Direct and Inverse Proportion - Worksheet

Skill

Group A - Direct and inverse proportion questions

Work out:

1) 24 cartons of orange juice costs £56.
Work out the cost of 27 cartons.

2) 24 books weigh $51kg$.
Work out the weight of 36 books.

3) 15 pavement slabs cost £60.15.
Work out the cost of 10 pavement slabs.

4) £1 = € 1.13. Change £25 into euros.

5) £1 = € 1.13. Change £75 into euros.

6) £1 = € 1.13. Change £150 into euros.

7) £1 = € 1.13. Change 113 euros into pounds.

8) £1 = € 1.13. Change 56.5 euros into pounds.

9) £1 = € 1.13. Change 169.5 euros into pounds.

10) Four people take 9 hours to build a wall. How long would it take 3 people to build the same wall at the same rate?

11) Eight people take 9 hours to build a wall. How long would it take 6 people to build the same wall at the same rate?

12) Seven people take 9 hours to build a wall. How long would it take 9 people to build the same wall at the same rate?

Group B - Direct and Inverse proportion tables

Complete the tables below:

1) $y \propto x$

x	4	12	
y		24	72

2) $y \propto x$

x	4	12	
y		36	72

3) $y \propto \frac{1}{x}$

x	4	12	
y		2	72

4) $y \propto \frac{1}{x}$

x	2	4	
y		8	32

5) $y \propto x^2$

x	2	3	
y	8		32

6) $y \propto x^2$

x	2	3	
y	32		200

Direct and Inverse Proportion - Worksheet

7) $y \propto \sqrt{x}$

x	4	9	
y	50		200

8) $y \propto \sqrt{x}$

x	4	9	
y	20		200

9) $y \propto \frac{1}{x^2}$

x	2	3	
y	36		144

10) $y \propto \frac{1}{x^2}$

x	2	3	
y	9		144

11) $y \propto \frac{1}{\sqrt{x}}$

x	4	9	
y	36		144

12) $y \propto \frac{1}{\sqrt{x}}$

x	4	9	
y	720		144

Group C - Algebraic direct and inverse proportion

Work out:

1) y is directly proportional to x. $y = 4$ when $x = 4$. Find y when $x = 7$.

2) y is directly proportional to x. $y = 72$ when $x = 6$. Find y when $x = 9$.

3) y is directly proportional to x. $y = 33$ when $x = 3$. Find x when $y = 88$.

4) y is directly proportional to x. $y = 90$ when $x = 9$. Find x when $y = 10$.

5) y is directly proportional to x^2. $y = 252$ when $x = 6$. Find y when $x = 2$.

6) y is directly proportional to x^3. $y = 56$ when $x = 2$. Find x when $y = 189$.

7) y is inversely proportional to x. $y = 8$ when $x = 1$. Find y when $x = 2$.

8) y is inversely proportional to x. $y = 2$ when $x = 9$. Find y when $x = 2$.

9) y is inversely proportional to x. $y = 2$ when $x = 7$. Find x when $y = 7$.

10) y is inversely proportional to x. $y = 6$ when $x = 8$. Find x when $y = 12$.

11) y is inversely proportional to x^2. $y = 4$ when $x = 3$. Find y when $x = 2$.

12) y is inversely proportional to $\sqrt{x}$. $y = 5$ when $x = 16$. Find x when $y = 4$.

Direct and Inverse Proportion - Worksheet

Applied

1) 12 football players need to drink a total of 3 litres of water during a match. How much water would be needed for 20 players during the same match? Give your answer in litres.

2) The time taken (t) for customers to receiver their food orders at a restaurant is inversely proportional to the square of the number of staff (s) working at that time. It takes 20 minutes from customers orders being taken when there are 4 staff members on duty.

(a) Write an equation for t in terms of s.

(b) If the number of staff is doubled, how many times quicker will the food be served?

3) a is directly proportional to c.
m is inversely proportional to the square root of a.

When $a = 32$, $c = 8$.
When $a = 16$, $m = 144$.

Find the value of m when $c = 9$.

4) x is directly proportional to y.
y is inversely proportional to z.

Given that $x = 12$ and $z = 5$ when $y = 3$,
find a formula for x in terms of z.

