| Teacher(s) | | Subject group and discipline | Math | | |
|---|---|---|---|---|---|
| Unit title | **2D and 3D Geometry** | **MYP year** | **2** | **Unit duration (hrs)** | |

## Inquiry: Establishing the purpose of the unit

| Key concept | Related concept(s) | Global context |
|---|---|---|
| Relationships | Generalization, measurement | Orientation in space and time: Human and natural landscapes |

**Statement of inquiry**

Generalizing relationships between measurements can help explore the formation of human and natural landscapes.

**Inquiry questions**

**Factual—** What is a measurement?

**Conceptual—** How are volume and area related?  How do we generalize relationships between measurements?

**Debatable—** Which exhibit more order, natural or human landscapes? Do humans mimic nature or does nature mimic humans?

| Objectives | Summative assessment | |
|---|---|---|
| A: Knowing and understanding<br><br>  i.   select appropriate mathematics when solving problems in both familiar and unfamiliar situations<br>  ii.  apply the selected mathematics successfully when solving problems<br>  iii. solve problems correctly in a variety of contexts.<br><br>B: Investigating patterns<br><br>  i.   select and apply mathematical problem- solving techniques to discover complex patterns<br>  ii.  describe patterns as relationships and/or general rules consistent with findings<br>  iii. verify and justify relationships and/or general rules.<br><br>D: Applying mathematics in real-life contexts<br><br>  i.   identify relevant elements of authentic real-life situations | Outline of summative assessment task(s) including assessment criteria:<br><br><br>**Unit Test: (criterion A)**<br><br>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 relationships between measurements that have been generalized (e.g. area, volume).  Students will calculate the perimeter, area and volume of a variety of shapes and apply these skills to solve real-life problems. The test will be completed individually during one class period.<br><br><br><br>**Investigation: Circumference (criterion B)**<br><br>In this task, students will develop the formula for the circumference of a circle. By drawing several circles and taking specific measurements (distance around | Relationship between summative assessment task(s) and statement of inquiry:<br><br><br><br>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 involving human and natural landscapes.<br><br><br><br><br>The investigation will help students learn not only content (how to calculate the circumference of a circle) but also the process of how to generalize relationships between measurements. This will help students develop the skill of |

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| ii. select appropriate mathematical strategies when solving authentic real-life situations<br>iii. apply the selected mathematical strategies successfully to reach a solution<br>iv. explain the degree of accuracy of a solution<br>v. explain whether a solution makes sense in the context of the authentic real-life situation. | circle and diameter), students will see that the relationship between these measurements involves a constant (pi). They will then determine how to find the circumference of a circle if they know its diameter. The investigation will be done during one class period under test conditions. | generalization for future investigations in the unit while also allowing them to analyze human and natural landscapes that involve circles. |
| | **Subway Construction: (criterion D)**<br><br>In this task, students will analyze the construction of a subway system. They will calculate the amount of dirt that needs to be removed in order to make the underground system (tunnels and subway stations that are rectangular prisms). Students will then be asked to propose the design of two islands that can be created with the excavated dirt.  Their designs and proposals will be contained in a report. | In the Subway Construction task, students use the relationships that they have generalized throughout the unit to create a human landscape: a subway system. This puts them in the role of not just analysing a human or natural landscape, but of actually creating it themselves. Both the subway system and proposed islands are the result of careful use of the relationships described by area and volume formulas. |

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| **Approaches to learning (ATL)** |
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| In order for students to be successful in the Unit Test and Subway Construction tasks, students will apply knowledge and skills in unfamiliar situations (Thinking: Transfer skills).  Students will be given many opportunities to solve problems and apply content in familiar situations, followed by a question or two that is unfamiliar to them in some way (different context, different idea, solve for different variable, etc.).  This will occur at regular intervals throughout the unit so that students see and learn that "unfamiliar" just means "different" and that they have the ability to solve any question.  This will be especially helpful in the Subway Construction task where they not only analyze but also create a landscape of their own (a totally unfamiliar situation). <br><br> In order for students to be successful in the Unit Test and Subway Construction tasks, students will make effective summary notes for studying (Communication: Communication skills).  The strategy students will learn and practice is "stop and summarize" where, once new learning has occurred, they create their own study notes related to the content.  These will then be compared to the notes of a peer so that students can both verify their summary and learn how others synthesize the same information. |

