

Teacher(s)		Subject group and discipline	Math		
Unit title	3D shapes	MYP year	3	Unit duration (hrs)	

Inquiry: Establishing the purpose of the unit

Key concept	Related concept(s)	Global context
Relationships	Generalization, measurement	Scientific and technical innovation: Products, processes and solutions
Statement of inquiry		
Generalizing relationships between measurements can help analyze and create products, processes and solutions.		
Inquiry questions		
<p>Factual— What is volume? What is surface area?</p> <p>Conceptual— How are surface area and volume related? How do we generalize relationships between measurements?</p> <p>Debatable— What makes for an ingenious solution? How can a product solve a problem?</p>		

Objectives	Summative assessment	
<p>A: Knowing and understanding</p> <ul style="list-style-type: none"> i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts. <p>B: Investigating patterns</p> <ul style="list-style-type: none"> i. select and apply mathematical problem- solving techniques to discover complex patterns ii. describe patterns as relationships and/or general rules consistent with findings iii. verify and justify relationships and/or general rules. <p>C: Communicating</p> <ul style="list-style-type: none"> i. use appropriate mathematical language (notation, symbols and terminology) in both oral and 	<p>Outline of summative assessment task(s) including assessment criteria:</p> <p>Unit Test: (criterion A)</p> <p>In this task, students will answer a wide range of questions, from simple to complex to challenging (in both familiar and unfamiliar situations), all based on 3D shapes. Students will determine the volume and surface area of cylinders, spheres, pyramids and cones and solve problems involving these shapes. The test will be done individually in class during one period. Students will have access to a calculator.</p> <p>Investigation: Surface Area of a Sphere (criterion B)</p> <p>In this task, students will generalize the relationship between the radius of a sphere at its surface area. Students will trace around an orange several times on a</p>	<p>Relationship between summative assessment task(s) and statement of inquiry:</p> <p>The Unit Test will ask students to apply the relationships between measurements that they have generalized to a wide range of questions and verify that they can solve problems involving 3D shapes. Many of the questions will include applications to real-life situations focused on clever products that humans have made to try to solve a problem.</p> <p>This unit provides the foundation for the study of more complex shapes in geometry. Developing the formula for the surface area of a sphere is not only important mathematically, but it allows students to see that even they can</p>

<p>written explanations</p> <ul style="list-style-type: none"> ii. use appropriate forms of mathematical representation to present information iii. move between different forms of mathematical representation iv. communicate complete and coherent mathematical lines of reasoning v. organize information using a logical structure. <p>D: Applying mathematics in real-life contexts</p> <ul style="list-style-type: none"> i. identify relevant elements of authentic real-life situations ii. select appropriate mathematical strategies when solving authentic real-life situations iii. apply the selected mathematical strategies successfully to reach a solution iv. explain the degree of accuracy of a solution v. explain whether a solution makes sense in the context of the authentic real-life situation. 	<p>piece of paper to create circles (at least 4). They will then peel the orange into small pieces and place them in the circles they have created. Students will share their results and then, individually, attempt to arrive at the formula for the surface area of a sphere based on the data collected. The investigation will be done in class during one period.</p> <p>Designing a Heat Bag: (criteria C, D)</p> <p>In this task, students design a microwavable heat bag that can be used for pain relief, relaxation, etc.. Students will explore a variety of shapes for the bag that has a given volume and then create the bag so that it is appealing to consumers. Students will also produce marketing materials in order to stimulate interest in their product.</p>	<p>generalize relationships between measurements. This knowledge then allows them to analyze some very interesting products on the market and perhaps even create one of their own.</p> <p>In the Designing a Heat Bag task, students will use the mathematics they have learned to design a product that can be used for pain relief, relaxation or simply to keep hands warm. Students will use the relationships they generalized throughout the unit in order to design and create their own product, including marketing materials. In this task, they see how mathematical knowledge can lead to an improved product.</p>
---	--	---

Approaches to learning (ATL)

In order for students to be successful in generalizing relationships through mathematical investigations, students will make guesses, ask “what if” questions and generate testable hypotheses (Thinking: Creative thinking skills). The strategy students will learn and practice is “guess what?” where, before starting an investigation, they will hypothesize about its outcome. This will help them focus their attention on the required outcome, but also encourage them to ask their own questions which they could later test.

In order for students to be successful in the “Designing a Heat Bag” task, students will combine knowledge, understanding and skills to create products or solutions (Thinking: Transfer skills). The strategy students will learn and practice is “Design U”, where they will make proposals for solutions to design problems and then analyse them mathematically to see if they are viable and/or useful.

