

**Emily Kreklau
Math Project**

A 15 day journey through 6th grade Algebra

**BSU
Mr. Frauenholtz
July 25, 2017**

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Intro

The focus of these 15 days of lesson are on the Algebra standards for 6th grade. Students will work on ratio and representing equations and inequalities on a graph along with the distributive, associative, commutative and identity properties.

During this 15 day journey through algebra, the 6th grade student will work their way through the planned lessons. If at any time the student finds themselves completed with a task, I will provide a algebra puzzle for extra credit. If they are done with this, they will explore the NVLM website, in particular, the balancing manipulative to get them ready to solve two step equations in 7th grade. 6th grade standards focus on understanding how a variable is used and how we can represent it on a graph and table. The equation of a line isn't introduced, but they are using it without knowing it. Differentiation could include working with the equation of the line on desmos.

Although there are 7 lesson plans, a few will take more than a day, possible three. Excellent conversation and enquiry may result and you need to give time to the students to explore their own work and the work of their classmates.

There are two small assessments during the 15 days and then a final assessment at the end of the 15 day period.

Lesson Plan Template

Instructor: Emily Kreklau	Subject Area: Math	Grade: 6	Date: 2 days
Information about the Lesson			
Complete each section below with the background information about the lesson. The italicized statements/questions are to guide the writing of background information. Do not answer each separately and explicitly. You may delete the italicized prompts after typing the background information in each section below the dotted line to reduce length of document.			
<p>Central Focus & Context/Rationale: The intention of the lesson is to allow students to look at different ways to represent 16 blocks and begin to recognize the importance of using variables when representing numbers and writing a number sentence.</p> <hr style="border-top: 1px dashed black;"/>			
<p>Learning Objective(s)</p> <ul style="list-style-type: none"> • All students will come up with an expression for 16, 20, 25, and 32 with 95% accuracy. <hr style="border-top: 1px dashed black;"/>			
<p>Guiding Question(s)</p> <ul style="list-style-type: none"> • How many different ways can we show these blocks? • How are we going to distinguish between each others patterns? • No matter how the blocks are displayed, does everyone still have 16 blocks? <hr style="border-top: 1px dashed black;"/>			
<p>Materials Needed:</p> <ul style="list-style-type: none"> • Pencils, paper, multilink blocks, • A spreadsheet will be created from the students work. <hr style="border-top: 1px dashed black;"/>			
<p>Misconceptions:</p> <ul style="list-style-type: none"> • 2t is thought of as 2+t and not 2xt • The different representations my question value of 16 because is won't look like 16. <hr style="border-top: 1px dashed black;"/>			
<p>Prior Academic Learning and Prerequisite Skills:</p> <ul style="list-style-type: none"> • Using factors • Evaluate expressions and solve equations involving variables when values for the variables are given. <hr style="border-top: 1px dashed black;"/>			
<p>MN Content Standard(s):</p> <ul style="list-style-type: none"> • 5.2.3.3 Evaluate expressions and solve equations involving variables when values for the variables are given. • 6.2.3.2 Solve equations involving positive rational numbers using number sense, properties of arithmetic and the idea of maintaining equality on both sides of the equation. Interpret a solution in the original context and assess the reasonableness of results. • <hr style="border-top: 1px dashed black;"/>			
Lesson Plan Details			
<ul style="list-style-type: none"> • Provide a detailed description of what the teacher and students do to complete the lesson objectives written in outline/bullet-point format. • Include instructional strategies, learning tasks, key questions, transitions, student support, student grouping, and assessment (informal and formal) strategies throughout the lesson. • The italicized prompts are reminders of what qualities should exist in these plans. Do not answer each prompt as if it is a question. 			
<p>Lesson Introduction: Talk about how ten blocks can look so different. Show the students ten blocks and discuss how many ways to build with them. Start with two towers of 5. Then do 5 towers of 2. Build a 2x2x2 cube with 2 extra blocks to the side. Now pass out 16 multilink blocks to each student. The blocks</p>			

need to be the same color per student. Let the students have 5 minutes to just play and build with the blocks.

Learning Activities: Have the students look at how many ways to represent 16 blocks. Make sure they are aware of what their classmates are doing so that they can be creative and hopefully you will have several different ways to work with. Have each student describe to the class their pattern or build or display of 16 blocks. (students can not just say "I have 16 blocks") Use one of the students and show the students how to represent their blocks as an equation. Example: a student has 8 groups of 2 blocks each, you could write $2+2+2+2+2+2+2+2 = 16$ or you could write 8 groups of 2 or $8t$ and the t can represent two blocks. This gives you the equation $8t=16$. What is t equal to again? " t " is a variable that represents 2 blocks. Now have the students try and develop an equation or number sentence of their own to represent their display.