**Action: Teaching and learning through inquiry**

| **Content** | **Learning process** |
|---|---|

| | **Learning experiences and teaching strategies** |
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| | **Formative assessment** |
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| | **Differentiation** |
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| **Resources** |
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**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 | Algebraic expressions and equations | MYP year | 2 | Unit duration (hrs) | |

**Inquiry: Establishing the purpose of the unit**

| Key concept | Related concept(s) | Global context |
|---|---|---|
| Form | Simplification, equivalence | Scientific and technical innovation: Puzzles and tricks |

| Statement of inquiry |
|---|
| Producing equivalent forms through simplification can help to clarify, solve and create puzzles and tricks. |

| Inquiry questions |
|---|

**Factual—** What does it mean to "simplify"? How do you solve an algebraic equation?

**Conceptual—** What does it mean to "be equivalent"? How does simplification produce equivalent forms?

**Debatable—** Does every puzzle have a solution? Can every trick be explained?

| Objectives | Summative assessment | |
|---|---|---|
| A: Knowing and understanding<br><br>  i.   select appropriate mathematics when solving problems in both familiar and unfamiliar situations<br>  ii.  apply the selected mathematics successfully when solving problems<br>  iii. solve problems correctly in a variety of contexts.<br><br>B: Investigating patterns<br><br>  i.   select and apply mathematical problem- solving techniques to discover complex patterns<br>  ii.  describe patterns as relationships and/or general rules consistent with findings<br>  iii. verify and justify relationships and/or general rules.<br><br>C: Communicating<br><br>  i.   use appropriate mathematical language (notation, symbols and terminology) in both oral and | Outline of summative assessment task(s) including assessment criteria:<br><br><br>**Unit Test: (criterion A)**<br><br>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 simplifying algebraic expressions and solving equations.  The test will be completed individually during one class period.<br><br><br><br>**Investigation: Solving Equations (criterion B)**<br><br>In this task, students will develop the process for solving simple equations. They will use balance puzzles to write equations and then investigate steps they can take in order to solve the puzzle.  These steps will lead to the general process of solving | Relationship between summative assessment task(s) and statement of inquiry:<br><br><br>The Unit Test will allow students to apply the content they have learned to a wide range of questions in order to verify that they can produce equivalent forms through simplification and apply these skills to solve problems involving algebraic expressions and equations. Many of the questions will include applications centering on puzzles and tricks.<br><br><br><br>The investigation will help students develop a foundational skill related to the statement of inquiry: how simplification produces equivalent forms.  This will help students determine how to solve balance puzzles. The process they generate then |

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| written explanations<br>ii. use appropriate forms of mathematical representation to present information<br>iii. move between different forms of mathematical representation<br>iv. communicate complete and coherent mathematical lines of reasoning<br>v. organize information using a logical structure. | simple equations. The investigation will be done during one class period under test conditions.<br><br>**Puzzles: (criteria B, C)**<br><br>In this task, students will analyze a puzzle (The Original Flash Mind Reader) and use algebra to justify why it works. They will then create two of their own puzzles or tricks (like the ones in the unit), one that can be justified using algebraic expressions and another that can be explained using algebraic equations. Students will use an app to create a short video explaining their tricks. | leads to students being able to create and solve other kinds of puzzles.<br><br>In the Puzzles task, students will solve and clarify a puzzle (The Original Flash Mind Reader) through the use of algebraic expressions that, when simplified, reveal how the online puzzle works. Students will also create two puzzles or tricks and explain them by showing how simplifying to produce equivalent forms leads to the correct result every time. It is in the summative task that students get to experience every aspect of the statement of inquiry. |

## Approaches to learning (ATL)

In order for students to describe patterns as relationships and/or general rules consistent with findings, students will make inferences and draw conclusions (Communication: Communication skills).  The strategy students will learn and practice is "so what?" where they will write down inferences made during inquiry activities and draw a variety of conclusions about definitions, processes and procedures.

