website will be time consuming.
○ _____
- Adding a video function should enable *International Dating* to charge a higher price.
○ _____

(b) Define the term *force field analysis*. [2]

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(c) Explain **one** advantage for Chaz of using force field analysis for *International Dating*. [2]

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Answers

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(a) Identify whether the following factors are driving or restraining forces. [4]

- The costs of a new advertising campaign for *International Dating*
 - Restraining force

- The video function could act as a unique selling point (USP) for *International Dating*.
 - Driving force

- Reviewing videos to ensure they are appropriate for the website will be time consuming.
 - Restraining force

- Adding a video function should enable *International Dating* to charge a higher price.
 - Driving force

(b) Define the term *force field analysis*. [2]

Force field analysis is a tool used by businesses to identify the driving and restraining forces for a specific course of action. These forces are given numeric weights or values, whereby the force with the highest total value should be the preferred course of action.

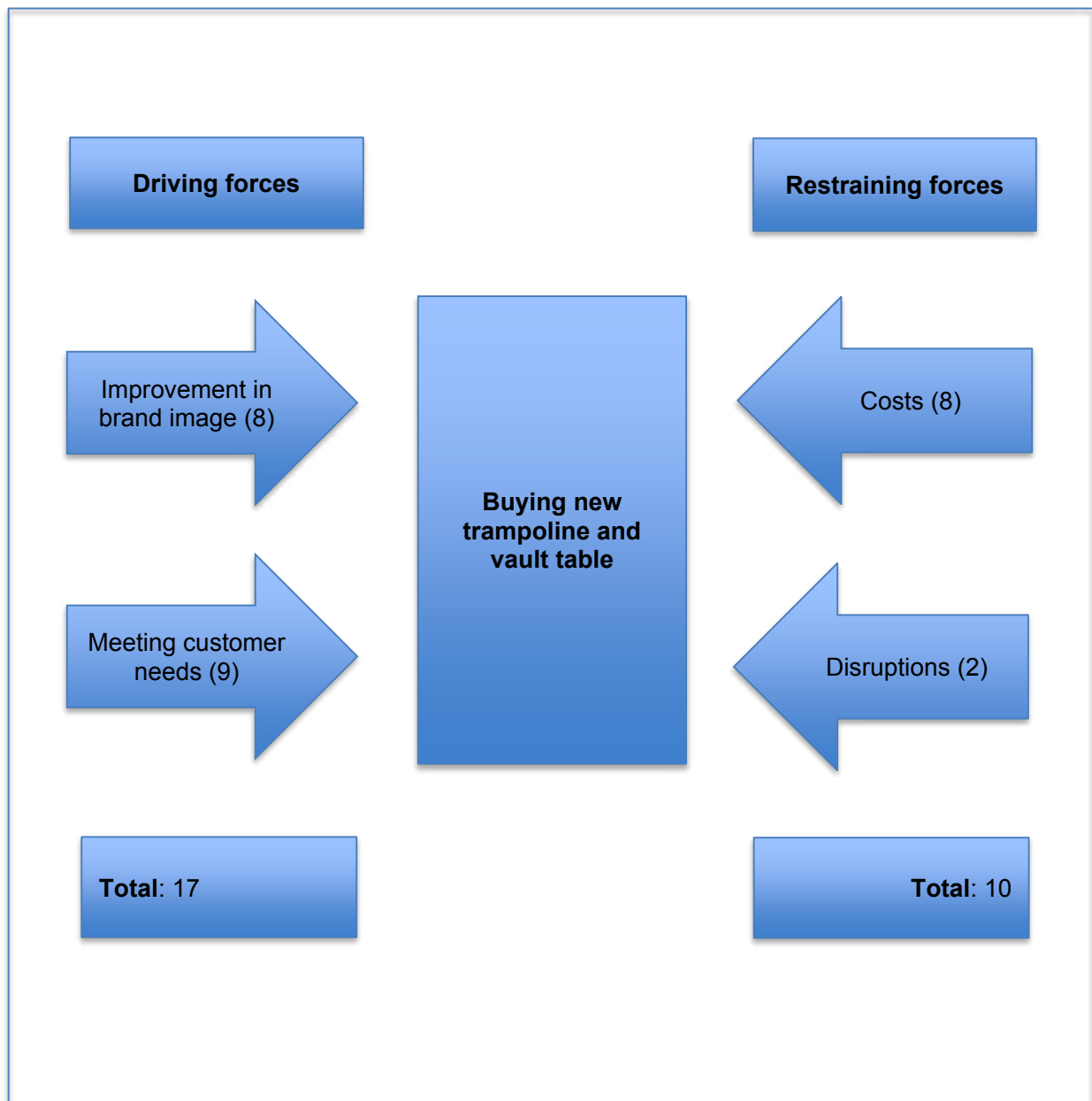
(c) Explain **one** advantage for Chaz of using force field analysis for *International Dating*. [2]

One advantage of using force field analysis for Chaz is that it may help him decide whether he should add the video function to member profiles on *International Dating*. Using the tool should allow him to identify all the key driving and restraining forces associated with this particular internal growth strategy for his business.

Gymtastics

Gymtastics is an academy for young children in Kent, UK. The business has been running for over 10 years. *Gymtastics* has maintained its equipment effectively, but the manager Keira, believes it might be worthwhile replacing the trampoline and vault table. She has noticed some wear and tear and the usual maintenance might not work for much longer. However, she does have some concerns about whether it is the right time to buy new equipment at this time. *Gymtastics* usually imports gymnastic equipment, but the British pound has been plummeting, so costs have increased.

Table 1: Force field analysis for Gymtastics



(a) Define the term *exchange rate*. [2]

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(b) Describe **two** elements of the force field analysis for *Gymnastics*. [4]

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(c) Explain **two** potential issues for Keira of using a force field analysis for *Gymnastics*. [4]

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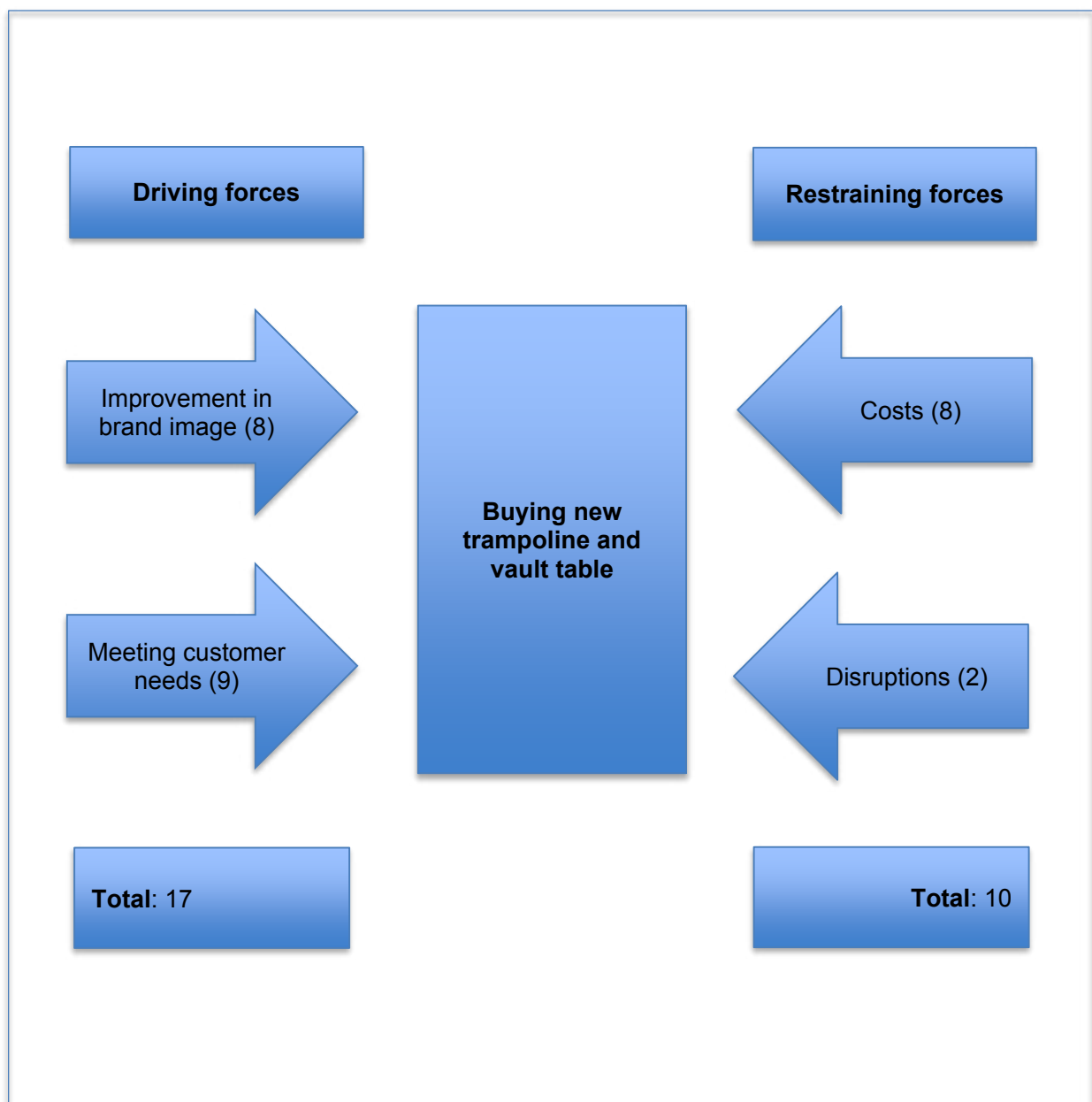
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Table 1: Force field analysis for Gymtastics



Answers

(a) Define the term *exchange rate*. [2]

The exchange rate measures how much one currency is worth in relation to another currency. The depreciation of the pound would lead to exports being cheaper but imports being more expensive.

(b) Describe **two** elements of the force field analysis for *Gymnastics*. [4]

Meeting customer needs is recorded as the most valuable driving force for *Gymnastics*, with a value of 9. This suggests that Keira believes it is very important that *Gymnastics* replaces the old equipment to ensure customers are happy with the service they receive. Disruptions have been recorded as the least valuable restraining force, with a value of 2. This suggests that any disruptions caused by physically replacing the equipment will be low and temporary.

(c) Explain **two** potential issues for Keira of using a force field analysis for *Gymnastics*. [4]

- Keira may not have included all relevant driving and restraining forces in the force field analysis. She currently only has two driving and two restraining forces, which seems low for an established gymnastics academy in this situation.
- Another potential issue is that the allocation of numerical values may be inaccurate due to their subjective nature. For example, Keira may have some bias towards replacing the gymnastics equipment, which may lead to her valuing the driving forces higher than they need to be.

(d) Using the information provided in Table 1, recommend to Keira what action *Gymnastics* should take. [10]

- The case study suggests the business has been using the trampoline and vault table for 10 years, so these need to be replaced in order for *Gymnastics* to remain competitive.
- The force field analysis suggests the change/upgrade will have a significant/positive impact on the brand image on the gymnastics academy.

Balanced argument

- The depreciation of the British pound suggests *Gymnastics* should wait a little longer to import the equipment due to the relatively high cost of imports.
- The case study also suggests there is currently only wear and tear of the capital equipment, so the purchase can be delayed at least for now.

NEWBrew

Public Utilities Board (PUB) is the national water agency of Singapore. To promote water sustainability, the directors of *PUB* would like to serve 10,000 litres of beer, branded as *NEWBrew*, to international delegates during Singapore International Water Week (SIWW). This is an annual global event to share and co-create innovative water solutions.

NEWBrew is to be made from *NEWater*, which is recycled water purified using high-tech membrane technologies and ultraviolet disinfection. However, a major business decision is the cost.

Should *PUB* manufacture the *NEWBrew* or buy the beer brewed elsewhere using its *NEWater*? This decision could be evaluated using make or buy analysis.

Task 1: Fill in the blanks

Table 1 below shows the cost to buy (CTB) and cost to make (CTM) formulae. Complete the missing blanks in the table.

Table 1: CTB and CTM formulae

Cost to Buy (CTB)	Cost to Make (CTM)
$CTB = P \times Q$	$CTM = FC + (VC \times Q)$
<p><i>Where:</i></p> <p><i>P</i> is _____ per unit</p> <p><i>Q</i> is _____ of demand for the product</p> <p><i>FC</i> is _____ costs related to manufacturing of the product</p> <p><i>VC</i> is _____ costs of manufacturing the product.</p>	

PUB has approached *Brewerkz*, a local craft brewery, about the possibility of producing the *NEWBrew* using its *NEWater*. To produce 28,000 cans of beer, *Brewerkz* has quoted \$3 per can. Using Table 1, the cost to buy (CTB) is _____. However, if *PUB* were to manufacture its own beer, it would require \$250,000 for brewing equipment and machinery plus variable costs of \$5 per can of beer for ingredients such as malt, hops yeast, and labour. Therefore, the cost to make (CTM) 28,000 cans of beer is _____.

Based on the CTB and CTM analysis above, *PUB* should _____ the production of *NEWBrew*.

However, before making a final decision, *PUB* should also consider _____ factors, such as sustainability issues, compliance, and quality control at *Brewerkz*.

Task 2: Multiple choice questions

3i Corporation Limited

During the COVID-19 outbreak, many residents struggled to obtain quality face masks. *3i Corporation Limited*, a furniture and cushion manufacturer in Hong Kong, spotted this opportunity. At the time, it intended to produce 1 million face masks per month. There were two options for the company.

Option 1 (CTB):

Buy from an external supplier in South Korea. *3i Corporation Limited* can then package the face masks under its own brand for resale. Each 4-layered *KF94* face mask cost \$0.30 from the South Korean supplier, with minimum purchase of 50,000 pieces.

Option 2 (CTM):

3i Corporation Limited would make the face masks itself as the company has expertise in non-woven fabrics. These fabrics are the basic materials used in the manufacturing of face masks. A manufacturing site plus machinery to make the masks need to be secured. Allocated fixed costs (including rental and equipment) work out to be \$50,000. Direct material costs are expected to be \$0.65 per piece.

1. The cost to buy (CTB) 1 million face masks is _____.
 - A. \$300,000
 - B. \$400,000
 - C. \$500,000
 - D. \$600,000

2. The cost to make (CTM) 1 million face masks is _____.
 - A. \$500,000
 - B. \$600,000
 - C. \$700,000
 - D. \$800,000

3. Based on your answers to question 1 and 2, *3i Corporation Limited* should choose:
 - A. Option 1
 - B. Option 2
 - C. Option 1 and Option 2
 - D. Neither of the options

4. Which of the following is not an example of fixed costs for *3i Corporation Limited*?
- A. Rental costs
 - B. Fabric costs
 - C. Equipment costs
 - D. Labour overheads
5. Which of the following is a qualitative factor that *3i Corporation Limited* should consider?
- A. The liquidity position
 - B. The profit margin
 - C. The market share
 - D. The preferences of customers

Answers

NEWBrew

Public Utilities Board (PUB) is the national water agency of Singapore. To promote water sustainability, the directors of *PUB* would like to serve 10,000 litres of beer, branded as *NEWBrew*, to international delegates during Singapore International Water Week (SIWW). This is an annual global event to share and co-create innovative water solutions.

NEWBrew is to be made from *NEWater*, which is recycled water purified using high-tech membrane technologies and ultraviolet disinfection. However, a major business decision is the cost.

Should *PUB* manufacture the *NEWBrew* or buy the beer brewed elsewhere using its *NEWater*? This decision could be evaluated using make or buy analysis.

Task 1: Fill in the blanks

Table 1 below shows the cost to buy (CTB) and cost to make (CTM) formulae. Complete the missing blanks in the table.

Table 1: CTB and CTM formulae

Cost to Buy (CTB)	Cost to Make (CTM)
$CTB = P \times Q$	$CTM = FC + (VC \times Q)$
<p><i>P</i> is price per unit <i>Q</i> is quantity of demand for the product <i>FC</i> is fixed costs related to manufacturing of the product <i>VC</i> is variable costs of manufacturing the product.</p>	

PUB has approached *Brewerkz*, a local craft brewery, about the possibility of producing the *NEWBrew* using its *NEWater*. To produce 28,000 cans of beer, *Brewerkz* has quoted \$3 per can. Using Table 1, the cost to buy (CTB) is **\$84,000**. However, if *PUB* were to manufacture its own beer, it would require \$250,000 for brewing equipment and machinery plus variable costs of \$5 per can of beer for ingredients such as malt, hops yeast, and labour. Therefore, the cost to make (CTM) 28,000 cans of beer is **\$390,000**.

Based on the CTB and CTM analysis above, *PUB* should **outsource** the production of *NEWBrew*.

However, before making a final decision, *PUB* should also consider **qualitative** factors, such as sustainability issues, compliance, and quality control at *Brewerkz*.

Task 2: Multiple choice questions

3i Corporation Limited

During the COVID-19 outbreak, many residents struggled to obtain quality face masks. *3i Corporation Limited*, a furniture and cushion manufacturer in Hong Kong, spotted this opportunity. At the time, it intended to produce 1 million face masks per month. There were two options for the company.

Option 1 (CTB):

Buy from an external supplier in South Korea. *3i Corporation Limited* can then package the face masks under its own brand for resale. Each 4-layered *KF94* face mask cost \$0.30 from the South Korean supplier, with minimum purchase of 50,000 pieces.

Option 2 (CTM):

3i Corporation Limited would make the face masks itself as the company has expertise in non-woven fabrics. These fabrics are the basic materials used in the manufacturing of face masks. A manufacturing site plus machinery to make the masks need to be secured. Allocated fixed costs (including rental and equipment) work out to be \$50,000. Direct material costs are expected to be \$0.65 per piece.

- The cost to buy (CTB) 1 million face masks is _____.
A. \$300,000 $\$0.3 \times 1,000,000 = \$300,000$
B. \$400,000
C. \$500,000
D. \$600,000
- The cost to make (CTM) 1 million face masks is _____.
A. \$500,000
B. \$600,000
C. \$700,000 $(\$0.65 \times 1,000,000) + \$50,000 = \$700,000$
D. \$800,000
- Based on your answers to question 1 and 2, *3i Corporation Limited* should choose:
A. Option 1
B. Option 2
C. Option 1 and Option 2
D. Neither of the options

4. Which of the following is not an example of fixed costs for *3i Corporation Limited*?
- A. Rental costs
 - B. Fabric costs**
 - C. Equipment costs
 - D. Labour overheads
5. Which of the following is a qualitative factor that *3i Corporation Limited* should consider?
- A. The liquidity position
 - B. The profit margin
 - C. The market share
 - D. The preferences of customers**

Sky Greens

Jack Ng, founder of *Sky Greens (SG)*, pioneered the world's first vertical farm using hydraulically driven technology. This disruptive innovation has turned urban organic farming into a commercial reality in land-scarce Singapore through the use of sustainable and green agricultural technology with minimal carbon footprints.

However, with limited space for farming, there are important business decisions to be made. Jack has to maximize the production and sales of his organic vegetables. To do this, Jack needs to have a breakdown of the variable costs for each of his organic vegetable products. With this financial information, he can make decisions regarding how much of his limited vertical farm to dedicate to each product by calculating the unit contribution.

Task 1: State the formulae used to calculate unit contribution.

.....

Task 2: Fill in the blanks

Currently, *Sky Greens* produces only two types of organic vegetables: kale and lettuce. Kale sells for \$8 per kg and lettuce sells for \$6 per kg. It is forecasted that demand for its kale is 100 kg while lettuce is 60 kg per week. Fill in the blanks for (i), (ii), (iii), and (iv) in **Table 1** below.