Have the students come up and show you their equation or number sentence and begin making a worksheet with all of their equations so you can pass out to the class everyone's equations on one sheet and then have them solve for the variable (if used) that each classmate has used.

When a student brings you their equation, have them go back and make another sentence or equation and keep track of how many different equations they can come up.

Once each student has brought you an equation, have the students pair up and build with 20 blocks together and come up with an equation and number sentence. Check their results and then have the students find number sentences and equations with 25, and then 32.

• **Lesson Conclusion:** Take an example of the 20 from a group and solve for their variable. Hand out the created worksheet with all of the student's equations (this will be homework) and have them solve for any variables that are on the worksheet.

Citations:

• www.newmathsgcse.org

Lesson Plan

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Information about the Lesson			
Complete each section below with the background information about the lesson. The italicized statements/questions are to guide the writing of background information. Do not answer each separately and explicitly. You may delete the italicized prompts after typing the background information in each section below the dotted line to reduce length of document.			
Central Focus & Context/Rationale: Students need to recognize that the equal sign means there is an equal balance between the two sides of the equation and by taking away and adding to our balance you can discover what the value of the variable is. Using money brings a real world idea of how to make change or represent a 1.			
Learning Objective(s) <ul style="list-style-type: none">All students will make 5 different expressions with money adding up to \$1 with 95% accuracy.			
Guiding Question(s) <ul style="list-style-type: none">How many different ways can we represent \$1?Can you guess what coins are being used in the expression. Example $4x = \\$1$ so x is 25 or a quarter.What is another way to represent that you have 4 quarters? Example $0.25x = \\$1$What coin set gets you to a dollar the fastest?			
Materials Needed: <ul style="list-style-type: none">Pencils, paper, multiple coins and a dollar bill, graph paper			
Misconceptions: <ul style="list-style-type: none">Even though $4x = \\$1$, if you use the same variable in $0.25x = \\$1$, these two x's are not equal because $4x$ can not equal $0.25x$.			
Prior Academic Learning and Prerequisite Skills: <ul style="list-style-type: none">Using factorsEvaluate expressions and solve equations involving variables when values for the variables are given.			
MN Content Standard(s): <ul style="list-style-type: none">6.2.3.1 Represent real-world or mathematical situations using equations and inequalities involving variables and positive rational numbers.6.2.3.2 Solve equations involving positive rational numbers using number sense, properties of arithmetic and the idea of maintaining equality on both sides of the equation. Interpret a solution in the original context and assess the reasonableness of results.6.2.1.1 Understand that a variable can be used to represent a quantity that can change, often in relationship to another changing quantity. Use variables in various contexts.6.2.1.2 Represent the relationship between two varying quantities with function rules, graphs and tables; translate between any two of these representations.			
Lesson Plan Details			
<ul style="list-style-type: none">Provide a detailed description of what the teacher and students do to complete the lesson objectives written in outline/bullet-point format.Include instructional strategies, learning tasks, key questions, transitions, student support, student grouping, and			

assessment (informal and formal) strategies throughout the lesson.

- The italicized prompts are reminders of what qualities should exist in these plans. Do not answer each prompt as if it is a question.

Lesson Introduction: There are so many ways to make change that adds up to a dollar. Talk about the different ways with actual coins. 100 pennies, 4 quarters, 10 dimes, 5 nickels and 3 quarters, etc. Write the equation $10x = \$1$ on the board. Ask the class what they think x must be. Hopefully they will say a dime, because 10 dimes are a dollar. Ask the students to give some more examples of an equation that can add up to a dollar using coins, and then use some variables.

Learning Activities: Have students work in pairs. They need to come up with their own equations of combinations to a dollar and their partner needs to guess what combination they are using. Example: $12x + 4y = \$1$. I would solve that $x = 5$ and $y = 10$ because 12 nickels and 4 dimes is a dollar. Have each student take turns 5 times each. They should track of their equations. At the end of this activity, ask for five different equations the class came up with and go over together.

Next look at a one variable equation the class came up with. Example would be $10x = \$1$. x is the independent variable and y is the dependent. Make a table for the value of dimes.

x	y
1	.10
2	.20
3	.30
4	.40
5	.50
6	.60
7	.70
8	.80
9	.90
10	1.00

Now have them graph those result.

(Show on board). Now have the students make a table for nickels, quarters, and 50 cent pieces and graph those table onto the same graph.

Which coin gets you to a dollar the fastest? They should say 50 cents. Compare the line to the line of the nickels...what do you notice (students should talk about steepness of the line...slope) talk about rate of change. Intercept is zero (for all the equations).

