Curriculum Sample Template

Max. 8 Pages

Grade Level	7	**Content Area**	Mathematics
Course Title (grades 9-12 Only)			
Length of Unit	2.5 to 3 weeks (1 week for the lessons on standard 7.EE.3, and additional time in the course of other curriculum	**Time of Year**	Block 6 of 10
Expected Prior Knowledge *The knowledge/skills mastered earlier in the year foundational to the mastery of the required Standard in the current sample.*	Students will have already solved multi-step equations and used mental math and estimation to check if their answer makes sense. Students will already be able to convert between percents, decimals, and fractions. Students will be able to add, subtract, multiply, and divide positive and negative numbers. Students will also be familiar with bar models and how to assign variables in word problems		
Alignment to Program of Instruction *Briefly outline methods of instruction found in this sequence of lessons that align to the Program of Instruction described in A.3.*	The following lesson shows the rigor/relevance framework outlined in the Program of Instruction. Students will be required to take the knowledge learned in lessons and apply it to a real world situation. Students will be creating a project in which they use, and demonstrate mastery of, the standard.		
Standard Number and Description *List the Number* and full description for the required Standard.*	7.EE.3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.		
Summative Assessment *Describe a cumulative and comprehensive activity, clearly separate from instruction and guided or independent practice, which allows each student to individually demonstrate mastery of the required Standard. A copy of the summative assessment must be attached to the curriculum sample.*	The summative assessment will be a paper pencil test in which students will model, write, and solve real-world mathematical problems that involve positive and negative whole numbers, decimals, fractions, and percents. Students will also describe how their solution makes sense using mental computation and estimation strategies. A copy of the assessment is attached to this curriculum sample.		
Scoring Scale and Mastery Level *Explain how the assessment is scored, to include points per question, how points are awarded, total points possible, criteria necessary to demonstrate mastery, and grading scale. A copy of the answer key and scoring rubric (whichever applicable) must be attached to the curriculum sample.*	The summative assessment will contain 5 word problems. Each problem will be worth 4 points for a total of 20 points. Students will receive per problem: 1 point for correct modeling, 1 point for writing the equation, 1 point for their solution, and 1 point for their description of how their solution makes sense using estimation. The following will be the grading scale: 0-14 = No Grade (required retake), 15-16 = C, 17-18 = B, 19-20 = A. Students must score 15 or greater (75%) to demonstrate mastery.		
Materials/Resources Needed	Document camera and projector, white-boards, computers with Internet access and power point software.		

<table>
<tr><th>Lesson
(add as needed)</th><th>Instruction</th><th>Student Activities</th></tr>
<tr><td>1</td><td>The students will be told that they are going to organize a fund-raiser to pay for the 8th grade promotion ceremonies. This project will serve as a foundation for students when in a later project they will make a plan to open a business. For this project students will be divided into teams. Each team will conduct a survey of groups at the school (staff, students, parents). The surveys will be to see what the groups might be interested in purchasing (treats for students, casseroles for staff and parents, etc...). Students will collect data and determine how much and what kind of each item should be made. From this the students will calculate the cost of supplies for making the items. After calculating costs and knowing the amount needed for the promotion ceremonies, students will determine the cost per item needed in order to raise the necessary funds. Students will do this by solving multi-step algebra equations (7.EE.3). Students will then present their results to the class in a power point presentation so students can decide if the prices needed would be reasonable. Power point presentations will include a section where students share their data and how they calculated their results. The power points will be assessed on a separate rubric not included in this sample. The project is introduced in this curriculum sample to show how the standard is taught through the rigor/relevance framework outlined in the Program of Instruction.

