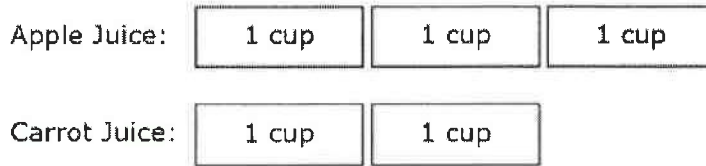


Unit Rates (7.RP.1)

1. This diagram shows how much apple juice is mixed with carrot juice for a recipe.



How many cups of apple juice are used for 1 cup of carrot juice? Show your work to find this unit rate and include units.

$$\frac{3 \text{ cups apple}}{2 \text{ cups carrot}} = \frac{x \text{ cups apple}}{1 \text{ cup carrot}}$$

↙  
•0.5

$$x = 3 \cdot 0.5 =$$

1.5 cups apple juice  
per 1 cup carrot  
juice

2. For a drink recipe, there is a ratio of 3 gallons mango juice to 12 gallons of peach juice.

How many gallons of mango juice are used for 1 gallons of peach juice? Show your work to find this unit rate and include units.

$$3 \text{ gallons mango juice} \div 12 \text{ gallons peach juice}$$

$$= 0.25 \text{ or } \frac{1}{4} \text{ gallons mango juice per 1 gallon peach juice}$$

3. The train ride at the zoo covers a distance of  $3\frac{1}{4}$  miles in  $\frac{1}{3}$  of an hour.

How many miles per hour does the train go? Show your work to find this unit rate and include units.

$$3\frac{1}{4} \text{ miles} \div \frac{1}{3} \text{ hour} = 9\frac{3}{4} \text{ or } 9.75 \text{ miles per hour}$$

**Proportional Relationships (7.RP.2a)**

1. Circle ALL the tables below that represent a proportional relationship between  $x$  and  $y$ .

~~A.~~

$x$	$y$
1	4
2	7
3	10
4	13

$\frac{1}{4} \neq \frac{2}{7}$

B.

$x$	$y$
1	4
2	8
3	12
4	16

$\frac{1}{4} = \frac{2}{8}$

~~C.~~

$x$	$y$
1	6
2	7
3	8
4	9

$\frac{1}{6} \neq \frac{2}{7}$

~~D.~~

$x$	$y$
5	-2
7	0
9	2
11	4

$\frac{9}{2} \neq \frac{11}{4}$

E.

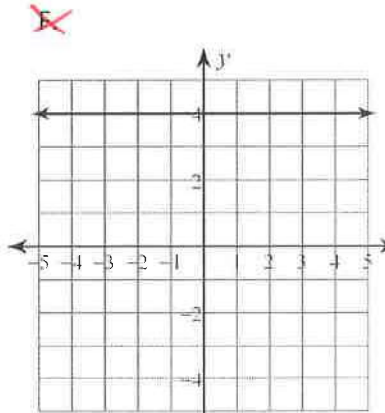
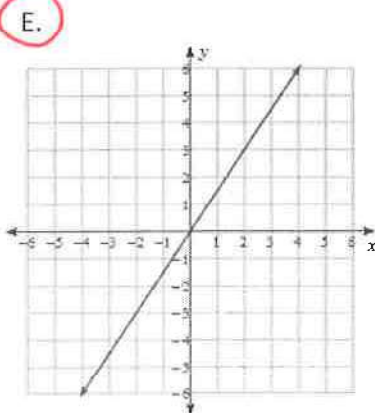
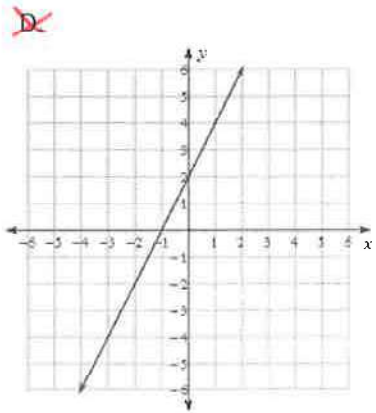
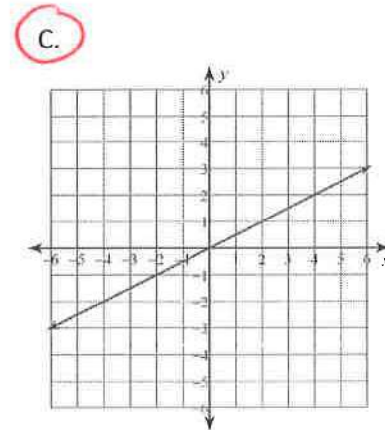
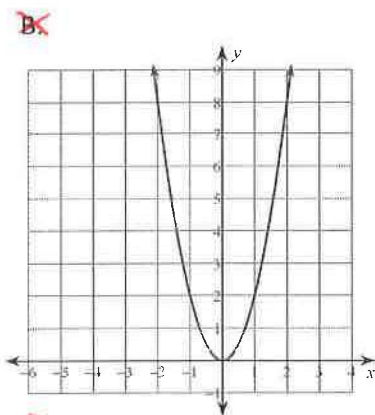
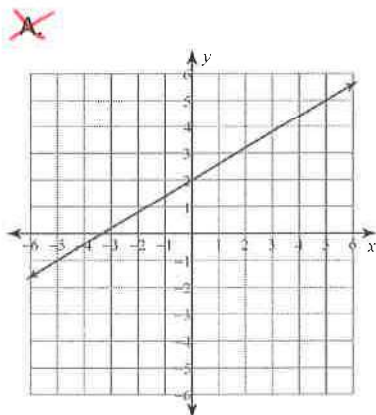
$x$	$y$
3	12
5	20
2	8
8	32