- **Lesson Conclusion:** See if the students can build a table and graph with the following story.
"Your friend gives you \$3 and says that they are going to give you a quarter everyday to help them save money. They just want you to hold their money until they need it because they are afraid they will spend it." Your independent variable (x) is the days and the dependent variable (y) is how much money you have.
Talk to the class about how you would set up your table and graph and then let them explore.

Citations:

www.scimathmn.org

Lesson Plan

Instructor: Emily Kreklau	Subject Area: Math	Grade: 6	Date: 2 days
Information about the Lesson			
Complete each section below with the background information about the lesson. The italicized statements/questions are to guide the writing of background information. Do not answer each separately and explicitly. You may delete the italicized prompts after typing the background information in each section below the dotted line to reduce length of document.			
<p>Central Focus & Context/Rationale: Students need to recognize a variable and what it represents in a math story.</p> <p>-----</p>			
<p>Learning Objective(s)</p> <ul style="list-style-type: none"> • Groups of 3 students will match the expression with the math story and then make a table and graph 6 of the stories (2each) with 90% accuracy. <p>-----</p>			
<p>Guiding Question(s)</p> <ul style="list-style-type: none"> • What are the key words used when writing a math story? • How do you know when to add, minus, or multiply? • Can you develop a math story of your own? <p>-----</p>			
<p>Materials Needed:</p> <ul style="list-style-type: none"> • Pencils, paper, graph paper, matching cards. <p>-----</p>			
<p>Misconceptions:</p> <ul style="list-style-type: none"> • Students cannot distinguish between independent and dependent variables. • Students misinterpret whether a relationship is additive or multiplicative given a table or graph. • Students interpret $y = 2x$ to mean that x is twice as large as y. • Students incorrectly graph the ordered pair (x, y). <p>-----</p>			
<p>Prior Academic Learning and Prerequisite Skills:</p> <ul style="list-style-type: none"> • Create and use rules, tables, spreadsheets and graphs to describe patterns of change and solve problems; • Use a rule or table to represent ordered pairs of positive integers and graph these ordered pairs on a coordinate system; • Represent real-world situations using equations and inequalities involving variables. Create real-world situations corresponding to equations and inequalities; • Use the associative, commutative and distributive properties and order of operations to generate equivalent expressions and to solve problems involving positive rational numbers. <p>-----</p>			
<p>MN Content Standard(s):</p> <ul style="list-style-type: none"> • 6.2.3.1 Represent real-world or mathematical situations using equations and inequalities involving variables and positive rational numbers. • 6.2.3.2 Solve equations involving positive rational numbers using number sense, properties of arithmetic and the idea of maintaining equality on both sides of the equation. Interpret a solution in the original context and assess the reasonableness of results. • 6.2.1.1 Understand that a variable can be used to represent a quantity that can change, often in relationship to another changing quantity. Use variables in various contexts. • 6.2.1.2 Represent the relationship between two varying quantities with function rules, graphs and tables; translate between any two of these representations. <p>-----</p>			

<p>A man buys 7 boxes containing n pencils each. He loses 3 pencils. How many are left?</p>	<p>$n - 15$</p>	
<p>A book costing \$$n$ is reduced by \$3. A man buys 7 of them. What is the total cost?</p>	<p>$7n$</p>	
<ul style="list-style-type: none"> • Lesson Conclusion: Have 6 students, one from a different group each time, talk about and display the graphs. Then talk about what would be different if we were making a table and plotting the expressions with 2 variable. Remind the students there will be a quiz tomorrow. 		
<p>Citations:</p>		
<p>www.scimathmn.org</p>		
<p>www.tes.com</p>		