5) y is inversely proportional to a^2.
When $y = 4,\ a = 10$

a is directly proportional to b^2.
When $a = 24,\ b = 2$

Find a formula for y in terms of b.
Give your answer in its simplest form.

Direct and Inverse Proportion - Worksheet

1) It takes 4 people 2 days to landscape a garden.

How long would it take for 2 people to landscape the same garden?

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(2 marks)

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2) y is directly proportional to x. When $y = 36$, $x = 4$.

(a) Find a formula for y in terms of x.

.....

(3)

(b) Find the value of y when $x = 3$

.....

(1)

(4 marks)

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3) x is inversely proportional to the square of m.

When $x = 7$, $m = 2$

Find the value of m when $x = 112$.

.....

(4 marks)

Direct and Inverse Proportion - Exam Questions

4) p is directly proportional to $\sqrt{q}$. r is inversely proportional to p^3

When $q = 49$, $p = 35$.

When $p = 2$, $r = 16$.

Find the value of r when $q = 4$.

.....

(6 marks)

Direct and Inverse Proportion - Answers

	Question	Answer
	Skill Questions	
Group A	Work out:	
	1) 24 cartons of orange juice costs £56. Work out the cost of 27 cartons.	**1)** £63
	2) 24 books weigh $51kg$. Work out the weight of 36 books.	**2)** $76.5kg$
	3) 15 pavement slabs cost £60.15. Work out the cost of 10 pavement slabs.	**3)** £40.10
	4) £1 = € 1.13. Change £25 into euros.	**4)** 28.25 euros
	5) £1 = € 1.13. Change £75 into euros.	**5)** 84.75 euros
	6) £1 = € 1.13. Change £150 into euros.	**6)** 169.5 euros
	7) £1 = € 1.13. Change 113 euros into pounds.	**7)** £100
	8) £1 = € 1.13. Change 56.5 euros into pounds.	**8)** £50
	9) £1 = € 1.13. Change 169.5 euros into pounds.	**9)** £150
	10) Four people take 9 hours to build a wall. How long would it take 3 people to build the same wall at the same rate?	**10)** 12 hours
	11) Eight people take 9 hours to build a wall. How long would it take 6 people to build the same wall at the same rate?	**11)** 12 hours
	12) Seven people take 9 hours to build a wall. How long would it take 9 people to build the same wall at the same rate?	**12)** 7 hours

Direct and Inverse Proportion - Answers

Group B

Complete the tables below:

1) $y \propto x$

x	4	12	
y		24	72

2) $y \propto x$

x	4	12	
y		36	72

3) $y \propto \frac{1}{x}$

x	4	12	
y		2	72

4) $y \propto \frac{1}{x}$

x	2	4	
y		8	32

5) $y \propto x^2$

x	2	3	
y	8		32

6) $y \propto x^2$

x	2	3	
y	32		200

7) $y \propto \sqrt{x}$

x	4	9	
y	50		200

8) $y \propto \sqrt{x}$

x	4	9	
y	20		200

1)

x	4	12	36
y	8	24	72

2)

x	4	12	24
y	12	36	72

3)

x	4	12	⅓
y	6	2	72

4)

x	2	4	1
y	16	8	32

5)

x	2	3	4
y	8	18	32

6)

x	2	3	5
y	32	72	200

7)

x	4	9	64
y	50	75	200

8)

x	4	9	400
y	20	30	200

Direct and Inverse Proportion - Answers

Group B contd

9) $y \propto \frac{1}{x^2}$

x	2	3	
y	36		144

9)

x	2	3	1
y	36	16	144

10) $y \propto \frac{1}{x^2}$

x	2	3	
y	9		144

10)

x	2	3	0.5
y	9	4	144

11) $y \propto \frac{1}{\sqrt{x}}$

x	4	9	
y	36		144

11)

x	4	9	¼
y	36	24	144

12) $y \propto \frac{1}{\sqrt{x}}$

x	4	9	
y	720		144

12)

x	4	9	100
y	720	480	144

Group C

Work out:

1) y is directly proportional to x.
$y = 4$ when $x = 4$.
Find y when $x = 7$.

1) 7

2) y is directly proportional to x.
$y = 72$ when $x = 6$.
Find y when $x = 9$.

2) 108

3) y is directly proportional to x.
$y = 33$ when $x = 3$.
Find x when $y = 88$.

