ABGS MIDDLE SCHOOL Unit Planner

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| **Teacher(s)** | | **Subject group and discipline** | **Math – Grade 7** | | DRAFT |
| **Unit title** | Ratios and Proportional Relationships | **MYP year** | **Year 2 (Grade 7)** | **Unit duration** | **7 weeks** |

***INQUIRY: Establishing the purpose of the unit***

| **Key concept** | **Related concept(s)** | **Global context** |
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| Relationships | Equivalence<br>Representation | Scientific and Technical Innovation - Systems, models, methods |

| **Statement of inquiry** |
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| Equivalent ratios can represent proportional relationships in order to model real world situations. |
| **Inquiry questions** |
| Factual – What is are mathematical relationships?<br>Conceptual – How does the way a graph looks change what it describes?<br>Debatable – What is the best model (graph, table, or unit rate statement) for a proportional relationship? |

| **Objectives** | **Summative assessment** | |
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| CCLS Standards<br>7.RP.01 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.<br>7.RP.02 Recognize and represent proportional relationships between quantities.<br>7.RP.02a Decide whether two quantities are | **AUTHENTIC ASSESSMENT: GRASPS**<br>Outline of summative assessment task(s) including assessment criteria:<br>Unit Assessment (Pre & Post Unit Assessment)<br>Students will model their understanding of operations with rational numbers and explain their reasoning. | **Relationship between summative assessment task(s) and statement of inquiry:**<br>**Relationship to Inquiry**<br>• Students will compute unit rates to represent proportional relationships. |

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| in a proportional relationship.<br>7.RP.02b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.<br>7.RP.02c Represent proportional relationships by equations.<br>7.RP.02d Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.<br>7.RP.03 Use proportional relationships to solve multistep ratio and percent problems.<br><br>IB Objectives<br><br>MYP.MA.I.C.1 use appropriate mathematical language (notation, symbols and terminology) in both oral and written statements<br>MYP.MA.I.D.4 explain the degree of accuracy of a solution<br>MYP.MA.I.D.5 discuss whether a solution makes sense in the context of the authentic real-life situation. | **Goal**<br>The goal is for students to recognize the relationship between tables, graphs and equations.<br>**Role**<br>You work for the airline control center in Florida.<br>**Audience**<br>You assist pilots when they need help.<br>**Situation**<br>Your job is to determine if an airplane has to make an emergency landing.<br>**Product**<br>You will find the constant of proportionality and use relationships to create equations and solve questions based on them.<br>**Success**<br>You will be able to determine if the airplane has to make an emergency landing. | • Students will use various methods to identify proportional relationships.<br>• Students will be able to identify the constant of proportionality. |

| **Approaches to learning (ATL)** |
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| - VIII. Critical thinking skills – Practice observing carefully in order to recognize problems.<br>• Students will consider each problem and determine what process is necessary to find a solution. Each problem will have different values and operations, students will have to determine what strategy they will use to successfully solve the problem. Each problem may be unique, but they will have to apply their knowledge and understanding in unfamiliar situations. |

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| X. Transfer skills – Utilize effective leaning strategies in subject groups and disciplines.<br>• Students will need to articulate their solution to a problem using the strategies discuss in class and patterns highlighted throughout the learning process. They will also use models to demonstrate their understanding. |
| VI. Information literacy skills – Collect and analyze data to identify solutions and make informed decisions.<br>• Students will consider the information within a problem to determine the strategy best necessary to find a solution. |
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***ACTION: Teaching and learning through inquiry***

| **Content** | **Learning process** | |
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| The Number System (7.NS) - Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.<br>7.NS.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.<br>**A. Describe situations in which opposite quantities combine to make 0.**<br>B. Understand p + q as the number located \|q\| from distance p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.<br>C. Understand subtraction of rational numbers as adding the additive inverse, p - q = p + (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference and apply this principle in real-world contexts.<br>D. Apply properties of operations as strategies to add and subtract rational numbers.<br>7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.<br>A. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for | **Learning experiences and teaching strategies**<br><br>Learning Experiences:<br>Students will compare relationships in tables, graphs and equations.<br>Recognize and represent proportional relationships between quantities. A. Decide whether two quantities are in a proportional relationship.<br>Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.<br>Represent proportional relationships be equations.<br>Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.<br><br>Teaching Strategies:<br><br>Teacher will use questioning techniques to build understanding. | **Relationship between summative assessment task(s) and statement of inquiry:**<br><br>**Relationship to Inquiry**<br><br>• Use operations of fractions to compute unit rate.<br>• Demonstrate cross multiplying to determine proportionality.<br>• Identify the unit rate as the constant of proportionality, *k* |

