

MathLinks

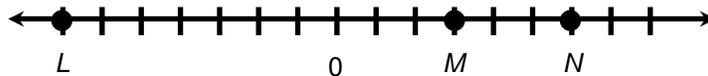
PROFICIENCY CHALLENGES GRADE 8 SETS 1-4

Proficiency Challenges are sets of interesting, mixed-topic problems. It may take a lot of time to complete each set, so consider doing only one or two parts at a time.

PROFICIENCY CHALLENGE 1

Complete each problem on your own paper. Show all work. Use graph paper if needed.

- This morning, the temperature was -10°C . During the afternoon, the temperature increased 50°C . In the evening, the temperature fell 20°C .
 - What was the temperature when it was the hottest?
 - What was the temperature when it was the coldest?
 - What was the temperature at the end of the evening?
- Which number is further from zero on the number line: 6 or -7 ? Explain.
- Examine the number line below, then answer the questions.



- Which letter represents the number with the greatest value? Explain.
 - Which letter represents the number with the greatest absolute value? Explain.
- Ortega is trying to fill three bags equally with sand. He wants each bag to weigh the same. The bags currently weigh 55 pounds, 51 pounds, and 48 pounds. Explain if it's possible for Ortega to make each bag have the same weight by moving sand among the bags.
 - Given: $a \bullet b = c$
Substitute $a, b, c, -a, -b,$ or $-c$ to make each statement true. (assume $a \neq 0, b \neq 0$)

$$\square \bullet (-a) = -c$$

$$\square \bullet (-b) = c$$

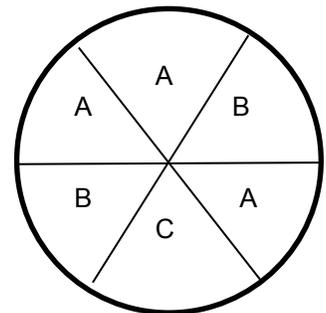
$$\frac{c}{\square} = b$$

$$-\frac{c}{\square} = a$$

- A spinner has 6 equal sections, each labeled A, B, or C.

Is the probability of landing on "A" less than, equal to, or greater than $\frac{1}{3}$?

Is the probability of landing on "B" less than, equal to, or greater than $\frac{1}{3}$?



PROFICIENCY CHALLENGE 2

Complete each problem on your own paper. Show all work. Use graph paper if needed.

1. Alexandra was making a list of guests to invite to her party. The number of guests on her list is g . Each guest is allowed to bring a friend. Not counting Alexandra, write an expression for the maximum number of people who could attend the party in terms of g .

2. Write your own word problem for which the solution is the expression $p + 5$.

3. Suzy and Carlita were trying to solve the following equation

$$8 - 2x = -3x - 1$$

Suzy thinks the solution is $x = 9$. Carlita thinks the solution is $x = -9$. Who is correct? Explain your reasoning.

4. In order to ride on a rollercoaster, each rider must be at least 50 inches tall but less than 72 inches tall.
- Write one or two inequalities to describe the height of riders who are eligible to ride the roller coaster.
 - Make a graph on a number line to show the height of riders who are eligible to ride the roller coaster.
 - Determine if each person below can ride on the rollercoaster. Explain your reasoning for each person.
 - Joey is 45 inches tall
 - Kendra is 50 inches tall
 - Luis is 66 inches tall.
 - Montessa is 72 inches tall.

5. Janet is saving money to buy a car. She wants to have \$6,000 saved in the bank after 12 months.
- Write an algebraic equation that, if solved, could determine how much money M Janet needs to save each month.
 - How much money should Janet save each month?

PROFICIENCY CHALLENGE 2 (Continued)

6. At the “Go Nuts” Store, you can purchase cashews for \$4.00 per pound and peanuts for \$2.00 per pound. You have \$20.00 to spend. You buy 3 pounds of peanuts. Write an inequality and make a graph to show all of the numbers of pounds n of cashews that you can buy with the remaining money.
7. Warren says the sum of a positive number plus a negative number always equals a positive number.
- Give an example that supports Warren’s claim.
 - Give an example that shows Warren’s claim is false.
 - Is Warren’s statement true or false? Explain.
8. Melvin’s car can travel $96\frac{4}{5}$ miles with 4.4 gallons of gas. How far can the car go with one gallon of gas?
9. Caleb and Lucas are going to buy pizza for their friends. Their choices are to buy 3 small 6-inch diameter pizzas for \$3 each, or 1 large 10-inch diameter pizza for \$8. Both prices include tax and tip.

The friends agree that their best choice is the one that gives them the most pizza for the money.

What is the best choice? Explain your answer.

PROFICIENCY CHALLENGE 3

Complete each problem on your own paper. Show all work. Use graph paper if needed.