Table 1: Revenue/Cost per product for SG

	Kale (\$)	Lettuce (\$)
Revenue	(i)	(ii)
Direct labour cost	20	10
Direct material cost	120	80
Total direct cost	30	10
Total contribution	(iii)	(iv)

Based on the contribution that each product makes, Jack can assess the profitability of kale and lettuce and then prioritize how much of his farm to be set aside for production. Contribution per _____ is calculated by taking away the _____ from the _____. Products that make a _____ contribution should remain in *Sky Green's* _____ portfolio. A new product can be added if it is estimated that it will contribute to *SG's* profitability. A _____ contribution would signal to Jack the product is making a _____. This means that the product needs to be _____ from the portfolio or have its selling price adjusted.

Missing words:

average variable cost, loss, negative, positive, product, removed, selling price, unit

Task 3: Multiple Choice Questions

Use the following information for Questions 1 to 5.

Magic Sauce

Magic Sauce is one of the few remaining local brands in Thailand that still produces sauces for Asian cooking, using traditional batch production methods. *Magic Sauce* manufactures three major product lines for its local market: oyster sauce, soya sauce, and fish sauce. The finance department has collected the following information.

Table 2: Cost/Revenue Information for *Magic Source* in Thai baht (฿)

	Oyster sauce	Soya sauce	Fish sauce
Selling price per bottle	฿20	฿15	฿30
Ingredients	500 kg	400 kg	600 kg
Labour (฿30/hour)	180 hours	100 hours	120 hours
Contribution per product	K	L	M

Demand for each product line is 5,000 bottles while the cost for ingredients are ฿40, ฿20, ฿30 per kg respectively. Total fixed costs are \$195,000 which would be allocated equally across all product lines. The managers of each product line would like to ensure that the product they are responsible for earns a positive contribution towards SG's fixed costs.

- The value of the contribution, **K** for oyster sauce is _____.
 A. ฿43,600
 B. ฿47,600
 C. ฿73,600
 D. ฿74,600
- The value of the contribution, **L** for soya sauce is _____.
 A. ฿46,000
 B. ฿64,000
 C. ฿68,000
 D. ฿86,000

Worksheet 39
13.2 Contribution: Contribution costing (HL only) – Sky Greens

3. The value of the contribution, **M** for fish sauce is _____.
- A. ₱128,400
 - B. ₱138,400
 - C. ₱148,400
 - D. ₱158,400

Table 3: Contribution to fixed costs for *Magic Sauce*

	Oyster sauce	Soya sauce	Fish sauce
Fixed costs	₱65,000	₱65,000	₱65,000
Profit/loss	X	Y	Z

A total fixed cost of ₱195,000 is shared equally among all the three products (Table 3.)

4. Calculate the profit/loss attributable to oyster sauce, soya sauce, and fish sauce (values of **X**, **Y** and **Z** respectively).

	X	Y	Z
A.	₱6,900	(₱1,000)	₱36,400
B.	₱6,900	₱1,000	₱36,400
C.	₱9,600	(₱1,000)	₱63,400
D.	₱9,600	₱1,000)	₱63,400

5. Based on the contribution made to fixed costs, which one of the following products could be considered for termination?
- A. Oyster sauce
 - B. Soya sauce
 - C. Fish sauce
 - D. None of the above

Answers

Sky Greens

Task 1:

Unit contribution = **Selling price per unit minus Variable costs per unit**

Task 2: Fill in the blanks

Currently, *Sky Greens* produces only two types of organic vegetables: kale and lettuce. Kale sells for \$8 per kg and lettuce sells for \$6 per kg. It is forecasted that demand for its kale is 100 kg while lettuce is 60 kg per week. Fill in the blanks for (i), (ii), (iii), and (iv) in **Table 1** below.

Table 1: Revenue/Cost per product for SG

	Kale (\$)	Lettuce (\$)
Revenue	(i) 800	(ii) 360
Direct Labour Cost	20	10
Direct Material Cost	120	80
Total Direct Cost	30	10
Total contribution	(iii) 630	(iv) 260

Based on the contribution that each product makes, Jack can assess the profitability of kale and lettuce and then prioritize how much of his farm to be set aside for production. Contribution per **unit** is calculated by taking away the **average variable cost** from the **selling price**. Products that make a **positive** contribution should remain in *Sky Green's* **product** portfolio. A new product can be added if it is estimated that it will contribute to *SG's* profitability. A **negative** contribution would signal to Jack the product is making a **loss**. This means that the product needs to be **removed** from the portfolio or have its selling price adjusted.

Task 3: Multiple Choice Questions

Use the following information for Questions 1 to 5.

Magic Sauce

Magic Sauce is one of the few remaining local brands in Thailand that still produces sauces for Asian cooking, using traditional batch production methods. *Magic Sauce* manufactures three major product lines for its local market: oyster sauce, soya sauce, and fish sauce. The finance department has collected the following information.

Table 2: Cost/Revenue Information for *Magic Source* in Thai baht (฿)

	Oyster sauce	Soya sauce	Fish sauce
Sales revenue (฿)	100,000	75,000	150,000
Ingredients (฿)	20,000	8,000	18,000
Labour (฿)	5,400	3,000	3,600
Contribution per product	K = 74,600	L = 64,000	M = 128,400
Fixed costs	65,000	65,000	65,000
Profit/loss	W = 9,600	X = (1,000)	Z = 63,400

Demand for each product line is 5,000 bottles while the cost for ingredients are ฿40, ฿20, ฿30 per kg respectively. Total fixed costs are \$195,000 which would be allocated equally across all product lines. The managers of each product line would like to ensure that the product they are responsible for earns a positive contribution towards SG's fixed costs.

- The value of the contribution, **K** for oyster sauce is _____.
 A. ฿43,600
 B. ฿47,600
 C. ฿73,600
D. ฿74,600
- The value of the contribution, **L** for soya sauce is _____.
 A. ฿46,000
B. ฿64,000
 C. ฿68,000
 D. ฿86,000
- The value of the contribution, **M** for fish sauce is _____.
A. ฿128,400
 B. ฿138,400
 C. ฿148,400
 D. ฿158,400

Table 3: Contribution to fixed costs for *Magic Sauce*

	Oyster sauce (R)	Soya sauce (R)	Fish sauce (R)
Sales revenue	100,000	75,000	150,000
Ingredients	20,000	8,000	18,000
Labour	5,400	3,000	3,600
Contribution	K = 74,600	L = 64,000	M = 128,400
Fixed costs	65,000	65,000	65,000
Profit/loss	9,600	(1,000)	63,400

4. Calculate the profit/loss attributable to oyster sauce, soya sauce and fish sauce (values of **X**, **Y** and **Z** respectively).

	X	Y	Z
A.	R6,900	(R1,000)	R36,400
B.	R6,900	R1,000	R36,400
C.	R9,600	(R1,000)	R63,400
D.	R9,600	R1,000)	R63,400

5. Based on the contribution made to fixed costs, which one of the following products could be considered for termination?
- A. Oyster sauce
 - B. Soya sauce**
 - C. Fish sauce
 - D. None of the above

Marina Airlines Limited

Marina Airlines Limited (MA) has three airline brands namely *Marina Airlines*, *Riverina Air*, and *Sands*. The *Marina Airlines* brand targets the full-service passenger segment for both short and long haul markets. *Riverina Air's* brand targets the full-service passenger segment targeting regional markets. Meanwhile, *Sands* targets the low-cost passenger segment. Regarding this, *MA's* CEO Sebastian Phong said at a recent conference that “*MA* is reviewing its flight operations to address connectivity more cost effectively”.

Figure 1: financial performance of MA’s three brands:



Figure 2: Breakdown of costs

In 2023/2024, *MA's* cost of operations were \$6,329 million. **Figure 2** shows the breakdown of these costs. If these costs were fully allocated or traced to *MA's* three brands, we can understand why *MA* decided to discontinue *Riverina Air's* operations.

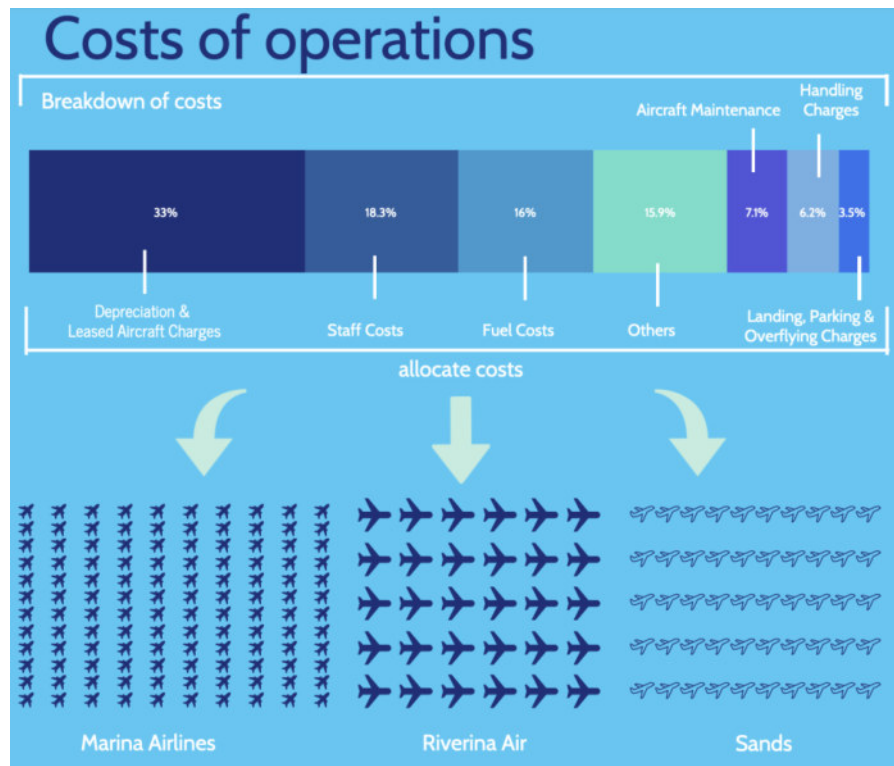


Figure 3 shows *Riverina Air* had the highest passenger unit cost. Even though *Riverina Air* brought in revenue for *MA*, the operations could not cover its costs. This method of identifying all the costs associated with *MA's* activities to its three brands to measure costs separately is known as absorption costing.

Figure 3: Passenger unit cost by brand



Task 1: Fill in the blanks

The MA case study highlights that the costs of providing a (or making a physical product) is of strategic importance in ensuring a business remains profitable for There are different categories of costs, such as costs, fixed costs, direct costs and indirect costs (.....). Information and data regarding these costs are crucial for such as setting, appraising product lines/business ventures, continuing or shutting down business activities, and managing the firm's overall

..... costing is one of the methods for identifying the costs of production related to a specific business activity or This method involves tracing costs to a product or brand for which the business wants to measure the separately. Once all costs have been identified, these costs will be shared or to each individual product based on criteria such as the number of employees, the amount of space occupied by the product or business activity, the duration of machine hours, or number of orders completed.

Missing words:

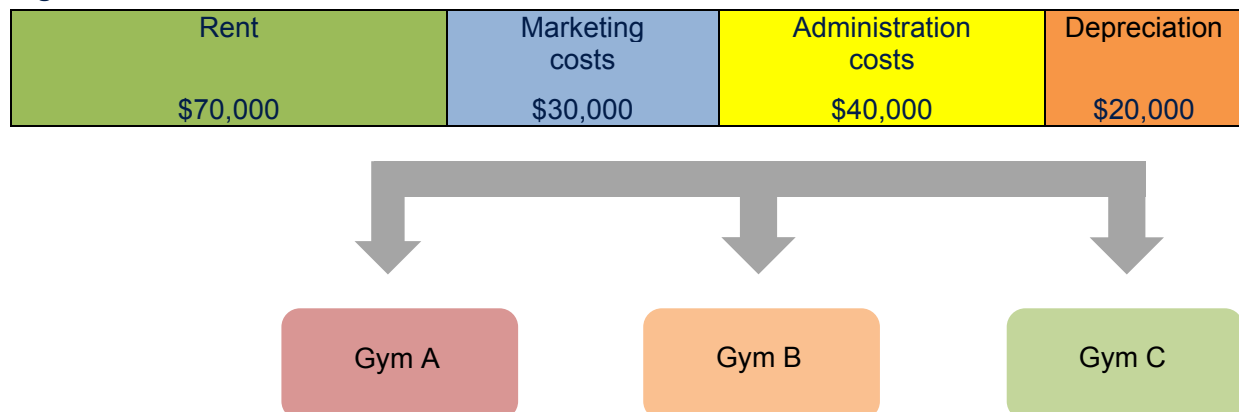
absorption, apportioned, costs, decision making, expenditure, floor, overheads, prices, product, service, survival, variable

Task 2: Multiple choice questions

Anywhere Fitness

Anywhere Fitness (AF) has gym operations in 3 locations. It has overheads totalling \$160,000 per month comprising rent, marketing costs, administration costs, and depreciation.

Figure 1: Cost information



Worksheet 40
13.3 Contribution: Absorption Costing (HL)

Table 1: Store information

Area of gym (square meters)	50	200	150
Number of fitness instructors	5	15	10
Value of fitness equipment \$ ('000)	15	40	25

Use the *Anywhere Fitness* case study to answer Questions 1 to 5.

1. Using the area of gym space as the criterion to apportion rent overheads, the cost allocations to Gym A, Gym B, and Gym C respectively are:

- | | | |
|-------------|----------|----------|
| A. \$7,500 | \$47,250 | \$15,250 |
| B. \$8,000 | \$40,000 | \$22,000 |
| C. \$8,750 | \$35,000 | \$26,250 |
| D. \$20,000 | \$40,000 | \$10,000 |

2. Using the number of fitness instructors as the criterion to apportion staff overheads, the cost allocations for the three gyms are:

- | | Gym A | Gym B | Gym C |
|----|---------|----------|----------|
| A. | \$9,000 | \$20,000 | \$11,000 |
| B. | \$6,500 | \$23,333 | \$10,167 |
| C. | \$6,237 | \$29,743 | \$4,020 |
| D. | \$6,667 | \$20,000 | \$13,333 |

3. Allocate the depreciation overheads based on the value of fitness of equipment to apportion the costs.

- | | Gym A | Gym B | Gym C |
|----|---------|----------|---------|
| A. | \$3,250 | \$15,000 | \$1,750 |
| B. | \$3,750 | \$10,000 | \$6,250 |
| C. | \$2,863 | \$9,871 | \$7,266 |
| D. | \$1,972 | \$10,250 | \$7,778 |

Worksheet 40
13.3 Contribution: Absorption Costing (HL)

4. In the case of *Anywhere Fitness*, Gym A, Gym B and Gym C are examples of _____.
- A. Cost centres
 - B. Departments
 - C. Profit centres
 - D. Revenue centres
5. Which one of the following is the most likely limitation of absorption costing?
- A. It is challenging to allocate overheads accurately in a non-subjective way
 - B. It is difficult to record all costs
 - C. It is too complicated to calculate
 - D. It is too time consuming to calculate

Worksheet 40
13.3 Contribution: Absorption Costing (HL)

Crazer Ltd.

Crazer Ltd. is a lifestyle brand for gamers. It manufactures two main products lines, a superbly-accurate, ultra-performance gaming mouse and its multi-award winning gaming keyboard with proprietary mechanical switches. *Crazer Ltd.*'s overhead costs total \$500,000 and comprise of \$200,000 for hazardous waste management and \$300,000 for administration.

Table 1: Revenue and cost per product line

	Mouse	Keyboard	Total
	(\$'000)	(\$'000)	(\$'000)
Revenue	800	1900	1,600
Direct labour cost	130	120	250
Direct material cost	710	590	1,300
Total direct cost	540	710	1,250
Production information			
	Mouse	Keyboard	Total
Area of factory (square metres)	100	180	280
No. of staff per product line	55	45	100

Table 2: Absorption cost statement for *Crazer Ltd.*

	Mouse	Keyboard	Total
	(\$'000)	(\$'000)	(\$'000)
Revenue	800	1,900	2,700
Direct labour cost	130	120	250
Direct material cost	710	590	1,300
Absorbed overheads			
Hazardous waste management	W	128.6	200
Administration	165	X	300
Profit/loss	Y	Z	780

For Questions 6 to 8, figures are in \$'000.

6. Using the absorption costing method, what is the value of **W** in **Table 2**?
- A. 60.9
 - B. 71.4
 - C. 89.9
 - D. 93.7

7. Use the absorption costing method to calculate the value of X in **Table 2**.
- A. 135
 - B. 140
 - C. 145
 - D. 150
8. Use the absorption costing method to calculate the value of Y **and** Z in **Table 2**.
- A. (67.6) and 92.4
 - B. 67.6 and (92.4)
 - C. (146) and 926.4
 - D. 76.6 and 926.4
9. Which of the following is not a benefit that *Crazer Ltd.* gains from using profit centres for its mouse and keyboard product line?
- A. A comparison between product lines in terms of efficiency and performance
 - B. A management tool to monitor the use of resources
 - C. Improved motivation of workers
 - D. Internal competition between departments responsible for mouse and keyboard product lines.
10. What decision should be done based on the values calculated for Y and Z?
- A. Shut down the mouse product line
 - B. Shut down the keyboard product line
 - C. Investigate qualitative factors regarding staff motivation and productivity
 - D. Dismissing managers for losses incurred by the product line

Answers

Task 1: Fill in the blanks

The MA case study highlights that the costs of providing a **service** (or making a physical product) is of strategic importance in ensuring a business remains profitable for **survival**. There are different categories of costs, such as **variable** costs, fixed costs, direct costs and indirect costs (**overheads**). Information and data regarding these costs are crucial for **decision making** such as setting **prices**, appraising product lines/business ventures, continuing or shutting down business activities, and managing the firm's overall **expenditure**.

Absorption costing is one of the methods for identifying the costs of production related to a specific business activity or **product**. This method involves tracing costs to a product or brand for which the business wants to measure the **costs** separately. Once all costs have been identified, these costs will be shared or **apportioned** to each individual product based on criteria such as the number of employees, the amount of **floor** space occupied by the product or business activity, the duration of machine hours, or number of orders completed.

Missing words:

absorption, apportioned, costs, decision making, expenditure, floor, overheads, prices, product, service, survival, variable

Task 2: Multiple choice questions

1. Using the area of gym space as the criterion to apportion rent overheads, the cost allocations to Gym A, Gym B, and Gym C respectively are:

- | | | | |
|-----------|----------------|-----------------|-----------------|
| A. | \$7,500 | \$47,250 | \$15,250 |
| B. | \$8,000 | \$40,000 | \$22,000 |
| C. | \$8,750 | \$35,000 | \$26,250 |
| D. | \$20,000 | \$40,000 | \$10,000 |

2. Using the number of fitness instructors as the criterion to apportion staff overheads, the cost allocations for the three gyms are:

- | | Gym A | Gym B | Gym C |
|-----------|----------------|-----------------|-----------------|
| A. | \$9,000 | \$20,000 | \$11,000 |
| B. | \$6,500 | \$23,333 | \$10,167 |
| C. | \$6,237 | \$29,743 | \$4,020 |
| D. | \$6,667 | \$20,000 | \$13,333 |

Worksheet 40
13.3 Contribution: Absorption Costing (HL)

3. Allocate the depreciation overheads based on the value of fitness of equipment to apportion the costs.

	Gym A	Gym B	Gym C
A.	\$3,250	\$15,000	\$1,750
B.	\$3,750	\$10,000	\$6,250
C.	\$2,863	\$9,871	\$7,266
D.	\$1,972	\$10,250	\$7,778

4. In the case of *Anywhere Fitness*, Gym A, Gym B and Gym C are examples of _____.

- A. Cost centres**
B. Departments
C. Profit centres
D. Revenue centres

5. Which one of the following is the most likely limitation of absorption costing?

- A. It is challenging to allocate overheads accurately in a non-subjective way**
B. It is difficult to record all costs
C. It is too complicated to calculate
D. It is too time consuming to calculate

Crazer Ltd.