$\frac{2}{8} = \frac{8}{32}$

2. Explain how you know if a TABLE represents a proportional relationship.

The table has equivalent ratios between the values.

3. Circle ALL the graphs below that show a proportional relationship between  $x$  and  $y$ .



4. Explain how you know if a GRAPH represents a proportional relationship.

The graph is a straight line through (0,0).

**Constant of Proportionality and Proportional Equations (7.RP.2c, 7.RP.2b)**

1. The following tables show a proportional relationship between x and y.

A.

x	y
1	4
2	8
3	12
4	16

B.

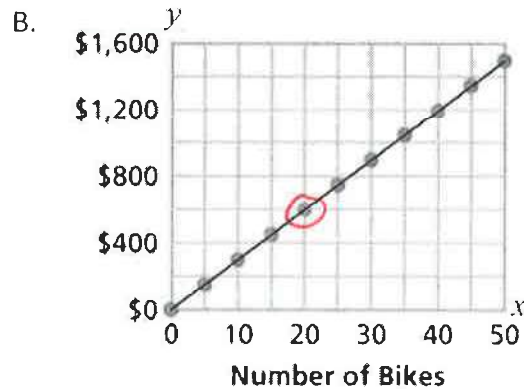
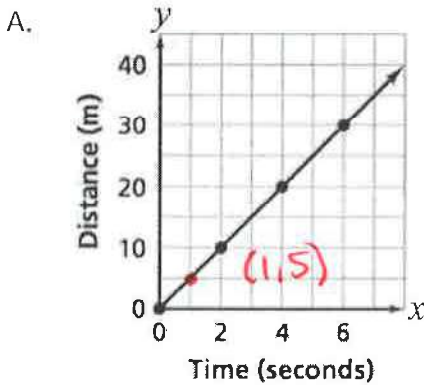
x	y
3	12
5	20
2	8
8	32

$$\frac{12}{3} = \frac{4}{1}$$

Handwritten notes:  $\cdot \frac{1}{3}$  (above 12),  $\cdot \frac{1}{3}$  (below 3)

- a. What is the constant of proportionality for table A? 4
- b. Write an equation of the form  $y = rx$  to represent table A.  $y = 4x$
- c. What is the constant of proportionality for table B? 4
- d. Write an equation of the form  $y = rx$  to represent table B.  $y = 4x$

2. The following graphs show a proportional relationship between x and y.



$$\frac{600}{20} = \frac{30}{1}$$

Handwritten notes:  $\cdot 0.05$  (above 600),  $\cdot 0.05$  (below 20)

- a. What is the constant of proportionality for graph A? 5
- b. Write an equation of the form  $y = rx$  to represent graph A.  $y = 5x$
- c. What is the constant of proportionality for graph B? 30
- d. Write an equation of the form  $y = rx$  to represent graph B.  $y = 30x$