In order for students to be successful in the Puzzles task, students will apply existing knowledge to generate new ideas, products and processes (Thinking: Creative thinking skills).  Throughout the unit, after analysing a puzzle or trick and understanding how it works, students will then create their own in the same style.  This skill will then be applied in the Puzzles task where students will have to create their own puzzle or trick in a style they choose.

## Action: Teaching and learning through inquiry

| Content | Learning process |
|---|---|
| | **Learning experiences and teaching strategies** |

| | **Formative assessment** |
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| | **Differentiation** |
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| Resources |
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**Reflection: Considering the planning, process and impact of the inquiry**

| Prior to teaching the unit | During teaching | After teaching the unit |
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| Teacher(s) | | Subject group and discipline | Math | | |
|---|---|---|---|---|---|
| Unit title | Integers | MYP year | 2 | Unit duration (hrs) | |

**Inquiry: Establishing the purpose of the unit**

| Key concept | Related concept(s) | Global context |
|---|---|---|
| Form | Quantity, representation | Orientation in space and time: Human explorations |

| Statement of inquiry |
|---|
| Being able to represent different forms of quantities has helped humans explore and describe our planet. |

| Inquiry questions |
|---|
| **Factual—** What is an integer? |
| **Conceptual—** How are different forms of quantities represented? |
| **Debatable—** How do we define where and when? |

| Objectives | Summative assessment | |
|---|---|---|
| A: Knowing and understanding<br><br>  i.  select appropriate mathematics when solving problems in both familiar and unfamiliar situations<br>  ii.  apply the selected mathematics successfully when solving problems<br>  iii.  solve problems correctly in a variety of contexts.<br><br>B: Investigating patterns<br><br>  i.  select and apply mathematical problem- solving techniques to discover complex patterns<br>  ii.  describe patterns as relationships and/or general rules consistent with findings<br>  iii.  verify and justify relationships and/or general rules.<br><br>C: Communicating<br><br>  i.  use appropriate mathematical language (notation, symbols and terminology) in both oral and | Outline of summative assessment task(s) including assessment criteria:<br><br><br>**Unit Test: (criterion A)**<br><br>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 forms of quantities. Students will be asked to order integers, graph coordinates and perform mathematical operations with integers. They will also be required to apply their knowledge of integers to solve real-life problems. The test will be completed individually during one class period.<br><br><br><br>**Investigation: Exponents (criterion B)**<br><br>In this task, students will develop a rule for what happens when you raise an integer to an exponent.  They will develop their | Relationship between summative assessment task(s) and statement of inquiry:<br><br><br>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 different forms of quantities and perform mathematical calculations with them. Many of the questions will include applications involving human explorations.<br><br><br><br><br><br>The investigation will help students |

written explanations

iv.     communicate complete and coherent mathematical lines of reasoning
v.      organize information using a logical structure.

D: Applying mathematics in real-life contexts

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.

own procedure to investigate the relationship and then report on their findings.  The investigation will be done during one class period under test conditions.

**Expeditions: (criteria C and D)**

In this task, students will analyze a famous expedition that they have not already seen in the unit.  They map the journey using our system of latitude and longitude and then create journal entries as if they were the explorer, describing life on the journey.  Included in the journal must be authentic examples of using operations with integers as they relate to the expedition (e.g. changes in latitude and longitude).  Students will then create their own expedition to a location in outer space.  Similar to the first part, they will create a log of the expedition, complete with authentic uses of operations with integers.

discover and develop a basic rule related to integers.  Representing quantities with exponents/indices is an important form in mathematics that is a building block for much of what students learn in future mathematics classes.