Use the *Crazer Ltd* case study to answer Questions 6 to 10.

Table 1: Revenue and cost per product line

	Mouse (\$'000)	Keyboard (\$'000)	Total (\$'000)
Revenue	800	1900	1,600
Direct labour cost	130	120	250
Direct material cost	710	590	1,300
Total direct cost	540	710	1,250
Production information			
	Mouse	Keyboard	Total
Area of factory (square metres)	100	180	280
No. of staff per product line	55	45	100

Worksheet 40
13.3 Contribution: Absorption Costing (HL)

Table 2: Absorption cost statement for Crazer Ltd.

	Mouse (\$'000)	Keyboard (\$'000)	Total (\$'000)
Revenue	800	1,900	2,700
Direct labour cost	130	120	250
Direct material cost	710	590	1,300
Absorbed overheads			
Hazardous waste management	W = 71.4	128.6	200
Administration	165	X = 135	300
Profit/loss	Y = (146)	Z = 926.4	780

For Questions 6 to 8, figures are in \$'000.

6. Using the absorption costing method, what is the value of *W* in **Table 2**?
 - A. 60.9
 - B. 71.4**
 - C. 89.9
 - D. 93.7

7. Use the absorption costing method to calculate the value of *X* in **Table 2**.
 - A. 135**
 - B. 140
 - C. 145
 - D. 150

8. Use the absorption costing method to calculate the value of *Y* and *Z* in **Table 2**.
 - A. (67.6) and 92.4
 - B. 67.6 and (92.4)
 - C. (146) and 926.4**
 - D. 76.6 and 926.4

9. Which of the following is not a benefit that *Crazer Ltd.* gains from using profit centres for its mouse and keyboard product line?
- A. A comparison between product lines in terms of efficiency and performance
 - B. A management tool to monitor the use of resources
 - C. Improved motivation of workers
 - D. Internal competition between departments responsible for mouse and keyboard product lines.**
10. What decision should be done based on the values calculated for Y and Z?
- A. Shut down the mouse product line
 - B. Shut down the keyboard product line
 - C. Investigate qualitative factors regarding staff motivation and productivity**
 - D. Dismissing managers for losses incurred by the product line

BC Shop

BC Shop is a dietary food supplements business that targets athletes, bodybuilders, and health conscious customers in Hong Kong. With 13 branches located across Hong Kong, *BC Shop* provides more than 1,000 products ranging from fitness gear to daily nutrition. The brands they carry are direct imports from the USA, Canada, and Europe.

However, facing intense competition from online stores like *iHerb* and *Myprotein*, *BC Shop* is constantly developing and producing products to ensure customer satisfaction and loyalty. *BC Shop* wants to introduce delicious chicken breast *shaomai*, a popular dumpling in Chinese cuisine. Traditionally made from pork, lard, and sugar, the chicken breast *shaomai* is low in carbs. The change of ingredient from pork to chicken breast meat allows customers to minimise the consumption of fat and calories, while having sufficient intake of protein to maintain a lean body.

Thus, a major decision needs to be made whether *BC Shop* should make or buy the chicken breast *shaomai*. The availability of old and vacant industrial buildings in Kowloon Bay, north of Hong Kong Island, could be the ideal location. Another alternative is to commission *Moon Palace*, a local Cantonese restaurant, to make the chicken breast *shaomai* using *BC Shop*'s recipe.

Table 1: Data for make or buy analysis

<ul style="list-style-type: none">• Estimated monthly sales volume of chicken breast <i>shaomai</i>: 10,000 packs• Cost of ingredients per pack: \$20• Cost of labour per pack: \$5• Rental costs per month: \$15,000• Quotation from <i>Moon Palace</i>: \$45 per pack

(a) Calculate the cost to make (CTM) and the cost to buy (CTB) chicken breast *shaomai*. [2]

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(b) Based on the results above, comment on the decision to be made by *BC Shop*. [2]

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Besides its dietary food supplements business, *BC Shop* offers several brands of fitness gear. The management team has decided to do a contribution analysis to identify products that are profitable and those that might require more consideration.

Table 2: Contribution analysis of products for BC Shop

	Tank-top	Massage roller	Shaker bottle	Push up bar
Unit price	\$120	\$280	\$65	\$150
Variable cost per unit	\$28.50	\$30.80	\$39.40	\$49.00
Unit contribution				
Sales (units per month)	632	120	475	203
Total contribution per product				
Total fixed overheads	\$83,003			
Profit/loss (per month)	X			

(c) Calculate the unit contribution of each product in **Table 2** above. [2]

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(d) Calculate the contribution that each product makes towards the fixed overheads. [2]

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(e) Comment on the profit/loss per month, **X**, based on the data in **Table 1**. [4]

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Worksheet 41
13.4 Contribution: Contribution and Absorption Analysis (HL only) – BC Shop

The total fixed overheads are allocated to each of the products using full costing. Each product is regarded as a profit centre. *BC Shop* is considering eliminating products that are unprofitable.

Table 3: Allocated fixed costs per month for *BC Shop*

	Tank-top	Massage roller	Shaker bottle	Push up bar
Fixed overheads	\$36,805	\$16,453	\$17,119	\$12,626
Profit/loss				

(f) Students of pirateIB, identify **two** examples of overheads for *BC Shop*. [2]

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(g) Using information in **Table 2** and **3**, calculate profit/loss of each of the four profit centres. [4]

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(h) Suggest which of the products *BC Shop* can consider for elimination from its portfolio. [4]

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Answers

BC Shop

(a) Calculate the cost to make (CTM) and the cost to buy (CTB) chicken breast *shaomai*. [2]

- Cost to make (CTM) = $(10,000 \times 25) + 15,000 = \$40,000$ or \$4 per pack
- Cost to buy (CTB) = $10,000 \times 45 = \$45,000$ or \$4.50 per pack

(b) Based on the results above, comment on the decision to be made by *BC Shop*. [2]

Based on (a), the cost to make is less than cost to buy, i.e., $CTB > CTM$. Hence, it is cheaper for *BC Shop* to make the product itself based on quantitative reasoning.

(c) Calculate the unit contribution of each product in Table 2 above. [2]

(d) Calculate the contribution that each product makes towards the fixed overheads. [2]

Table 2: Contribution analysis of products for *BC Shop*

	Tank-top	Massage roller	Shaker bottle	Push up bar
Unit price	\$120	\$280	\$65	\$150
Variable cost per unit	\$28.50	\$30.80	\$39.40	\$49.00
Unit contribution	\$91.50	\$249.20	\$25.60	\$101
Sales (units per month)	632	120	475	203
Total contribution per product	\$57,828	\$29,904	\$12,160	\$20,503

(e) Comment on the profit/loss per month, *X*, based on the data in Table 1. [4]

- Profit/loss per month (*X*) = Total contribution – Total fixed overheads
- Profit/loss = $(\$57,828 + \$29,904 + \$12,160 + \$20,503) - \$83,003$
- Profit per month = \$37,392

BC Shop earns a total profit of \$37,392 based on the sales data. However, without allocating fixed overheads to individual products, the management team cannot determine which product earns a positive contribution to the overall profit.

Worksheet 41
13.4 Contribution: Contribution and Absorption Analysis (HL only) – BC Shop

(f) Identify two examples of overheads for *BC Shop*. [2]

Possible examples of overheads include rent, marketing costs, staff salaries, depreciation cost, and so forth.

Accept any other relevant examples.

(g) Using information in Table 2 and 3, calculate profit/loss of each of the four profit centres. [4]

	Tank-top	Massage roller	Shaker bottle	Push up bar
Unit price	\$120	\$280	\$65	\$150
Variable cost per unit	\$28.50	\$30.80	\$39.40	\$49.00
Unit contribution	\$91.50	\$249.20	\$25.60	\$101
Sales (units per month)	632	120	475	203
Total contribution per product	\$57,828	\$29,904	\$12,160	\$20,503
Allocated fixed overheads	\$36,805	\$16,453	\$17,119	\$12,626
Profit/loss (per month)	\$21,023	\$13,451	(\$4,959)	\$7,877

(h) Suggest which of the products *BC Shop* can consider for elimination from its portfolio. [4]

Based on contribution costing, indirect costs (or overheads) are allocated to each respective product in *BC Shop's* portfolio. This allows *BC Shop* to identify which product is relatively profitable and which product requires more attention. In this case, shaker bottles show losses of almost \$5,000 after overheads are allocated. Although it shows relatively strong sales, it does not help to cover the allocated fixed overheads. Thus, shaker bottles can be considered for elimination from *BC Shop's* product portfolio.

Superior Sounds Ltd.

Superior Sounds Ltd. (SS) is known for its digital entertainment products. SS started its business with its original *Sound Master* sound cards. It was a success and soon its sound cards became the de-facto audio standard for personal computers. With further research and development, SS launched new product lines with its patented *Sound Master* audio enhancement technologies. As part of its future plans, SS seeks to strengthen its position in the personal digital lifestyle and entertainment market through innovation in its designs and products.

Ongoing external factors have severely disrupted supply chains, especially in semiconductors, a key component for SS’s audio chips. This has resulted in production delays. Concerned about this, SS would like to conduct a contribution analysis to determine whether the company should manufacture its own semiconductor wafers or continue its purchase these from *ARK Inc.*, its current supplier.

ARK Inc. sells the 300mm wafers for \$2,200 per unit. SS requires 12,000 units for its current production levels. If SS were to manufacture its own semiconductors, it would need to have a dedicated clean room where all fabrication of wafers takes place and contains the machinery for integrated circuit production. The cost to produce is shown in **Table 1**.

Table 1: Estimated costs of making 12,000 units of 300mm wafers

	per unit (\$)
Direct materials	\$1,300
Direct labour	\$280
Fixed overheads	\$900
Other variable costs	\$800

(a) Define the term *contribution*. [2]

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(b) Calculate SS’s cost to make (CTM) and cost to buy (CTB) the 300mm wafers. [2]

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Worksheet 42
13.5 Contribution and Absorption analysis (HL only) – Superior Sounds Ltd

(c) Using the results in part (a), comment on the choice of action for SS. [2]

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The COVID-19 pandemic was a blessing in disguise for SS. With lockdowns, people working from home, and social distancing restrictions, people were forced to spend more time at home than before. This led to a huge uptrend in the use of streaming platforms, especially on television. With rising popularity of platforms such as *HBO Max*, *Netflix*, *Apple TV+*, *Disney+*, SS launched *Soundbars* for televisions. However, SS is a relatively new entrant in this growing market. In response to competition from *Apple's AirPods Pro*, SS upgraded its popular *X-Fi* headphones. These upgrades include enhanced background noise cancellation technology. Meanwhile, SS's *Sound Master* cards continue to be its cash cow in the personal computers market.

Table 2: Revenue/Cost related information for each product line

	X-Fi Headphones	Sound Master Cards	Soundbars
Unit price	\$300	\$450	\$1,500
Annual output (units)	25,000	65,000	4,000
Direct material cost	\$2,700,000	\$7,000,000	\$1,000,000
Direct labour cost	\$2,300,000	\$6,500,000	\$4,900,00

Concerned about the bottom line of SS, the Vice President (VP) of operations is considering whether to withdraw unprofitable product lines. SS's fixed overheads include rent and administration costs of \$450,000 and \$1,500,000 respectively. The VP has compiled additional information in **Table 3**.

Table 3: Additional information for each product line

	X-Fi Headphones	Sound Master Cards	Soundbars
Floor space (feet ²)	7,000	4,000	9,000
Number of employees assigned	120	200	80

Worksheet 42
13.5 Contribution and Absorption analysis (HL only) – Superior Sounds Ltd

(d) Calculate the profit/loss for each product line. Enter your answers in **Table 4** below. [4]

Table 4

	X-Fi Headphones (\$'000)	SoundMax cards (\$'000)	Soundbars (\$'000)
Revenue			
Direct material cost			
Direct labour cost			
Contribution			
Less: allocated fixed overheads			
Rent			
Administration			
Profit/loss			

(e) Using your answers in part (c) and (d), as well as other information in the stimulus, recommend to the VP whether any product line should be dropped. [10]

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Answers

Superior Sounds Ltd.

(a) Define the term *contribution*. [2]

Contribution refers to the difference between the revenue derived from the sales of a product and its variable costs. The difference can then be used to pay towards the firm's fixed costs.

(b) Calculate SS's cost to make (CTM) and cost to buy (CTB) the 300mm wafers. [2]

- Cost to make (CTM) = FC + (VC × Q)
- CTM = (\$900 × 12,000) + (\$2,380 × 12,000)
- CTM = \$10,800,000 + \$28,560,000 = \$39,360,000

- Cost to buy (CTB) = P × Q
- CTB = \$2,200 × 12,000 = \$26,400,000

(c) Using the results in part (a), comment on the choice of action for SS. [2]

On quantitative grounds, as the cost to make is significantly greater than the cost to buy (CTM > CTB), SS should buy the 300mm wafers from *ARK Inc.*

(d) Calculate the profit/loss for each product line. Enter your answers in Table 4 below. [4]

	X-Fi Headphones (\$'000)	Sound Master cards (\$'000)	Soundbars (\$'000)
Revenue	7,500	29,250	6,000
Direct material cost	2,700	7,000	1,000
Direct labour cost	2,300	6,500	4,900
Contribution	2,500	15,750	100
Less: allocated fixed overheads			
Rent	157.5	90	202.5
Administration	450	750	300
Profit/loss	1,892.5	14,910	(402.5)

- (e) Using your answers in part (c) and (d), as well as other information in the stimulus, recommend to the VP whether any product line should be dropped. [10]

Based on contribution costing, all products are profitable and make a positive contribution to fixed costs (top half of **Table 4**). However, using absorption costing where SS's overheads or fixed costs are distributed based on different criteria, the *Soundbars* makes a loss of \$402,500,000. Based on the absorption costing approach, *Soundbars* should be dropped. Even with contribution costing, the positive contribution is only \$100,000 which is significantly lower than that for both the *X-Fi Headphones* and *Sound Master cards*.

However, whatever criterion is used to apportion overheads, there is never a perfect approach to apportioning overheads accurately or truly in an objective way. As *Soundbars* may require more factory floor space for its production, this would attribute to its higher overhead costs. However, this is a growing niche market for SS and it takes time to increase sales in a new and growing market due to increased demand for streaming TV shows and movies.

There might still be some common fixed costs that arise and will continue even if *Soundbars* are dropped. These fixed costs might simply be allocated to the remaining two products, thereby reducing the profit of both *X-Fi Headphones* and *Sound Master cards*.

Furthermore, there may be an issue of excess capacity. Should *Soundbars* be dropped, SS needs to consider whether it can use the current equipment and machinery for other purposes, such as producing a new product or making additional units of *X-Fi Headphones* or *Sound Master cards*.

In addition, SS needs to consider whether the discontinuation of *Soundbars* could affect the sales of its other products *X-Fi Headphones* or *Sound Master cards*. For example, customers could use the *X-Fi Headphones* as a complementary product that could be wirelessly connected to its *Soundbars*.

Thus, on quantitative grounds, *Soundbars* should be dropped. However, SS needs to consider the wider implications of excess capacity and the potential effects on sales of its remaining products before making any final decision.

Jewel Changi Airport



The Jewel, at Changi Airport in Singapore

A visually stunning masterpiece designed by world renowned architect, Moshe Safdie, *Jewel Changi Airport (Jewel)* is one of the most Instagrammable places for visitors to Singapore. *Jewel* is recognized by its glass domed roof with a *Rain Vortex*, pouring 130 feet tall down from a central oculus (or eye-like opening) and thereby earning the title of world's highest indoor waterfall. *Jewel* is a game changer in the aviation industry by integrating lifestyle entertainment within a terminal that is built as an environmentally sustainable building. The *Rain Vortex* also controls the interior thermal conditions and contributes to the cooling of the entire airport terminal. In wet and tropical Singapore, rain water from frequent and intense thunderstorm flows into the controlled opening at the oculus before being collected at the base of the vortex which serves as a reservoir. The rainwater is then reused throughout the building, as well as for the water feature itself.

At a size of 135,700 m², *Jewel* is a mammoth building with 5 levels built above ground and five underneath. Under its glass domed roof, *Jewel* houses a vast canopy, hedge/mirror maze, forest valley, a multi-screen *IMAX* cinema, a hotel, a full-sized supermarket, 280 retail spaces, and more than 2,500 car park spaces. However, the construction of *Jewel* was a challenging project due to limited site access precisely located in the middle of one the world's busiest airports. The sophistication of *Jewel's* iconic glass roof structure required advanced engineering methods. The latest computational technology was used to create digital plans of the construction process, track each of the components individually, verify that everything was pieced together in the precise order, and ensured that *Jewel* was structurally sound. On top of this, materials and construction processes needed to be coordinated with different contractors to ensure time schedules and strict deadlines were met.

Task 1: Fill in the blanks

Note: the list of missing words is shown on the next page.

Considering the complexity in the construction of the *Jewel* project, an analytical technique to assist and control of the construction project is known as a _____ analysis (CPA), or sometimes referred to as _____ analysis. Using CPA, a complicated project is broken down into a number of smaller _____. These activities are to be carried out in _____. Each individual activity is represented on a network _____ to show their _____ in a sequential order.

The aim of a CPA is to allow decision makers to quantify the minimum _____ required to complete the entire project. An individual task identified as having an impact on the subsequent task, or causing _____ in completion of the entire project within the required minimum time, is termed a _____. In this way, CPA is a valuable _____ tool for decision makers to better manage, facilitate, and _____ their projects.

Missing words:

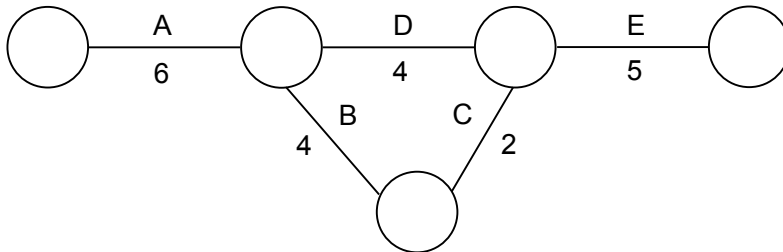
coordinate, critical activity, critical path, delays, diagram, duration, network, planning, relationships, sequence, tasks

Task 2: Multiple Choice Questions

1. Which one of the following is not one of the aims of a critical path analysis?
 - A. Determine the total duration of a project
 - B. Enhance the planning and coordination of a project
 - C. Facilitate better use of resources
 - D. Reduce job redundancies
2. A critical path analysis allows decision makers to _____.
 - A. Determine the types of training needed for its workers
 - B. Identify important activities that are likely to cause bottlenecks
 - C. Motivate its staff
 - D. Outsource individual tasks
3. Using a CPA diagram, decision makers can _____.
 - A. Appraise the returns of the project
 - B. Determine whether to terminate the project
 - C. Find out the cash flows of the project
 - D. Reduce idle time for individual tasks

Questions 4 and 5 relate to the network diagram below:

Jewel's critical path analysis (excerpt)



4. Which one of the following is true?
- A. Activity B is an independent activity
 - B. Activity E can be only be completed after Activity C and Activity D are completed
 - C. Activity D is dependent on Activity A and Activity B
 - D. Activity D is an independent activity
5. Which one of the following is false?
- A. Activity D is dependent on Activity A
 - B. Bottlenecks in Activity C can delay the entire project
 - C. Delays in Activity C will affect Activity E
 - D. Activity D can only be completed after Activity B and Activity C

Answers

Jewel Changi Airport

Task 1: Fill in the blanks

Considering the complexity in the construction of the *Jewel* project, an analytical technique to assist and control of the construction project is known as a **critical path** analysis (CPA), or sometimes referred to as **network** analysis. Using CPA, a complicated project is broken down into a number of smaller **tasks**. These activities are to be carried out in **sequence**. Each individual activity is represented on a network **diagram** to show their **relationships** in a sequential order.