Action: Teaching and learning through inquiry

Content	Learning process
	Learning experiences and teaching strategies

	Formative assessment
	Differentiation
Resources	

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit

--	--	--

Teacher(s)		Subject group and discipline	Math		
Unit title	Bivariate data	MYP year	3	Unit duration (hrs)	

Inquiry: Establishing the purpose of the unit

Key concept	Related concept(s)	Global context
Relationships	Models, quantity	Identities and relationships: What it means to be human
Statement of inquiry		
Modeling the relationship between quantities can highlight what it means to be human.		
Inquiry questions		
<p>Factual— What is a model? What is correlation?</p> <p>Conceptual— How are relationships modeled? How does correlation relate to causation?</p> <p>Debatable— How can the human experience be quantified? What does it mean to be human?</p>		

Objectives	Summative assessment	
<p>A: Knowing and understanding</p> <ul style="list-style-type: none"> i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts. <p>B: Investigating patterns</p> <ul style="list-style-type: none"> i. select and apply mathematical problem- solving techniques to discover complex patterns ii. describe patterns as relationships and/or general rules consistent with findings iii. verify and justify relationships and/or general rules. <p>C: Communicating</p> <ul style="list-style-type: none"> i. use appropriate mathematical language (notation, symbols and terminology) in both oral and 	<p>Outline of summative assessment task(s) including assessment criteria:</p> <p>Unit Test: (criterion A)</p> <p>In this task, students will answer a wide range of questions, from simple to complex to challenging (in both familiar and unfamiliar situations), all related to analysing and modelling the relationship between various quantities. Questions will focus on drawing and interpreting scatter plots, finding the equation of a line of best fit and analyzing the correlation between two variables. The test will be done individually in class during one period.</p> <p>Investigation: Effect of an Outlier (criterion B)</p> <p>In this task, students will study the effects of an outlier on the relationship between two variables. Students are given sets of data that they model using technology and then calculate the correlation coefficient.</p>	<p>Relationship between summative assessment task(s) and statement of inquiry:</p> <p>The Unit Test will allow students to apply the content they have learned to a wide range of questions and verify that they can analyze bivariate data and establish relationships between quantities. Many of the questions will include applications related to various aspects of the human existence.</p> <p>The investigation will help students discover the effects of extraordinary data on the results of a statistical analysis. Understanding the effects of keeping or removing data allows students to analyze models for their appropriateness. It also allows them to create models that best</p>

<p>written explanations</p> <ul style="list-style-type: none"> ii. use appropriate forms of mathematical representation to present information iii. move between different forms of mathematical representation iv. communicate complete and coherent mathematical lines of reasoning v. organize information using a logical structure. 	<p>Students are then asked to decide whether or not there are any outliers, remove them, and then reformulate the model and recalculate the correlation coefficient. Based on their results, they generalize the effects of removing an outlier on linear regression analysis. The investigation will be done during one class period under test conditions.</p> <p>What Does It Mean to Be Human?: (criterion C)</p> <p>In this task, students will attempt to answer the question “What does it mean to be human?” by collecting and analysing data on variables that are of interest to them. Students will collect data from reputable sources and represent the data using a table of values, a scatterplot, and an equation (of the trendline). Their result should help them understand whether or not there is a relationship between the chosen variables and, if so, how linear it is and ultimately how strong that relationship is.</p>	<p>represent the data they are trying to interpret. Good models lead to good insights into the information they are representing, such as what it means to be human.</p> <p>In the What Does It Mean to Be Human task, students will put the statement of inquiry into action. By modelling the relationship between two quantities, students will determine whether or not they are related and how that helps them better understand what it means to be human. The fact that students choose their own variables to study makes the results that much more personal and meaningful.</p>
--	--	--

--	--	--

Approaches to learning (ATL)

In order for students to be successful in the What Does It Mean to Be Human task, students will locate, organize, analyze, evaluate, synthesize and ethically use information from a variety of sources and media (including digital social media and online networks) (Research: Media literacy skills). The strategy students will learn and practice is “justified research”, where they will search for reputable sources of information, cite them and justify how they know the source is reliable.

In order for students to be successful in the What Does It Mean to Be Human task, students will select and use technology effectively and productively (Self-management: Organizational skills). Students will learn how to use a wide range of technology (GDC, software, apps, etc.) to perform linear regression and apply those skills to a variety of regression tasks throughout the unit as they prepare for the summative assessment. They will then make their own selection of technology for the summative task analysis and report.