In the Expeditions task, students will represent different forms of numbers in order to recreate a famous historical expedition and create their own journey into outer space.  They will keep a journal of the journey, including information about what the expedition is like and calculations important to the expedition.  They will see how being able to describe and calculate changes using different forms of numbers would have helped explorers to navigate and complete their journeys.

**Approaches to learning (ATL)**

In order for students to be able to appreciate the contribution of mathematics to other areas of knowledge, students will make connections between subject groups and disciplines (Thinking: Transfer skills).  Throughout the unit, students will explore how integers are also an integral part of other subjects like physics, chemistry, astronomy and history. These links will be explicit so that students can make easy connections.

In order for students to develop perseverance and persistence in learning and problem solving, students will consider personal learning strategies (Self-management: Reflection skills).  The strategy students will learn and practice is "check-in", where students will take stock of how well they are learning unit content and explore what they could do to be a more effective and efficient learner.

**Action: Teaching and learning through inquiry**

| Content | Learning process |
|---------|------------------|
|         | **Learning experiences and teaching strategies** |
|         | **Formative assessment** |

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|---|---|
|  | **Differentiation** |

| Resources |
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**Reflection: Considering the planning, process and impact of the inquiry**

| Prior to teaching the unit | During teaching | After teaching the unit |
|---|---|---|
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| Teacher(s) | | Subject group and discipline | Math | | |
|---|---|---|---|---|---|
| Unit title | Probability | MYP year | 2 | Unit duration (hrs) | |

**Inquiry: Establishing the purpose of the unit**

| Key concept | Related concept(s) | Global context |
|---|---|---|
| Logic | Representation, systems, justification | Personal and cultural expression: Games and play |

| Statement of inquiry |
|---|
| A logical system of representation can help explore and analyse games that humans play. |

| Inquiry questions |
|---|

**Factual—** What makes something logical? How is probability calculated?

**Conceptual—** How can logic be used with different representations?  How can you represent the likelihood of an event occurring?

**Debatable—** Can winning be calculated or is it just luck?

| Objectives | Summative assessment | |
|---|---|---|
| A: Knowing and understanding<br><br>　i.　select appropriate mathematics when solving problems in both familiar and unfamiliar situations<br>　ii.　apply the selected mathematics successfully when solving problems<br>　iii.　solve problems correctly in a variety of contexts.<br><br>B: Investigating patterns<br><br>　i.　select and apply mathematical problem- solving techniques to discover complex patterns<br>　ii.　describe patterns as relationships and/or general rules consistent with findings<br>　iii.　verify and justify relationships and/or general rules.<br><br>C: Communicating<br><br>　i.　use appropriate mathematical language (notation, symbols and terminology) in both oral and | Outline of summative assessment task(s) including assessment criteria:<br><br><br>**Unit Test: (criterion A)**<br><br>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 logically representing information and outcomes.  Students will represent sample spaces, calculate probabilities and and create simulations.) The test will be completed individually during one class period.<br><br><br><br>**Investigation: Complementary Events (criterion B)**<br><br>In this task, students will develop a definition and formula for complementary events.  They will analyse several pairs of events (that are complementary) to discover the relationship between them | Relationship between summative assessment task(s) and statement of inquiry:<br><br><br>The Unit Test will allow students to apply the content they have learned to a wide range of questions and verify that they can use a logical system to represent information and outcomes. Many of the questions include applications involving games and play.<br><br><br><br>The investigation will help students discover and develop a basic relationship in probability (between complementary events).  This will enable students to more efficiently analyse games that humans play, especially when there are a large number of outcomes. |

written explanations
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.

and then use the system of representation to calculate their probabilities. The pattern in their answers will lead to the rule that the probability of complementary events can be calculated $(1 - P(A))$.

