

Comparing direct and inverse proportion

Year 7 About 70 minutes Calculator allowed 47 marks



Hints online, answers free with an account:

mathswariz.uk/worksheets/ks3-year-7-comparing-direct-and-inverse-proportion/

Date _____

A Do Now

Quick questions to start.

A1 Needed today
Work out $21 \div 6$.

[1 mark]

Answer

A2 Needed today
Work out 2.5×3.2 .

[1 mark]

Answer

A3 Last lesson
 $xy = 48$. Work out y when
 $x = 3.2$.

[1 mark]

Answer

A4 From chapter 12
Work out 0.6×0.04 .

[1 mark]

Answer

B Example, then your turn

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Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

The table shows two sets of values of y , P and Q, for the same values of x . For each one, say whether it shows direct proportion, inverse proportion or neither. Write the formula.

x	P: y	Q: y
2	7	20
5	17.5	8
8	28	5

Hint Work out $y \div x$ for each pair, and xy for each pair. Look for the one that stays the same.

B1 For each set, R and S, say whether it shows direct proportion, inverse proportion or neither. Give a reason. Write the formula if there is one. [4 marks]

x	R: y	S: y
2	15	7
5	6	10
10	3	15

EXAMPLE 2

When $p = 15$, $q = 24$. Find q when $p = 40$ if (a) q is directly proportional to p , (b) q is inversely proportional to p .

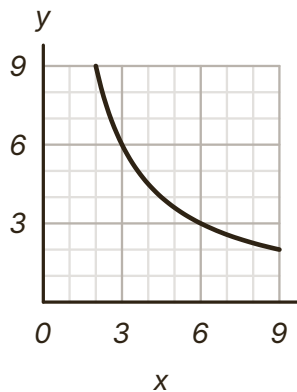
Hint For direct, find $q \div p$. For inverse, find pq .

B2 When $r = 12$, $s = 7.5$. Find s [4 marks]
when $r = 18$ if (a) s is directly
proportional to r , (b) s is
inversely proportional to r .

Answer (a) $s = \dots$ (b) $s = \dots$

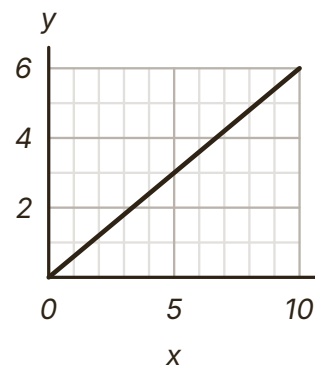
EXAMPLE 3

Does this graph show direct proportion or inverse proportion? Write a formula connecting x and y .



Hint A curve that falls is not direct proportion. Read a point on the curve where it crosses a grid corner.

B3 Does this graph show direct [3 marks]
proportion or inverse
proportion? Give a reason.
Write a formula for y in terms
of x .



Answer $y = \dots\dots$

EXAMPLE 4

A 300 g bag of rice is shared into n equal portions, each of w g. Explain why w is inversely proportional to n . Write a formula and find w when $n = 8$.

Hint Multiply the number of portions by the size of each one. What do you always get?

B4 Ella cycles 36 km at a steady [4 marks]
speed of v km/h. It takes her t
hours. Explain why t is
inversely proportional to v .
Write a formula, and find t
when $v = 16$.

Answer $vt = \dots$ $t = \dots$ hours

C Practice

Year 7

- C1** When $x = 40$, $y = 0.5$. Write a formula for y in terms of x if they are in direct proportion. [2 marks]
Write a formula connecting x and y if they are in inverse proportion.

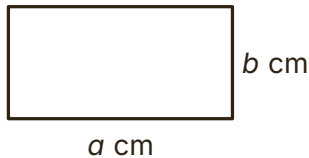
Answer $y = \dots$ $xy = \dots$

- C2** Which of these formulas show that y is inversely proportional to x ? Write down the letters. [2 marks]

$$\begin{array}{ll} \text{A: } y = \frac{12}{x} & \text{B: } y = \frac{x}{12} \\ \text{C: } y = 12 - x & \text{D: } xy = 5 \end{array}$$

Answer

- C3** A rectangle has a perimeter of 24 cm. Its sides are a cm and b cm. Use $a = 4$ and $a = 6$ to show that b is neither directly nor inversely proportional to a . [3 marks]



Not drawn accurately

- C4** Show that w is inversely proportional to u . Write the formula. [2 marks]

u	w
0.4	3
1.5	0.8
2.5	0.48

Answer $uw = \dots$ **D Exam-style questions**

GCSE Foundation

- D1** Sana reads at a steady rate. The time she takes is directly proportional to the number of pages.

- (a) Work out the two missing times. [2 marks]

Pages	Minutes
24	18
36	?
60	?

Answer ... and ... minutes

- (b) Sana reads a book of 260 pages. How long does it take her? Give your answer in hours and minutes. [3 marks]

Answer ... hours ... minutes

Total for D1: 5 marks

D2

Theo says, "The table shows inverse proportion, because when x goes up, y goes down."

[2 marks]

Is Theo correct? Give a reason for your answer.

x	y
2	30
4	15
6	12

D3 A fence 150 m long is made from panels that are all the same length. Panels come in three lengths.

- (a) Explain why the number of panels needed is inversely proportional to the length of each panel. [1 mark]

Length (m)	Cost (£)
1.2	7.60
2	12.30
2.5	15.50

- (b)** Which length of panel gives the cheapest fence? You must show your working. [4 marks]

Answer ... m

Total for D3: 5 marks

D4 4 taps fill a tank in 45 minutes. All the taps run at the same rate.

- (a) How long would 3 taps take to fill the tank? [2 marks]

Answer ... minutes

- (b)** Jack says, "The time is directly proportional to the number of taps." Is Jack correct? Explain your answer. [2 marks]

Total for D4: 4 marks

No route is given. The hints are at the end of the sheet. Use one at a time.

E1 y is inversely proportional to x . The value of x goes up by 25%. By what percentage does y go down? [3 marks]

Answer ...%

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Try numbers: start with $x = 100$ and $y = 1$, so $xy = 100$.
Hint 2 x goes up by 25% to 125. Then $125y = 100$, so $y = 0.8$.
Hint 3 y went from 1 to 0.8, which is down by 0.2, or 20%. It is not 25%.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can tell direct proportion ($y \div x$ the same) from inverse proportion (xy the same). ☐ ☐ ☒

I can find a missing value if two quantities are directly or inversely proportional. ☐ ☐ ☒

I can explain why a real situation is direct or inverse proportion. ☐ ☐ ☒