Lesson Plan

Instructor: Emily Kreklau	Subject Area: Math	Grade: 6	Date: 2/3 days
Information about the Lesson			
<p>Complete each section below with the background information about the lesson. The italicized statements/questions are to guide the writing of background information. Do not answer each separately and explicitly. You may delete the italicized prompts after typing the background information in each section below the dotted line to reduce length of document.</p>			
<p>Central Focus & Context/Rationale: Students apply their knowledge of ratios, equivalent fractions, and percent's to solve a wide variety of problems, including those involving mixtures and concentrations.</p> <hr style="border-top: 1px dashed black;"/>			
<p>Learning Objective(s)</p> <ul style="list-style-type: none"> • All students will develop a lemonade recipe and work with the ratio of the mixture to determine whose is the sweetest with 85% accuracy. <hr style="border-top: 1px dashed black;"/>			
<p>Guiding Question(s)</p> <ul style="list-style-type: none"> • How are you going to make your lemonade? • When it asks for proportions, are you going to make a gallon of lemonade at a time, or are you going to just look at the proportions? What is the difference? Is there a difference? • Think about the cost of making the lemonade when you consider your recipe. <hr style="border-top: 1px dashed black;"/>			
<p>Materials Needed:</p> <ul style="list-style-type: none"> • Pencils, paper, iPad <hr style="border-top: 1px dashed black;"/>			
<p>Misconceptions:</p> <ul style="list-style-type: none"> • Students may believe that 8:4 and 2:1 represent different ratios; • Students may not understand that order matters in a ratio. For example, students may believe that 3:1 and 1:3 are the same ratios; • Given the ratio 3 boys to every 7 girls, students may think there are exactly only 3 boys and 7 girls; • Students see little difference between fractions and ratios, believing that all ratios express part-to-whole relationships; • Students may misinterpret or misrepresent ratios expressed in words. For example, students may believe that the ratio of problems wrong to problems correct is 1:6 when a student gets one out of every six problems wrong rather than 1:5; • Students believe that <i>adding</i> or <i>subtracting</i> the same number to the numerator and denominator produces an equivalent ratio (e.g., 84 is equivalent to $8+24+2$ or 610); • When scaling up by non-integer values, students revert to additive structures (e.g., When asked, "If it takes 6 pizzas to feed 24 people, how many pizzas will it take to feed 36 people," students add $6 + 12$ rather than multiply 6×1.5); • Students do not understand unit rates as fractions (e.g., 25 students per bus means <i>1 bus 25 students</i>) <hr style="border-top: 1px dashed black;"/>			
<p>Prior Academic Learning and Prerequisite Skills:</p> <ul style="list-style-type: none"> • Understand that a ratio is a comparison of two quantities; • Understand that ratios can be represented in more than one way; • Identify, order, write and compare fractions, mixed numbers, improper fractions, decimals, and percents; • Locate fractions, mixed numbers, improper fractions, and decimals on a number line; • Add and subtract decimals and fractions using multiple strategies including standard algorithms and a variety of representations; <hr style="border-top: 1px dashed black;"/>			

- Use equivalent fractions as a strategy to add and subtract unlike fractions;
- Multiply and divide whole numbers;
- Solve real-world and mathematical problems requiring addition and subtraction of decimals, fractions and mixed numbers, including those involving measurement, geometry and data.

MN Content Standard(s):

- **6.1.2.1** Identify and use ratios to compare quantities; understand that comparing quantities using ratios is not the same as comparing quantities using subtraction.
- **6.1.2.2** Apply the relationship between ratios, equivalent fractions and percents to solve problems in various contexts, including those involving mixtures and concentrations.
- **6.1.2.3** Determine the rate for ratios of quantities with different units.
- **6.1.2.4** Use reasoning about multiplication and division to solve ratio and rate problems.

Lesson Plan Details

- Provide a detailed description of what the teacher and students do to complete the lesson objectives written in **outline/bullet-point** format.
- Include instructional strategies, learning tasks, key questions, transitions, student support, student grouping, and **assessment (informal and formal) strategies throughout the lesson.**
- The italicized prompts are reminders of what qualities should exist in these plans. Do not answer each prompt as if it is a question.

Lesson Introduction: It is important to have manipulatives available to those students that may need it. Go through the bronze questions with the class using blocks, markers, etc to represent the ratio. For the first one when the ratio is 2:1 have two students stand up and give two to one and one to the other. Explain that together they have the whole (3) and then they each are holding a part. Rewrite the ratios as part to whole or a fraction. $\frac{2}{3}$ or $\frac{1}{3}$. You can also say that one person has twice as much. Have the students work in pairs to do the silver and those who get done to do the gold...

Questions

	Bronze	Silver	Gold
	Share 24 into the following ratios:	Share £36 into the following ratios:	Share 48cm into the following ratios:
a)	2:1	2:1	4:2
b)	3:1	3:1	3:5
c)	5:1	1:5	1:7
d)	2:4	7:5	1:5:6

Learning Activities: Making a recipe for Lemonade. Students may work on their own or with a partner. They need to research some lemonade recipes and find the ratio of mix to water. Or lemons juice to sugar to water. It may depend on what they are using for their recipe. As they come up with their recipes, put on a spread sheet and give them the following worksheet.

Yum Yum lemonade!

1. What is your ratio?

2. Define each part and describe what your whole would be.

3. How many parts of each would you need of your recipe to make 100 cups of lemonade?

4. A serving of lemonade is $\frac{1}{2}$ cup per person. How much of each part would you need for your class?

5. How much would you sell your lemonade for?

While the students bring you their recipe and you are handing out the worksheet for them to fill out, make a spreadsheet of all their recipes (ratios) to hand out later to the class. With the sheet of ratios they will need to define the whole and determine whose recipe would be the most watery, lemoniest, and most sugary. They should justify their reasoning. Have the work in groups of three or four.

- **Lesson Conclusion:** Go over and have students present how they calculated the most l, w, s. This could take more than one day depending on the various methods they may have used.