**Games Day: (criterion C)**

In this task, students will create a game for a school Games Day event. Students will work in pairs and create a game that they will construct so that others may play. Each pair will analyze their game in terms of the sample space and the theoretical probability of winning. On Games Day, students will play each other's games and collect information in two ways: the experimental probability of winning the game they created based on players' outcomes and the experimental probability of winning every other game based on their own experience. Individually, students will create a report that summarizes this information and calculates the theoretical probability of the games they played.

In the Games Day task, students use probability's system of representation to analyse games that they create and play. By representing the sample space for each game and calculating both experimental and theoretical probability, students can begin to understand what makes a game "fair" as well as whether winning is something that can be calculated (as opposed to just luck). In essence, they experience the statement of inquiry firsthand as both game designers and players.

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| Approaches to learning (ATL) |
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| In order for students to be successful in the Games Day task, students will evaluate and manage risk (Thinking: Critical thinking skills). The strategy students will learn and practice is "risk or reward?" where after analysing a game, they will reflect on and discuss whether or not the potential reward makes the game something that they would be willing to play.

In order for students to develop perseverance and persistence in learning and problem solving, students will organize and depict information logically (Communication: Communication skills). The strategy students will learn and practice is "TTDL" where they will practice representing information in a variety of ways (table, tree diagram, list) until they ultimately select the most logical representation on their own. |

**Action: Teaching and learning through inquiry**

| Content | Learning process |
|---|---|
| | **Learning experiences and teaching strategies** |

|  | **Formative assessment** |
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|  | **Differentiation** |

| **Resources** |
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**Reflection: Considering the planning, process and impact of the inquiry**

| **Prior to teaching the unit** | **During teaching** | **After teaching the unit** |
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| Teacher(s) | | Subject group and discipline | Math | | |
|---|---|---|---|---|---|
| Unit title | Rates | MYP year | 2 | Unit duration (hrs) | |

**Inquiry: Establishing the purpose of the unit**

| Key concept | Related concept(s) | Global context |
|---|---|---|
| Relationships | Equivalence, measurement | Globalization and sustainability: Interconnectedness of human-made systems |

**Statement of inquiry**

Establishing relationships of equivalence between measurements illustrates the interconnectedness of human-made systems.

**Inquiry questions**

**Factual—** What is a rate?  What does it mean to be equivalent?

**Conceptual—** How are relationships of equivalence established?

**Debatable—** How can 'different' still be equivalent? Do our different systems hinder our interconnectedness?

| Objectives | Summative assessment | |
|---|---|---|
| A: Knowing and understanding<br><br>  i.    select appropriate mathematics when solving problems in both familiar and unfamiliar situations<br>  ii.   apply the selected mathematics successfully when solving problems<br>  iii.  solve problems correctly in a variety of contexts.<br><br>B: Investigating patterns<br><br>  i.    select and apply mathematical problem- solving techniques to discover complex patterns<br>  ii.   describe patterns as relationships and/or general rules consistent with findings<br>  iii.  verify and justify relationships and/or general rules.<br><br>C: Communicating<br><br>  i.    use appropriate mathematical language (notation, symbols and terminology) in both oral and | Outline of summative assessment task(s) including assessment criteria:<br><br><br>**Unit Test: (criterion A)**<br><br>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 relationships of equivalence that exist among different systems of measurement. In particular, students will convert between different currencies and different systems of linear measurement.  The test will be completed individually during one class period.<br><br><br><br>**Investigation: Unit Rates (criterion B)**<br><br>In this task, students will develop the process for calculating unit rates. They will be given different scenarios and asked to find an equivalent ratio that is compared to a measurement of "one" (e.g. one hour, | Relationship between summative assessment task(s) and statement of inquiry:<br><br><br>The Unit Test will allow students to apply the content they have learned to a wide range of questions and verify that they can establish relationships of equivalence between different measurements. Many of the questions will include applications involving human-made systems.<br><br><br><br><br>This investigation establishes relationships of equivalence between a variety of measurements.  It will help students discover and develop a basic skill that will then allow them to compare |

written explanations
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.