Action: Teaching and learning through inquiry

Content	Learning process
	Learning experiences and teaching strategies

	Formative assessment
	Differentiation
Resources	

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit
-----------------------------------	------------------------	--------------------------------

--	--	--

Teacher(s)		Subject group and discipline	Math		
Unit title	Geometric transformations	MYP year	3	Unit duration (hrs)	

Inquiry: Establishing the purpose of the unit

Key concept	Related concept(s)	Global context
Form	Patterns, space	Personal and cultural expression: Expressing beliefs and values
Statement of inquiry		
An understanding of patterns created by forms in space can enhance creativity and help express beliefs and values.		
Inquiry questions		
<p>Factual— What are the different types of transformations? What defines a pattern?</p> <p>Conceptual— How are patterns created by different forms in space?</p> <p>Debatable— What enhances creativity? How do we express culture, beliefs and values?</p>		

Objectives	Summative assessment	
<p>A: Knowing and understanding</p> <ul style="list-style-type: none"> i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts. <p>B: Investigating patterns</p> <ul style="list-style-type: none"> i. select and apply mathematical problem- solving techniques to discover complex patterns ii. describe patterns as relationships and/or general rules consistent with findings iii. verify and justify relationships and/or general rules. <p>C: Communicating</p> <ul style="list-style-type: none"> i. use appropriate mathematical language (notation, symbols and terminology) in both oral and 	<p>Outline of summative assessment task(s) including assessment criteria:</p> <p>Unit Test: (criterion A)</p> <p>In this task, students will answer a wide range of questions, from simple to complex to challenging (in both familiar and unfamiliar situations), all related to the use of geometric principles and transformations. Students will transform figures using reflections, rotations, translations and dilations and analyze how their coordinates change. The test will be completed in one class period.</p> <p>Investigation: Dilations (criteria B, C)</p> <p>In this task, students will develop a rule for the effects of a dilation (centered at the origin) on the coordinates of an image. Students will be given a triangle on a coordinate grid and asked to dilate it using a given factor (centered at the origin).</p>	<p>Relationship between summative assessment task(s) and statement of inquiry:</p> <p>The Unit Test will allow students to apply the content they have learned to a wide range of questions and verify that they can apply transformations to a wide range of figures (both in and out of context). Many of the questions will include applications to patterns that express culture, beliefs or values.</p> <p>The investigation will be one of many that will help students discover and develop the skills necessary to be successful in analysing transformations and creating their own. The rule that they will discover will help them better understand and analyze the patterns created by forms in</p>

<p>written explanations</p> <ul style="list-style-type: none"> ii. use appropriate forms of mathematical representation to present information iii. move between different forms of mathematical representation iv. communicate complete and coherent mathematical lines of reasoning v. organize information using a logical structure. 	<p>They will repeat the process several times, collecting data on the results of each dilation. From their data, they will generalize the relationship between the coordinates of an image before and after a dilation of a given scale factor (centered at the origin). The investigation will be done under test conditions during one class period.</p> <p>Your Own Tessellation: (criterion C)</p> <p>In this task, students will create their own shape that can be tessellated. They will then use it to create a pattern that represents them (or their beliefs and values) in some way. Students will have to create a storyboard for their pattern and analyze the pattern for any transformations that are contained in it.</p>	<p>space.</p> <p>In the Your Own Tessellation task, students will experience how their own creativity is impacted by an understanding of how forms in space can create patterns. The patterns that students choose to create should be a reflection of some aspect of who they are as a person, so that they can see how easy or difficult it can be to try to express an aspect of themselves using a pattern. They may experience the struggles and joys that artists have in trying to communicate something delicate, abstract or vague through a piece that contains precise movements.</p>
--	--	--

Approaches to learning (ATL)

In order for students to be successful, students will consider personal learning strategies

- What can I do to become a more efficient and effective learner?
- How can I become more flexible in my choice of learning strategies?
- What factors are important for helping me learn well?

(Self-management: Reflection skills). The strategy students will learn and practice is “reflect and discuss”, where students will reflect on one of the above aspects of their learning and discuss their insights with a peer.

In order for students to develop their use of appropriate mathematical language in both oral and written explanations, students will use and interpret a range of discipline-specific terms and symbols (Communication: Communication skills). The strategy students will learn and practice is “guided talk and writing”, where students are encouraged to use math vocabulary that they have recently acquired in discussions and explanations. By focusing on one new vocabulary word at a time, students should then be ready to choose from their new word bank in the summative task (and beyond).