3. The following equations show a proportional relationship between x and y.

A.  $y = 3.7x$

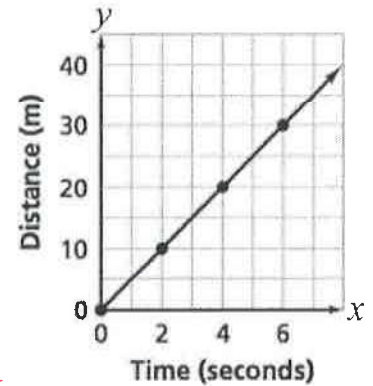
B.  $y = \frac{4}{9}x$

- a. What is the constant of proportionality for equation A? 3.7
- b. What is the constant of proportionality for equation B?  $\frac{4}{9}$

**Explaining Coordinate Points (7.RP.2d)**

1. The graph at right shows a proportional relationship between  $x$  and  $y$ .

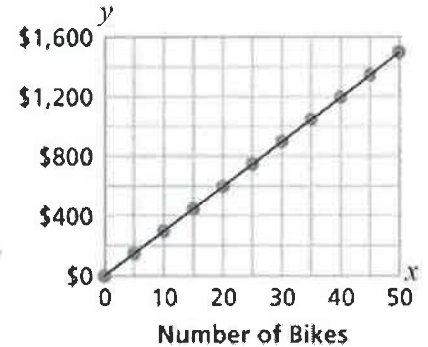
What do the following points represent in terms of the situation?



- (0, 0) You have traveled 0 meters after 0 seconds.
- (1, 5) You have traveled 5 meters after 1 second.
- (6, 30) You have traveled 30 meters after 6 seconds.

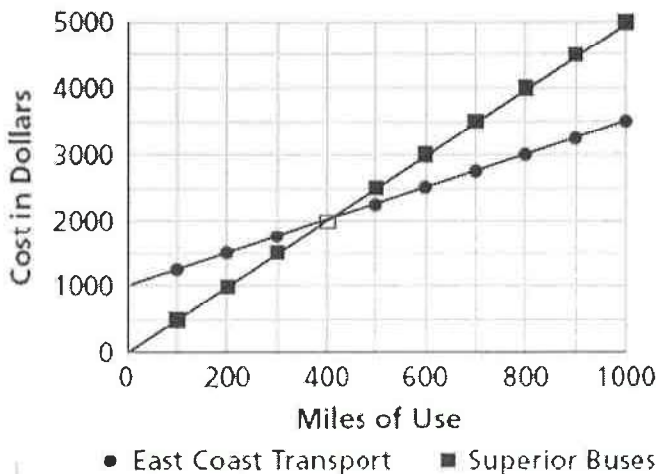
2. The graph at right shows a proportional relationship between  $x$  and  $y$ .

What do the following points represent in terms of the situation?



- (0, 0) 0 bikes cost \$0.
- (1, 30) 1 bike costs \$30.
- (40, 1200) 40 bikes cost \$1200.

3. The following graph for Superior Buses shows a proportional relationship between  $x$  and  $y$ .



Select True or False for each statement about the graph.

Statement	True	False
Point $\square$ represents the total cost of travel when traveling for 400 miles.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
The total cost of travel is \$5 when traveling for 1 mile.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
The total cost of travel is \$600 when traveling for 3000 miles.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**Multi-Step Proportion Problems (7.RP.3)**

1. The ratio of blueberries to mango in a fruit smoothie drink is 5 to 15. What percent of the drink is mango? Write and solve a proportion to find the answer, and include units.

$5 + 15 = 20$  total

$$\frac{15 \text{ mango}}{20 \text{ total}} = \frac{x\%}{100\%}$$

$x = 15 \cdot 5 = 75$

**75% mango**

2. Bill has a paper route in his neighborhood. It takes him 45 minutes to deliver newspapers to the 30 customers on his route. How long will it take Bill to complete his route if he adds 25 more customers in his neighborhood? Write and solve a proportion to find the answer, and include units.

