ABGS MIDDLE SCHOOL Unit Planner

Teacher(s)		**Subject group and discipline**	**Math – Grade 7**		DRAFT
Unit title	**Number Sense with Rational Numbers**	**MYP year**	**Year 2 (Grade 7)**	**Unit duration**	**4 weeks**

INQUIRY: Establishing the purpose of the unit

Key concept	**Related concept(s)**	**Global context**
Form	Measurement Space	Identities and Relationships

Statement of inquiry
"Rational numbers are modeled by taking similar fractions and forming connections between different values."
Inquiry questions
Factual – What patterns are you able to identify within equivalent fractions? Conceptual – Does my solution make logical sense to the context of the problem? Debatable - Is the most efficient way to solve a problem the easiest?

Objectives	**Summative assessment**	
The Number System (7.NS) - Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 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. **A. Describe situations in which opposite**	**AUTHENTIC ASSESSMENT: GRASPS** Outline of summative assessment task(s) including assessment criteria: Unit Assessment (Pre & Post Unit Assessment) Students will model their understanding of operations with rational numbers and explain their reasoning. **Task** Integers Unit Test Without a Calculator **Goal**	**Relationship between summative assessment task(s) and statement of inquiry:** **Relationship to Inquiry** • Students use arrow to model integer addition and subtraction. • Students will use rational

quantities combine to make 0. 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. 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. D. Apply properties of operations as strategies to add and subtract rational numbers. 7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers. Mathematical Practices IB Objectives 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) MYP.MA.I.A.2 select appropriate mathematical strategies when solving problems MYP.MA.I.A.3 apply the selected mathematical strategies successfully when solving problems	The goal is for students to use logic to model adding and subtracting integers with an array of methods. **Role** You are a reporter for the school newspaper **Audience** Your middle school football team. The team gains and loses yards you are to report on the game. **Situation** Your team wins the game. You have to find out how many yards the quarterback threw for the winning touchdown. **Product** You will draw and model with arrows the pattern of yards gained and lost to show the final yards. Your model needs to include a labeled number line and arrows showing the correct direction of the yards gained and lost using persistence and perseverance. **Standards of Success** (Rubric) **AUTHENTIC ASSESSMENT: GRASPS** **GOAL:** Students will be able to calculate a bank account balance at the start of a month given the previous month's bank account balance and a list of transactions (withdrawals and deposits). **ROLE:** Students have a job and are learning. **AUDIENCE:** Students are proving that they can budget their money to their parents. **SITUATION:** Students are given the last months balance on their account. Students will distinguish between withdrawals (negative quantities) and deposits (positive quantities).	numbers to add and subtract signed numbers. • Students will be able to demonstrate their conceptual understanding of integers and rational numbers using the number line, absolute value and opposites.

MYP.MA.I.A.4 solve problems correctly in both familiar and unfamiliar situations in a variety of contexts. MYP.MA.I.B.1 apply mathematical problem-solving techniques to recognize patterns MYP.MA.I.B.2 describe patterns as relationships or general rules consistent with correct findings MYP.MA.I.B.3 verify whether the pattern works for other examples. The Number System (7.NS) - Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 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. **A. Describe situations in which opposite quantities combine to make 0.** 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. 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. D. Apply properties of operations as	Students will calculate the balance of their account at the end of the month. **PRODUCT:** Students will keep track of the transactions on a checkbook balance sheet. They will show all calculations on a separate sheet of paper. Students will find their balance at the end of the month. **AUTHENTIC ASSESSMENT: GRASPS** **GOAL:** Students will be able to compete with their peers to find the lowest sum possible. **ROLE:** Students are game show contestants. **AUDIENCE:** Math Class **SITUATION:** Students are contestants in a gameshow called DEALING DOWN. They will have to write an expression with the least possible quantity win a point. **PRODUCT:** Students will be able to use the properties of operations with rational numbers to determine the least possible outcome of the 4 cards dealt. They will have to compare answers and discuss how they know that their quantity is accurate and the least possible. Last, students will play several rounds of the game and document the expression with the least quantity. Lastly, students will write a report on the strategies they found.	

strategies to add and subtract rational numbers. 7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. 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 multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. 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. C. Apply properties of operations as strategies to multiply and divide rational numbers. 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. 7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers. 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)		

MYP.MA.I.A.2 select appropriate mathematical strategies when solving problems MYP.MA.I.A.3 apply the selected mathematical strategies successfully when solving problems MYP.MA.I.A.4 solve problems correctly in both familiar and unfamiliar situations in a variety of contexts. MYP.MA.I.B.1 apply mathematical problem-solving techniques to recognize patterns MYP.MA.I.B.2 describe patterns as relationships or general rules consistent with correct findings MYP.MA.I.B.3 verify whether the pattern works for other examples.		