Action: Teaching and learning through inquiry

Content	Learning process
	Learning experiences and teaching strategies

	Formative assessment
	Differentiation
Resources	

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit
-----------------------------------	------------------------	--------------------------------

--	--	--

Teacher(s)		Subject group and discipline	Math		
Unit title	Linear relationships	MYP year	3	Unit duration (hrs)	

Inquiry: Establishing the purpose of the unit

Key concept	Related concept(s)	Global context
Relationships	Change, models, representation	Globalization and sustainability: Impact of human decision-making
Statement of inquiry		
Representing patterns of change as relationships can help determine the impact of human decision-making on the environment.		
Inquiry questions		
<p>Factual— What is a pattern? What is slope?</p> <p>Conceptual— How can you represent changing relationships? What makes a good representation?</p> <p>Debatable— How does human decision-making affect the environment? How are we held accountable for our decisions?</p>		

Objectives	Summative assessment	
<p>A: Knowing and understanding</p> <ul style="list-style-type: none"> i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts. <p>B: Investigating patterns</p> <ul style="list-style-type: none"> i. select and apply mathematical problem- solving techniques to discover complex patterns ii. describe patterns as relationships and/or general rules consistent with findings iii. verify and justify relationships and/or general rules. <p>C: Communicating</p> <ul style="list-style-type: none"> i. use appropriate mathematical language (notation, symbols and terminology) in both oral and written explanations ii. use appropriate forms of 	<p>Outline of summative assessment task(s) including assessment criteria:</p> <p>Unit Test: (criterion A)</p> <p>In this task, students will answer a wide range of questions, from simple to complex to challenging (in both familiar and unfamiliar situations), all based on linear patterns of change and how they can be represented. Questions will focus on representing lines in a variety of forms, graphing lines, finding the equation of a linear pattern and applying these skills to solve real-life problems. The test will be done individually in class during one period.</p> <p>Investigation: Gradient of a Line (criterion B)</p> <p>In this task, students will generalize the relationship between the coordinates of two points on a line and the steepness of that line (its gradient or slope). They will first work with specific points on several</p>	<p>Relationship between summative assessment task(s) and statement of inquiry:</p> <p>The Unit Test will allow students to apply the content they have learned to a wide range of questions and verify that they can represent patterns of change as relationships and apply these to make decisions. Many of the questions will include applications to real-life situations focused on how decisions made by humans affect the planet on which we live.</p> <p>Generalizing the relationship between the coordinates of two points and the slope of the line joining them is the building block for being able to identify patterns of change and then representing them in a</p>

<p>mathematical representation to present information</p> <ul style="list-style-type: none"> iii. move between different forms of mathematical representation iv. communicate complete and coherent mathematical lines of reasoning v. organize information using a logical structure. <p>D: Applying mathematics in real-life contexts</p> <ul style="list-style-type: none"> i. identify relevant elements of authentic real-life situations ii. select appropriate mathematical strategies when solving authentic real-life situations iii. apply the selected mathematical strategies successfully to reach a solution iv. explain the degree of accuracy of a solution v. explain whether a solution makes sense in the context of the authentic real-life situation. 	<p>lines to see how the steepness can be calculated and then they will generalize that relationship to arrive at a formula for gradient/slope of a line that joins any two points. The investigation will be done individually in class during one period, under test conditions.</p> <p>Feeding a Growing Planet: (criteria C, D)</p> <p>In this task, students become part of a task force to analyse and report on the problems associated with meat production and deforestation in light of the fact that the world's population is predicted to be 8.5 billion people by 2030. Students use linear models to describe patterns of change that help inform the recommendations made by the task force.</p>	<p>variety of forms. Without knowledge of slope, students would not be able to identify and describe the relationship between certain human decisions and their effects on the environment.</p> <p>In the Feeding a Growing Planet task, students will use the mathematics that they have learned in order to describe the patterns of change in meat consumption and rainforest destruction. The decisions humans have made in these areas have a direct impact on our planet and students are asked to not only assess what they are, but also suggest ways to minimize (or reverse) these patterns. This brings the statement of inquiry to life and takes it one step further as students realize that knowledge can lead to the power to make changes just in the nick of time.</p>
--	--	--

Approaches to learning (ATL)

In order to develop students to develop as reflective risk-takers, students will identify obstacles and challenges. (Thinking: Critical thinking skills) The strategy students will learn and practice is “challenge yourself”, where they will identify at least one challenge to changing behaviour. Minimizing our effect on the planet begins with the small, daily decisions and understanding what prevents us from making them. Students are asked to identify obstacles to making a new decision despite its positive effects on the environment.

In order for students to be successful in the “Feeding a Growing Planet” task, students will locate, organize, analyze, evaluate, synthesize and ethically use information from a variety of sources and media (including digital social media and online networks) (Research: Media literacy skills). The strategy students will learn and practice is “justified research”, where they will search for reputable sources of information, cite them and justify how they know the source is reliable.