Citations:

www.scimathmn.org

www.tes.com

Lesson Plan

Instructor: Emily Kreklau	Subject Area: Math	Grade: 6	Date: 1or2 days
Information about the Lesson			
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<p>Central Focus & Context/Rationale: Student's learn to represent information with a function, table and graph and interpret what that information is. Once students understand properties applied to numerical expressions and equations, they will be able to use algebraic symbols flexibly to represent mathematical relationships and to solve problems.</p> <hr style="border-top: 1px dashed black;"/>			
<p>Learning Objective(s)</p> <ul style="list-style-type: none"> • All students will make a graph, function, and table to represent their lemonade sales with 100% accuracy. <hr style="border-top: 1px dashed black;"/>			
<p>Guiding Question(s)</p> <ul style="list-style-type: none"> • What does the slope stand for in our graphs? • On our expressions, what could we add to it so that we are not starting from zero? • Who would you buy lemonade from? • Would you spend more for freshly squeezed or from a mix? • How many servings do you plan/hope to sell in an hour? • What could effect the sale of the lemonade? <hr style="border-top: 1px dashed black;"/>			
<p>Materials Needed:</p> <ul style="list-style-type: none"> • Pencils, graph paper, Desmos on their iPad, different sizes of drinking cups <hr style="border-top: 1px dashed black;"/>			
<p>Misconceptions:</p> <ul style="list-style-type: none"> • Students think that variables can represent only <i>one</i> number; • Students ignore letters used to represent unknowns when simplifying; for example, $3m + 2 = 5$, or $3m + 2 = 5m$; • Students do not distinguish between letters used to represent variables and letters used to represent units of measure (e.g., $5m$ and 5 m as in meters, or $3h$ and 3 h, as in hours); • Students think of the equal sign as a symbol that means "to calculate" rather than "is the same as;" • Students struggle to solve equations such as $5 = x + 2$ or $10 = 2x$, where the variable is on the right side; • Students may attempt to solve equations such as $5x + 2 = 15$ by dividing by 5 before subtracting 2, thus "undoing" the multiplication before the addition; • Students may believe that equations always result in whole number solutions. <hr style="border-top: 1px dashed black;"/>			
<p>Prior Academic Learning and Prerequisite Skills:</p> <ul style="list-style-type: none"> • Determine whether an equation or inequality involving a variable is true or false for a given value of the variable; • Represent real-world situations using equations and inequalities involving variables. Create real-world situations that correspond to equations and inequalities; • Evaluate expressions and solve equations involving variables when values for the variables are given; • Solve real-world and mathematical problems requiring addition, subtraction, multiplication and division of multi-digit whole numbers. Use various strategies, including the use of technology, 			

inverse relationships between operations, and the context of the problem to assess the reasonableness of results.

MN Content Standard(s):

- **6.2.3.1 Represent** real-world or mathematical situations using equations and inequalities involving variables and positive rational numbers.
- **6.2.1.2** Represent the relationship between two varying quantities with function rules, graphs and tables; translate between any two of these representations.

Lesson Plan Details

- Provide a detailed description of what the teacher and students do to complete the lesson objectives written in **outline/bullet-point** format.
- Include instructional strategies, learning tasks, key questions, transitions, student support, student grouping, and **assessment (informal and formal) strategies throughout the lesson.**
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Lesson Introduction: From the lesson the day before, students should pull out their worksheet Yum Yum lemonade and look at the question that asked the about how much money they would charge for a glass of lemonade. Discuss what a glass would be: A cup, $\frac{1}{2}$ and cup. Show them several options. Talk about why they choose to sell their lemonade at that price. Talk about what they might have to spend to make the lemonade in the first place so how much would they sell to start making a profit.

Learning Activities: Have students go back to their partners (if they had one) and make a table, graph and find the expression for their lemonade sales (each student will need to make their own graph but will have the same data as their partner). Students then need to consider another graph, table, expression to represent the cost of the ingredients before the sale. Can they graph this?

- **Lesson Conclusion:** Have each group share their functions and talk about their findings.