$30 + 25 = 55$  customers

$$\frac{45 \text{ min}}{30 \text{ customers}} = \frac{x \text{ min}}{55 \text{ customers}}$$

**82 1/2 minutes**

$x = 45 \cdot 1 \frac{5}{6} = 82 \frac{1}{2}$

3. You have lunch at a Thai restaurant with your friends. The bill before tax is \$54.75, and the sales tax is 7%. You decide to leave a 20% tip for the waitress based on the pre-tax amount. What will be the amount of the total bill, including tax and tip? Write and solve proportions to find the answer, and include units.

$$\begin{array}{r} 58.5825 \\ + 10.9500 \\ \hline 69.5325 \end{array}$$

$$\frac{\$54.75}{100\%} = \frac{\$x}{107\%}$$

$x = 54.75 \cdot 1.07 = \$58.5825$

$$\frac{\$54.75}{100\%} = \frac{\$x}{20\%}$$

$x = 54.75 \cdot 0.2 = \$10.95$

**\$69.53**

4. Shirts Galore sells a Batman shirt for \$24.49, but is having a sale for 25% off. Rainbow Shirts sells the same Batman shirt for \$21.99, but is having a sale for 15% off. Which store offers the better price, after the discount? Write and solve proportions to find the answer, and include units with your answer.

SG:  $\frac{\$24.49}{100\%} = \frac{\$x}{25\%}$

$x = 24.49 \cdot 0.25 = \$6.1225$

$24.49 - 6.1225 = \$18.3675$

or  
 $\$18.37$

RS:  $\frac{\$21.99}{100\%} = \frac{\$x}{15\%}$

$x = 21.99 \cdot 0.15 = \$3.2985$

$21.99 - 3.2985 = \$18.6915$

or  
 $\$18.69$

**Shirts Galore offers the better price.**



**Factor and Expand Linear Expressions (7.EE.1)**

1. Simplify the following expressions completely.

a.  $10(1 + 4x) + 7(9x - 1)$

$$\underline{10 + 40x} + \underline{63x - 7}$$

$$103x + 3$$

c.  $-9(1 + x) + 4(7x + 4)$

$$\underline{-9 - 9x} + \underline{28x + 16}$$

$$19x + 7$$

e.  $-6(8 - 9x) + 8(6x + 10)$

$$\underline{-48 + 54x} + \underline{48x + 80}$$

$$102x + 32$$

b.  $4(-3x - 6) + 6(1 - 9x)$

$$\underline{-12x - 24} + \underline{6 - 54x}$$

$$-66x - 18$$

d.  $-6(9 - 3x) + 8(10 + 10x)$

$$\underline{-54 + 18x} + \underline{80 + 80x}$$

$$98x + 26$$

f.  $9(1 - 9x) + 8(9x - 4)$

$$\underline{9 - 81x} + \underline{72x - 32}$$

$$-9x - 23$$

2. Use the Distributive Property to write ALL the possible expressions in factored form.

a.  $-4x + -8$

$$-2(2x + 4)$$

$$-4(x + 2)$$

b.  $40x + 100$

$$2(20x + 50) \quad 10(4x + 10)$$

$$4(10x + 25) \quad 20(2x + 5)$$

$$5(8x + 20)$$

c.  $40 + 32x$

$$2(20 + 16x)$$

$$4(10 + 8x)$$

$$8(5 + 4x)$$

d.  $100x - 20$

$$2(50x - 10)$$

$$4(25x - 5)$$

$$5(20x - 4)$$

$$10(10x - 2)$$

$$20(5x - 1)$$

**Write and Explain Equivalent Expressions (7.EE.2)**

1. Gage goes to Burger Palace with 3 friends. Each person buys 3 cheeseburgers and 1 drink. Let  $C$  represent the cost of a cheeseburger and  $D$  represent the cost of a drink.

- a. Using the distributive property, write TWO equivalent expressions that represent the total amount spent at the restaurant for all 4 people.

①  $4(3C + D)$

②  $12C + 4D$

- a. Explain how each expression describes the situation in a different way.

Expression 1:

adds the cost of 3 cheeseburgers and 1 drink, and then multiplies it by 4 people

Expression 2:

adds the cost of 12 cheeseburgers and 4 drinks

2. A Fitbit is on sale for 25% off the original price  $p$ .

- a. Write TWO equivalent expressions that would find the final price of the Fitbit, from the original price  $p$ .

①  $p - 0.25p$

②  $0.75p$

- b. Explain how each expression describes the situation in a different way.

Expression 1:

finds 25% of the price, and subtracts it from the original price

Expression 2:

finds the remaining 75% of the original price

Write and Solve Equations (7.EE.4a)

1. Sophia has a membership with an online music store. The membership costs \$19.99, and each song costs \$0.99. Sophia has saved \$118. How many songs can she buy?