Action: Teaching and learning through inquiry

Content	Learning process
	Learning experiences and teaching strategies

	Formative assessment
	Differentiation
Resources	

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit

--	--	--

Teacher(s)		Subject group and discipline	Math		
Unit title	Linear systems	MYP year	3	Unit duration (hrs)	

Inquiry: Establishing the purpose of the unit

Key concept	Related concept(s)	Global context
Relationships	Representation, models	Fairness and development: Social entrepreneurship
Statement of inquiry		
Representing relationships with models can promote and support social entrepreneurship.		
Inquiry questions		
<p>Factual— What is a linear system? What does it mean to ‘break even’?</p> <p>Conceptual— How are relationships represented with models?</p> <p>Debatable— What is our responsibility to those in our community and other communities? How can I make a difference?</p>		

Objectives	Summative assessment	
<p>A: Knowing and understanding</p> <ul style="list-style-type: none"> i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts. <p>B: Investigating patterns</p> <ul style="list-style-type: none"> i. select and apply mathematical problem- solving techniques to discover complex patterns ii. describe patterns as relationships and/or general rules consistent with findings iii. verify and justify relationships and/or general rules. <p>C: Communicating</p> <ul style="list-style-type: none"> i. use appropriate mathematical language (notation, symbols and terminology) in both oral and 	<p>Outline of summative assessment task(s) including assessment criteria:</p> <p>Unit Test: (criterion A)</p> <p>In this task, students will answer a wide range of questions, from simple to complex to challenging (in both familiar and unfamiliar situations), all related to representing different linear relationships with models. Students will solve linear equations and systems of linear equations using graphing, substitution and elimination. The test will be completed individually during one class period.</p> <p>Investigation: Classifying Systems of Equations (criterion B)</p> <p>In this task, students will solve pairs of linear equations and determine the</p>	<p>Relationship between summative assessment task(s) and statement of inquiry:</p> <p>The Unit Test will allow students to apply the content they have learned to a wide range of questions and verify that they can represent linear relationships with models and analyze systems of linear equations. Many of the questions will include applications to social entrepreneurship.</p> <p>The investigation will help students develop the ability to interpret their analysis of different systems of linear</p>

<ul style="list-style-type: none"> ii. written explanations iii. use appropriate forms of mathematical representation to present information iv. move between different forms of mathematical representation v. communicate complete and coherent mathematical lines of reasoning vi. organize information using a logical structure. 	<p>number of solutions of each. They will then analyze various aspects of each system to see if they can determine each case even before solving the system. The investigation will be done during one class period under test conditions.</p>	<p>relationships. Because linear systems (even those that arise from entrepreneurial situations) can have zero, one or an infinite number of solutions, the investigation will allow students to be able to interpret when each of these occurs. This may impact the decision of whether a social entrepreneur should begin their business.</p>
<p>D: Applying mathematics in real-life contexts</p> <ul style="list-style-type: none"> i. identify relevant elements of authentic real-life situations ii. select appropriate mathematical strategies when solving authentic real-life situations iii. apply the selected mathematical strategies successfully to reach a solution iv. explain the degree of accuracy of a solution v. explain whether a solution makes sense in the context of the authentic real-life situation. 	<p>Your Own Business: (criteria C, D)</p> <p>In this task, students will create their own business with the goal of raising money for a charity of their choice (they will be social entrepreneurs). Students will make the products to, hopefully, sell at a school fundraiser. They will use a system of linear equations to analyze their costs and potential revenue in order to find their break-even point and/or to make decisions about pricing. Students will present their work using publishing software.</p>	<p>In the Your Own Business task, students are applying the skills they learned in the unit (on representing relationships with models) in order to become a social entrepreneur. They will see how business decisions can be made using an analysis that involves solving a system of linear equations. By representing relationships from their own business as models, students can see how social entrepreneurship can be supported and promoted.</p>

--	--	--

Approaches to learning (ATL)

In order for students to develop an understanding of the principles and nature of mathematics, students will negotiate ideas and knowledge with peers and teachers (Communication: Communication skills). The strategy students will learn and practice is “think, pair, share”, where students will discuss key ideas and questions with a partner throughout the unit. Students will often have questions that guide their discussions as they develop knowledge over the course of the unit.

In order for students to work effectively with others , students will help others succeed (Social: Collaboration skills). The strategies students will learn and practice are “equal partners” and “lead, don’t give” where students use each other as a resource to understand concepts, but ask leading questions instead of giving answers outright. Students use both of these strategies throughout the unit as they build knowledge together through the activities, investigations and practice exercises.

