

5-E Lesson Plan Template

Standards addressed:

6.EE.7:

Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.

Learning Targets:

I can solve real-world and mathematical problems.

I can write and solve equations of the form $x + p = q$ and $px = q$ when those are all positive, whole numbers.

List of Material:

Problems/ questions from Illuminations
Building bridges activity sheet

INSTRUCTIONAL SEQUENCE**Do Now-**

Pose the following question to students: Every Saturday you play basketball in the local community youth club. At the end of the season after a club tournament, the players in the club meet at a fast-food restaurant for a party. If hamburgers cost 59¢, what is the total cost for 15 players to have a hamburger each?

Engage

1. Every Saturday you play basketball in the local community youth club. At the end of the season after a club tournament, the players in the club meet at a fast-food restaurant for a party. If hamburgers cost 59¢, find a way to determine the total cost of hamburgers when various numbers of players in the club each have a hamburger.
 - a. How is this question similar to the original Hamburger Problem?
 - b. How is this question different from the original Hamburger Problem?
 - c. How did you solve the new problem differently?

Under this second scenario, students may make a table of values, construct some portion of a graph, or invoke the use of variables. More important, they may identify, describe, and extend a pattern. In other words, they are engaged in what we understand as algebraic thinking.

Students may use algebraic symbols to respond to this new problem. For example, a student might respond with $C = \$0.59 \times p$. In this equation, C represents the total cost, and p represents the number of players.

Explore

Partner Activity: Each class in your middle school is making Valentine's Day cards to sell at affordable prices to elementary school students in your district. The cards are boxed in groups of 12 before they are routed to the elementary schools. Find a way to determine how many cards have been made when various numbers of boxes have been routed to the elementary schools.

Teacher asks the following guiding questions while monitoring: Can you find how many cards were made if 25 boxes were routed to the elementary schools? If 40 boxes were routed? What did you do in each case? Write an explanation to describe what you did.

For students who have already begun to list the number of cards made for specific numbers of boxes, the teacher might pose these questions: Can you organize your information into a table or graph? How would you describe your table or graph?

For students who have already begun to organize a table or construct a graph, the teacher might use some of the following probes: What if the district routed more boxes than those shown in your table or graph? Can you see a pattern that goes beyond your table or graph? Write a description of your pattern.

For students who have already begun to describe the pattern in words, the teacher might use some of the following probes: What is the key aspect of the pattern you have described?

Can you express the pattern you see using b to stand for the number of boxes and C for the total number of cards made for the elementary schools?

Explain

- **Describe the above problem in a table/ graph.**
- **What if the district routed more cards? Can you see a pattern? Let's create a description.**

Use talk move during discussion to promote mathematical discourse:

Math Talk Moves:

Re-voicing: the teacher tries to repeat what a student has said, then asks the student to respond and verify whether or not the teacher's revoicing is correct. *"So you're saying..."*

asking students to restate someone else's reasoning: the teacher asks one student to repeat or rephrase what another student has said, then follows up with the first student. *"Can you repeat what he just said in your own words?"*

asking students to apply their reasoning to someone else's reasoning: students make their own reasoning explicit by applying thinking to someone else's contribution. *"Do you agree or disagree and why?"*

prompting students for further participation: the teacher asks for further commentary. *"Would someone like to add on?"*

using wait time: the teacher waits at least ten seconds for students to think before calling on someone for an answer. *"Take your time...we'll wait."*

Elaborate

Related Problems, Algebraic Representations, and Potential Solution Strategies
(Stemming from the Valentine-Card Problem and the Algebraic Representation $C = 12b$)

RELATED PROBLEMS	ALGEBRAIC REPRESENTATIONS	SOLUTION STRATEGIES
(1) How many cards were made if 600 boxes were routed to elementary schools?	$C = 12(600)$	Compute; return to the original problem
(2) By the end of the first week in February, 1440 cards had been sent to the elementary schools. How many boxes had been sent?	$1440 = 12b$	
(3) If more than 9600 cards have been made by the district's middle schools, how many boxes will be routed to the elementary schools?	$12b > 9600$	Read value; use a graphic representation or a table of values Solve; use formal algebraic thinking
(4) In one shipment of b boxes of cards, water damage destroys two cards in each box. How many cards in the shipment are still usable? Solve this problem in two different ways.	$C = 12b - 2b$, $C = 10b$, or $12b - 2b = 10b$	

Evaluate

Exit ticket:

- The girls in your school play a one-on-one basketball tournament in which every girl plays every other girl exactly once.
 - Find a way to determine the number of games to be played when various numbers of girls register for the tournament.
- To raise money for a school concert, Becky suggests the following idea: On the first day, Becky invites two friends for lemonade and cookies. Each friend pays 25¢. On the second day, each of Becky's two friends invites two more friends for lemonade and cookies at the same cost. On the third day, each of the four new friends from the second day invites two friends, and so the process goes on.
 - Find a way to determine the number of friends invited to lemonade and cookies on different days. Also find a way to determine the total amount of money raised after the process has continued for various numbers of days.

Lower level: Raise the question, "David walks his dog, Marty McFly, twice per day. His evening walk is 2.5 times as far as his morning walk. At the end of the week, he tells Miss Z, "I walked Marty 30 miles."

Solve this by drawing a picture, and then try to find an equation to support it.

Higher-level: Find multiple equations to represent the same problem above.