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Units & Lessons

MATHEMATICS

Grade 8

Grant funded by:



Lesson 9: Interpreting Real-World Situations

Focus Standard(s): 8.EE.8c

Additional Standard(s): 8.EE.7a, 8.EE.7b, 8.EE.8a, 8.EE.8b,

Standards for Mathematical Practice: SMP.1, SMP.2, SMP.3, SMP.4, SMP.7

Estimated Time: 50 minutes

Resources and Materials:

- Document camera
- Highlighters
- Handout 9.1: Real-World Examples

Lesson Target(s):

- Students will analyze the relationship between the dependent and independent variables.
- Students will use variables to represent two quantities in a real-world problem.

Guiding Question(s):

- How can systems of equations be used to solve real world examples?


Vocabulary

Academic Vocabulary:

- Algebraic equation

Instructional Strategies for Academic Vocabulary:

- Introduce words with student-friendly definition and pictures
- Model how to use the words in discussion
- Read and discuss the meanings of words in a mathematical context

Symbol	Type of Text and Interpretation of Symbol
	Instructional support and/or extension suggestions for students who are EL, have disabilities, or perform well below the grade level and/or for students who perform well above grade level
✓	Assessment (Pre-assessment, Formative, Self, or Summative)
Instructional Plan	
<p>Understanding Lesson Purpose and Student Outcomes: Students will be able to write an algebraic equation to express one quantity in terms of the other quantity. Students will be able to represent proportional relationships by equations.</p> <p>Anticipatory Set/Introduction to the Lesson: Whole Group Discussion Begin the lesson by reviewing homework from Lesson 7. Attend to any misconceptions students might have as well questions students may pose. Explain to learners that today’s lesson is not only about solving systems of equations, but also creating them.</p> <p>Activity 1: Real-World Examples Distribute Handout 9.1 Real-World Examples and a highlighter to each student. Using a document camera, model finding information relevant to setting up a system of equations from a real-world example. The following should be highlighted from the first problem:</p> <ul style="list-style-type: none"> • 11 vehicles • 9 students • 50 students • 222 students • How many vehicles did the class use? <p>To encourage defining the variables, guide learning by prompting students finding the question in the problem. Explain that usually the variables will answer the question. In this case, let x=number of buses and y=number of vans. Students will replace the word ‘bus’ with an x and the word ‘van’ with a y in the real-world example.</p> <p>Guide students in creating the following system:</p> $x + y = 11$ $2x + 50y = 222$	

Possible prompts could be:

- In writing the sentence algebraically, what words represent our unknowns?
- Where should the equal sign be placed in the algebraic sentence?

The goal in this activity is for students to make sense of real world examples, not necessarily solve (SMP.1). Teacher will solve during lesson closure.

Allow students a few minutes to work independently on the second example (SMP.2). Students self-assess their system as teacher models writing the equations in the same manner as example 1.

Allow students a few minutes to work independently writing the system from the third example. Give students one minute to compare their system with another student in the classroom (SMP.3). Students may make changes if necessary (SMP.7).

For students who are EL, have disabilities, or perform well below grade-level:

- Students may need to use the 'erase and replace' method on mini whiteboards to keep their thinking organized.
- Provide students with sentence frames to fill in missing values.

Extensions for students with high interest or working above grade level:

- Students may determine the solutions to the real-world examples.

Activity 2: Students Write a Real-World Situation

Students will work in pairs to create a real-world example and illustrate (SMP.1).

Reflection and Closing:

- ✓ Revisit example one from **Handout 9.1: Real-World Examples**. Model solving the system that was created. Encourage students to use graphing, substitution, guess and check, and/or tables to solve. Have students explain their solution in the context of the problem.

Homework

Students will complete and solve **Handout 9.1: Real World Examples** (SMP.4).

Handout 9.1: Real-World Examples**Name:** _____**Date:** _____

Directions: For each real-world example, define a variable, create a system of equations, and solve. State your answers using complete sentences.

1. A class used vans and buses to go on a field trip. They used 11 vehicles to go on the trip. Each van holds nine students and each bus holds fifty students. If 222 students went on the trip, then how many of each type of vehicle did the class use?
2. Jenny spent \$270 on pairs of pants. Dress pants cost \$90 and jeans cost \$30. If she bought a total of 5 pairs of pants, then how many of each kind did she buy?
3. Sara has agreed to help with her younger sister's science fair experiment. Her sister planted string beans in two pots. She is using a different fertilizer in each pot to see which one will grow the tallest plant. Currently, plant A is 4 inches tall and grows $\frac{2}{3}$ inch per day, while plant B is 9 inches tall and grows $\frac{1}{2}$ inch per day. If the plants continue growing at these rates, in how many days will the two plants be the same height?

4. To rent a jet ski at Sam's costs \$25 plus \$3 per hour. At Claire's, it costs \$5 plus \$8 per hour. At how many hours will the rental cost at both shops be equal? What will the cost be for the rentals when they are the same?

5. Post Falls High School in Idaho has 1160 students and is growing by 22 students per year. Richmond High School in Indiana has 1900 students and is shrinking by 15 students per year. When will the student population be the same? How many students will there be at each school at that time?

Handout 9.1: Real-World Examples KEY

Name: _____

Date: _____

Directions: For each real-world example, define a variable, create a system of equations, and solve. State your answers using complete sentences.

1. A class used vans and buses to go on a field trip. They used 11 vehicles to go on the trip. Each van holds nine students and each bus holds fifty students. If 222 students went on the trip, then how many of each type of vehicle did the class use?

The class used 3 buses and 8 vans for the field trip.

2. Jenny spent \$270 on pairs of pants. Dress pants cost \$90 and jeans cost \$30. If she bought a total of 5 pairs of pants, then how many of each kind did she buy?

Jenny bought 2 pairs of dress pants and 3 pairs of jeans.

3. Sara has agreed to help with her younger sister's science fair experiment. Her sister planted string beans in two pots. She is using a different fertilizer in each pot to see which one will grow the tallest plant. Currently, plant A is 4 inches tall and grows $\frac{2}{3}$ Inch per day, while plant B is 9 inches tall and grows $\frac{1}{2}$ inch per day. If the plants continue growing at these rates, in how many days will the two plants be the same height?

The plants will be the same height in 30 days.

4. To rent a jet ski at Sam's costs \$25 plus \$3 per hour. At Claire's, it costs \$5 plus \$8 per hour. At how many hours will the rental cost at both shops be equal? What will the cost be for the rentals when they are the same?

After 4 hours, both shops will charge \$37 for a Jet Ski rental.

5. Post Falls High School in Idaho has 1160 students and is growing by 22 students per year. Richmond High School in Indiana has 1900 students and is shrinking by 15 students per year. When will the student population be the same? How many students will there be at each school at that time?

The population will be the same after 20 years. The population at both schools will be 1600 students.

For training or questions regarding this unit,
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