Citations:

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Lesson Plan

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<p>Central Focus & Context/Rationale. Concrete models and pictorial representations of algebraic expressions are used to develop understanding that the commutative, associative, and distributive properties and order of operations apply in the same way that they did for numeric expressions. Students use these properties and the order of operations to generate equivalent expressions and evaluate expressions that involve positive rational numbers.</p> <hr style="border-top: 1px dashed black;"/>			
<p>Learning Objective(s)</p> <ul style="list-style-type: none"> • All students will use the Mathematical properties of commutative, associative, distributive and identity with 85% accuracy. <hr style="border-top: 1px dashed black;"/>			
<p>Guiding Question(s)</p> <ul style="list-style-type: none"> • How will you determine which property is the best to use. • What is the difference between the properties. <hr style="border-top: 1px dashed black;"/>			
<p>Materials Needed:</p> <ul style="list-style-type: none"> • Pencil, LINC sheet, multilink block and worksheet with examples of expressing 16. Short assessment <hr style="border-top: 1px dashed black;"/>			
<p>Misconceptions:</p> <ul style="list-style-type: none"> • Students incorrectly apply the order of operations; • Students may think that 3×5 is equivalent to $3 \times 3 + 2$, not recognizing the need for parentheses; • Students misinterpret exponents (e.g., 4^2 as 4×2); • Students may be confused by the differences between the commutative and associative properties and will incorrectly identify them; • Since $2+21=221$, students misinterpret $2x$ as $2 + x$; • Students do not recognize that $x + x$ can be simplified to $2x$; • Students may misinterpret $x + x + x$ as x^3, rather than $3x$; • Students do not recognize that $x \cdot 5$ and $5x$ are equivalent expressions, resulting in the inability to generate the equivalent expression $8x$ for $x \cdot 5 + 3x$; • When given $x = 3$, students incorrectly interpret $5x$ as 53. <hr style="border-top: 1px dashed black;"/>			
<p>Prior Academic Learning and Prerequisite Skills:</p> <ul style="list-style-type: none"> • Determine whether an equation or inequality is true or false for a given value of the variable; • Represent real-world situations using equations and inequalities involving variables. Create real-world situations corresponding to equations and inequalities; • Evaluate expressions and solve equations involving variables when values are given for the variables.. <hr style="border-top: 1px dashed black;"/>			

MN Content Standard(s):

- 6.2.2.1 Apply the associative, commutative and distributive properties and order of operations to generate equivalent expressions and to solve problems involving positive rational numbers.

Lesson Plan Details

- Provide a detailed description of what the teacher and students do to complete the lesson objectives written in **outline/bullet-point** format.
- Include instructional strategies, learning tasks, key questions, transitions, student support, student grouping, and **assessment (informal and formal) strategies throughout the lesson.**
- The *italicized* prompts are reminders of what qualities should exist in these plans. Do not answer each prompt as if it is a question.

Lesson Introduction: Remind the students of the 16 block multilink exercise where they found as many ways to represent 16. Even though everyone had a different way to “see” 16, everyone still had 16 blocks. To jump from one expression to the next, we have properties in Mathematics that lets us do that. They are called Commutative, Distributive, Associative, and Identity.

Learning Activities: Students will fill out the LINCing sheet provided and tell a lincing story with each word to help them not only remember, but learn what each word means.

LINCS Strategy for Properties

Term	LINCing Story	LINCing Picture	Essential Definition
Commutative <small>Remembering Word</small> Commutate	6 th graders commuted from class to class	$E + P = G$ $P + G = E$	moving stuff around a+b=c b+a=c
Associative <small>Remembering Word</small> donkey	The farmer has 3 donkeys even though one gets out of the back	$0 + (1 + 2) = 3$ $(0 + 1) + 2 = 3$	add or multiply (a+b)+c regardless of how a+b numbers are grouped
Identity <small>Remembering Word</small> Idea	My idea is to be myself with +0 or x1	$1 + 1 = 2$ $1 \times 1 = 1$	adding 0 or multiplying by 1 to any number is it self $a+0=a$ $a \times 1=a$
Distributive <small>Remembering Word</small> tribe	The chief distributed arrows to the tribe members	$3 \times (2 + 1) = 9$ $(3 \times 2) + (3 \times 1) = 9$	Multiplication distributes over addition $a(b+c)$ $(ax)+b$

List the Parts **I**ndicate a Remembering word **N**ote a LINCing Story **C**onstruct a LINCing Picture **S**elf-test

After completing their stories. They need to use the 16 multilink, or the expression sheet we generated in class, and give an example of each property when comparing two of the expressions.

- **Lesson Conclusion:** Have students share some of their LINCing stories and examples to the class. And give the short assessment below.

1. Evaluate $32x+21$ for $x=43$.

2. Tell which property is illustrated by each statement.

a) $2.1 \cdot (m+3) = (m+3) \cdot 2.1$

b) $2.1 \cdot (m \cdot 3) = (2.1 \cdot m) \cdot 3$

c) $2.1 \cdot (m+3) = 2.1 \cdot m + 2.1 \cdot 3$

3. Use the indicated property to complete each statement.

Property	Statement
Commutative	$4(3y) = \underline{\hspace{2cm}}$
Associative	$4(3y) = \underline{\hspace{2cm}}$
Distributive	$4(3 + y) = \underline{\hspace{2cm}}$

4. Simplify: $5m + 12 + 3(m + 2)$

5. Draw models for $2y + 4$ and $2(y + 4)$. Explain how they are different.

Citations:

www.scimathmn.org

www.tes.com

Lesson Plan Template

Instructor: Emily Kreklau	Subject Area: Math	Grade: 6	Date: 1 day
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Information about the Lesson

Complete each section below with the background information about the lesson. The italicized statements/questions are to guide the writing of background information. Do not answer each separately and explicitly. You may delete the italicized prompts after typing the background information in each section below the dotted line to reduce length of document.

