PROPORTIONAL REASONING:

Four ~~Three~~ Strategies to Spark Engagement*

Presented by

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*Poster Problem
*Big Square Puzzle
*Blank Paper Lesson
*Technology with Desmos®

POSTER PROBLEMS: TEACHER DIRECTIONS

Use Poster Problems for group review or practice.

Materials:	Prepare ahead:
• Chart paper, 11 ×17 paper, or white board space (one per group) • Markers (one color per group) • Rulers (optional) • Calculators (optional) • Poster Problem Reproducible (one per group)	• Post the reproducible page where everyone can see it, or print one copy for each group. • Create numbered posters (chart paper/white board space) equal to the number of groups you will have in your classroom and post them around the room on walls or at table stations.

Directions:

Part 1:

- Put students into groups no larger than 4.
- Give each group one copy of the reproducible, or post it so all can easily see it.
- Identify group members as A, B, C, or D.
- Number the groups. This will be their "start" poster.
- Give each group a different colored marker (for accountability purposes).

Part 2:

- Each group begins at their numbered poster.
- (Step 1) Student "A" does part A of the poster problem with the group's colored marker. Other members support and help.
- (Step 2) After an appropriate amount of time, say "3, 2, 1, Go." All groups move to the next problem. The entire group checks the previous work on the poster for that problem. Then Student "B" does part B for that problem with the group's colored marker. Other members support and help.
- Repeat Step 2 twice more to complete parts C and D.

Part 3:

- Groups return to their seats and complete problems.
- Discuss posters.

POSTER PROBLEM 1

Part 1: Your teacher will divide you into groups.

- Identify members of your group as A, B, C, or D.
- Each group will start at a numbered poster. Our group start poster is _____.
- Each group will have a different colored marker. Our group marker is _____.

Part 2: Do the problems on the posters by following your teacher's directions.

A. Copy the fact statement below. Then make a table of values that illustrate this situation.

Poster 1 (or 5)	Poster 2 (or 6)	Poster 3 (or 7)	Poster 4 (or 8)
Dee Dee can buy 12 markers for $7.20.	A baseball team plays 8 games in 3 weeks.	A recipe has a ratio of 3 cups of milk to 4 cups of flour.	Danisha grows 2 inches in 40 weeks.

B. Make a tape diagram or double number line to illustrate this situation.

C. Find the unit rate or unit price.

D. Copy the question below. Then answer it.

Poster 1 (or 5)	Poster 2 (or 6)	Poster 3 (or 7)	Poster 4 (or 8)
How much would it cost her to buy 8 markers at this rate?	At this rate, how many games would be played in 12 weeks?	At this rate, how many cups of milk are needed for a recipe that uses 16 cups of flour?	At this rate, how much would Danisha grow in 10 weeks?

Part 3: Return to your seats. Work with your group.

Refer to the poster problems. Discuss and answer each question below.
Each answer has a "twist."

1. Dee Dee can buy 12 markers for $7.20. How many markers can she buy for $1.00?
2. A baseball team plays 8 games in 3 weeks. Devon says, "The games per week unit rate does not make sense." Explain what you think Devon means.
3. A recipe has a ratio of 3 cups of milk to 4 cups of flour. Elisa says combining 3 cups of milk and 4 cups of flour makes a 7 cup mixture. Margit disagrees. Who do you think is correct? Explain.
4. Danisha grew 2 inches in 40 weeks. Explain why this situation could make sense for Danisha, but not for other people.

POSTER PROBLEM 2

Part 1: Your teacher will divide you into groups.

- Identify members of your group as A, B, C, or D.
- Each group will start at a numbered poster. Our group start poster is _____.
- Each group will have a different colored marker. Our group marker is _____.

Part 2: Do the problems on the posters by following your teacher's directions.

Poster 1 (or 5)	Poster 2 (or 6)	Poster 3 (or 7)	Poster 4 (or 8)
Sports Drink: Box P contains 6 bottles and costs $2.70. Box Q contains 18 bottles and costs $7.20.	**Deli Turkey:** Package R is 3 pounds and costs $5.25. Package S is 5 pounds and costs 7.50.	**Crackers:** Box T is 12 ounces and costs $1.92. Box V is 18 ounces and costs $3.42.	**Oranges:** Bag X has 10 oranges and costs $5.00. Bag Y has 6 oranges and costs $3.00.

A. Copy the problem. Make a table and use it to determine which is the better buy.

B. Make a graph and use it to show which is the better buy.

C. Use another method to show which is the better buy.

D. Which method(s) worked best for this problem? Why?

Part 3: Return to your seats. Work with your group.

Refer to the costs of Sports Drinks in problem 1 (or 5).

1. Write an equation to find the cost in terms of the number of bottles purchased for Box P.

2. Write an equation to find the cost in terms of the number of bottles purchased for Box Q .

3. Suppose the bottles in Box P can be recycled for $0.05 each. Would this affect your decision about which is the better buy? Why?

