Constant of Proportionality

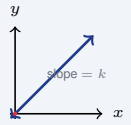
Name: _____	Date: _____	Score: _____ / 18

Quick Review and Helpful Hints

In a proportional relationship $y = kx$, the number k is the *constant of proportionality* – it equals $\frac{y}{x}$ (the unit rate). Find k by dividing any y by its x. The graph is a straight line through the origin.

▷ **Example:** If $y = 12$ when $x = 3$, find k. **Work:** Divide y by x: $k = \frac{12}{3} = 4$.

★ **Answer:** $k = 4$



$y = kx$ through the origin.

Practice Problems

Find the constant of proportionality k.

1. $y = 12, x = 3$ _____
2. $y = 20, x = 4$ _____
3. $y = 15, x = 5$ _____
4. $y = 10, x = 2$ _____
5. $y = 9, x = 3$ _____
6. $y = 24, x = 6$ _____
7. $y = 7, x = 1$ _____
8. $y = 100, x = 20$ _____
9. $y = 18, x = 9$ _____
10. $y = 8, x = 4$ _____
11. $y = 30, x = 5$ _____
12. Table x: $1, 2, 3$, y: $2, 4, 6$ _____
13. Table x: $2, 4$, y: $6, 12$ _____
14. $y = 50, x = 10$ _____

Word Problems

15. 3 lb of apples cost $\$12$. Find k (cost per pound).
16. A car travels 120 mi in 2 hr. Find k (miles per hour). _____
17. $y = 45$ when $x = 9$. Find k. _____
18. If $y = kx$ with $y = 16$ and $x = 4$, find k. _____

Answer Keys

1. 4	**7.** 7	**13.** 3
2. 5	**8.** 5	**14.** 5
3. 3	**9.** 2	**15.** 4
4. 5	**10.** 2	**16.** 60
5. 3	**11.** 6	**17.** 5
6. 4	**12.** 2	**18.** 4

Step-by-Step Explanations

1. Start by naming the process: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is In a proportional relationship, the constant is found with $k = \frac{y}{x}$. Here $y = 12$ and $x = 3$, so divide $12 \div 3 = 4$. Therefore $k = 4$. So the final answer is 4.

2. A good way to think about this is: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is Use the rule $k = \frac{y}{x}$, which means divide the y-value by the matching x-value. With $y = 20$ and $x = 4$, $20 \div 4 = 5$, so $k = 5$. So the final answer is 5.

3. Step by step: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is The constant tells how much y there is for each 1 unit of x. Divide y by x: $15 \div 5 = 3$, so $k = 3$. So the final answer is 3.

4. Take it one move at a time: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is Start with $k = \frac{y}{x}$. Substitute the given values: $k = \frac{10}{2}$. Since $10 \div 2 = 5$, the constant is $k = 5$. So the final answer is 5.

5. Start by naming the process: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is Divide the dependent value y by the input value x. Here $9 \div 3 = 3$, so the relationship has constant of proportionality $k = 3$. So the final answer is 3.

6. A good way to think about this is: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is To find k, ask how much y goes with one x. Since 24 goes with 6, divide $24 \div 6 = 4$. So $k = 4$. So the final answer is 4.

7. Step by step: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is Use $k = \frac{y}{x}$. Because $x = 1$, the constant is the same as the y-value: $7 \div 1 = 7$, so $k = 7$. So the final answer is 7.

8. Take it one move at a time: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is The pair is $x = 20$ and $y = 100$. Divide y by x: $100 \div 20 = 5$. This means y increases by 5 for every 1 increase in x, so $k = 5$. So the final answer is 5.

9. Start by naming the process: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is Use the matching values $y = 18$ and $x = 9$. The constant is $18 \div 9 = 2$, so each 1 unit of x corresponds to 2 units of y. So the final answer is 2.

10. A good way to think about this is: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is Find the unit rate by dividing y by x. Here $8 \div 4 = 2$, so the constant of proportionality is $k = 2$. So the final answer is 2.

11. Step by step: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is Substitute into $k = \frac{y}{x}$: $k = \frac{30}{5}$. Dividing gives $30 \div 5 = 6$, so $k = 6$. So the final answer is 6.

12. Take it one move at a time: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is From the table, use one matching pair such as $x = 1$ and $y = 2$. Divide $2 \div 1 = 2$; the other pairs give the same result, so $k = 2$. So the final answer is 2.

13. Start by naming the process: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is Choose a matching pair from the table, for example $x = 2$ and $y = 6$. Then $k = \frac{6}{2} = 3$; the pair $x = 4, y = 12$ also gives $12 \div 4 = 3$, so $k = 3$. So the final answer is 3.

14. A good way to think about this is: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is Apply $k = \frac{y}{x}$ with $y = 50$ and $x = 10$. Dividing 50 by 10 gives 5, so the constant is $k = 5$. So the final answer is 5.

15. Step by step: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is Here k means cost per pound. Divide the total cost by the number of pounds: $12 \div 3 = 4$. So the constant is $k = 4$ dollars per pound. So the final answer is 4.

16. Take it one move at a time: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is Here k means miles per hour, or miles for one hour. Divide distance by time: $120 \div 2 = 60$. So $k = 60$ miles per hour. So the final answer is 60.

17. Start by naming the process: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is Use the same proportional rule: divide y by x. With $y = 45$ and $x = 9$, $45 \div 9 = 5$, so $k = 5$. So the final answer is 5.

18. A good way to think about this is: In a proportional relationship, the constant is the unit rate, so divide the matching y-value by the x-value. The setup/work is In $y = kx$, dividing both sides by x gives $k = \frac{y}{x}$. Substitute $y = 16$ and $x = 4$: $16 \div 4 = 4$, so $k = 4$. So the final answer is 4.

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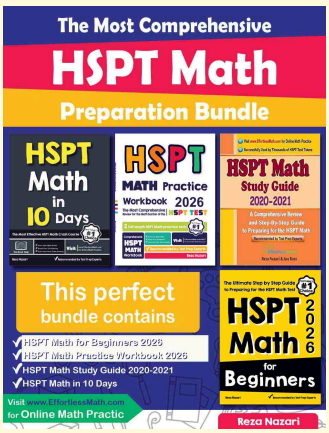

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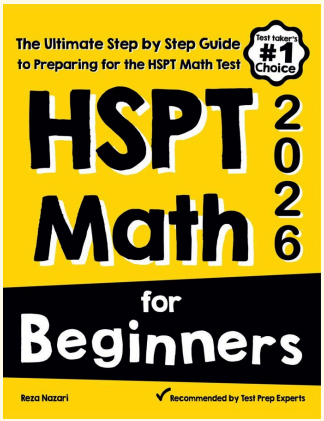

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