The aim of a CPA is to allow decision makers to quantify the minimum **duration** required to complete the entire project. An individual task identified as having an impact on the subsequent task, or causing **delays** in completion of the entire project within the required minimum time, is termed a **critical activity**. In this way, CPA is a valuable **planning** tool for decision makers to better manage, facilitate, and **coordinate** their projects.

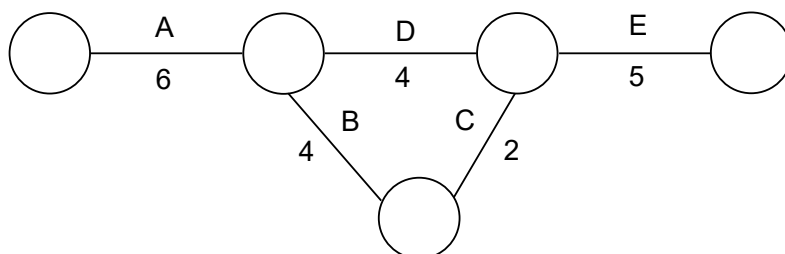
Task 2: Multiple Choice Questions

- Which one of the following is not one of the aims of a critical path analysis?
 - Determine the total duration of a project
 - Enhance the planning and coordination of a project
 - Facilitate better use of resources
 - D. Reduce job redundancies**
- A critical path analysis allows decision makers to _____.
 - Determine the types of training needed for its workers
 - B. Identify important activities that are likely to cause bottlenecks**
 - Motivate its staff
 - Outsource individual tasks

3. Using a CPA diagram, decision makers can _____.
- A. Appraise the returns of the project
 - B. Determine whether to terminate the project
 - C. Find out the cash flows of the project
 - D. Reduce idle time for individual tasks**

Questions 4 and 5 relate to the network diagram below:

Jewel's critical path analysis (excerpt)



4. Which one of the following is true?
- A. Activity B is an independent activity
 - B. Activity E can be only be completed after Activity C and Activity D are completed**
 - C. Activity D is dependent on Activity A and Activity B
 - D. Activity D is an independent activity
5. Which one of the following is false?
- A. Activity D is dependent on Activity A
 - B. Bottlenecks in Activity C can delay the entire project
 - C. Delays in Activity C will affect Activity E
 - D. Activity D can only be completed after Activity B and Activity C**

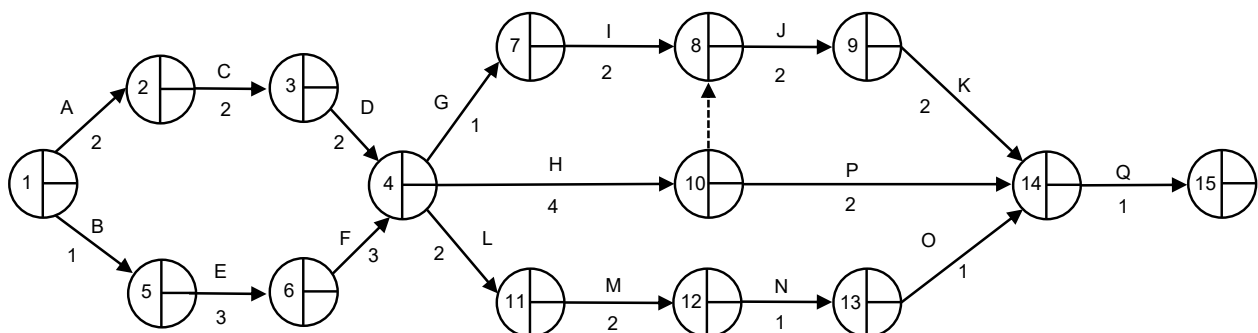
K-pop Band Concert

The Events Manager for a popular South-Korean Korean popular music (K-pop) boy band is planning the next concert. The K-pop boy band and staff will need to collaborate and coordinate with the concert venue team. For such a large project, the Events Manager intends to make use of critical path analysis (CPA) for planning and coordinating the concert. Table 1 shows the list of activities that need to be completed before opening night in one of their venues.

Table 1: Activities involved in staging a concert

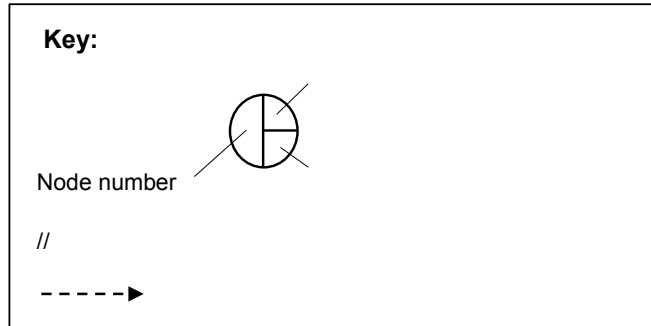
Activity	Description	Preceded by	Duration (hours)
A	Load-in	-	2
B	Sound checks	-	1
C	Transporting of gear	A	2
D	Unloading of headline, support, and opening band	C	2
E	Setting up of PA system	B	3
F	Setting up IT logistics	E	3
G	Setting up of stage	D,F	1
H	Band performance for sound test	D,F	4
I	Setting up running lights and visuals	G	2
J	Setting up of props, individual items, and fireworks	H,I	2
K	Sorting costumes and wardrobe maintenance	J	2
L	Setting up of venue security	D,F	2
M	Setting up of reception	L	2
N	Setting up of concert merchandises	M	1
O	Setting up of refreshments	N	1
P	Installing sound gear	H	2
Q	Full dress rehearsals	K,O,P	1

Diagram 1: Critical path network for staging a concert



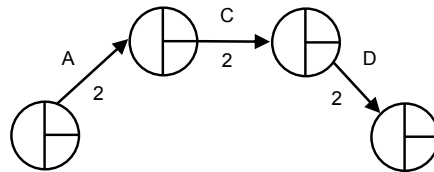
- (a) Annotate on **Diagram 2** below the earliest starting time (EST) and latest finishing time (EFT). [2]

Diagram 2



- (b) Label the two symbols in **Diagram 2** above. [2]

- (c) Describe the dependencies between activities A, C, and D show in the diagram below [2]

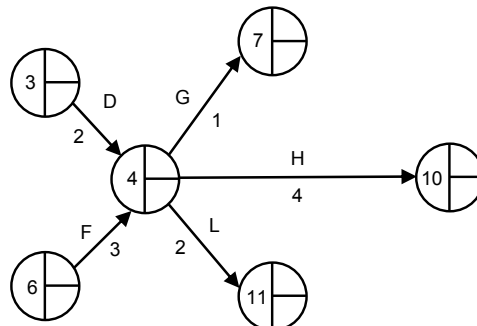


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- (d) Outline the dependencies between activities D, F, G, H, and L in the diagram below. [2]



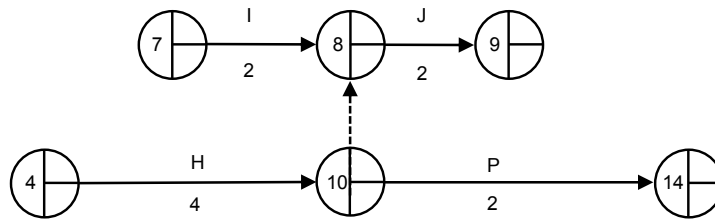
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Worksheet 44
14.2 Critical path analysis (HL only) – K-pop Band Concert

(e) Explain the use of the dummy activity shown in the diagram below. [2]



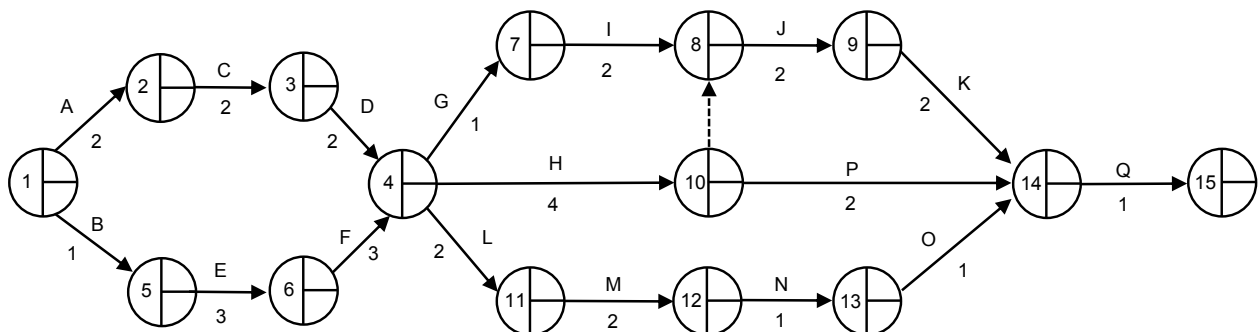
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(f) Using the data from **Table 1**, complete the earliest starting time (EST) for all the activities in the diagram below. [2]



(g) Using data from **Table 1** and the EST in Question (f), complete the latest finishing time (LFT) for all the activities in the diagram above. [2]

(h) Annotate the critical path on the diagram above. [2]

Worksheet 44
14.2 Critical path analysis (HL only) – K-pop Band Concert

- (i) Calculate the total float and the free float for each activity for the concert. Enter your answers in **Table 2** below. [4]

Table 2 – Total and free float for a concert

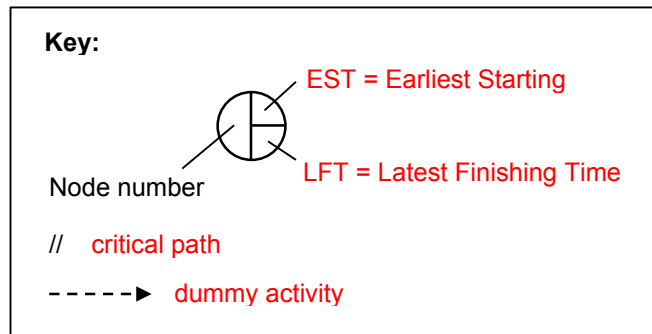
Activity	Free float EST next task – EST this task – Duration	Total float LFT – EST – Duration
A		
B		
C		
D		
E		
F		
G		
H		
I		
J		
K		
L		
M		
N		
O		
P		
Q		

Answers

K-pop Band Concert

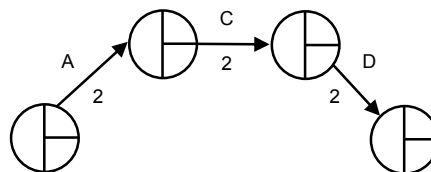
(a) Annotate on **Diagram 2** below the earliest starting time (EST) and latest finishing time (EFT). [2]

Diagram 2



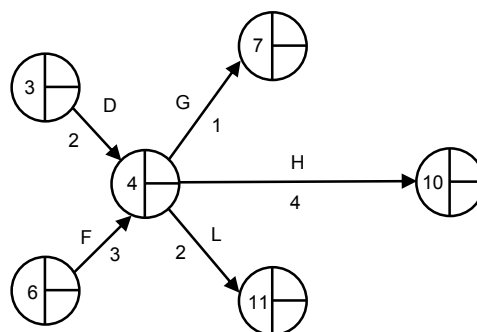
(b) Label the two symbols in **Diagram 2** above. [2]

(c) Describe the dependencies between activities A, C, and D show in the diagram below. [2]



- Activity A must be completed before Activity C can commence.
- Activity D can only start after the completion of Activity C.

(d) Outline the dependencies between activities D, F, G, H, and L in the diagram below. [2]

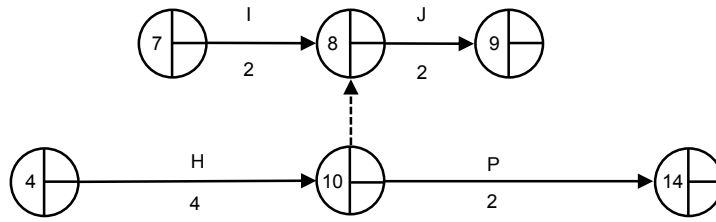


- Activity D and activity F are independent of each other. However, both activities have to be completed before activities G, H and L can commence.
- Activities G, H and L are independent of each other and can be performed concurrently.

Worksheet 44
14.2 Critical path analysis (HL only) – K-pop Band Concert

(e) Explain the use of the dummy activity shown in the diagram below.

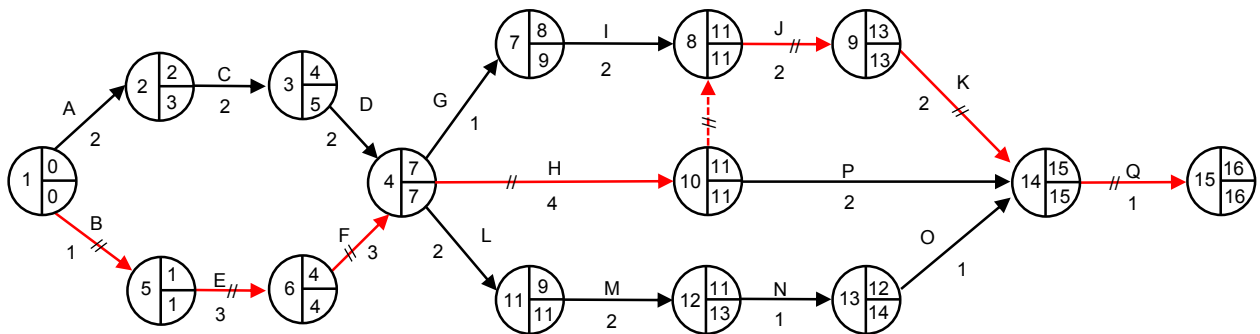
[2]



A dummy activity is a non-activity that is denoted by a dotted arrow line. It is used to represent a logical dependency that neither takes up time nor uses resources. In this case, Activity J cannot commence until activity I and H have been completed but activity P does not depend on the completion of Activity I. Activity J and activity P are independent of each other.

(f), (g), and (h)

Using data from **Table 1**, complete the earliest starting time (EST) and latest finishing time (LFT) for all the activities in the diagram below. Annotate the critical path on the diagram.



Worksheet 44
14.2 Critical path analysis (HL only) – K-pop Band Concert

- (i) Calculate the total float and the free float for each activity for the concert. Enter your answers in **Table 2** below. [4]

Table 2 – Total and free float for a concert

Activity	Free float EST next task – EST this task – Duration	Total float LFT – EST – Duration
A	0	1
B	0	0
C	2	1
D	1	1
E	0	0
F	0	0
G	0	1
H	0	0
I	1	1
J	0	0
K	0	0
L	0	2
M	0	2
N	0	2
O	2	2
P	2	2
Q	0	0

Eng Lee Engineering

From a traditional family business, *Eng Lee Engineering (Eng Lee)* has grown to become a large construction corporation in Singapore. One of its milestones was the construction of Eco-Link@BKE, Southeast Asia's first ecological corridor. Shaped like an hourglass, the 75 metre ecological bridge crosses over a busy expressway and connects the Bukit Timah Nature Reserve with the Central Catchment Nature Reserve. Eco-link@BKE enables native animals, birds and insects to migrate freely along the connecting bridge and interact between the two nature reserves. This ensures the conservation of native plant and animal species and enhances the sustainability of the city state.

Eng Lee's other projects include the iconic Marina Bayfront Bridge, a 280m “Double-Helix” pedestrian bridge linking picturesque Bayfront Area and Marina Centre. To manage such large projects, critical path analysis (CPA) is an important tool for planning and control.

(a) Describe **one** benefit of using critical path analysis (CPA). [2]

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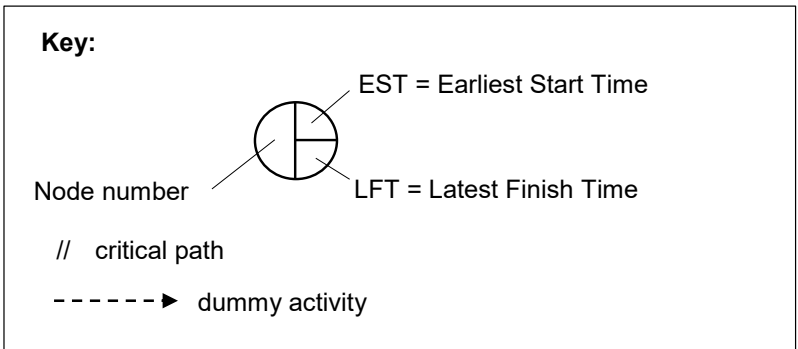
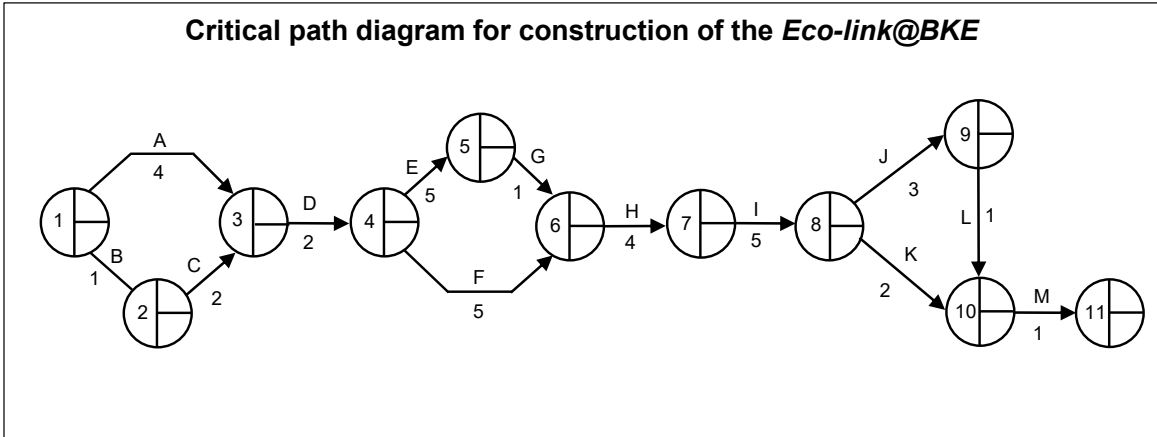
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Table 1: Activities involved in the construction of the *Eco-link@BKE*

Activity	Description	Preceded by	Duration (months)
A	Site inspection and planning	-	4
B	Traffic flow design	-	1
C	Break ground	A,K	2
D	Compaction of soil	C	2
E	Pour abutments	C	5
F	Girder placement	L,E	5
G	Installation of deck	F	1
H	Railings installed	G	4
I	Paint and decor	G	5
J	Resurfacing	I,M	3
K	Traffic diversion	B	2
L	Testing	D	1
M	Approval	H	1

(b) Complete the critical path diagram that represents the activities in **Table 1**.

