3.8 Inverse Proportion: 2-hour Pack

Calculators not allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A group of 12 people can paint a fence in 24 hours. Each person paints at the same rate. How many people are needed to paint it in 96 hours?

(3)

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2 The table shows pairs of values of two quantities that are directly proportional.

x	8	17
y	16	?

Work out the missing value.

(2)

---

3 The table shows pairs of values of two quantities that are directly proportional.

x	4	3
y	36	?

Work out the missing value.

(2)

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4 The brightness of a lamp varies inversely with the square of the distance from the lamp. If brightness is 100 units at 2 m, find the brightness at 5 m. Give your answer as a fraction or a decimal.

(3)

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5 A tank is emptied by 6 identical pumps in 6 hours. How long would 2 of these pumps take to empty it?

(3)

---

6 y is directly proportional to x. When x = 6, y = 24. Work out the value of y when x = 9.

(2)

---

7 A tank is emptied by 6 identical pumps in 6 hours. How long would 12 of these pumps take to empty it?

(3)

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8 y is directly proportional to x. When x = 5, y = 30. Work out the value of y when x = 11.

(2)

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9 A tank is emptied by 12 identical pumps in 8 hours. How long would 2 of these pumps take to empty it?

(3)

---

10 y is directly proportional to x. When x = 4, y = 32. Work out the value of y when x = 2.

(2)

---

11 A tank is emptied by 8 identical pumps in 12 hours. How long would 24 of these pumps take to empty it?

(3)

---

12 y is directly proportional to x. When x = 2, y = 16. Work out the value of y when x = 17.

(2)

---

13 y is inversely proportional to x. When x = 2, y = 36. Work out the value of y when x = 6.

(2)

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14 y is inversely proportional to x. When x = 6, y = 5. Work out the value of y when x = 5.

(2)

---

15 A tank is emptied by 4 identical pumps in 12 hours. How long would 24 of these pumps take to empty it?

(3)

---

16 The table shows pairs of values of two quantities that are directly proportional.

x	8	11
y	24	?

Work out the missing value.

(2)

---

17 y is inversely proportional to x. When x = 2, y = 15. Work out the value of y when x = 15.

(2)

---

18 A tank is emptied by 2 identical pumps in 6 hours. How long would 4 of these pumps take to empty it?

(3)

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19 The table shows pairs of values of two quantities that are directly proportional.

x	8	4
y	56	?

Work out the missing value.

(2)

---

20 The table shows pairs of values of two quantities that are directly proportional.

x	4	8
y	32	?

Work out the missing value.

(2)

---

21 The table shows pairs of values of two quantities that are directly proportional.

x	7	16
y	49	?

Work out the missing value.

(2)

---

22 A cyclist takes 2 hours to travel 30 miles at a steady speed. Assuming speed is inversely proportional to time for a fixed distance, find how long it takes to travel the same distance at 9 mph.

(3)

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23 y is inversely proportional to x. When x = 3, y = 8. Work out the value of y when x = 8.

(2)

---

24 The table shows pairs of values of two quantities that are directly proportional.

x	7	15
y	42	?

Work out the missing value.

(2)

---

25 The table shows pairs of values of two quantities that are directly proportional.

x	7	15
y	28	?

Work out the missing value.

(2)

---

26 y is inversely proportional to x. When x = 4, y = 30. Work out the value of y when x = 15.

(2)

---

27 y is inversely proportional to x. When x = 4, y = 9. Find y when x = 6.

(1)

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28 r is inversely proportional to s. When s = 9, r = 4. Find s when r = 12.

(2)

---

29 y is inversely proportional to x^2. When x = 2, y = 18. Find y when x = 3.

(2)

---

30 The variable c is inversely proportional to d. When d = 0.5, c = 16. Find c when d = 4.

(2)

---

31 w is inversely proportional to t. When t = 3, w = 14. Find w when t = 8. Give your answer as a decimal.

(2)

---

32 Two variables g and h are inversely proportional. When g = 15, h = 4. Find h when g = 6.

(2)

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33 The force needed to balance a see-saw is inversely proportional to the distance from the pivot. A force of 45 N balances the see-saw at a distance of 2 m from the pivot. What force is needed to balance it at a distance of 5 m from the pivot?

(3)

---

34 A charity divides a fixed amount of money equally among a number of families. The amount each family receives is inversely proportional to the number of families sharing the money. If 6 families each receive £150, how much would each family receive if there were 9 families instead?

(3)

---

35 The number of tiles needed to cover a floor of fixed area is inversely proportional to the area of one tile. Using tiles of area 0.25 m^2, 96 tiles are needed. How many tiles of area 0.4 m^2 are needed to cover the same floor?

(3)

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36 The time taken for identical machines to complete a printing order is inversely proportional to the number of machines used, assuming a fixed total amount of work and each machine works at the same rate. Using 5 machines, the order takes 18 hours. Find how many machines are needed to complete the same order in 3 hours.

(4)

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37 In the relationship $y = k/x$, $x = 3$ and $y = 20$. Find the value of k.

(1)

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38 A water tank is filled by a number of identical pipes working together. The time to fill the tank is inversely proportional to the number of pipes used, assuming a fixed tank volume and each pipe delivers water at the same steady rate. It takes 4 pipes 6 hours to fill the tank. A larger job requires the time to be reduced to 1.5 hours using the same type of pipes. How many pipes are needed, and how many more pipes is this than the original 4?