In order for students to be able to complete the project they will be given lessons in solving real-world multi-step equations. The students will be exposed to solving equations with positive and negative whole numbers, fractions, decimals and percents. Students will already be familiar with how to solve multi-step equations involving positive and negative numbers, and with how to convert from decimals to percents and fractions, but these lessons will introduce them to changing word problems (real-world problems) into the equations they are already familiar with. Students will begin these lessons with a review on solving multi-step equations, and a review of converting between fractions, decimals, and percents. Students will then be shown a bar model for a multi-step equation from a real-world problem. After completing some examples as a class, students will work with a partner to complete several bar models for real-world problems. Students will think-pair-share with</td><td>Students will solve multi-step equations.

Students will convert between decimals, percents, and fractions.

Students will complete, as a class, bar models for real-world problems

Students will complete, with a partner, bar models for real-world problems

Students will think-pair-share with a partner on the procedure for constructing bar models

Students will complete individually, bar models for real-world problems

Students will complete, as homework, bar models for real-world problems

example:

1. The temperature today is 8.2 degrees more than twice what it was yesterday. If the temperature today is -2.4 degrees, what was the temperature yesterday?

<table><tr><td colspan="3">-2.4 degrees</td></tr><tr><td>T</td><td>T</td><td>8.2</td></tr></table>
2. Jerry put 10% of his allowance in savings and spent the rest on new chapter books. If Jerry spent $13.50 on chapter books, How much did he put into savings? How much allowance did he receive?

<table><tr><td colspan="2">T</td></tr><tr><td>T(0.9)=books = $13.50</td><td>T(0.1)= Savings</td></tr></table></td></tr>
</table>

<table>
<tr><td></td><td>their partner explaining to one another the procedure for constructing a bar model. In a check for understanding students will complete a bar model for a problem as a ticket out the door. Students will receive homework problems in which they have to construct bar models for multi-step real-world word problems.</td><td></td></tr>
<tr><td>2</td><td>Students will begin the day by completing bell work reviewing how to construct bar models for real world problems that involve positive and negative decimals, percents and fractions. The teacher will then demonstrate how to turn the bar models into equations. Students will work individually on turning their homework bar models into equations. The teacher at this time will circulate around the classroom helping students with individual needs. After all students have completed the problems the teacher will check for understanding by having students complete problems on their individual white-boards. Students will hold up solutions to problems, and misconceptions can be addressed. After this, students will be placed in their teams. As a group, students will solve the equations from the white-boards. After each group has solved the equations they will come to the front and demonstrate it to the class using the document camera. Students will be given homework in which they create bar models, write equations, and solve 2 of the homework problems.</td><td>Students will complete bar models for bell work

students will write equations for bar models as a class

Students will individually write equations from bar models

Students will write bar models and equations on white-boards

Students will, in teams, solve multi-step equations with decimals, fractions and percents.

Students will demonstrate how their team solved the equation

Students will complete homework in which they construct bar models, write equations, and solve 2 of the equations on their homework

example:
1. The temperature today is 8.2 degrees more than twice what it was yesterday. If the temperature today is -2.4 degrees, what was the temperature yesterday?

<table><tr><td colspan="3">-2.4</td></tr><tr><td>T</td><td>T</td><td>8.2</td></tr></table>
Equation: 2T + 8.2 = -2.4

Solution: 2T + 8.2 = -2.4 Subtract 8.2 from each side
-8.2 -8.2
$\frac{2T}{2} = \frac{-10.6}{2}$ Divide Each side by 2
T= -5.3 degrees</td></tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>2. Jerry put 10% of his allowance in savings and spent the rest on new chapter books. If Jerry spent $13.50 on chapter books, How much did he put into savings? How much allowance did he receive?