1. Christiana and Luca are both saving money to buy their own laptop computers. The laptops each cost \$1000 each.

Christiana created a table of her savings plan for the next few months. She had some money in the bank, and is adding the same amount each month.

x (# of months)	y (total amount Christiana saved)
0	\$100
1	\$250
2	\$400
3	\$550

- a. Use the partial table at the right to make a complete table for her saving plan.
- b. Write an equation for the amount Christiana saves (y) at the end of any month (x).

Luca has created the following linear equation to model his saving plan where y is the amount of money saved (in dollars) and x is the number of months.

$$y = 100x + 250$$

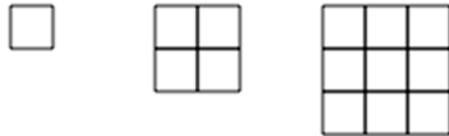
- c. Who is saving more money per month, Christiana or Luca? Explain.
- d. Who started with more money already saved in the bank, Christiana or Luca? Explain.
- e. Who will have saved \$1000 the soonest?
- f. Use the information above to graph the total amounts of money that Christiana and Luca have saved each month. Include a title, scale and label the axes, and label both graphs.
- g. Is there a month where Christiana and Luca have saved the same amount of money in the bank? Explain.
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2. Julia claims that when $\frac{1}{3}$ is divided by a fraction, the result will always be less than $\frac{1}{3}$. Create an equation that supports Julia's claim. Create an equation that contradicts Julia's claim. Is Julia's claim true or false? Explain.

PROFICIENCY CHALLENGE 4

Complete each problem on your own paper. Show all work. Use graph paper if needed.

1. This is a pattern of growing squares built from unit squares.

a. Continue the pattern for step 4. Then complete the table.



Step # (x)	1	2	3	4	5
# of squares (y)	1	4	9		

Step # 1 2 3

b. On a graph paper, draw a vertical axis and label it “# of squares” and scale appropriately. Draw a horizontal axis on the grid and label it “step number” and scale appropriately. Then graph the data in the table.

c. Jeanette thinks that this relationship can be modeled with a linear equation in the form $y = mx + b$. Critique Jeanette’s reasoning by stating why she is *incorrect*.

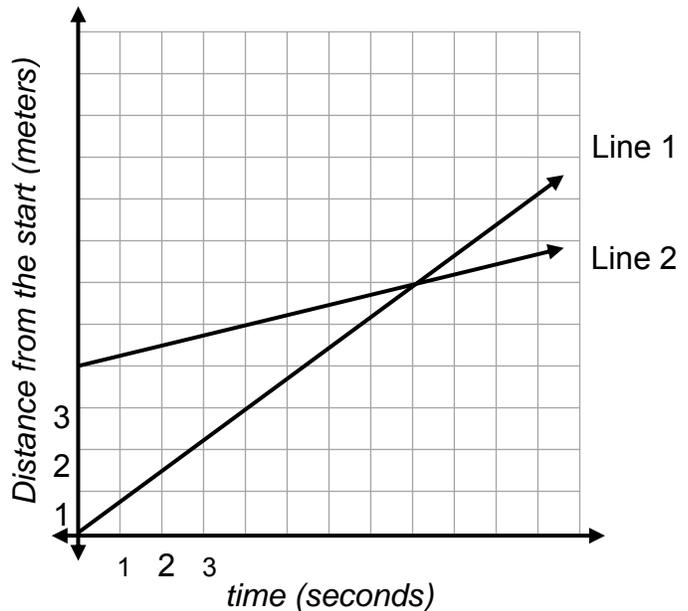
2. Marco and his younger brother Patricio agree to have a race. Their distances over time are shown in the graph to the right. Marco runs faster than Patricio.

a. Which line represents the distance traveled by Marco?

Which line represents the distance traveled by Patricio?

b. How fast did Marco run? Label your units.

How fast did Patricio run? Label your units.



c. What does the intersection of the two lines represent?

d. Marco gave Patricio a head start. How much of a head start did Marco give Patricio? Explain your reasoning.

PROFICIENCY CHALLENGE 4 (Continued)

3. Mrs. Alvarez's weekly pay is \$560 per week. She receives a 15% raise. Which calculations can Mrs. Alvarez use to compute her new weekly pay rate? Choose all that apply.

$$\$560 \div 0.15$$

$$\$560 \div 1.15$$

$$\frac{x}{560} = \frac{15}{100}$$

$$(\$560)(0.15)$$

$$(\$560)(1.15)$$

$$\frac{x}{560} = \frac{115}{100}$$

4. Given: $c \cdot b = a$

Substitute a , b , c , $-a$, $-b$, or $-c$ to make each statement true. (assume $c \neq 0$, $b \neq 0$)

$$\square \cdot (-c) = a$$

$$\square \cdot (-b) = -a$$

$$\frac{-a}{\square} = b$$

$$-\frac{c}{\square} = 1$$

5. The entry fee to an amusement park is \$12. Each ride ticket costs \$0.50.
- Write an equation that models the relationship between the total amount spent (y) and the number of ride tickets purchased (t).
 - Graph the relationship. Be sure to label the axes and title your graph.