Write an equation in terms of the number of songs  $n$ . Solve to find the answer and show all steps.

$$\begin{array}{r} 19.99 + 0.99n = 118 \\ -19.99 \qquad -19.99 \\ \hline 0.99n = 98.01 \\ \div 0.99 \quad \div 0.99 \\ \hline n = 99 \end{array}$$

99 songs

2. In winter, the price of apples suddenly went up by \$0.75 per pound. Sam bought 3 pounds of apples at the new price, for a total of \$5.88. What was the original price per pound?

Write an equation for the cost in terms of the original price per pound  $p$ . Solve to find the answer and show all steps.

$$\begin{array}{r} 3(p + 0.75) = 5.88 \\ 3p + 2.25 = 5.88 \\ -2.25 \quad -2.25 \\ \hline 3p = 3.63 \\ \div 3 \quad \div 3 \\ \hline p = 1.21 \end{array}$$

\$1.21 per pound originally

3. Melissa's bank account has \$1250 dollars in it, and her internet bill is automatically deducting \$60 from her account every month. Her bank requires its customers to keep a minimum balance of \$350. If Melissa doesn't deposit any additional money in her account, after how many months will her account have only \$350?

Write an equation in terms of the number of months  $m$ . Solve to find the answer and show all steps.

$$\begin{array}{r} 1250 - 60m = 350 \\ -1250 \qquad -1250 \\ \hline -60m = -900 \\ \div -60 \quad \div -60 \\ \hline m = 15 \end{array}$$

After 15 months

4. Marco's grandma went on a vacation and asked Marco to take care of her tank of exotic fish. She promised to pay him \$3.50 for every fish in the tank when she returned. Four of the fish didn't survive, so Marco's grandma paid him \$59.50 for the remaining fish. How many fish were in the tank originally?

Write an equation in terms of the number of fish  $f$ . Solve to find the answer and show all steps.

$$\begin{array}{r} 3.50(f - 4) = 59.50 \\ 3.50f - 14 = 59.50 \\ +14 \quad +14 \\ \hline 3.50f = 73.50 \\ \div 3.50 \quad \div 3.50 \\ \hline f = 21 \end{array}$$

21 fish originally



**Write and Solve Inequalities (7.EE.4b)**

1. Tatiana wants to give friendship bracelets to her 32 classmates. She already has 5 bracelets, and she can buy more bracelets in packages of 4. How many packages does Tatiana need to buy?

a. Write an inequality in terms of the number of packages  $p$ . Solve to find the answer and show all steps.

$$\begin{array}{r} 5 + 4p \geq 32 \\ -5 \quad -5 \\ \hline 4p \geq 27 \\ \div 4 \quad \div 4 \\ \hline p \geq 6.75 \end{array} \quad \text{OR} \quad \begin{array}{r} 32 \leq 5 + 4p \\ 6.75 \leq p \end{array}$$

b. Explain your answer in words. Then, graph the solution on a number line.

Tatiana needs to buy 7 or more packages of bracelets.



2. Renna pushed the button for the elevator to go up, but it would not move. The weight limit for the elevator is 450 kilograms, but the current group of passengers weighs a total of 750 kilograms. The passengers each weigh about 75 kilograms. How many passengers need to get off the elevator?

a. Write an inequality in terms of the number of passengers  $p$ . Solve to find the answer and show all steps.

$$\begin{array}{r} 750 - 75p \leq 450 \\ -750 \quad -750 \\ \hline -75p \leq -300 \\ \div -75 \quad \div -75 \\ \hline p \geq 4 \end{array} \quad \text{OR} \quad \begin{array}{r} 450 \geq 750 - 75p \\ 4 \leq p \end{array}$$

b. Explain your answer in words. Then, graph the solution on a number line.

4 or more passengers need to get off the elevator.



3. Joey is trying to break his own personal record, so he needs to eat more than 72 hot dogs in 10 minutes. After 1 minute of competition, Joey has eaten 10 hot dogs. How many hot dogs does he need to eat per minute for the remaining 9 minutes, in order to break his own record?

a. Write an inequality in terms of the number of hot dogs  $h$ . Solve to find the answer and show all steps.

$$\begin{array}{r} 10 + 9h > 72 \\ -10 \quad -10 \\ \hline 9h > 62 \\ \div 9 \quad \div 9 \\ \hline h > 6.\bar{8} \end{array} \quad \text{OR} \quad \begin{array}{r} 72 < 10 + 9h \\ 6.\bar{8} < h \end{array}$$

b. Explain your answer in words. Then, graph the solution on a number line.

Joey must eat more than 6 hot dogs.