Annotate the earliest start time (EST) and the latest finishtime (LFT) for each activity **and** the critical path. [4]



(c) Calculate the total float and the free float for each activity. Enter your answers in **Table 2**. [4]

Table 2: Free float and total float

Activity	Free float	Total float
	EST next task – EST this task – Duration	LFT – EST – Duration
A		
B		
C		
D		

Worksheet 45
14.3 Critical path analysis (HL only) – Eng Lee Engineering

Activity	Free float EST next task – EST this task – Duration	Total float LFT – EST – Duration
E		
F		
G		
H		
I		
J		
K		
L		
M		

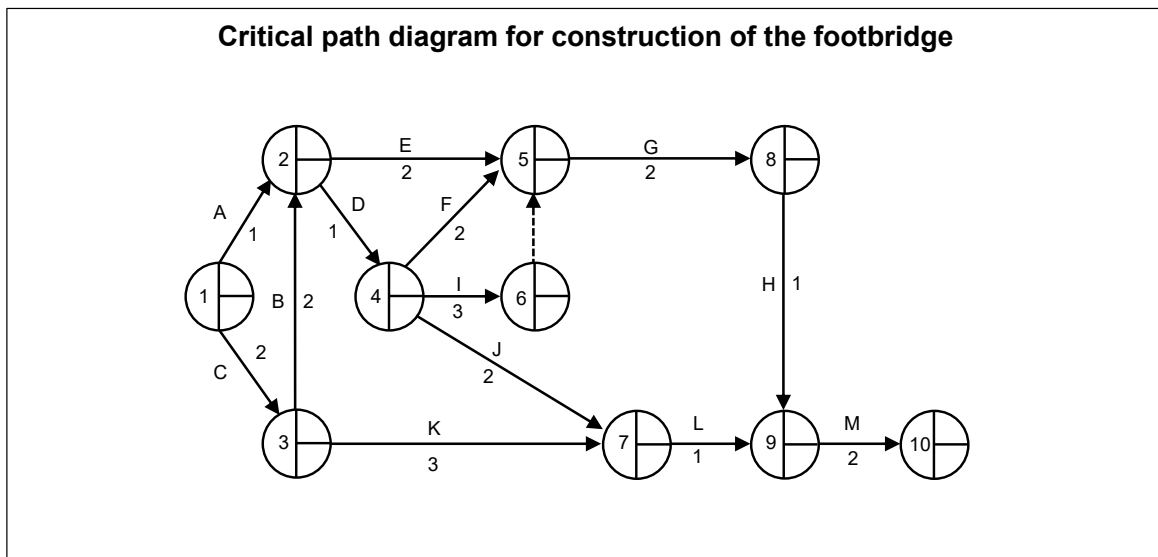
Worksheet 45
14.3 Critical path analysis (HL only) – Eng Lee Engineering

Following the completion of the “Double-Helix” pedestrian bridge, *Eng Lee* is starting on a new project to build an arch footbridge over a waterway that separates a town in Punggol in the North-East Region of Singapore. The project manager has broken down construction of the footbridge into activities A to N. The CPA diagram in **Table 3** shows the order and the duration of the tasks.

Table 3: Activities involved in the construction of the footbridge

Activity	Preceded by	Duration (months)
A	-	1
B	C	2
C	-	2
D	A,B	1
E	A,B	2
F	D	2
G	E,F,I	2
H	G	1
I	D	3
J	D	2
K	C	3
L	K,J	1
M	H,L	2

- (d) Complete the critical path diagram that represents the activities in **Table 3**. Annotate the earliest start time (EST), the latest finish time (LFT) for each activity **and** the critical path. [4]



Worksheet 45
14.3 Critical path analysis (HL only) – Eng Lee Engineering

(e) Explain the use of the dummy activity indicated in the critical path diagram in part (d). [2]

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(f) Calculate the total float and the free float for activity E and activity K. Using your answers, comment on the consequence on the footbridge project if:

- Activity E is delayed by one month.
- Activity K is delayed by three months. [4]

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Answers

Eng Lee Engineering

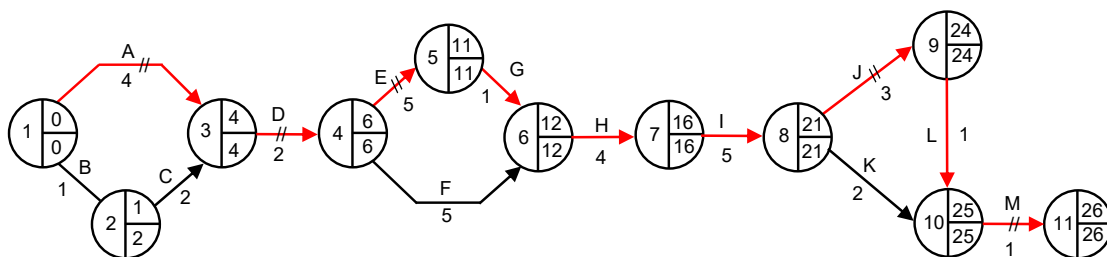
(a) Describe **one** benefit of using critical path analysis (CPA). [2]

- CPA allows decision makers a visual view of complicated projects, such as the Eco-link@BKE.
- CPA is a planning tool that allows decision makers to manage the deployment of resources at particular stages of the project
- The identification of the critical path helps decision makers ensure associated tasks are not delayed and the entire project can be completed on time.

(b) Complete the critical path diagram that represents the activities in **Table 1**.

Annotate the earliest start time (EST) and the latest finish time (LFT) for each activity **and** the critical path. [4]

Critical path diagram for construction of the *Eco-link@BKE*



(c) Calculate the total float and the free float for each activity. Enter your answers in **Table 2**. [4]

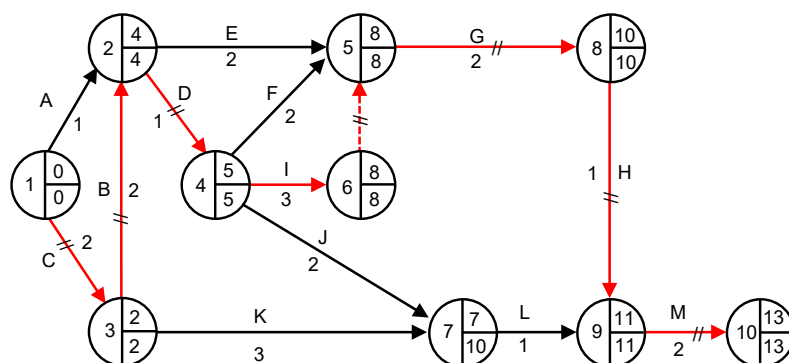
Table 2: Free float and total float

Activity	Free float	Total float
	EST next task - EST this task - Duration	LFT - EST - Duration
A	0	0
B	0	1
C	1	1
D	0	0

Worksheet 45
14.3 Critical path analysis (HL only) – Eng Lee Engineering

Activity	Free float	Total float
	EST next task - EST this task - Duration	LFT - EST - Duration
E	0	0
F	1	1
G	0	0
H	0	0
I	0	0
J	0	0
K	2	2
L	0	0
M	0	0

(d) Complete the critical path diagram that represents the activities in **Table 3**. Annotate the earliest start time (EST), the latest finish time (LFT) for each activity **and** the critical path. [4]



Worksheet 45
14.3 Critical path analysis (HL only) – Eng Lee Engineering

(e) Explain the use of the dummy activity indicated in the critical path diagram in part (d). [2]

A dummy activity refers to an activity that does not take up any time or resources. In the new arch footbridge project, the dummy activity is indicated by a dotted line in the network diagram. It is added to maintain a logical dependency between different activities. The dummy activity is added to ensure that Activity G cannot commence until Activities E, F and I are completed.

(f) Calculate the total float and the free float for activity E and activity K. Using your answers, comment on the consequence on the footbridge project if:

- Activity E is delayed by one month.
- Activity K is delayed by three months. [4]

Activity	Free float EST next task - EST this task - Duration	Total float LFT - EST - Duration
E	2	2
K	2	5

If activity E is delayed by one month, it will not affect the overall duration of the footbridge project or the following activities as both floats are two months.

If activity K is delayed by three months, it will not affect the overall duration of the footbridge project. However it will delay the following activity L by 1 month.

Floating solar farm

On the calm waters of Tengeh Reservoir, located in the western part of Singapore, floats a 45-hectare (or the size of 45 football fields) solar photovoltaic (PV) farm. With an output of 60-megawatt peak (MWp), this floating solar farm generates enough energy to power 16,000 four-bedroom apartment buildings for one year. Most importantly, the floating solar panel farm can cut carbon emissions by about 32 kilotonnes annually. This is equivalent to removing 7,000 cars off the roads each year. Constructed by *Sembcorp Industries (Sembcorp)*, this floating solar farm is one of the largest in the world.

Inspired by the success of *Sembcorp*, a local startup, *Aqua Solar Ltd (Aqua Solar)* has won a contract to construct a floating solar farm on a lake in neighbouring Batam Island, Indonesia. This project involves assembling over 120,000 pieces of solar PV panels, installing high density polyethylene pontoons (floats), cables, mooring lines, anchors, combiner box, power conditioning system, performance monitoring control system, and connecting to the power grid. The project manager, Max, has identified operations, sequence, and duration, which are shown in **Table 1** below.

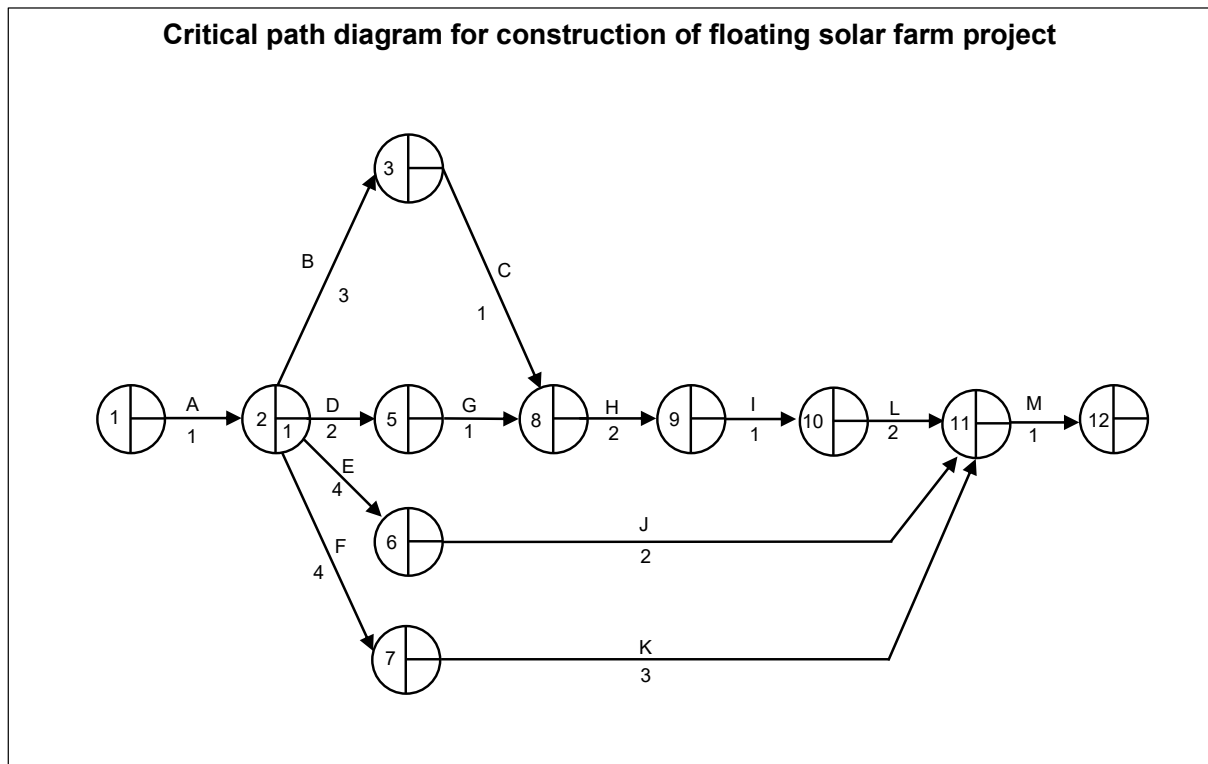
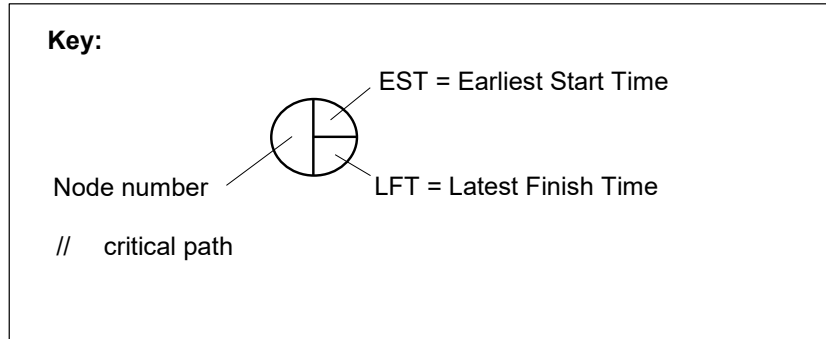
Table 1: Floating solar farm project activities (in months)

Activity	Description	Preceded by	Duration (months)
A	Clearing the reservoir area	-	1
B	Assembling the solar PV panels	A	3
C	Testing of sola PV panels	B	1
D	Constructing the underwater anchors at reservoir bed	A	2
E	Constructing piled foundation at reservoir bed	A	4
F	Construction of control building	A	4
G	Attaching floating pontoons to underwater anchors at reservoir bed with mooring lines	D	1
H	Installing solar PV panels onto floating pontoons attached to the reservoir bed by mooring lines	C,G	2
I	Installation of combiner box on floating pontoons	H	1
L	Constructing the power conditioning system over piled foundation at reservoir bed	I	2
J	Installing performance monitoring system in control building	E	2
K	Laying cables from floating pontoons to control building	F	3
M	Connection to the power grid	L,J,K	1

For new start-ups like *Aqua Solar*, the stakes are high as the company has limited funding but the owners are determined to make the floating solar farm project a success. Using **Table 1**, Max will need to conduct a critical path analysis before any construction starts.

Worksheet 46
14.4 Critical path analysis (HL only) – Floating solar farm

- (a) Complete the critical path diagram below that represents the activities in **Table 1**. Annotate the earliest start time (EST) and the latest finish time (LFT) for each activity, **and** the critical path on the diagram. [4]



Worksheet 46
14.4 Critical path analysis (HL only) – Floating solar farm

(b) Calculate the total float and the free float for each activity. Enter your answers in the **Table 2** below. [4]

Table 2

Activity	Free float EST next task - EST this task - Duration	Total float LFT - EST - Duration
A		
B		
C		
D		
E		
F		
G		
H		
I		
J		
K		
L		
M		

Worksheet 46
14.4 Critical path analysis (HL only) – Floating solar farm

- (c) Using the answers to part (b), comment on the possible effect on other activities and the total duration of the floating solar farm project if Activity F is delayed 2 months. [2]

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Most of *Aqua Solar's* key components for manufacturing the PV cells used in the solar panels are imported from overseas. *Aqua Solar* currently manufactures its own solar panels on a small scale before they can be assembled for use on floating solar farms. Together with challenges arising from manpower and resources in Singapore, Max suggests outsourcing production of the solar panels to a specialized manufacturer, *Helios Cells*, which has its own complete local Indonesian supply chain, and charges 30% cheaper per unit than *Aqua Solar's* cost to make (CTM).

However, the operations manager, Aaron, is concerned about meeting the environmental standards of the project, which require the use of double-glass PV modules instead of the single-glass variant commonly manufactured for rooftop installations. The solar PV panels need the durability to withstand both hot and wet environments as well as degradation from intense sunlight exposure. Most importantly, the solar panels must be corrosion resistant to minimize the impacts on the biodiversity and water quality of the reservoir. According to Aaron's update, *Aqua Solar* only has sufficient manpower in the assembly team to assemble 800 pieces of solar panels a day. The finance manager, Sally, has prepared the following cash flow forecast for the executive meeting. The owners of *Aqua Solar* would like to make informed decisions to ensure that the floating solar farm project is not delayed.

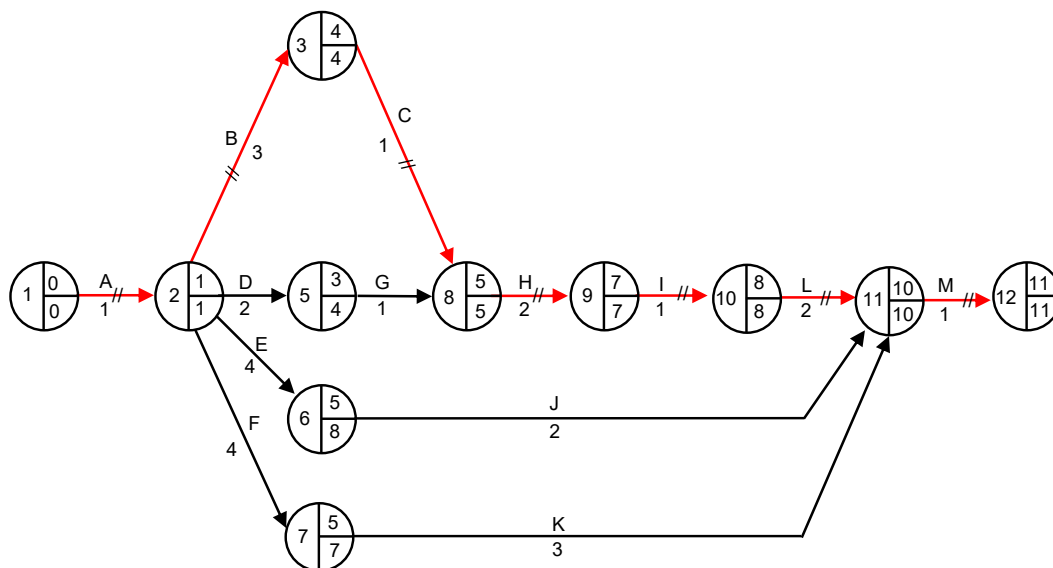
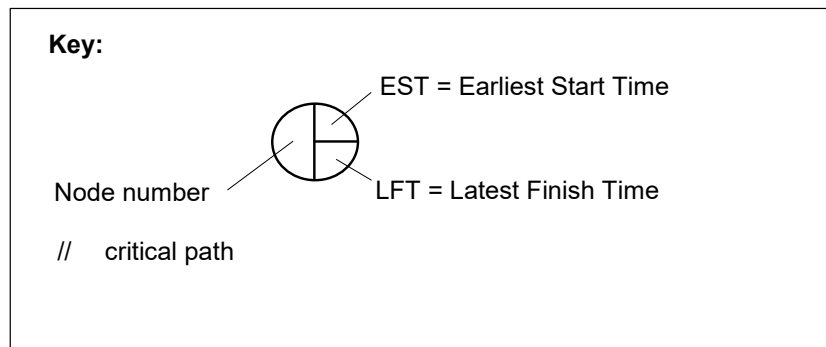
Table 3: Cash flow forecast for *Aqua Solar Ltd* for the first three months of 2024

<i>All figures in \$'000</i>	January	February	March
Opening balance	0	520	540
Cash inflows			
Sales	450	650	750
Government grant	500	0	0
Total cash inflows	950	650	750
Cash outflows			
Rent	60	60	60
Materials and transportation	100	180	395
Cost of sales	130	250	400
Utilities	60	60	60
Salaries and wages	80	80	80
Total cash outflows	430	630	995
Net cash flow	520	20	(245)
Closing balance	520	540	295

Answers

Floating solar farm

- (a) Complete the critical path diagram below that represents the activities in **Table 1**. Annotate the earliest start time (EST) and the latest finish time (LFT) for each activity, **and** the critical path on the diagram. [4]



Worksheet 46
14.4 Critical path analysis (HL only) – Floating Solar Farm

- (b) Calculate the total float and the free float for each activity. Enter your answers in the **Table 2** below. [4]

Table 2

Activity	Free float EST next task - EST this task - Duration	Total float LFT - EST - Duration
A	0	0
B	0	0
C	0	0
D	0	1
E	0	3
F	0	2
G	1	1
H	0	0
I	0	0
J	3	3
K	2	2
L	0	0
M	0	0

Worksheet 46
14.4 Critical path analysis (HL only) – Floating Solar Farm

- (c) Using the answers to part (b), comment on the possible effect on other activities and the total duration of the floating solar farm project if Activity F is delayed 2 months. [2]

If Activity F is delayed by 2 months, the duration of the floating solar farm project will not be delayed because its total float time is not exceeded. However, it would mean that Activity F would delay the start of the subsequent Activity K by 2 months.