D: Applying mathematics in real-life contexts

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.

one euro, etc.).  From their work, they will generalize the procedure for determining the unit rate given any ratio of measurements. The investigation will be done during one class period under test conditions.


**Holiday Travels: (criteria C, D)**

In this task, students will create an itinerary for a holiday trip to five different countries.  Students will research travel, accommodations, meals and sights in each location in local currencies.  They will then convert these amounts to their own currency to arrive at a budget for the entire trip.  Additional questions related to travel, buying goods and finding a job in the local country will require students to further apply the rates that they have been learning all unit.  The final product will be a report that includes a map and itinerary as well as detailed calculations for the cost of the trip.

and convert across human-made systems.



In the Holiday Travels task, students use relationships of equivalence (rates) in a wide range of ways as they plan and budget for a trip.  They will see how different monetary systems (which are human-made) are connected as well as different systems of measurement as they calculate the length of time for each leg of their trip.  They will experience how being familiar and adept at moving between different human-made systems allows them to make good decisions.

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| Approaches to learning (ATL) |
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| In order for students to develop as inquirers, students will make guesses, ask 'what if' questions and generate testable hypotheses (Thinking: Creative thinking skills).  The strategy students will learn and practice is "I wonder…" where they will pose their own "what if?" questions related to content that they have just learned.  They will be encouraged to look beyond just skill development and to wonder aloud.  These will be discussed with a peer before sharing and exploring as a class.<br><br>In order for students to develop powers of abstraction, students will draw reasonable conclusions and generalizations (Thinking: Critical thinking skills).  Throughout the unit, students will be asked to develop theories and procedures, make connections between topics, and analyze information.  These will help them develop their ability to reason quantitatively and abstractly, which is a necessary skill to develop as a mathematician, and be successful in future mathematics courses. |

## Action: Teaching and learning through inquiry

| Content | Learning process |
| --- | --- |
|  | **Learning experiences and teaching strategies** |

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|---|---|
| | **Formative assessment** |
| | **Differentiation** |

| Resources |
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**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 | Ratios and proportions | MYP year | 2 | Unit duration (hrs) | |

**Inquiry: Establishing the purpose of the unit**

| Key concept | Related concept(s) | Global context |
|---|---|---|
| Logic | Equivalence, quantity, representation | Identities and relationships: Competition and cooperation |

| Statement of inquiry |
|---|
| Using a logical process to simplify quantities and establish equivalence can help analyse competition and cooperation. |

| Inquiry questions |
|---|

**Factual—** What is a ratio?  What is a proportion?

**Conceptual—** How can you establish equivalence?  How are simplification and equivalence related?

**Debatable—** What makes for healthy and fair competition? Which is more about being equal, competition or cooperation?  Explain.

| Objectives | Summative assessment | |
|---|---|---|
| A: Knowing and understanding<br><br>  i.   select appropriate mathematics when solving problems in both familiar and unfamiliar situations<br>  ii.  apply the selected mathematics successfully when solving problems<br>  iii. solve problems correctly in a variety of contexts.<br><br>B: Investigating patterns<br><br>  i.   select and apply mathematical problem- solving techniques to discover complex patterns<br>  ii.  describe patterns as relationships and/or general rules consistent with findings<br>  iii. verify and justify relationships and/or general rules.<br><br>C: Communicating<br><br>  i.   use appropriate mathematical language (notation, symbols and terminology) in both oral and | Outline of summative assessment task(s) including assessment criteria:<br><br><br>**Unit Test: (criterion A)**<br><br>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 simplifying quantities and establishing equivalence.  (Students will simplify ratios, write equivalent ratios and apply ratios to solve problems.)  The test will be completed individually during one class period.<br><br><br><br>**Investigation: Equivalent Ratios (criterion B)**<br><br>In this task, students will develop the process for creating equivalent ratios. They will be given examples of equivalent ratios and then asked to determine not only what makes them equivalent but also | Relationship between summative assessment task(s) and statement of inquiry:<br><br><br>The Unit Test will allow students to apply the content they have learned to a wide range of questions and verify that they can simplify quantities, establish equivalence and apply these skills to solve problems. Many of the questions will include applications involving competition and cooperation.<br><br><br><br><br>The investigation will help students discover and develop a basic skill related to the statement of inquiry: determining and creating simplified, equivalent ratios. After learning this skill, students will then be able to use proportional reasoning to analyze different examples of competition |