Action: Teaching and learning through inquiry

Content	Learning process
	Learning experiences and teaching strategies

	Formative assessment
	Differentiation
Resources	

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit
-----------------------------------	------------------------	--------------------------------

--	--	--

Teacher(s)		Subject group and discipline	Math		
Unit title	Number	MYP year	3	Unit duration (hrs)	

Inquiry: Establishing the purpose of the unit

Key concept	Related concept(s)	Global context
Form	Quantity, representation, simplification	Orientation in space and time: Discoveries and developments
Statement of inquiry		
Representing and simplifying quantities in different forms can help explore remarkable discoveries and developments.		
Inquiry questions		
<p>Factual— What is a quantity? What are the laws of exponents?</p> <p>Conceptual— How are quantities represented in different forms? How does simplification lead to equivalent forms?</p> <p>Debatable— What does it take to make the next great discovery? Are great discoveries planned or accidental?</p>		

Objectives	Summative assessment	
<p>A: Knowing and understanding</p> <ul style="list-style-type: none"> i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts. <p>B: Investigating patterns</p> <ul style="list-style-type: none"> i. select and apply mathematical problem- solving techniques to discover complex patterns ii. describe patterns as relationships and/or general rules consistent with findings iii. verify and justify relationships and/or general rules. <p>C: Communicating</p> <ul style="list-style-type: none"> i. use appropriate mathematical language (notation, symbols and terminology) in both oral and 	<p>Outline of summative assessment task(s) including assessment criteria:</p> <p>Unit Test: (criterion A)</p> <p>In this task, students will answer a wide range of questions, from simple to complex to challenging (in both familiar and unfamiliar situations), all related to the use of numbers in different forms. Students will classify numbers, represent decimals as fractions, simplify algebraic expressions, perform operations with numbers written in scientific notation and solve real-life problems. The test will be done individually in class during one period.</p> <p>Investigation: Product Rule (criterion B)</p> <p>In this task, students will develop one of the Laws of Indices/Exponents that is so crucial to the development of the rest of</p>	<p>Relationship between summative assessment task(s) and statement of inquiry:</p> <p>The Unit Test will allow students to apply the content they have learned to a wide range of questions and verify that they can represent, simplify and perform operations with numbers written in different forms. Many of the questions will include applications to discoveries and developments from around the world.</p> <p>The investigation will help students discover and develop the skills necessary to be successful in the other summative tasks (unit test and Microchip technology</p>

<p>written explanations</p> <ul style="list-style-type: none"> ii. use appropriate forms of mathematical representation to present information iii. move between different forms of mathematical representation iv. communicate complete and coherent mathematical lines of reasoning v. organize information using a logical structure. <p>D: Applying mathematics in real-life contexts</p> <ul style="list-style-type: none"> i. identify relevant elements of authentic real-life situations ii. select appropriate mathematical strategies when solving authentic real-life situations iii. apply the selected mathematical strategies successfully to reach a solution iv. explain the degree of accuracy of a solution v. explain whether a solution makes sense in the context of the authentic real-life situation. 	<p>the content in the unit (and mathematics). They will be given many expressions that involve multiplying powers of the same base (e.g. $2^3 \times 2^4$). After expanding and multiplying, they will look for a pattern that could help them multiply the expressions without expanding. The investigation will be done during one class period under test conditions.</p> <p>Microchip Technology: (criteria C, D)</p> <p>In this task, students will analyse the development and application of the microchip using very large and very small numbers. Moore's Law will help them predict the number of transistors on a chip from its original invention. They will go on to analyse current developments in microchip technology, all through the use of numbers in different forms. The task culminates with students designing their own chip, supported by calculations.</p>	<p>task). Students will, in fact, make their own discovery of a foundational law in mathematics by representing and simplifying numbers in different forms.</p> <p>In the Microchip task, students will use very large and very small numbers written in different forms (decimal, scientific notation) to analyse one of the most impactful discoveries of all time, the development of the microchip. By simplifying and performing operations with these numbers, students will discover the technology behind most of the devices they use today. They will then be asked to design their own microchip and write an article to report on its size and cost. Students will see how the ability to work with different forms of numbers can lead to a potential discovery or development of their own.</p>
---	---	---

--	--	--

Approaches to learning (ATL)

In order for students to be successful in the unit test and Microchip technology tasks, students will use memory techniques to develop long-term memory (Research: Information literacy skills). The strategy students will learn and practice is “creative summaries”, where students use a variety of different summary techniques to condense information into smaller, easier to remember forms.