- (d) Using the data provided in the **Table 1** and **Table 3**, and other information in the stimulus, recommend to *Aqua Solar* whether to outsource the manufacture of PV cells used in the solar panels. [10]

Outsourcing refers to the use of an external party for its production process to minimize costs. In this case *Aqua Solar* would be able to find other specialized manufacturers closer to its market to reduce production costs and overcome manpower and resource challenges. Specialized manufacturers will be able to gain from economies of scale in the production of solar PV panels and produce these 30% cheaper compared to the cost to make if *Aqua Solar* were to manufacture these. This may help to reduce cash outflows from higher costs of materials, transportation, and cost of sales (Table 3).

Most importantly, as shown in the critical path analysis, Activity B which involves assembling the solar PV panels, is on the critical path. There is no free or total float time. Any delay in the manufacture of PV cells will affect the assembly of the solar panels, thereby resulting in delays in the entire project. Outsourcing to *Helios Cells* can reduce the chances of delay in the shipment of components from overseas as it has a complete supply chain within Indonesia. *Aqua Solar* can focus on assembling solar PV panels instead.

Although outsourcing to *Helios Cells* may reduce costs, quality management might be a concern to *Aqua Solar*. As highlighted by the operations manager, the floating solar PV panels need to be highly customized to meet strict quality and environmental standards. The PV panels must be double-glassed, durable, and corrosion resistant to ensure the biodiversity and water quality of the reservoir are not compromised. For *Aqua Solar* being a new start-up, any damage to its reputation is risky and can be potentially disastrous should there be any problems with the quality of the PV panels.

Outsourcing *Helios Cells* may also result in redundancies at *Aqua Solar* during a time when staff are already overworked. This may harm staff morale at *Aqua Solar*. Also according to Aaron, *Aqua Solar* only has the manpower to assemble 800 pieces of solar PV panels a day which is far below the rate of 1,000 pieces required if 120,000 pieces of solar PV panels are to be assembled in 4 months. Thus, outsourcing to *Helios Cells* might not solve the problem of potential delays. In fact, they may need to hire more workers to speed up the assembly process. However, this will mean liquidity problems for *Aqua Solar* in the first 3 months of the project.

Before the owners of *Aqua Solar* make a decision to outsource the manufacture of PV cells to *Helios Cells*, they need to consider whether there is sufficient working capital or liquidity to complete the 11-month project. An important consideration for *Aqua Solar* is to find additional funding or cash inflows besides the initial government grant of \$500,000.

Other qualitative factors may also need to be considered. The quality of production by *Helios Cells* need to be further investigated, such as defect testing, as well as checks on safety and environmental standards. *Aqua Solar* also needs to ensure that the level of customization of production of PV cells at *Helios Cells* adhere to its specific needs on the floating solar farm as indicated in the stimulus. Employee motivation is another qualitative factor that *Aqua Solar* needs to address before deciding on whether to outsource production to *Helios Cells*, especially as employees are currently overworked.

Choc Choc Bakery Shop

Roy is planning to open a bakery shop and call it *Choc Choc Bakery Shop (CCBS)*. He intends to serve the niche market for chocolate lovers by baking chocolate cakes. He believes that the amount of chocolate consumed depends on age. To better satisfy the needs of his customers, Roy knows he needs to find information regarding the relationship between chocolate consumption and age before he opens *CCBS*.

Task 1: Fill in the blanks

Roy needs to conduct market research to collect data regarding chocolate consumption and the age of consumers. These data are then presented as a _____ graph. He can attempt to find a relationship or _____ between two _____ by using a _____ model. In simple linear regression, the _____ between two variables is described by fitting a _____ to the observed data to establish a _____ (if one exists). Linear regression allows Roy to estimate how a _____ variable (chocolate consumption) changes as the _____ variable (age) changes.

Simple linear regression will allow Roy to find out:

1. The _____ of the relationship (correlation) between two variables (e.g., the relationship between chocolate consumption and age).
2. To _____ or predict the value of the dependent variable (chocolate consumption) at a certain value of the independent variable (age) not in the range of his collected sample data through _____.

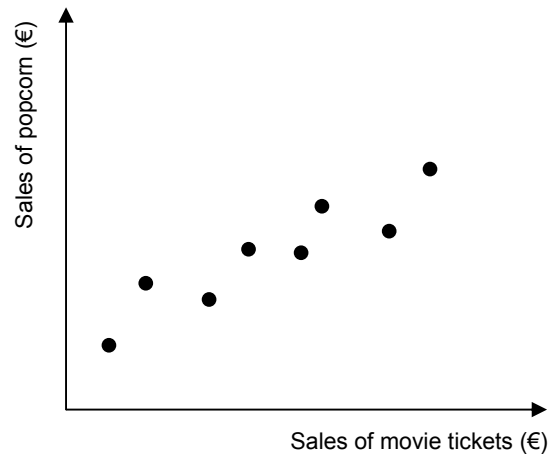
Missing words:

correlation, dependent, estimate, extrapolation, independent, line, nature, regression, relationship, scatter, trend, variables

Task 2: Multiple choice questions

Use Figure 1 to answer Questions 1 and 2.

Figure 1: Scatter graph of movie tickets and popcorns

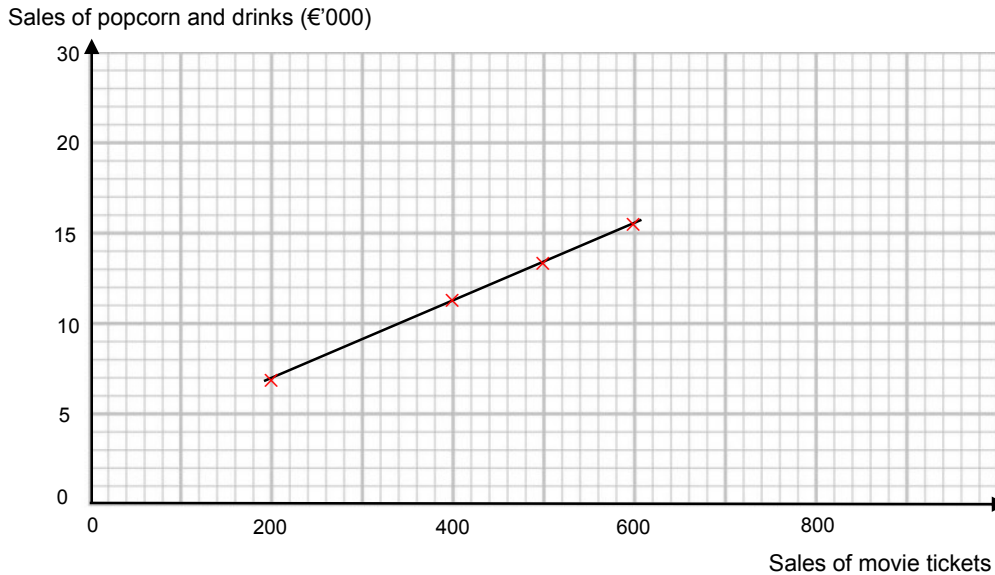


1. The method of using the line of best fit is called _____.
 - A. Force field analysis
 - B. Linear regression
 - C. Ratio analysis
 - D. Sales forecasting
2. What can be deduced about the relationship between sales of movie tickets and popcorn?
 - A. Both a positive and negative correlation
 - B. Negative correlation
 - C. No correlation
 - D. Positive correlation
3. What is not true about “extrapolation”?
 - A. It is guesswork
 - B. It is a forecast
 - C. It is close to absolute certainty
 - D. It is an estimation

Worksheet 47
15.1 Simple linear regression (HL only) – Choc Choc Bakery Shop

A new blockbuster movie is premiering next week. It was estimated to bring in sales of €400,000. The sales manager at *UA Cinemas* needs to make sure there is enough popcorn and drinks during the premier.

Figure 2: Scatter graph of movie tickets and popcorn and drinks

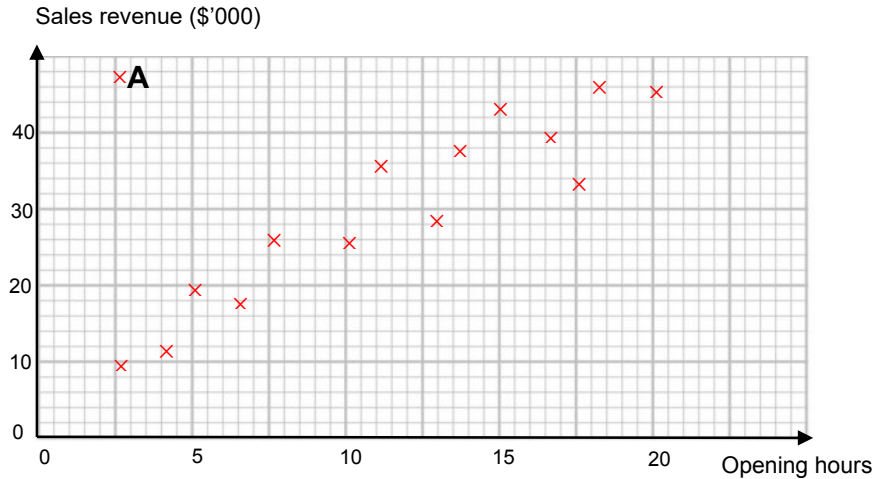


4. Use Figure 2 above to help the sales manager estimate the sales of popcorn if 800 movie tickets are sold.
- A. €10,000
 - B. €20,000
 - C. €30,000
 - D. €40,000
5. _____ is the method of estimating a value outside a data set.
- A. Extrapolation
 - B. Line of best fit
 - C. Scatter graph
 - D. Standard deviation

Worksheet 47
15.1 Simple linear regression (HL only) – Choc Choc Bakery Shop

Figure 3 shows a scatter graph for opening hours per day and sales revenue for a retailer. Use this figure to answer Question 6 and 7.

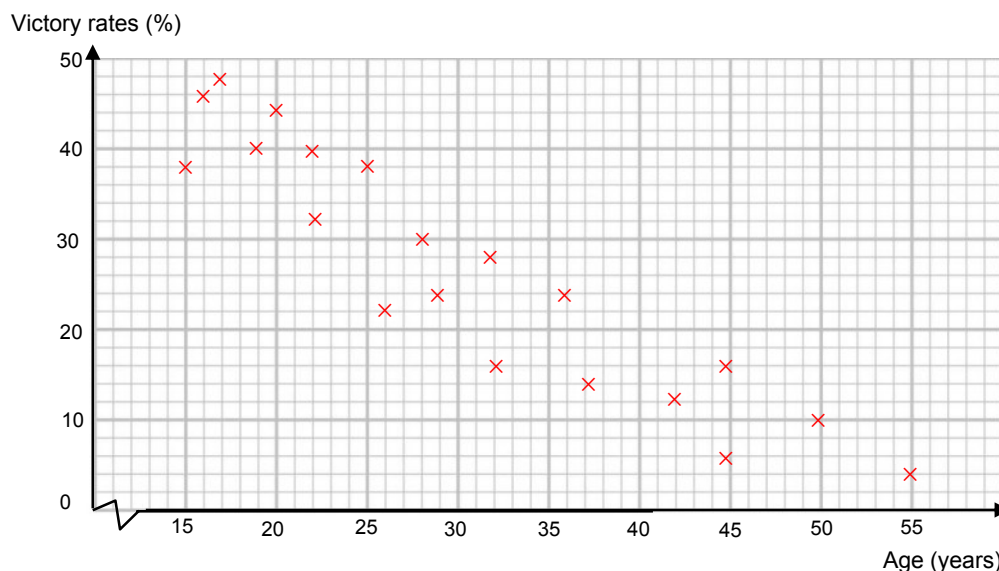
Figure 3: Scatter graph of opening hours and sales



6. The scatter graph (Figure 3) shows what sort of relationship between sales revenue and opening hours?
- A. A strong negative correlation
 - B. A strong positive correlation
 - C. A weak positive correlation
 - D. No correlation
7. Point A in Figure 3 is called a/an _____.
- A. Outlier
 - B. Quartile
 - C. Sampling error
 - D. Standard deviation

8. *League of Legends (LOL)* is a form of popular strategy video game where two teams of players compete against each other in real time. A survey was conducted by a DP student for his Extended Essay on *LOL* and results are shown in Figure 4.

Figure 4: Scatter graph of victory rates and age

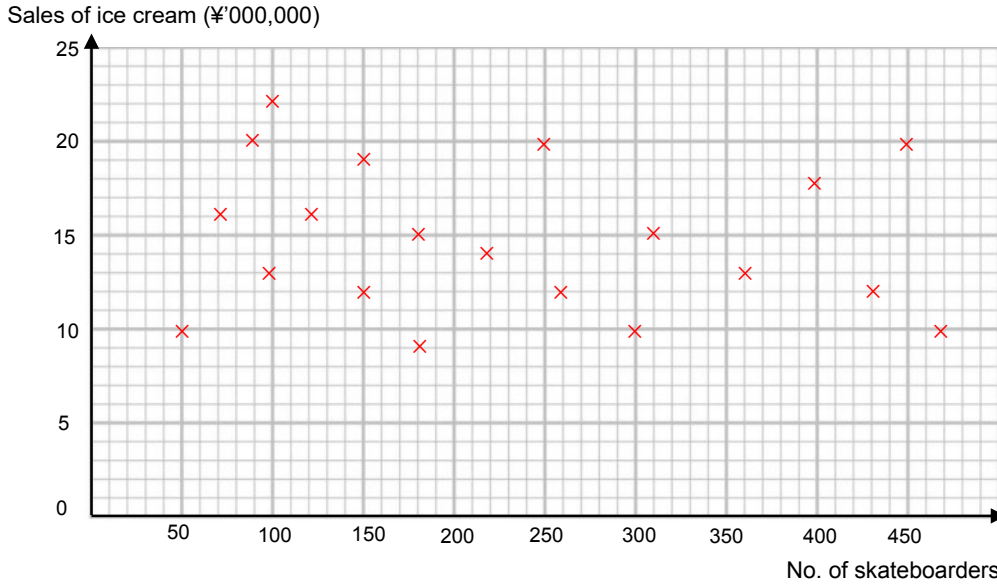


The scatter graph in Figure 4 shows _____ relationship between the victory rates and age of players.

- A. Strong negative correlation
- B. Weak negative correlation
- C. Strong positive correlation
- D. Weak positive correlation

9. The results of an observation of skateboarders in a popular city park in Japan, where an ice cream parlour operates, are shown in Figure 5.

Figure 5: Scatter graph of sales of ice cream and number of skateboarders

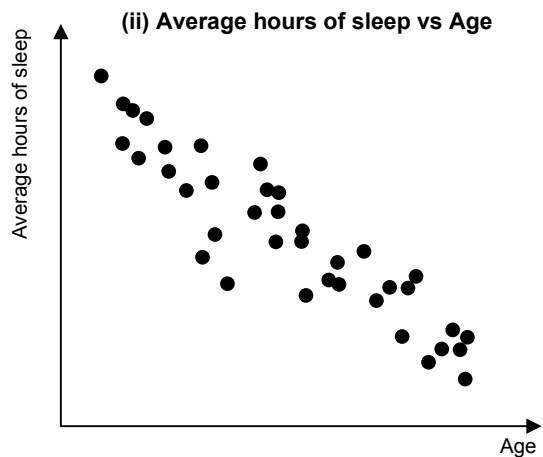
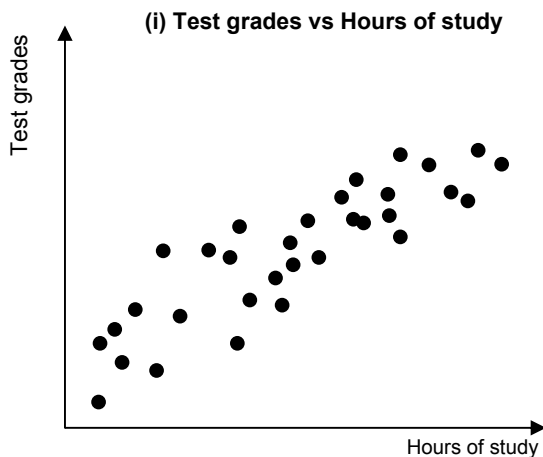


The scatter graph in Figure 5 shows which type of relationship between ice cream sales and the number of skateboarders at the city park?

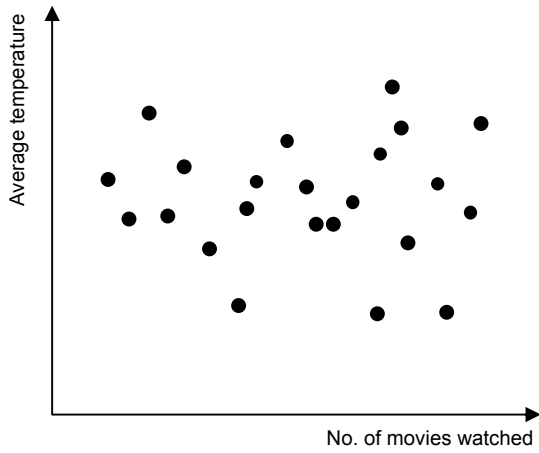
- A. Both a positive and negative correlation
- B. No correlation
- C. Weak negative correlation
- D. Weak positive correlation

Task 3: Short answer questions

1. With reference to correlation, describe what each graph below indicates.



(iii) **Average temperature vs Number of movies watched**



- (i)
-
-
- (ii)
-
-
-
- (iii)
-
-

2. Using an example, suggest how an understanding of correlation might be useful to a marketing team.

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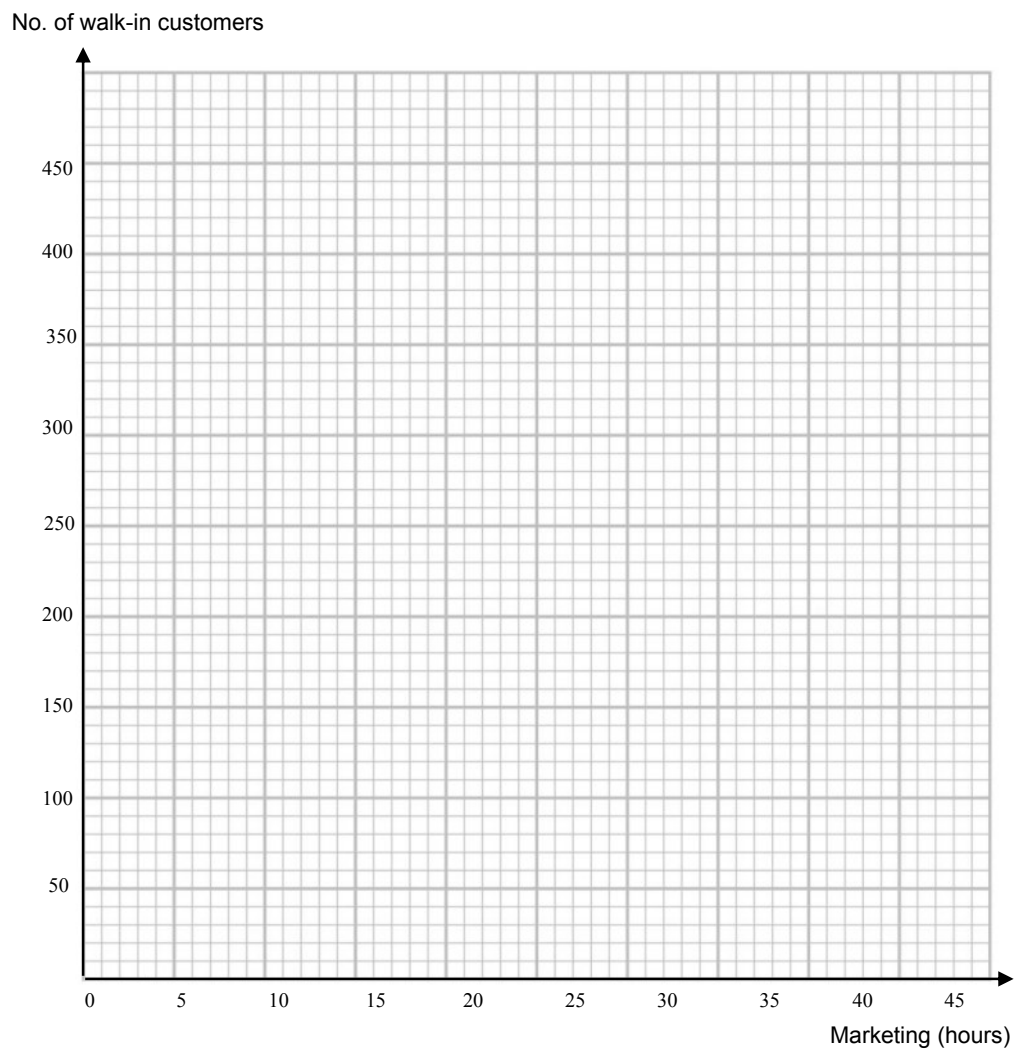
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3. Table 1 shows the duration spent on marketing in relation to the number of walk-in customers for a particular business.