Central Focus & Context/Rationale: Working with inequalities. Beginning to explore how to graph the inequality to show that there are many solutions depending on the environment.

Learning Objective(s)

- All students will match inequalities and graph y is greater than or equal to $3x$ with 80% accuracy.
-

Guiding Question(s)

- How are these inequalities different from equations?
 - The graph would look different, how do you think it would look?
 - Can you start with $y = 3x$?
-

Materials Needed:

- Pencil, paper, glue, set of matching cards to cut/match/paste
-

Misconceptions:

-
-

Prior Academic Learning and Prerequisite Skills:

- Use algebraic concepts and processes to represent and solve problems that involve variable quantities.
 - Represent real-world situations using equations and inequalities involving variables.
 - Create real-world situations corresponding to equations and inequalities.
 - Determine whether an equation or inequality is true or false for a given variable value.
 - Use the $<$ and $>$ symbols.
 - Solve equations and inequalities that are not embedded in a context.
-

MN Content Standard(s):

- **6.2.3.1 Represent** real-world or mathematical situations using equations and inequalities involving variables and positive rational numbers.
-

Lesson Plan Details

- Provide a detailed description of what the teacher and students do to complete the lesson objectives written in **outline/bullet-point** format.
- Include instructional strategies, learning tasks, key questions, transitions, student support, student grouping, and **assessment (informal and formal) strategies throughout the lesson.**
- The italicized prompts are reminders of what qualities should exist in these plans. Do not answer each prompt as if it is a question.

Lesson Introduction: Remind the students of inequalities and what they look like. This is a very good time to bring in word skills by pulling a part the word inequality to find its meaning. Talk about a math story where you go shopping with 20 dollars. You obviously can't spend more than that so how would you write a mathematical expression to represent only have \$20 to spend? Answer: What I buy must be less than or equal to \$20. Your variable will be what you buy. What if you buy candy bars at \$1.25 a bar. How many candy bars could you buy with your 20 dollars?

Learning Activities: Have each student cut and paste the inequality matching cards. These should be used as a reminder of what equalities and how we use them. Plot a few on a number line. Next, talk about seeing the inequalities in the equations that we have been using to graph. How can we represent inequalities? Graph $y = 3x$now what if we had $y > 3x$. Explain how you would have an open line and then shading where a coordinate fits the expression. How can we use this in our lemonade sales? Have the class graph the following inequalities.

1. $y < 2x$
2. $y > x + 1$

- **Lesson Conclusion:** Have two students show their work and talk through what they have done.

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Name _____ Date _____

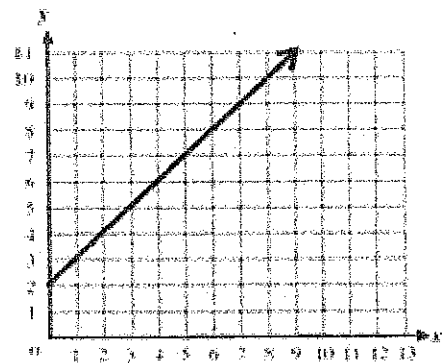
Math Assessment 1

1. With a set of 12 blocks, draw and give 2 different expressions to represent the 12 blocks. (4)

2. Complete the table by using the rule $y = x - 2.3$. (2)

x	y
7.6	
5	
6.1	
	4

3. Which is the rule for the graph shown below? (1)

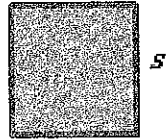


- a. $y = 2x$ b. $y = 2x - 1$ c. $y = x + 1$ d. $y = x + 2$

Name _____ Date _____

Math Assessment 1

4. The perimeter P of a square can be found using the formula $P = 4s$, where s represents the length of one side. Describe how the perimeter of a square changes when the length of one side is decreased by 3. (2)



5. Come up with your own math story and find the expression for your story. Draw a table and graph your story. (6)

Name _____ Date _____

- Assessment 2

1. Evaluate $32x+21$ for $x=43$.

2. Tell which property is illustrated by each statement.

a) $2.1 \cdot (m+3) = (m+3) \cdot 2.1$

b) $2.1 \cdot (m \cdot 3) = (2.1 \cdot m) \cdot 3$

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Name _____ Date _____

Final

1. Kelly earns \$7 an hour and Tim earns \$8 an hour. They each worked the same number of hours, x . Together they earned a total of \$75 last week. Write an equation that represents this situation. (3)