In order for students to develop perseverance and persistence in learning and problem solving, students will practice positive thinking (Self-management: Affective skills). The strategies students will learn and practice are “periodic check-ins” and “positive self-talk”, where students take stock of how well they are doing and practice looking for positive aspects of themselves as students.

Action: Teaching and learning through inquiry

Content	Learning process
	Learning experiences and teaching strategies

	Formative assessment
	Differentiation
Resources	

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit
-----------------------------------	------------------------	--------------------------------

--	--	--

Teacher(s)		Subject group and discipline	Math		
Unit title	Triangles	MYP year	3	Unit duration (hrs)	

Inquiry: Establishing the purpose of the unit

Key concept	Related concept(s)	Global context
Relationships	Generalization, measurement	Scientific and technical innovation: Principles, processes and solutions
Statement of inquiry		
Generalizing relationships between measurements can help develop principles, processes and solutions.		
Inquiry questions		
Factual — What is a relationship?		What are the three fundamental trigonomet
Conceptual — How do we generalize relationships between measurements?		
Debatable — How much proof is “enough”? Do scientific principles lead to good solutions or do good solutions lead to scientific principles?		

Objectives	Summative assessment	
<p>A: Knowing and understanding</p> <ul style="list-style-type: none"> i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts. <p>B: Investigating patterns</p> <ul style="list-style-type: none"> i. select and apply mathematical problem- solving techniques to discover complex patterns ii. describe patterns as relationships and/or general rules consistent with findings iii. verify and justify relationships and/or general rules. <p>C: Communicating</p> <ul style="list-style-type: none"> i. use appropriate mathematical language (notation, symbols and terminology) in both oral and 	<p>Outline of summative assessment task(s) including assessment criteria:</p> <p>Unit Test: (criterion A)</p> <p>In this task, students will answer a wide range of questions, from simple to complex to challenging (in both familiar and unfamiliar situations), all related to the relationships that are generalized between measurements. Students will solve problems related to similar triangles, the Pythagorean theorem, distance between points, and the three fundamental trigonometric ratios. The test will be done individually in class during one period. Students will have access to a calculator.</p> <p>Investigation: Distance Formula (criterion B)</p> <p>In this task, students will generalize the relationship between the coordinates of two points and the lengths of their sides in</p>	<p>Relationship between summative assessment task(s) and statement of inquiry:</p> <p>The Unit Test will allow students to apply the content they have learned to a wide range of questions and verify that they can apply relationships between measurements that they have generalized. Many of the questions will include applications to principles, processes and solutions to real-life issues.</p> <p>Generalizing the relationship between the coordinates of two points and the distance between them will allow students to then study processes like how video games are created or how archeologists map out</p>

<p>written explanations</p> <ul style="list-style-type: none"> ii. use appropriate forms of mathematical representation to present information iii. move between different forms of mathematical representation iv. communicate complete and coherent mathematical lines of reasoning v. organize information using a logical structure. <p>D: Applying mathematics in real-life contexts</p> <ul style="list-style-type: none"> i. identify relevant elements of authentic real-life situations ii. select appropriate mathematical strategies when solving authentic real-life situations iii. apply the selected mathematical strategies successfully to reach a solution iv. explain the degree of accuracy of a solution v. explain whether a solution makes sense in the context of the authentic real-life situation. 	<p>order to develop the distance formula. They will also discover how this is related to the Pythagorean theorem that they developed previously in the unit. The investigation will be done individually in class during one period, under test conditions.</p> <p>Measuring the immeasurable: (criteria C, D)</p> <p>In this task, students will use mathematics to calculate the height of an object that is too tall or too far away to measure in a traditional way. Students are asked to use two methods to find the height of their chosen object as well as to develop their own method that relates to content they have learned in the unit.</p>	<p>a site. The investigation will also help students apply a relationship between measurements that they discovered earlier in the unit.</p> <p>In the Measuring the Immeasurable task, students will use the mathematics that they have learned in order to find a solution to the common problem of measuring something that is too large or too far away to measure by hand. The unit activities and the relationships that have been generalized throughout are drawn upon so as to find multiple ways to solve the problem of finding the height of an object that simply isn't possible without mathematics. By asking students to not just apply given methods but to also develop their own, they are experiencing all elements of the statement of inquiry: they have generalized relationships between measurements and developed a process that will help solve to a real-life problem.</p>
<p>Approaches to learning (ATL)</p>		

In order for students to be successful in mathematical investigations, students will test generalizations and conclusions (Thinking: Critical thinking skills). The strategy students will learn and practice is “test and verify”, where they will verify that the generalization they have made works for other cases.