- (i) Construct a scatter graph in the grid on the next page to represent the data in the table below.
- (ii) Plot the line of best fit in your graph.

Marketing (hours)	Number of walk-in customers
12	150
20	200
15	150
27	300
6	90
31	380
30	300
11	70
16	200
26	330
7	60
20	250

Worksheet 47
15.1 Simple linear regression (HL only) – Choc Choc Bakery Shop



Answers

Choc Choc Bakery Shop

Roy is planning to open a bakery shop and call it *Choc Choc Bakery Shop (CCBS)*. He intends to serve the niche market for chocolate lovers by baking chocolate cakes. He believes that the amount of chocolate consumed depends on age. To better satisfy the needs of his customers, Roy knows he needs to find information regarding the relationship between chocolate consumption and age before he opens CCBS.

Task 1: Fill in the blanks

Roy needs to conduct market research to collect data regarding chocolate consumption and the age of consumers. These data are then presented as a **scatter** graph. He can attempt to find a relationship or **correlation** between two **variables** by using a **regression** model. In simple linear regression, the **relationship** between two variables is described by fitting a **line** to the observed data to establish a **trend** (if one exists). Linear regression allows Roy to estimate how a **dependent** variable (chocolate consumption) changes as the **independent** variable (age) changes.

Simple linear regression will allow Roy to find out:

1. The **nature** of the relationship (correlation) between two variables (e.g., the relationship between chocolate consumption and age).
2. To **estimate** or predict the value of the dependent variable (chocolate consumption) at a certain value of the independent variable (age) not in the range of his collected sample data through **extrapolation**.

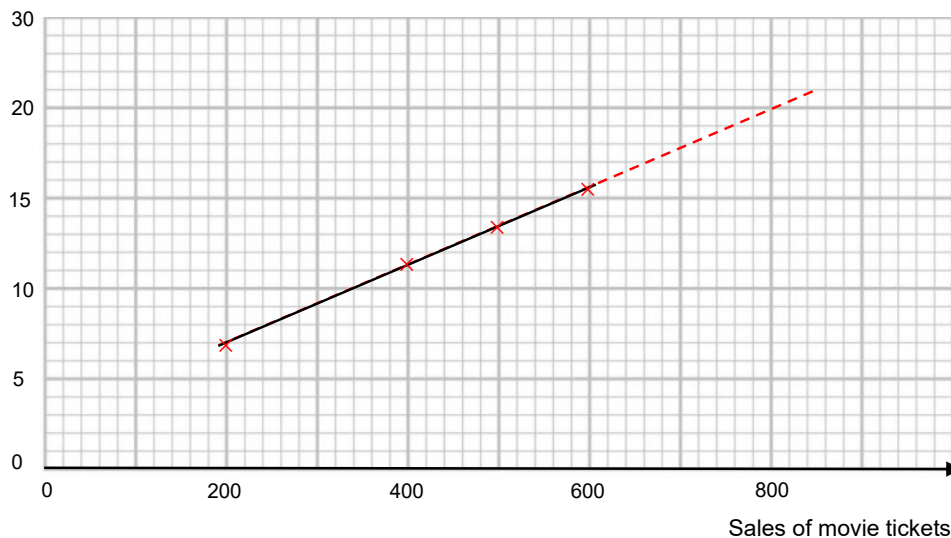
Task 2: Multiple Choice Questions

1. The method of using the line of best fit is called _____.
 - A. Force field analysis
 - B. Linear regression**
 - C. Ratio analysis
 - D. Sales forecasting

2. What can be deduced about the relationship between sales of movie tickets and popcorn?
- A. Both a positive and negative correlation
 - B. Negative correlation
 - C. No correlation
 - D. Positive correlation**
3. What is not true about “extrapolation”?
- B. It is a forecast
 - D. It is an estimation
 - C. It is close to absolute certainty**
 - A. It is guesswork

Figure 2: Scatter graph of movie tickets and popcorn and drinks

Sales of popcorn & drinks (€'000)



4. Use Figure 2 above to help the sales manager estimate the sales of popcorn if 800 movie tickets are sold.
- A. €10,000
 - B. €20,000**
 - C. €30,000
 - D. €40,000

5. _____ is the method of estimating a value outside a data set.
- A. **Extrapolation**
 - B. Line of best fit
 - C. Scatter graph
 - D. Standard deviation
6. The scatter graph (Figure 3) shows what sort of relationship between sales revenue and opening hours?
- A. A strong negative correlation
 - B. **A strong positive correlation**
 - C. A weak positive correlation
 - D. No correlation
7. Point A in Figure 3 is called a/an _____.
- A. **Outlier**
 - B. Quartile
 - C. Sampling error
 - D. Standard deviation
8. *League of Legends (LOL)* is a form of popular strategy video game where two teams of players compete against each other in real time. A survey was conducted by a DP student for his Extended Essay on *LOL* and results are shown in Figure 4.
- The scatter graph in Figure 4 shows _____ relationship between the victory rates and age of players.
- A. **Strong negative correlation**
 - B. Weak negative correlation
 - C. Strong positive correlation
 - D. Weak positive correlation
9. The scatter graph in Figure 5 shows which type of relationship between ice cream sales and the number of skateboarders at the city park?
- A. Both a positive and negative correlation
 - B. **No correlation**
 - C. Weak negative correlation
 - D. Weak positive correlation

Task 3: Short answer questions

1. With reference to correlation, describe what each graph below indicates.
 - (i) There is a strong positive correlation between test (assessment) grades and the number of hours of studied.
 - (ii) There is a strong negative correlation between average hours of sleep and a person's age.
 - (iii) There is no correlation between the average temperature and the number of movies watched.

2. Using an example, suggest how an understanding of correlation might be useful to a marketing team.

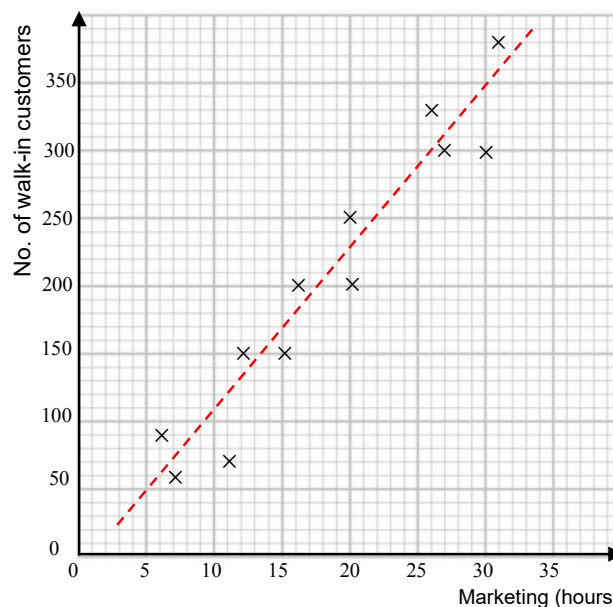
Marketeers can find out correlations between a dependent variable (such as heart disease) and the independent variable (cigarette consumption). Hence, a marketing team can better understand their customers, such as healthcare providers or the government.

Correlation analysis also allows a marketing team to monitor and test customers' reactions to different marketing tactics, such as the types of movies watched not being influenced by the weather. Hence, they can devise a more appealing and successful marketing mix.

3. Table 1 shows the duration spent on marketing in relation to the number of walk-in customers for a particular business.

- (i) Construct a scatter graph in the grid below to represent the data in the table.
- (ii) Plot the line of best fit in your graph.

Marketing (hours)	Walk-in customers
12	150
20	200
15	150
27	300
6	90
31	380
30	300
11	70
16	200
26	330
7	60
20	250



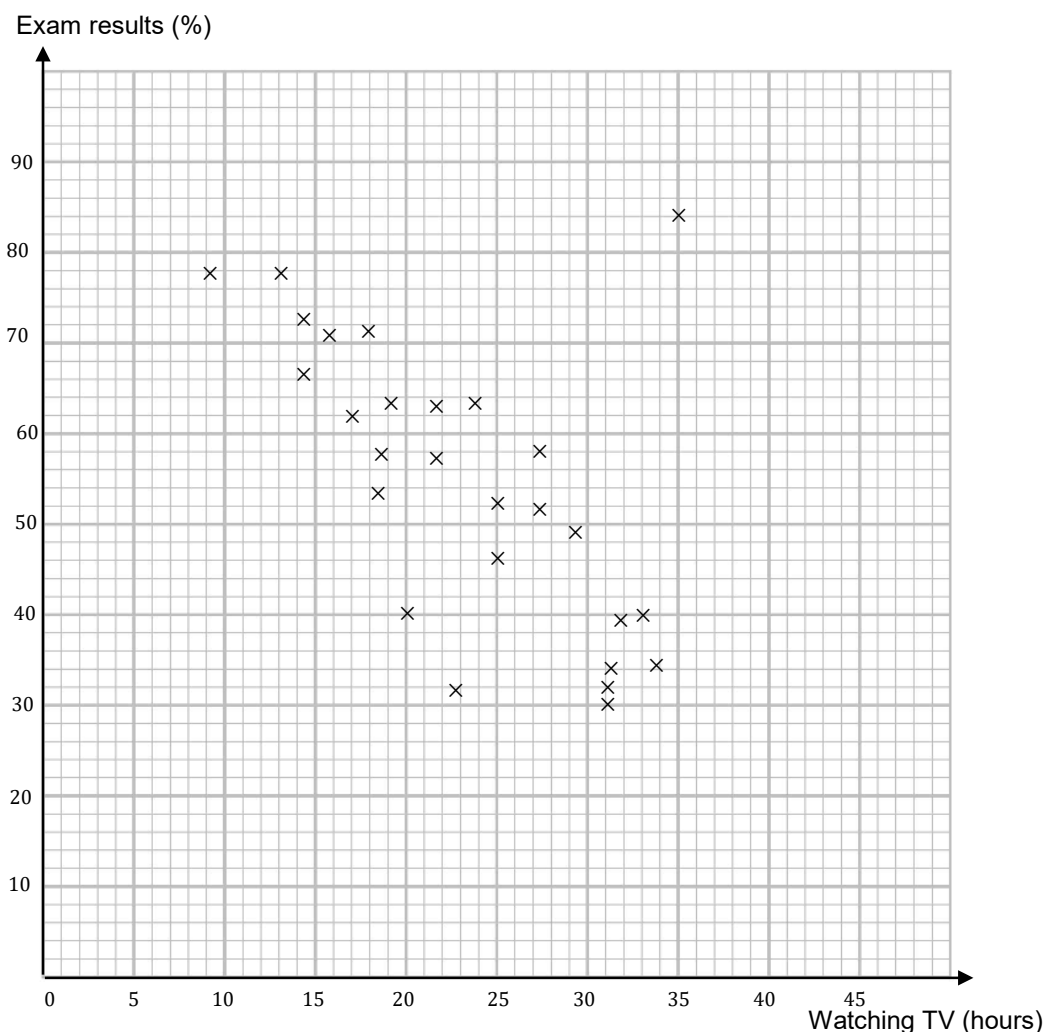
National exams vs TV hours

47 students participated in a survey after they received their results in a local examination. The total scores in the national exams associated with the number of hours spent watching TV per month were plotted in a scatter graph shown in **Graph 1**.

(a) Plot the missing data from **Table 1** on the grid below in order to complete the scatter graph. [2]

Table 1: Watching TV (hours) vs Exam results (% grade)

Watching TV (hours)	Exam results (% grade)
10	80
13	72
17	68
21	54
23	54
23	48
27	46
29	40
32	38
35	28



Graph 1: Scatter graph

(b) Students of pirateIB, state what the completed scatter graph indicates. [2]

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(c) Annotate on the scatter graph the outlier. [1]

(d) Construct the line of best fit on the scatter graph. [2]

(e) Using the line of best fit in part (d) answer the following questions:

(i) State the likely exam result (% grade) for a student who watched 30 hours of TV. [1]

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(ii) State the likely number of hours of watching TV for a student who scored 82% in the exams. [1]

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(f) "Watching only 5 hours of TV or less would not affect my exam results. I want to score over 90%." Comment on this statement by a student. [2]

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Answers

National exams vs TV hours

(a) Plot the missing data from **Table 1** on the grid below in order to complete the scatter graph. [2]

See diagram below

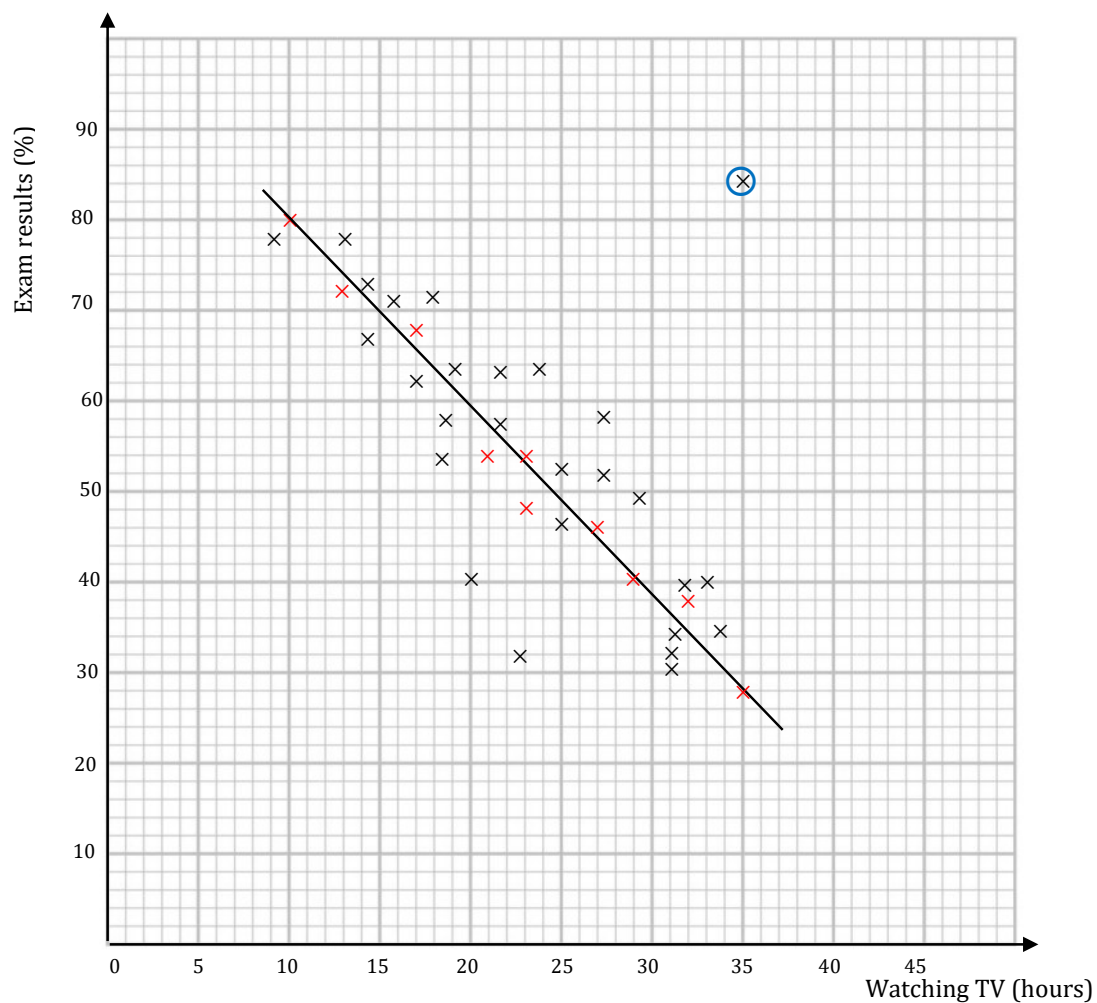
(b) State what the completed scatter graph indicates. [2]

The scatter graph indicates a negative correlation between the students' exam results and the number of hours they spend watching TV.

(c) Annotate on the scatter graph the outlier. [1]

See diagram below

(d) Construct the line of best fit on the scatter graph. [2]



Worksheet 48
15.2 Simple linear regression (HL only) – National exams vs TV hours

(e) Using the line of best fit in part (d) answer the following questions:

(i) State the likely exam result (% grade) for a student who watched 30 hours of TV. [1]

38%

(ii) State the likely number of hours of watching TV for a student who scored 82% in the exams. [1]

9 hours of TV

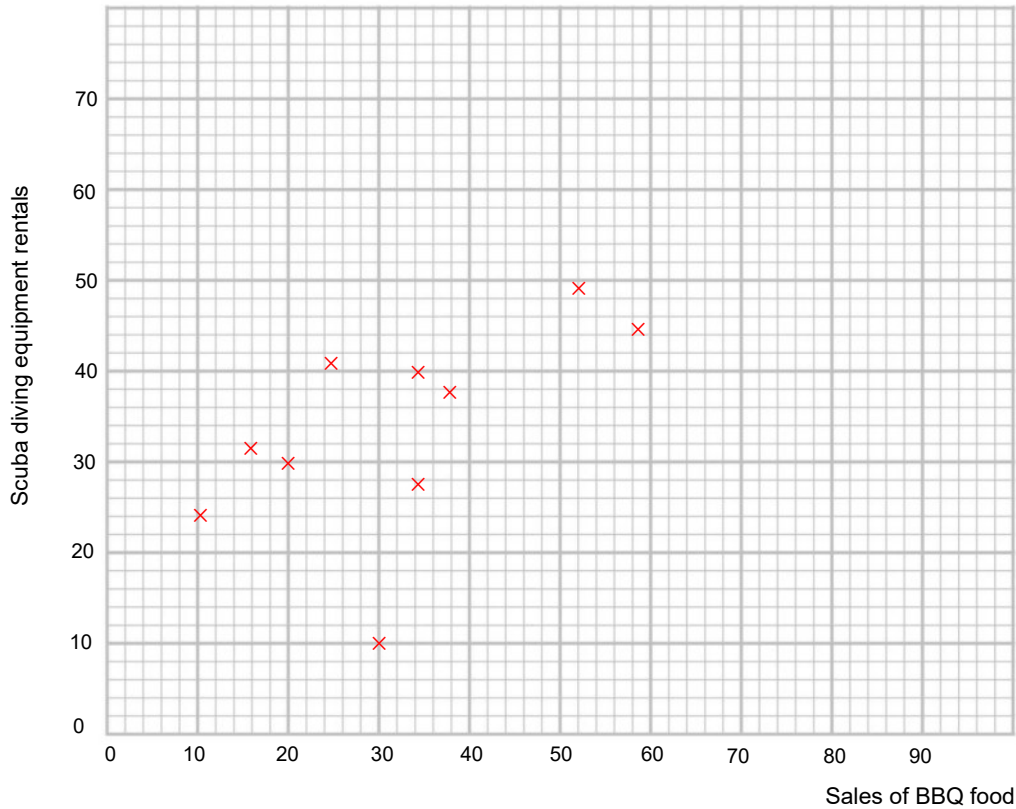
(f) “Watching only 5 hours of TV or less would not affect my exam results. I want to score over 90%.” Comment on this statement by a student. [2]

The scatter graph does not support this statement. Watching television for 5 hours and scoring over 90% in the exams falls outside the line of best fit. Only through extrapolation might this be determined.