2. Lucy makes trail mix with 4 cups of raisins, 6 cups of peanuts and 2 cups of chocolate candy. What is the ratio of raisins to trail mix for each batch? What is the ratio of peanuts to cups of chocolate? (Write in simplest form). (4)

3. Beth buys the pioneer press paper each day at the news stand. The paper costs \$0.50 each day. Write an equation to represent this situation. Draw a table and graph the function. (6)

How much money does she spend if she buys a paper every day for 2 weeks? Use your equation to find the answer. (2)

Name _____ Date _____

4. Stephanie picked out sticker books that originally cost \$12.50 each. Each sticker book was on sale for \$5.00 off. She bought 2 sticker books. Which expression may be used to find the amount of money she spent on the sticker books? (1)

- A. $\$12.50 - 2(\$5.00)$
- B. $2(\$12.50) - \5.00
- C. $2(\$12.50 - \$5.00)$
- D. $2(\$12.50) + \5.00

5. Write 4 number sentences and 2 equations with variables for the number 48. (12)

6. Name and give an example of all 4 properties we learned about. (8)

Name _____

Yum Yum lemonade!

1. What is your ratio?
2. Define each part and describe what your whole would be.
3. How many parts of each would you need of your recipe to make 100 cups of lemonade?
4. A serving of lemonade is $\frac{1}{2}$ cup per person. How much of each part would you need for your class?
5. How much would you sell your lemonade for?

EQUATION GRID PUZZLE

Solve the equations below and shade in the corresponding answer box in the grid.

The letters left over at the end (in the un-shaded squares) can be arranged to spell out a phrase (see clue at the bottom of the page).

E $a=2$	S $a=\frac{3}{4}$	F $a=100$	A $a=30$	E $a=150$	D $a=15$	N $a=39$
E $a=17$	I $a=0$	G $a=-3$	H $a=-10$	C $a=25$	A $a=26$	O $a=63$
H $a=9$	S $a=3.5$	R $a=201$	S $a=91$	J $a=7$	I $a=28$	O $a=8$
D $a=\frac{1}{2}$	Q $a=-6$	S $a=12$	S $a=68$	I $a=75$	L $a=2.5$	N $a=80$
U $a=41$	O $a=51$	E $a=11$	Y $a=125$	P $a=\frac{1}{4}$	T $a=5$	O $a=19$
G $a=20$	U $a=89$	Q $a=3$	A $a=99$	F $a=1$	T $a=200$	V $a=-7$
T $a=10$	L $a=110$	K $a=-2$	D $a=55$	C $a=4$	I $a=120$	A $a=7.5$

- | | | |
|---------------|-------------------|-----------------|
| 1) $2a+1=7$ | 10) $10a+4=124$ | 19) $2a-5=0$ |
| 2) $3a-1=20$ | 11) $5a-9=31$ | 20) $2a+6=116$ |
| 3) $5a+5=5$ | 12) $11a-3=19$ | 21) $4a-7=23$ |
| 4) $3a+7=40$ | 13) $3a+10=55$ | 22) $5a+12=2$ |
| 5) $6a-2=28$ | 14) $17a+12=29$ | 23) $2a+6=88$ |
| 6) $4a+10=50$ | 15) $5a-6=39$ | 24) $3a-3=600$ |
| 7) $2a+1=2$ | 16) $3a+3=78$ | 25) $a+5=-5$ |
| 8) $a+21=51$ | 17) $6a-15=105$ | 26) $16a+7=11$ |
| 9) $7a-3=25$ | 18) $7a+300=1000$ | 27) $2a-12=114$ |

Clue: _____ / _____ / _____ / _____ .

A plant is n cm tall. It grows a further 7cm. How tall is it in centimeters?	$15n$
A piece of string is 15cm long. How many centimeters remain if I cut n cm off?	$n + 7 - m$
A box contains n chocolates. 15 are eaten. How many are left?	$7n - 3$
A brick weighs n kg. How many kilograms do 7 bricks weigh?	$7(n-3)$
A box contains n chocolates. How many chocolates in 15 boxes?	$n + 7 + m$
The price of a CD is $\$n$. It goes up by $\$7$ and is then reduced by $\$m$. What is the new price in pounds?	$n + 7$
A man walks n meters, jogs a further 7 meters and runs m meters. How many meters has he moved?	$15 - n$
A man buys 7 boxes containing n pencils each. He loses 3 pencils. How many are left?	$n - 15$
A book costing $\$n$ is reduced by $\$3$. A man buys 7 of them. What is the total cost?	$7n$