Approaches to learning (ATL)
I. Communication skills • Exchanging thoughts, messages and information effectively through interaction. They will also give and receive meaningful feedback
X. Transfer skills – Utilize effective leaning strategies in subject groups and disciplines. • 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.
VIII. Critical thinking Analyzing and evaluating issues and ideas • Practice observing carefully in order to recognize problems. Students will gather and organize relevant information to formulate an argument

ACTION: Teaching and learning through inquiry

Content	Learning process- can add essential questions here	
Content: 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. A. Describe situations in which opposite quantities combine to make 0. 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. 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. D. Apply properties of operations as strategies to add and subtract rational numbers. 2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. 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 multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. 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. C. Apply properties of operations as strategies to multiply and divide rational numbers. 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.	**Learning experiences and teaching strategies** Learning Experiences: Students will have the opportunity to identify and **explain** patterns in problems involving integers in order to create an algorithm for adding, subtracting multiplying and dividing integers. Teaching Strategies: Teacher will use questioning techniques to build understanding. 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.	**Relationship between summative assessment task(s) and statement of inquiry:** **Relationship to Inquiry** • Use models of number line, absolute value and opposites. • Use real world examples to add, subtract, multiply and divide signed numbers. • Use calculator to convert fractions to decimals.

3. Solve real-world and mathematical problems involving the four operations with rational numbers.		
	Formative assessment 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. 1. Self-Evaluation Allow students to evaluate their own work, **encouraging them to learn their own strengths and weaknesses.** 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. 2. Think Share Pair Oversee a think-pair-share exercise to **deliver three content-processing activities in one**, easily assessing student understanding during the last stage. 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. 3. Entry/Exit Tickets **Gather information about how well students processed your most recent lesson** by giving them five minutes to write an entry or exit ticket. 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. 4. Stop and Go **Allow students to give you real-time feedback as you teach** with "stop and go" cards. 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 Use of Number line, counters Real world examples: temperature, gain/loss,

Approaches to learning (ATL)
- VIII. Critical thinking skills – Practice observing carefully in order to recognize problems. • 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.
X. Transfer skills – Utilize effective leaning strategies in subject groups and disciplines. • 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. • Students will consider the information within a problem to determine the strategy best necessary to find a solution.

Resources
Engage NY Modules Connected Math 2 Go Math Workbooks (created by math 7 department team of teachers - attached above), teacher created PowerPoint, 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**
Why do we think that the unit or the selection of topics will be interesting? What do students already know, and what can they do? What have students encountered in this discipline before? What does my experience tell me about what to expect in this unit? What attributes of the learning profile does this unit offer students opportunities to develop? What potential interdisciplinary connections can we identify? What do we know about my students' preferences and patterns of interaction? Are there any possible opportunities for meaningful service learning? What in the unit might be inspiring for community or personal projects? Could we develop authentic opportunities for service learning? How can we use my students' multilingualism as a resource for	What difficulties did we encounter while completing the unit or the summative assessment task(s)? What resources are proving useful, and what other resources do we need? What student inquiries are emerging? What can we adjust or change? What skills need more practice? What is the level of student engagement? How can we scaffold learning for students who need more guidance? What is happening in the world right now with which we could connect teaching and learning in this unit? How well are the learning experiences aligned with the unit's objectives? 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 were the learning outcomes of this unit? 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? What evidence of learning can we identify? What artefacts of learning should we document? Which teaching strategies were effective? Why? What was surprising? What student-initiated action did we notice? What will we do differently next time? How will we build on our experience to plan the next unit? How effectively did we differentiate learning in this unit? What can students carry forward from this unit to the unit? to the next year/ level of study? Which subject groups could we work with

learning?		next time? What did we learn from standardizing the assessment?