3) 8

4) y is directly proportional to x.
$y = 90$ when $x = 9$.
Find x when $y = 10$.

4) 1

Direct and Inverse Proportion - Answers

	5) y is directly proportional to x^2. $y = 252$ when $x = 6$. Find y when $x = 2$.	**5)** 28
	6) y is directly proportional to x^3. $y = 56$ when $x = 2$. Find x when $y = 189$.	**6)** 3
	7) y is inversely proportional to x. $y = 8$ when $x = 1$. Find y when $x = 2$.	**7)** 4
	8) y is inversely proportional to x. $y = 2$ when $x = 9$. Find y when $x = 2$.	**8)** 9
	9) y is inversely proportional to x. $y = 2$ when $x = 7$. Find x when $y = 7$.	**9)** 2
	10) y is inversely proportional to x. $y = 6$ when $x = 8$. Find x when $y = 12$.	**10)** 4
	11) y is inversely proportional to x^2. $y = 4$ when $x = 3$. Find y when $x = 2$.	**11)** 9
	12) y is inversely proportional to $\sqrt{x}$. $y = 5$ when $x = 16$. Find x when $y = 4$.	**12)** 25

Direct and Inverse Proportion - Answers

	Question	Answer
	Applied Questions	
1)	12 football players need to drink a total of 3 litres of water during a match. How much water would be needed for 20 players during the same match? Give your answer in litres.	5 litres
2)	The time taken (t) for customers to receiver their food orders at a restaurant is inversely proportional to the square of the number of staff (s) working at that time. It takes 20 minutes from customers orders being taken when there are 4 staff members on duty. **a)** Write an equation for t in terms of s. **b)** If the number of staff is doubled, how many times quicker will the food be served?	**a)** $t = \frac{320}{s^2}$ **b)** 4 times quicker
3)	a is directly proportional to c. m is inversely proportional to the square root of a. When $a = 32, c = 8$. When $a = 16, m = 144$. Find the value of m when $c = 9$.	$a = 4c$ and $m = \frac{576}{\sqrt{a}}$ $c = 9,\ a = 36$ $m = 96$
4)	x is directly proportional to y. y is inversely proportional to z. Given that $x = 12$ and $z = 5$ when $y = 3$ find a formula for x in terms of z.	$x = 4y$ and $y = \frac{15}{z}$ $x = \frac{60}{z}$
5)	y is inversely proportional to a^2. When $y = 4,\ a = 10$. a is directly proportional to b^2. When $a = 24,\ b = 2$. Find a formula for y in terms of b. Give your answer in its simplest form.	$y = \frac{400}{a^2}$ and $a = 6b^2$ $y = \frac{100}{9b^4}$

Direct and Inverse Proportion - Mark Scheme

	Question	Answer	
	Exam Questions		
1)	It takes 4 people 2 days to landscape a garden. How long would it take for 2 people to landscape the same garden?	$4 \times 2 = 8$ $8 \div 2 = 4$ days	**(1)** **(1)**
2) (a)	y is directly proportional to x. When $y = 36,\ x = 4$ Find a formula for y in terms of x.	**(a)** $y = kx$ $4k = 36$ or $k = 9$ $y = 9x$	**(1)** **(1)** **(1)**
(b)	Find the value of y when $x = 3$	**(b)** $y = 27$	**(1)**
3)	x is inversely proportional to the square of m When $x = 7,\ m = 2$ Find the value of m when $x = 112$.	$x = \frac{k}{m^2}$ $k = 28$ or $x = \frac{28}{m^2}$ $m = \sqrt{\frac{28}{112}}$ $m = 0.5$	**(1)** **(1)** **(1)** **(1)**
4)	p is directly proportional to $\sqrt{q}$ r is inversely proportional to p^3 When $q = 49,\ p = 35$ When $p = 2,\ r = 16$ Find the value of r when $q = 4$	$k_1 = \frac{35}{\sqrt{49}} = 5$ $p = 5\sqrt{q}$ $k_2 = 2^3 \times 16 = 128$ $r = \frac{128}{p^3}$ $p = 5 \times \sqrt{4} = 10, r = \frac{128}{10^3}$ $r = 0.128$	**(1)** **(1)** **(1)** **(1)** **(1)** **(1)**