Sunny Dayz

Sunny Dayz rents scuba diving equipment and sells packaged BBQ food at a seaside resort on an island off the coast of Peninsular Malaysia. **Figure 1** shows the revenue from scuba diving equipment rentals and BBQ food sales in the past 12 months. The figures are in thousands of Malaysian ringgits (MYR), where USD 1 = approx. MYR 4.55.

Figure 1: Suba diving equipment rentals and sales of BBQ food (MYR '000)



(a) Construct the line of best fit in **Figure 1** above. [2]

(b) Outline the type of correlation shown in the scatter graph. [2]

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(c) Explain the relationship between scuba diving equipment rentals and BBQ food sales at *Sunny Dayz*. [4]

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(d) Annotate the outlier shown in **Figure 1**. [1]

(e) Suggest **one** cause for the outlier in Question (d). [2]

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The chief chef at *Sunny Dayz* needs to order ingredients for the BBQ food. However, he is not sure about the sales of BBQ food. Meanwhile, the store manager for scuba diving equipment rentals is more optimistic. He is confident that *Sunny Dayz* will earn rental revenue of MYR 60,000 next month.

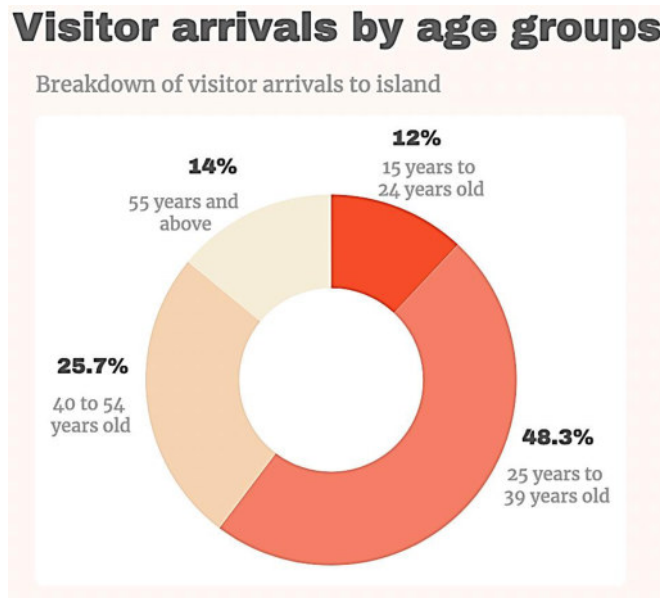
(f) Demonstrate how the sales of BBQ food next month can be estimated by using extrapolation in **Figure 1**. [4]

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To reach the island, the most common route for visitors is by ferry. Based on immigration information from the ferry terminal, the age distribution of tourist arrivals to the island is shown in **Figure 2**. *Dive World*, a popular diving guide app, recommends people the best places to dive based on the reviews written by real local people. It has just gave the island high review ratings. These ratings are based on deep water challenges and adventures experienced by divers.

Figure 2: Infographics of visitor arrivals by age groups



(g) Using information from **Figure 2**, comment on the reliability of the estimated sales of BBQ food in Question (e). [4]

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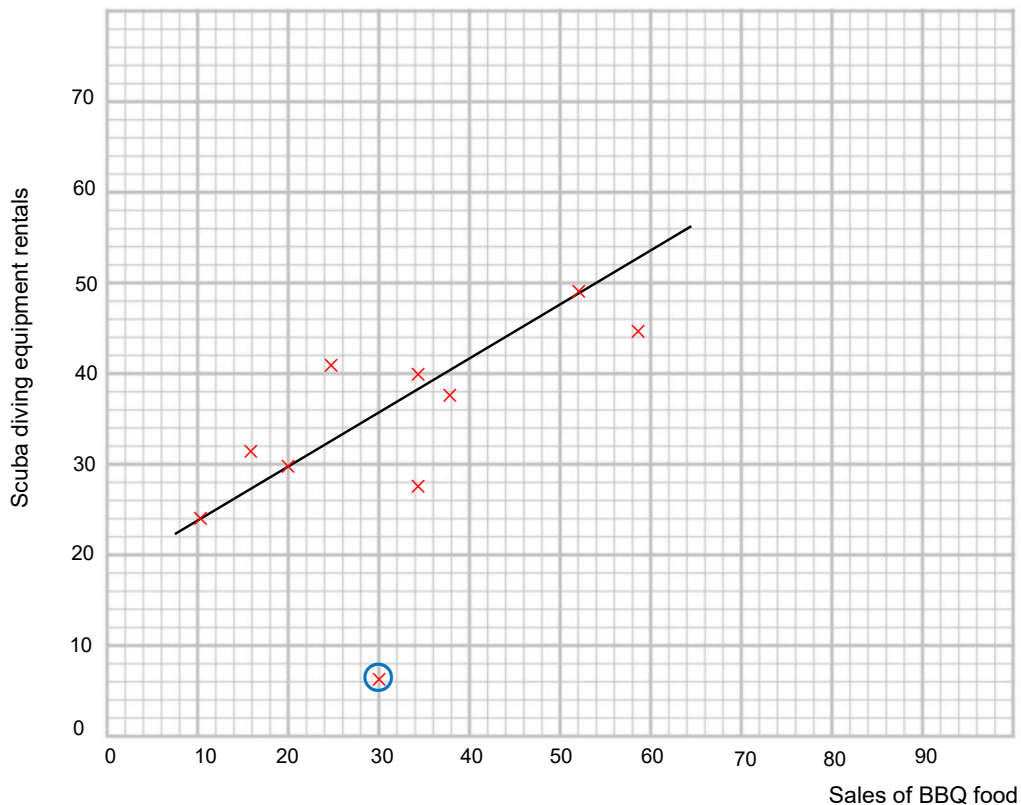
Answers

Sunny Dayz

(a) Construct the line of best fit in **Figure 1** above. [2]

See below

Figure 1: Suba diving equipment rentals and sales of BBQ food (MYR \$'000)



(b) Explain the type of correlation shown in the scatter graph. [4]

The scatter graph suggests there is a positive correlation between the scuba diving equipment rentals and the sales of BBQ food. This is indicated by the positive slope of the line of best fit. This happens when the demand for both services are complementary. As more divers come to rent scuba diving equipment on the island seaside resort, they also tend to demand more of the food services.

(c) Annotate the outlier shown in **Figure 1**. [1]

Refer to the **Figure 1** above.

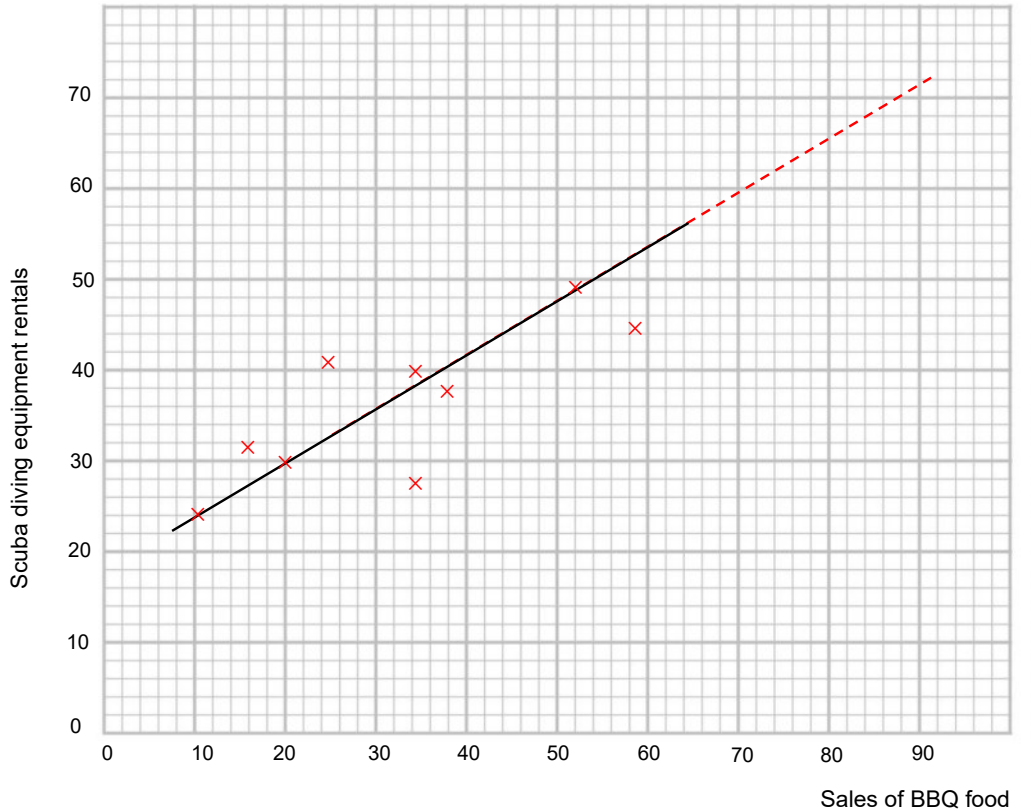
(d) Suggest **one** cause for the outlier in Question (d). [2]

Possible causes of outliers in this case could include:

- Sampling errors could arise from extracting data from the wrong/inaccurate sources.
- Data entry errors, such as human mistakes when data is collected, recorded, and/or entered.

- (e) Demonstrate how the sales of BBQ food next month can be estimated by using extrapolation in **Figure 1**. [2]

Figure 1: Suba diving equipment rentals and sales of BBQ food (MYR \$'000)



In Figure 1, the line of best fit is extrapolated so that the sales of BBQ food can be estimated based on the positive correlation relationship with scuba diving equipment rentals.

- (f) Using information from **Figure 2**, comment on the reliability of the estimated sales of BBQ food in Question (e). [4]

The extrapolation is purely a quantitative method based on the line of best fit. The technique of extrapolation is based on past data which is then projected to estimate the sales of BBQ food. However, external factors and/or qualitative factors could affect the actual sales of Sunny Dayz's BBQ food.

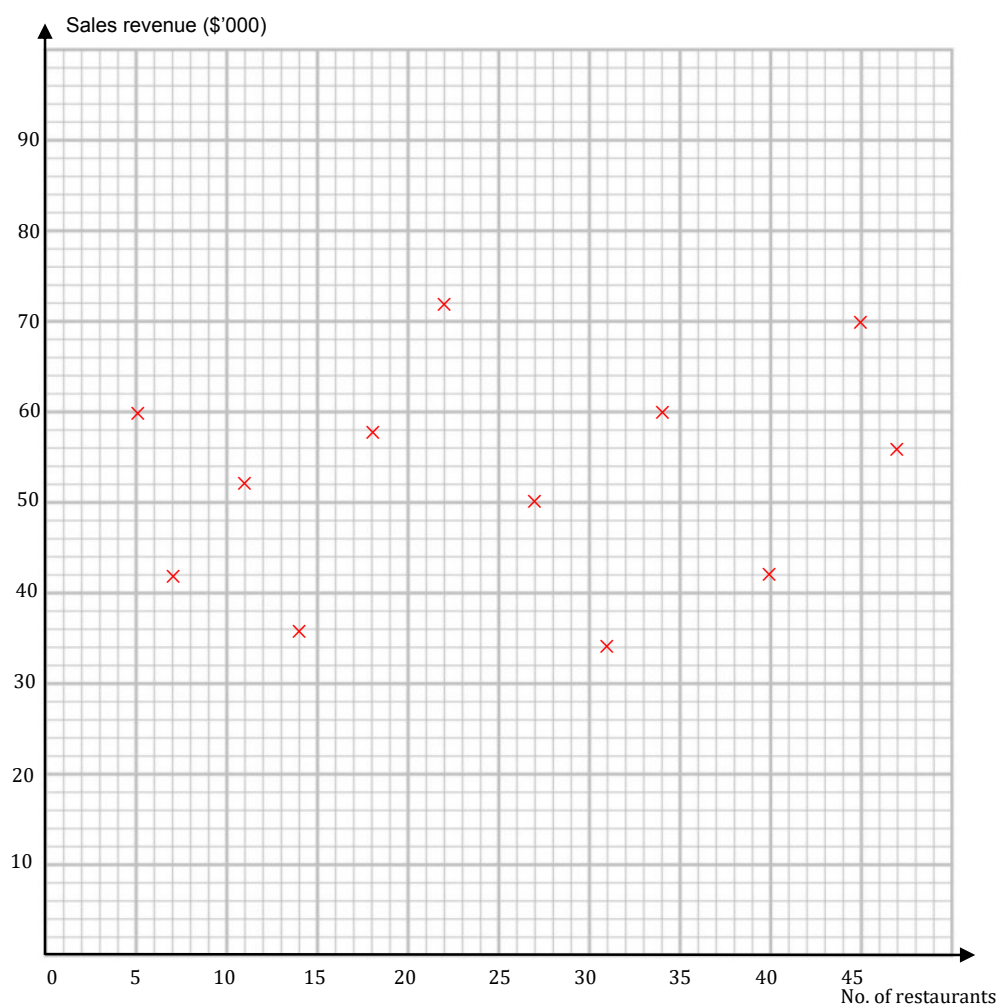
External factors such as adverse weather could affect diving conditions, and therefore have a negative impact on the sales of BBQ food sold on the island. Changes in the global economy could also affect tourist arrivals to the island seaside resort. Changes in the demographics of tourist arrivals can also have an impact on the estimated sales as younger people may be more adventurous about diving expeditions.

Mr. Tomato

Sham Shui Po is one of the oldest neighbourhoods in Hong Kong, known for its textiles industry before sectoral changes from manufacturing to financial services. Recently, Sham Shui Po has undergone another change to become one of the hippest districts in Hong Kong due to a new generation of creative residents who have successfully reinvigorated the vicinity. A key attraction of Sham Shui Po is its numerous restaurants, and this has drawn the attention of both residents and visitors alike.

Mr. Tomato is one of the restaurants in Sham Shui Po and its **unique selling point (USP)** is its specialty in serving quality tomato-soup based noodles. Concerned about rising competition, Jayce, the owner of *Mr. Tomato*, has tracked his monthly sales revenue against the number of new restaurants that sprang up in Sham Shui Po over the past year. The data are presented in Figure 1 below.

Figure 1: Scatter diagram of sales revenue against number of new restaurants



(a) Define the term *unique selling point* (USP). [2]

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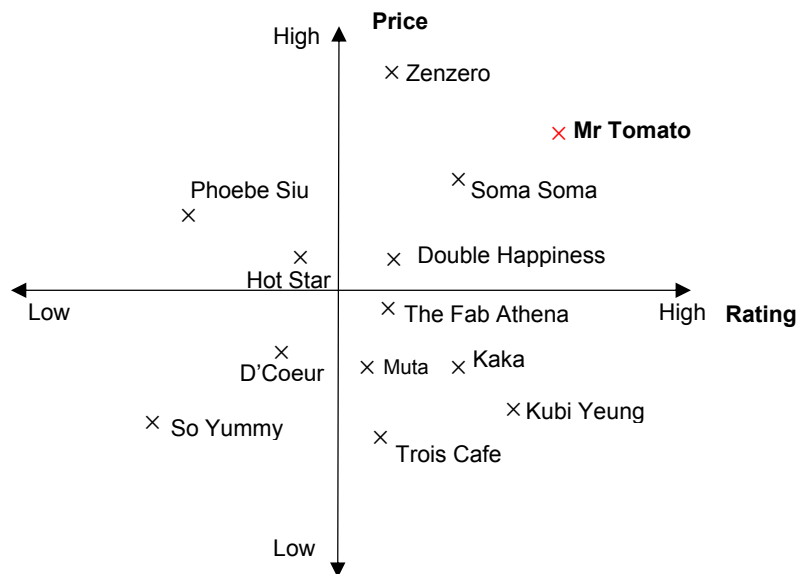
(b) Comment on the type of correlation shown in Figure 1. [2]

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Jayce conducted primary research using random sampling for his respondents. **Figure 2** shows the position map of some restaurants in Sham Shui Po based on Jayce’s survey results.

Figure 2: Position map of restaurants in Sham Shui Po



(c) Explain the impact of competition on Jayce’s business. [4]

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Answers

Mr. Tomato

- (a) Define the term *unique selling point* (USP). [2]

The term unique selling point (USP) refers to how businesses gain a distinctive competitive advantage by using any feature of its brand or its product that differentiates it from its competitors.

- (b) Comment on the type of correlation shown in Figure 1. [2]

There is no clear correlation between *Mr. Tomato's* sales revenue and the number of new restaurants. This is because the line of best fit in the scatter diagram would be a near-horizontal line based on the given data set.

- (c) Explain the impact of competition on Jayce's business. [4]

In theory, increased competition should reduce the sales revenue of Jayce's business. However, the scatter diagram suggests that there is no correlation between *Mr. Tomato's* sales revenue and the number of restaurants opened.

This suggests that *Mr. Tomato's* quality tomato-soup based noodles has allowed it to differentiate itself from its competitors. Thus, the impact of competition due to the increase in the number of new restaurants seems to have a minimal, if any, impact on *Mr. Tomato's* sales revenue due to its unique selling point in the market.

- (d) Explain **one** advantage and **one** disadvantage for the use of random sampling in primary research. [4]

Advantages could include an explanation of:

- Random sampling minimizes bias as there is an equal chance for anyone to be selected for primary research.
- It is a relatively easy and simple method to extract a sample from a large population.

Disadvantages could include an explanation of:

- Bias may still exist if the sample size is not large enough to gather statistically valid data.
- Researchers need to have sufficient experience and skills to conduct the random sampling successfully.

- (e) Using the stimulus material and data in **Figure 1** and **Figure 2**, recommend suitable pricing methods for *Mr. Tomato*. (You can continue your answer on a separate page) [10]

Appropriateness pricing methods could include a discussion of the following:

- Cost-plus (mark-up) pricing
- Premium pricing
- Competitive pricing (HL only)
- Contribution pricing (HL only)
- Price elasticity of demand (HL only)

As Sham Shui Po become one of the hippest districts in Hong Kong, this suggests there has been an influx of customers, both locally and regionally. This could allow *Mr. Tomato* to raise its prices in order to benefit from higher profit margins.

Based on Figure 1, there is no correlation between *Mr. Tomato*'s sales revenue and the number of restaurants opened. This indicates that *Mr. Tomato* is less likely to be threatened by new entrants in the industry, i.e., demand is price inelastic. The fact that *Mr. Tomato* serves tomato-soup based noodles suggests that it might be operating in a niche market and has a unique selling proposition.

However, operating in a niche market means there are fewer customers. This might allow *Mr. Tomato* to set higher prices using its quality tomatoes for its soup-based noodles (as its USP). Setting higher prices will allow *Mr. Tomato* to earn higher profit margins. However, *Mr. Tomato* could face higher costs due to low economies of scale with fewer customers, so cost-based pricing may also be appropriate.

The position map used in Figure 2 shows customer perceptions of the different restaurants in the Sham Shui Po vicinity based on the pricing (high or low) and the rating of food quality (high or low). Based on the data Figure 2, the results suggest that despite charging higher prices, *Mr. Tomato* receives a rather high rating from its customers for product quality. This suggests that *Mr. Tomato* is seen as a premium brand justifying its higher prices. Together with Figure 1, it can be argued that *Mr. Tomato* has positioned itself in a niche market with its unique tomato-soup-based noodles which helps to differentiate the business from its competitors. Thus, there is not much of a threat with new entrants, so charging premium prices could be justified.

Accept any other relevant point that is appropriately discussed in the context of the case study.