| | | |
|---|---|---|
|      written explanations<br>  ii.  use appropriate forms of mathematical representation to present information<br>  iii.  move between different forms of mathematical representation<br>  iv.  communicate complete and coherent mathematical lines of reasoning<br>  v.  organize information using a logical structure.<br><br>D: Applying mathematics in real-life contexts<br><br>  i.  identify relevant elements of authentic real-life situations<br>  ii.  select appropriate mathematical strategies when solving authentic real-life situations<br>  iii.  apply the selected mathematical strategies successfully to reach a solution<br>  iv.  explain the degree of accuracy of a solution<br>  v.  explain whether a solution makes sense in the context of the authentic real-life situation. | what a simplified ratio might look like.  The ultimate goal is to determine a process for simplifying any ratio.  The investigation will be done during one class period under test conditions.<br><br>**Fair Competition: (criteria C, D)**<br><br>In this task, students will analyze different competitions in the Olympic Games to see if height makes a difference in athletic performance.  They will use ratios and proportions to determine whether some events should be organized no only by gender, but by height as well.  Students will create new distances for events that are proportional to each athlete's height and use their speed (rate) to determine the time in this "proportional event".  After analysing several competitions, students will then determine whether or not height gives athletes an advantage and if these events could/should be made fairer. | and cooperation.<br><br><br>In the Fair Competition task, students use ratios and proportions to redesign Olympic events to determine if the height of an athlete makes a difference in the outcome.  They will use a logical process to establish proportional relationships and apply these to find the results of the redesigned events.  This analysis will help them evaluate whether current Olympic events are fair or if they should be redesigned so that they are even more so. |

## Approaches to learning (ATL)

In order for students to be successful in the Unit Test and Fair Competition tasks, students will create plans to prepare for summative assessments (examinations and performances) (Self-management: Organization skills).  One strategy students will learn and practice is "making plans" where they will write out a detailed plan to complete summative assessments on time and study for the unit test.  Another strategy is "mind maps" where students create a mind map for the content to summarize what they have learned in the unit.

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** | | |
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| | | |

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

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

**Factual—** How are the mean, median and mode of a data set calculated? How do we represent information?

**Conceptual—** What makes a form of representation effective?  What are the strengths and weaknesses of numerical data?

**Debatable—** How can equality be represented? How can we use information to instigate change and make a difference?

| Objectives | Summative assessment | |
|---|---|---|
| A: Knowing and understanding<br><br>i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations<br>ii. apply the selected mathematics successfully when solving problems<br>iii. solve problems correctly in a variety of contexts.<br><br>B: Investigating patterns<br><br>i. select and apply mathematical problem- solving techniques to discover complex patterns<br>ii. describe patterns as relationships and/or general rules consistent with findings<br>iii. verify and justify relationships and/or general rules.<br><br>C: Communicating<br><br>i. use appropriate mathematical language (notation, symbols and terminology) in both oral and | Outline of summative assessment task(s) including assessment criteria:<br><br><br><br>**Unit Test: (criterion A)**<br><br>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.<br><br><br><br>**Investigation: Mean (criterion B)**<br><br>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 | Relationship between summative assessment task(s) and statement of inquiry:<br><br><br><br>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.<br><br><br><br>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 |

written explanations
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.

period under test conditions.

**Making a Difference: (criteria C, D)**

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.

to equal opportunities.

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.

| | | |
|---|---|---|
| | | |

| 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 |
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| |

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

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