<table>
<tr><td colspan="2">T</td></tr>
<tr><td>T(0.9)=books = 13.50$</td><td>T(0.1)= Savings</td></tr>
</table>

Equation 1 (step 1) : <u>T(0.9)</u> = <u>13.50</u>
(0.9) (0.9) Divide each side by 0.9
T = $15.00
Equation 2 (step2) : Total = books + Savings
15.00 = 13.50 + S
-13.50 -13.50 subtract 13.50 from each side
$1.50 = S</td>
</tr>
<tr>
<td>3</td>
<td>For bell work students will complete 2 problems in which they need to solve a multi-step equation with positive and negative whole numbers decimals, fractions, and percents, and then use mental math with estimation to check and see if their answer makes sense. This would be review for the students. Students are then given several word problems and instructed that they need to design a bar model, write an equation, solve the equation (showing work), and provide a description of how they checked their answer to see if it makes sense using mental math. As students are completing problems the teacher will address individual concerns. As the teacher checks work, when he comes across an exemplary paper, he will show it to the class using the document camera. This way he can use student work to take the students through a problem. Students are then told they will review for the test by solving three problems where they must do all the things they just completed in their class work, and have the three problems signed off by 3 different individuals. Getting a problem signed off is a way for peers to review one another's work. The peer reviewed work will be examined by the teacher as students leave class.</td>
<td>Students will solve multi-step equations and use mental math to check answers

Students will solve real-world problems in which they design a bar model, write an equation, solve the equation (showing work), and provide a description of how they checked their answer to see if it makes sense using mental math

Students will perform a peer review with each other to check if work is correct

example:
1. The temperature today is 8.2 degrees more than twice what it was yesterday. If the temperature today is -2.4 degrees, what was the temperature yesterday?
<table>
<tr><td colspan="3">-2.4</td></tr>
<tr><td>T</td><td>T</td><td>8.2</td></tr>
</table>

Equation: 2T + 8.2 = -2.4</td>
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		Solution: 2T + 8.2 = -2.4 Subtract 8.2 from each side -8.2 -8.2 $\frac{2T}{2} = \frac{-10.6}{2}$ Divide Each side by 2 T= -5.3 degrees Mental math check: The increase is close to 8 and the Temperature is close to -2. The answer is close to -5. Twice -5 is -10, and -10 plus 8 is -2 so the answer makes sense 2. Jerry put 10% of his allowance in savings and spent the rest on new chapter books. If Jerry spent $13.50 on chapter books, How much did he put into savings? How much allowance did he receive? T T(0.9)=books = 13.50$ | T(0.1)= Savings Equation 1 (step 1) : $\frac{T(0.9)}{(0.9)} = \frac{13.50}{(0.9)}$ Divide each side by 0.9 T = $15.00 Equation 2 (step2) : Total = books + Savings 15.00 = 13.50 + S -13.50 -13.50 subtract 13.50 from each side $1.50 = S Mental math check: 90% is close to but less than the entire amount. Because $13.50 is close to $15.00 but a little less, the result makes sense.
4	Students will do review problems like the individual ones they did the previous day in order to review for their summative assessment. Students will then complete the attached summative assessment. After completing	Students will solve review problems Students will complete assessment.

	the assessment students will continue work on the project aspect of this standard applying the skills they learned in the previous lessons. Taking their data, knowing the cost of supplies, and the total amount they need to earn, they can use multi-step equations to set the price of their items.	Students will continue work on their projects.

Paste Summative Assessment Here

Solving Multi-step Real-world Equations Involving Fractions, Decimals, and Percents

For each problem:

- Design a bar model
- Write an equation
- Solve equation (show work)
- Provide description of mental math and estimation used to check if answer is reasonable

1. You are ordering books from a catalog. Each book costs $5.42. The shipping fee is $4.50. If you have $26.00. How many books can you order?
2. You are planning a fund raiser in which you sell cookies. You have determined that you will be able to sell 200 cookies. The cost to make 200 cookies is 15% of your expected profit. If you want to make a profit of $150.00, how much will you have to sell each cookie for?
3. The temperature last year on this date was 6.3 degrees more than 3 times what it is today. If the temperature last year was -4.2 degrees what is the temperature today (all degrees are in Celsius)?
4. The cost of a magazine was 1/3 of the total bill. You also bought 4 erasers. If you spent a total of $9.42. How much did each eraser cost?
5. 300 students went on a field trip. 2% of the students got rides from their parents, and the rest were spread evenly on 6 buses. How many students were on each bus?