(4)

---

39 p is inversely proportional to q. When $q = 5$, $p = 10$. Find p when $q = 2$.

(1)

---

40 a is inversely proportional to b. When $b = 7$, $a = 6$. Find a when $b = 21$.

(1)

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Mark scheme · 3.8 Inverse Proportion: 2-hour Pack

Question 1

12 x 24 = 288	M1
288 ÷ 96	M1
3 cao	A1

Answer: **3 people**

Question 2

16 ÷ 8 = 2	M1
34 cao	A1

Answer: **34**

Question 3

36 ÷ 4 = 9	M1
27 cao	A1

Answer: **27**

Question 4

recognise brightness proportional to $1/d^2$ and find k: k = brightness * d^2 = 100*4 = 400	M1
substitute d = 5: brightness = 400/25	M1
16 cao	A1

Answer: **16**

Question 5

6 x 6 = 36	M1
36 ÷ 2	M1
18 hours cao	A1

Answer: **18 hours**

Question 6

y = kx with k = 24 ÷ 6 = 4	M1
36 cao	A1

Answer: **36**

Question 7

6 x 6 = 36	M1
36 ÷ 12	M1
3 hours cao	A1

Answer: **3 hours**

Question 8

y = kx with k = 30 ÷ 5 = 6	M1
66 cao	A1

Answer: **66**

Question 9

12 x 8 = 96	M1
96 ÷ 2	M1
48 hours cao	A1

Answer: **48 hours**

Question 10

y = kx with k = 32 ÷ 4 = 8	M1
16 cao	A1

Answer: **16**

Question 11

8 x 12 = 96	M1
96 ÷ 24	M1
4 hours cao	A1

Answer: **4 hours**

Question 12

y = kx with k = 16 ÷ 2 = 8	M1
136 cao	A1

Answer: **136**

Question 13

y = k/x with k = 2 x 36 = 72	M1
12 cao	A1

Answer: **12**

Question 14

y = k/x with k = 6 x 5 = 30	M1
6 cao	A1

Answer: **6**

Question 15

4 x 12 = 48	M1
48 ÷ 24	M1
2 hours cao	A1

Answer: **2 hours**

Question 16

24 ÷ 8 = 3	M1
33 cao	A1

Answer: **33**

Question 17

y = k/x with k = 2 x 15 = 30	M1
2 cao	A1

Answer: **2**

Question 18

2 x 6 = 12	M1
12 ÷ 4	M1
3 hours cao	A1

Answer: **3 hours**

Question 19

56 ÷ 8 = 7	M1
28 cao	A1

Answer: **28**

Question 20

32 ÷ 4 = 8	M1
64 cao	A1

Answer: **64**

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Question 21

49 ÷ 7	M1
112 cao	A1

Answer: **112**

Question 22

use distance = speed * time; distance fixed = 30 miles	M1
time = distance/speed = 30/9	M1
10/3 hours or 3 1/3 hours cao	A1

Answer: **10/3 hours**

Question 23

y = k/x with k = 3 x 8 = 24	M1
3 cao	A1

Answer: **3**

Question 24

42 ÷ 7 = 6	M1
90 cao	A1

Answer: **90**

Question 25

28 ÷ 7 = 4	M1
60 cao	A1

Answer: **60**

Question 26

y = k/x with k = 4 x 30 = 120	M1
8 cao	A1

Answer: **8**

Question 27

y = 6 cao	B1

Answer: **y = 6**

Question 28

find k = 9*4 = 36	M1
s = 3 cao	A1

Answer: **s = 3**

Question 29

find k = $y*x^2$ = 18*4 = 72	M1
y = 8 cao	A1

Answer: **y = 8**

Question 30

find k = 0.5*16 = 8	M1
c = 2 cao	A1

Answer: **c = 2**

Question 31

find k = 3*14 = 42	M1
w = 5.25 cao	A1

Answer: **w = 5.25**

Question 32

find k = 15*4 = 60	M1
h = 10 cao	A1

Answer: **h = 10**

Question 33

find k = force*distance = 45*2 = 90	M1
substitute distance = 5: force = 90/5	M1
18 N cao	A1

Answer: **18 N**

Question 34

find k = amount*families = 150*6 = 900	M1
substitute families = 9: amount = 900/9	M1
£100 cao	A1

Answer: **£100**

Question 35

find the fixed floor area: tiles*tileArea = 96*0.25 = 24 m^2	M1
substitute tileArea = 0.4: tiles = 24/0.4	M1
60 tiles cao	A1

Answer: **60 tiles**

Question 36

find k = machines*time = 5*18 = 90	M1
state machines = k/time	M1
substitute time = 3: machines = 90/3	M1
30 machines cao	A1

Answer: **30 machines**

Question 37

k = 60 cao	B1

Answer: **k = 60**

Question 38

find k = pipes*time = 4*6 = 24	M1
substitute time = 1.5: pipes = 24/1.5	M1
compute pipes = 16	M1
16 pipes, which is 12 more than the original 4 cao	A1

Answer: **16 pipes; 12 more pipes than the original 4**

Question 39

p = 25 cao	B1

Answer: **p = 25**

Question 40

a = 2 cao	B1

Answer: **a = 2**

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