BIG SQUARE PUZZLE

To make your own big squares, download the Tarsia application for PC from http://www.mmlsoft.com/index.php/products/tarsia

3:27 2 for every 1	5:45 6:3 1:2	50:90 2 to 4 3:6	2:5 12:24
11:5 1 to 9 3:5	2:2 1:9 0.6:1 8 for every 5	3:2 5 to 9 24:15 2:3	3 to 4 1 for every 2.5 14:21
3 for every 1 22:10 2 for every 2	12:18 1 for every 1 5:5 30:6	28:8 6:4 10 to 2 30 to 5	6:8 30:40 6:1
15 to 12 6:2	10:40 2:3 5 to 4	12 for every 3 7 to 2 2:8	4 to 1 12:16

BLANK PAPER LESSON:
BAGELS

SHMEAR 'N THINGS	HOLE-Y BREAD
_____ bagels for _____	_____ bagels for _____

BAGELS

SHMEAR 'N THINGS	HOLE-Y BREAD
4 bagels for $3.00	5 bagels for $4.00

1. Complete the tables. Assume a proportional relationship between the number of bagels and the cost.

SHMEAR 'N THINGS	
# of bagels (x)	cost (y)
4	
8	
12	
16	
20	

HOLE-Y BREAD	
# of bagels (x)	cost (y)
5	
10	
15	
20	
25	

2. Which shop has the better buy? Use entries in the tables to explain your reasoning.

3. Write equations to relate the number of bagels to cost.

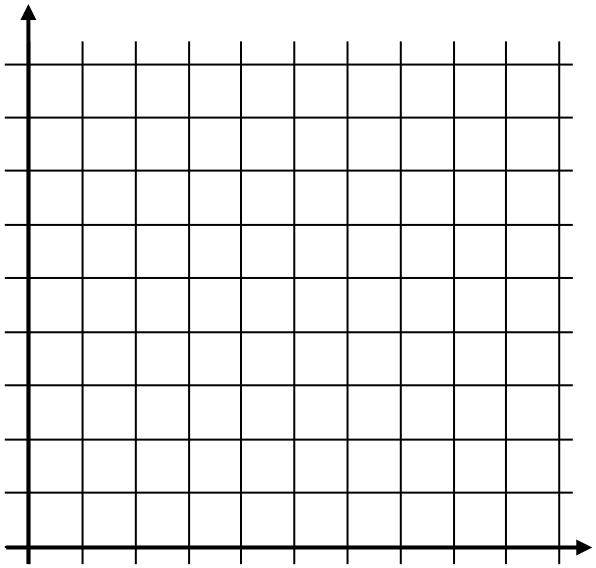
SHMEAR 'N THINGS $y =$ _____

HOLE-Y BREAD $y =$ _____

The linear functions you wrote above are both in the form $y = mx$. This is called a direct proportion equation because y is directly proportional to (is a multiple of) x.

4. How is the direct proportion equation different from the linear function $y = mx + b$?

5. Title, label, and scale the grid. Graph the data using two different colors.



6. Explain which graph illustrates a slower rise in price.

7. Identify the coordinates when $x = 1$

SHMEAR 'N THINGS (1, ____)

HOLE-Y BREAD (1, ____)

What do these y-coordinates represent in the context of the problem?

TECHNOLOGY WITH desmos
TILE PILE

Teachers: Set up the Tile Pile activity at teacher.desmos.com.

Students: Go to student.desmos.com, get the class password, and do the Desmos activity called Tile Pile.

For this part we will focus on slides 1-3 of the activity (Mr. Martinez just hired you to tile his bathroom floor).

1. As you did this activity, you were told that you used _____ tiles to cover a _____ square foot section of the floor. What is the length of each side of this square?

2. Find the dimensions and the area of one of the purple rectangular tiles.

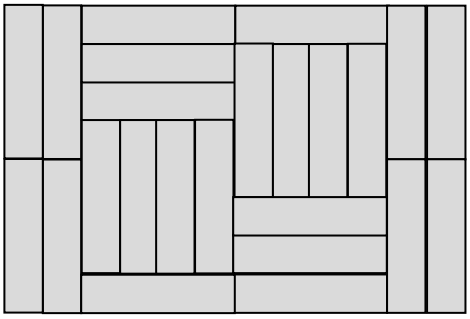
3. Compare your tiling with as many partners as is practical in class.

   Did anyone do it exactly the same as you?

   How many classmates that you compared with did it differently?

4. Why does it always take 16 of any type of pieces to tile the original 4 square foot floor?

Chase tiled the floor below using the purple tiles from this activity.



5. How many tiles did he use?

6. Write the dimensions for his floor on the diagram.

7. What is the perimeter of his floor?

8. What is the area of his floor?

9. Two entries from the table on slide 4 are provided here. Use this table to determine the area of Chase's tiled floor. Clearly explain your reasoning, and whether or not this calculation agrees with your calculation in problem 8.

Area (sq ft)	Number of Tiles
4	16
12	48

10. Use this data to find the area of a floor that is tiled with 256 tiles.