In order for students to develop their ability to construct viable arguments and critique the reasoning of others, students will give and receive meaningful feedback (Communication: Communication skills). The strategy students will learn and practice is “feedback protocol”, where they will first ask questions before moving on to providing both comments (including at least one positive piece of feedback) and suggestions.

Action: Teaching and learning through inquiry

Content	Learning process
	<p>Learning experiences and teaching strategies</p>
	<p>Formative assessment</p>

	Differentiation
Resources	

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit

--	--	--

Teacher(s)		Subject group and discipline	Math		
Unit title	Univariate data	MYP year	2	Unit duration (hrs)	

Inquiry: Establishing the purpose of the unit

Key concept	Related concept(s)	Global context
Form	Representation, justification	Fairness and development: Accessing equal opportunities
Statement of inquiry		
Different forms of representation can help justify conclusions regarding access to equal opportunities.		
Inquiry questions		
<p>Factual— How are the mean, median and mode of a data set calculated? How do we represent information?</p> <p>Conceptual— What makes a form of representation effective? What are the strengths and weaknesses of numerical data?</p> <p>Debatable— How can equality be represented? How can we use information to instigate change and make a difference?</p>		

Objectives	Summative assessment	
<p>A: Knowing and understanding</p> <ul style="list-style-type: none"> i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts. <p>B: Investigating patterns</p> <ul style="list-style-type: none"> i. select and apply mathematical problem- solving techniques to discover complex patterns ii. describe patterns as relationships and/or general rules consistent with findings iii. verify and justify relationships and/or general rules. <p>C: Communicating</p> <ul style="list-style-type: none"> i. use appropriate mathematical language (notation, symbols and terminology) in both oral and 	<p>Outline of summative assessment task(s) including assessment criteria:</p> <p>Unit Test: (criterion A)</p> <p>In this task, students will answer a wide range of questions, from simple to complex to challenging (in both familiar and unfamiliar situations), all related to representing data in a variety of forms (stem and leaf plot, box and whisker plot, five number summary). The test will be completed individually during one class period.</p> <p>Investigation: Mean (criterion B)</p> <p>In this task, students will develop the process for calculating the mean of a set of univariate data. Given different data sets and the mean of each, students will be asked to generalize the procedure for calculating the mean value. The investigation will be done during one class</p>	<p>Relationship between summative assessment task(s) and statement of inquiry:</p> <p>The Unit Test will allow students to apply the content they have learned to a wide range of questions and verify that they can represent and analyze data in different forms. Many of the questions will include an analysis of whether or not different people have access to equal opportunities.</p> <p>This investigation establishes one of the main ways to represent a set of data, by looking at a measure of its center (and a five number summary). It will help students develop a foundational skill that can then be used to analyse data and determine whether or not there is access</p>

<p>written explanations</p> <ul style="list-style-type: none"> ii. use appropriate forms of mathematical representation to present information iii. move between different forms of mathematical representation iv. communicate complete and coherent mathematical lines of reasoning v. organize information using a logical structure. 	<p>period under test conditions.</p> <p>Making a Difference: (criteria C, D)</p> <p>In this task, students will work in pairs to produce an infographic on the difference between low-income and high-income countries. Students will select one of the World Bank’s goals for sustainable development and 10 countries of each type. After conducting research and collecting data from the human development index related to their chosen goal, students will represent the data using stem and leaf plots, box and whisker plots and measures of central tendency and dispersion.</p>	<p>to equal opportunities.</p> <p>In the Making a Difference task, students use different forms of representation to draw and justify conclusions about whether or not people in different countries have access to equal opportunities. This is the goal of the entire unit, to have students be able to collect data, analyse it and draw conclusions. This can then empower them to find ways to instigate change and make a difference. The mathematics shines light on the problem and allows students to see it clearly.</p>
--	--	--

--	--	--

Approaches to learning (ATL)

In order for students to be successful in the Making a Difference task, students will process data and report results (Research: Information literacy skills). The strategy students will learn and practice is “analyze and answer” where they will analyse a set of data and answer one or more questions related to the data. Throughout the unit, students will practice different ways of representing data (plots and numerical methods) so that they can then draw on these skills in their summative research task.

In order for students to develop the learner profile characteristic of “caring”, students will practice empathy (Social: Collaboration skills). The strategy students will learn and practice is “what would it be like...?” where they will wonder what it might be like to be in someone else’s shoes, to be in a different circumstance. They will reflect on the situation and discuss how they think it would feel to be somehow involved or affected by it.

Action: Teaching and learning through inquiry

Content	Learning process
	Learning experiences and teaching strategies

	Formative assessment
	Differentiation
Resources	

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit
-----------------------------------	------------------------	--------------------------------

--	--	--