

# CONSTANT OF PROPORTIONALITY

Liam is making breakfast for dinner using a pancake mix.

CUPS OF MIX	# OF PANCAKES
1	12
2	24

- a. How many cups of mix will he use for 12 pancakes? 1  
 b. How many cups of mix will he use for 24 pancakes? 2  
 c. What is the ratio of cups of mix to servings?

1:12

## PROPORTIONAL RELATIONSHIPS

- A relationship is proportional when the ratio of  $y$  over  $x$  is constant

## CONSTANT OF PROPORTIONALITY

- The value of the ratio of two proportional quantities.
- It is represented by the equation  $k = \frac{y}{x}$ , where:
  - $y$  represents: dependent variable
  - $x$  represents: independent variable
- Use the equation  $y = kx$  to represent proportional relationships.

For 1-3, find the ratio of  $\frac{y}{x}$  to determine if each table represents a proportional relationship.

1.

x	y	$\frac{y}{x}$
1	6	$\frac{6}{1} = 6$
2	12	$\frac{12}{2} = 6$
3	18	$\frac{18}{3} = 6$
4	24	$\frac{24}{4} = 6$

$k = \underline{6}$

2.

x	y	$\frac{y}{x}$
2	10	$\frac{10}{2} = 5$
3	15	$\frac{15}{3} = 5$
4	20	$\frac{20}{4} = 5$
5	25	$\frac{25}{5} = 5$

$k = \underline{5}$

3.

x	y	$\frac{y}{x}$
8	4	$\frac{4}{8} = \frac{1}{2}$
10	5	$\frac{5}{10} = \frac{1}{2}$
12	6	$\frac{6}{12} = \frac{1}{2}$
14	7	$\frac{7}{14} = \frac{1}{2}$

$k = \underline{\frac{1}{2}}$

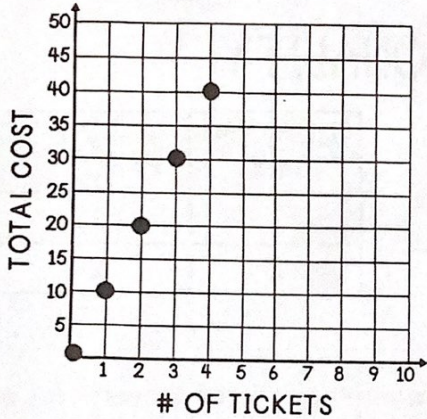
4. The cost of 6 pounds of almonds is \$23.28. What is the constant of proportionality that relates  $y$ , the cost in dollars, to  $x$ , the number of pounds?

$\frac{\$23.28}{6} = \frac{y}{x}$   
 $k = \underline{3.88}$

5. A car travels 220 miles in 4 hours. What is the constant of proportionality that relates  $y$ , the total number of miles, to  $x$ , the number of hours?

$\frac{220}{4} = \frac{y}{x}$   
 $k = \underline{55}$

6. Use the graph below to complete the table and answer the following questions.



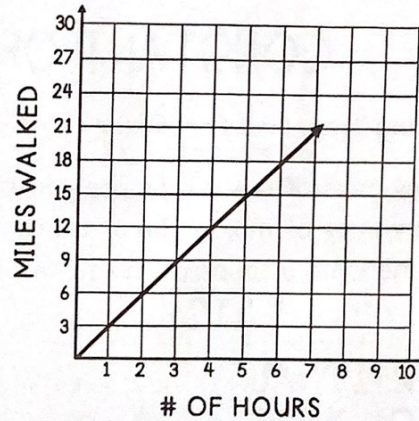
x	y
1	10
2	20
3	30
4	40

a.  $k =$  10

b. What does the point (1, 10) represent in the relationship?

You earn \$10 in 1 hour.

7. Use the graph below to complete the table and answer the following questions.



x	y
1	3
2	6
3	9
4	12

a.  $k =$  3

b. What does the point (1, 3) represent in the relationship?

You walk 3 miles in 1 hour

Use your understanding of the constant of proportionality to answer the questions below.

8. While training for a marathon, Keith's watch reported the number of calories he had burned at each mile marker. The data is shown below.

X # OF MILES	1	2	3	4	5
Y # OF CALORIES BURNED	117	234	351	468	585

a. Is the number of calories proportional to the number of miles? Justify your thinking.

yes,  $\frac{y}{x}$  is constant

b. What is the constant of proportionality that relates y, the number of calories burned, to x, the number of miles?

117

c. Write an equation to represent the relationship between the number of miles and the calories burned.

$$y = 117x$$

d. The next day, Keith ran 7 miles. How many calories did he burn?

$$117 \cdot 7 = 819 \text{ calories}$$

e. If Keith's watch reported that he burned 1,170 calories, how many miles did Keith run that day?

$$1170 = 117x$$

$$\div 117 \quad \div 117$$

Summarize today's lesson:

10 = x  
miles