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| multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.<br>B. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then -(p/q) = (-p)/q = p/(-q). Interpret quotients of rational numbers by describing real-world contexts.<br>C. Apply properties of operations as strategies to multiply and divide rational numbers.<br>D. Convert a rational number to a decimal using long division, know that the decimal form of a rational number terminates in 0s or eventually repeats.<br><br>7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers.<br><br>MYP.MA.I.A.1 demonstrate knowledge and understanding of some of the principles from the four branches of mathematics (number, algebra, geometry and trigonometry, statistics and probability)<br>MYP.MA.I.A.2 select appropriate mathematical strategies when solving problems<br>MYP.MA.I.A.3 apply the selected mathematical strategies successfully when solving problems<br>MYP.MA.I.A.4 solve problems correctly in both familiar and unfamiliar situations in a variety of contexts.<br>MYP.MA.I.B.1 apply mathematical problem-solving techniques to recognize patterns<br>MYP.MA.I.B.2 describe patterns as relationships or general rules consistent with correct findings<br>MYP.MA.I.B.3 verify whether the pattern works for other examples. | Concrete Pictorial Abstract (CPA) is a three-step instructional approach that has been found to be highly effective in teaching math concepts. The first step is called the concrete stage. It is known as the "doing" stage and involves physically manipulating objects to solve a math problem. The pictorial (semi-concrete) stage is the next step. It is known as the "seeing" stage and involves using images to represent objects to solve a math problem. The final step in this approach is called the abstract stage. It is known as the "symbolic" stage and involves using only numbers and symbols to solve a math problem. CPA is a gradual systematic approach. Each stage builds on to the previous stage and therefore must be taught in sequence. | |
| | **Formative assessment** | |

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| | Teacher will present the problem, students will work in pairs/small groups to model the problem and then model the solution with tools (number lines, integer chips, fraction diagrams, etc.) teacher will walk around to see students working together with the tools reinforcing the understanding and use of sensory learning preferences. Formative feedback can be collected using student white boards, cold calling, or smart response clickers.<br><br>1. Self-Evaluation<br>Allow students to evaluate their own work, **encouraging them to learn their own strengths and weaknesses.**<br>Giving students time to formally review their own written assessments is an easy way of doing so. After completing the assessment, give each student access to an expanded rubric that details expectations. They should grade themselves accordingly. You can also ask them to hand in their completed rubrics, letting you note concerns that students may have about their own knowledge and comprehension.<br>2. Think Share Pair<br>Oversee a think-pair-share exercise to **deliver three content-processing activities in one**, easily assessing student understanding during the last stage.<br>As the name of this differentiated instruction strategy implies, start by asking each student to *think* about a specific topic or answer a given question. Next, *pair* students together to discuss their findings. Finally, each pair should *share* their thoughts with the class and accept questions from classmates.<br>3. Entry/Exit Tickets<br>**Gather information about how well students processed your most recent lesson** by giving them five minutes to write an entry or exit ticket.<br>As a formative assessment, entry tickets should ask students to reflect on a specific class or exercise from the previous day. Exit tickets should involve students summarizing what they've just learned. Either way, you'll receive small products that let you easily see how well students processed and retained key content, indicating knowledge gaps. |

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| | 4. Stop and Go<br>**Allow students to give you real-time feedback as you teach** with "stop and go" cards.<br>Purchasable or assignable as an art task, they're two-sided cards — one green and one red. As you deliver a lesson, students should hold the green side toward you if they understand everything. If something's unclear, encourage them to turn the red side forward. When you see red, stop and clarify — or expand upon — your points until you see green again. This should help you quickly assess if students are processing content as you deliver it. |
| | **Differentiation**<br>Use of Number line, counters<br>Real world examples: temperature, gain/loss, |

| **Resources** |
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| Engage NY Modules<br>Connected Math 2<br>Go Math<br>Workbooks (created by math 7 department team of teachers - attached above), teacher created<br>Powerpont, manipulatives, smart response clickers, Promethium board, pencils, paper, calculators. |

***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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| Why do we think that the unit or the selection of topics will be interesting?<br>What do students already know, and what can they do?<br>What have students encountered in this discipline before? | What difficulties did we encounter while completing the unit or the summative assessment task(s)?<br>What resources are proving useful, and what other resources do we need?<br>What student inquiries are emerging?<br>What can we adjust or change? | What were the learning outcomes of this unit?<br>How well did the summative assessment task serve to distinguish levels of achievement? Was the task sufficiently complex to allow students to reach the highest levels? |

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| What does my experience tell me about what to expect in this unit?<br>What attributes of the learning profile does this unit offer students opportunities to develop?<br>What potential interdisciplinary connections can we identify?<br>What do we know about my students' preferences and patterns of interaction?<br>Are there any possible opportunities for meaningful service learning?<br>What in the unit might be inspiring for community or personal projects?<br>Could we develop authentic opportunities for service learning?<br>How can we use my students' multilingualism as a resource for learning? | What skills need more practice?<br>What is the level of student engagement?<br>How can we scaffold learning for students who need more guidance?<br>What is happening in the world right now with which we could connect teaching and learning in this unit?<br>How well are the learning experiences aligned with the unit's objectives?<br>What opportunities am I hearing to help students explore the interpretative nature of knowledge, including personal biases that might be retained, revised or rejected? (DP Theory of knowledge skills development) | What evidence of learning can we identify? What artefacts of learning should we document?<br>Which teaching strategies were effective? Why?<br>What was surprising?<br>What student-initiated action did we notice?<br>What will we do differently next time?<br>How will we build on our experience to plan the next unit?<br>How effectively did we differentiate learning in this unit?<br>What can students carry forward from this unit to the unit? to the next year/ level of study?<br>Which subject groups could we work with next time?<br>What did we learn from standardizing the assessment? |