Direct or inverse proportion?

Give exact answers, or 3 significant figures where the answer is not exact.
Give money to 2 decimal places.

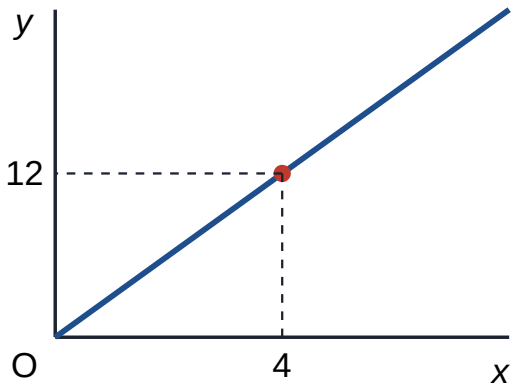
Name _____

Date _____

Part A: one of each

Each question tells you which type of proportion it is.

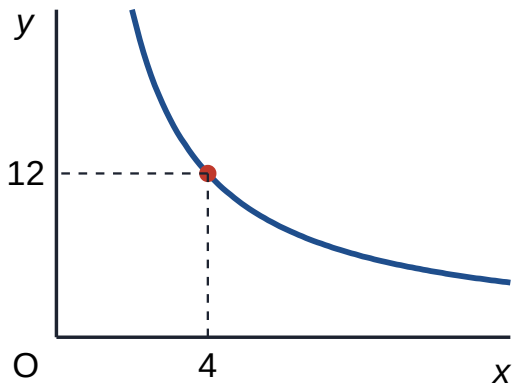
1 **DIRECT PROPORTION**



y is directly proportional to x. When $x = 4$, $y = 12$. Find y when $x = 7$.

Answer: _____

2 **INVERSE PROPORTION**



y is inversely proportional to x. When $x = 4$, $y = 12$. Find y when $x = 6$.

Answer: _____

Part B: you decide

Direct $y = kx^n$
As one quantity goes up, the other goes up in the same ratio (for $n = 1$: double one, double the other). The graph of y against x is a straight line through the origin.

Inverse $y = \frac{k}{x^n}$
As one quantity goes up, the other goes down (for $n = 1$: double one, halve the other). The product xy stays the same.

For each question, decide whether the proportion is direct or inverse, find k, then answer the question. Each answer matches a letter in the code table. The letters from questions 1 to 8, in order, spell a word.

1

y is directly proportional to x. When $x = 6$, $y = 15$. Find y when $x = 10$.

Which method? ☐ Direct ☐ Inverse

Answer: _____ Letter: ____

2

y is inversely proportional to x. When $x = 5$, $y = 8$. Find y when $x = 4$.

Which method? ☐ Direct ☐ Inverse

Answer: _____ Letter: ____

3

y is directly proportional to the square of x. When $x = 3$, $y = 18$. Find y when $x = 5$.

Which method? ☐ Direct ☐ Inverse

Answer: _____ Letter: ___

4

6 workers take 18 days to build a wall. How long would 9 workers take, working at the same rate?

Which method? ☐ Direct ☐ Inverse

Answer: _____ Letter: ___

5

The distance d m an object falls is proportional to the square of the time t s. It falls 20 m in 2 s. How far does it fall in 3.5 s?

Which method? ☐ Direct ☐ Inverse

Answer: _____ Letter: ___

6

The brightness B of a lamp is inversely proportional to the square of the distance d from it. $B = 36$ when $d = 2$. Find B when $d = 3$.

Which method? ☐ Direct ☐ Inverse

Answer: _____ Letter: ___

7

x	2	4	6
y	18	9	6

Find y when $x = 9$. (Which type of proportion fits all three pairs?)

Which method? ☐ Direct ☐ Inverse

Answer: _____ Letter: ___

8

The cost of cheese is directly proportional to its mass. 2.5 kg costs 7.20. How much does 4 kg cost?

Which method? ☐ Direct ☐ Inverse

Answer: _____ Letter: ___

4	4.5	6.4	6.48	9	10	11.52	12	16	25	27	30	35	50	61.25	81
O	**H**	**D**	**B**	**S**	**R**	**N**	**C**	**I**	**F**	**Q**	**Y**	**U**	**A**	**T**	**X**

1	2	3	4	5	6	7	8

Answers

Part A

1. $y = kx$; $12 = 4k \Rightarrow k = 3$. $y = 3 \times 7 = 21$

2. $y = \dfrac{k}{x}$; $12 = \dfrac{k}{4} \Rightarrow k = 48$. $y = \dfrac{48}{6} = 8$

Part B

1. Direct. $y = kx$, $k = \frac{15}{6} = 2.5$. $y = 2.5 \times 10 = 25$ → **F**

2. Inverse. $y = \frac{k}{x}$, $k = 5 \times 8 = 40$. $y = \frac{40}{4} = 10$ → **R**

3. Direct. $y = kx^2$, $k = \frac{18}{9} = 2$. $y = 2 \times 25 = 50$ → **A**

4. Inverse. More workers, fewer days. $k = 6 \times 18 = 108$ worker-days, so $\frac{108}{9} = 12$ days → **C**

5. Direct. $d = kt^2$, $k = \frac{20}{4} = 5$. $d = 5 \times 3.5^2 = 61.25$ m → **T**

6. Inverse. $B = \frac{k}{d^2}$, $k = 36 \times 4 = 144$. $B = \frac{144}{9} = 16$ → **I**

7. Inverse. $xy = 36$ for every pair, so $k = 36$ and $y = \frac{36}{9} = 4$ → **O**

8. Direct. $k = \frac{7.20}{2.5} = 2.88$ per kg. $2.88 \times 4 = 11.52$ → **N**

The word is **FRACTION**. The other letters come from using the wrong type of proportion, or from forgetting to square in questions 3, 5 and 6. In question 7, y halves when x doubles, so it is inverse.