Paste Answer Key/Scoring Rubric Here:

The summative assessment will contain 5 word problems. Each problem will be worth 4 points for a total of 20 points. Students will receive per problem: 1 point for correct modeling, 1 point for writing the equation, 1 point for their solution, and 1 point for their description of how their solution makes sense using estimation. The following will be the grading scale: 0-14 = No Grade (required retake), 15-16 = C, 17-18 = B, 19-20 = A. Students must score 15 or greater (75%) to demonstrate mastery

Solving Multi-step Real-World Equations Answer Key

1. Bar model

$26.00	
X($5.42)	$4.50

Equation: 5.42X + 4.50 = 26.00
Solution: 5.42X + 4.50 = 26.00 Subtract 4.50 from each side

$$\begin{array}{rcl} -4.50 & & -4.50 \\ \hline \frac{5.42X}{5.42} & = & \frac{21.50}{5.42} \end{array}$$

Divide each side by 5.42

X = 3.97

Because you can't order 0.97 of a book the most that can be ordered is 3

Mental Math Description: Rounding the shipping cost to $5 and subtracting it from the $26 gives $21. The price of books is close to $5 + 50 cents. If you divide the $21 by $5 you get 4 books, but the 50 cents extra per book ($2) would put you over the cost. If you take 3 books it would be $15 plus $1.50 which fits within the estimated $21. The answer makes sense.

Each students answer will be a bit different depending on the mental math and estimations used. The above is a sample answer that would receive full credit. The rest of the solutions in this key will not contain the mental math description. It will be up to the teacher to determine if the mental math makes sense.

Half credit can be awarded for proper solution technique, but incorrect solution due to arithmetic mistake. Half credit can also be awarded on description of mental math if teacher feels the student response was adequate, but not exactly reasonably sound.

2. Bar model

$150.00	
(200)X	C=15% of Profit

Equation 1 step 1: Cost of cookies = 15% of Profit

C = (0.15)(150)

C = $22.50

Equation (step 2): 200X + C = 150.00

Solution: 200X + 22.50 = 150.00 Subtract 22.50 from each side

$$\begin{array}{rcl} -22.50 & & -22.50 \\ \hline \frac{200X}{200} & = & \frac{127.50}{200} \end{array}$$

Divide each side by 200

X = $0.6375 round to $0.64

3. Bar model

-4.2			
T	T	T	6.3

Equation: 3T + 6.3 = -4.2

Solution: 3T + 6.3 = -4.2 Subtract 6.3 from each side

$$\frac{3T}{3} \overset{\underline{-6.3}}{=} \frac{-10.5}{3} \overset{\underline{-6.3}}{} \quad \text{Divide each side by 3}$$

T = -3.5 degrees

4. Bar Model

$9.42				
E	E	E	E	M= (1/3) (9.42)

Equation 1 (step 1) : M = (1/3)(9.42)
M = 3.14

Equation 2 (step 2) : 4E + M = 9.42

Solution : 4E + 3.14 = 9.42 Subtract 3.14 from each side

$$\frac{4E}{4} \overset{\underline{-3.14}}{=} \frac{6.28}{4} \overset{\underline{-3.14}}{} \quad \text{Divide each side by 4}$$

E = $1.57

5. Bar Model

300						
B	B	B	B	B	B	R=(0.02)(300)

Equation 1 (step 1): Rides from Parents = 2% of Total
R = (0.02)(300)
R = 6

Equation 2 (step 2): 6B + R = 300

Solution: 6B + 6 = 300 Subtract 6 from each side

$$\frac{6B}{6} \overset{\underline{-6}}{=} \frac{294}{6} \overset{\underline{-6}}{} \quad \text{Divide each side by 6}$$

B = 49