3.1 Ratio, Proportion and Rates of Change: 2-hour Pack

Calculator allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A shop sells notebooks at a constant price each. 4 notebooks cost £10.48. How many notebooks can be bought for £94.32?

(3)

2 y is directly proportional to x. When x = 7, y = 42. Work out the value of y when x = 15.

(2)

3 y is directly proportional to x. When x = 2, y = 6. Work out the value of y when x = 11.

(2)

4 A tap fills a bucket at a rate of 12 litres per minute. How many litres does it deliver in 20 minutes?

(2)

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5 A car travels 72 km in 1 hour 30 minutes. Work out its average speed in km/h.

(3)

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6 A shop sells pens at a constant price each. 7 pens cost £37.45. How many pens can be bought for £187.25?

(3)

---

7 A pump moves water at 15 litres per minute. How many litres does it move in one hour?

(2)

---

8 A tap fills a container at a rate of 25 litres per minute. How long does it take to put 150 litres into the container?

(2)

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9 y is directly proportional to x. When x = 9, y = 54. Work out the value of y when x = 4.

(2)

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10 A shop sells notebooks at a constant price each. 5 notebooks cost £20.45. How many notebooks can be bought for £143.15?

(3)

---

11 One of a type of bottles of water costs £3.33. Work out the cost of 7 of them.

(1)

---

12 A metal has a density of 7.3 g/cm^3. Work out the mass of 5 cm^3 of the metal.

(2)

---

13 A tap fills a container at a rate of 5 litres per minute. How long does it take to put 60 litres into the container?

(2)

---

14 y is directly proportional to x. When x = 2, y = 12. Work out the value of y when x = 14.

(2)

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15 A shop sells pens at a constant price each. 7 pens cost £5.67. How many pens can be bought for £45.36?

(3)

---

16 One of a type of apple costs £0.47. Work out the cost of 5 of them.

(1)

---

17 Amir types 168 words in 7 minutes. At this rate, how long will it take him to type 840 words?

(3)

---

18 A liquid has a density of 7.8 g/cm^3. It has a mass of 62.4 g. Work out its volume.

(3)

---

19 Ria earns £265.20 for 26 hours of work. Work out her hourly rate of pay.

(2)

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20 Ben is paid £10.20 per hour. He works 43 hours in a week. How much is he paid?

(2)

---

21 A metal has a density of 6.2 g/cm^3. Work out the mass of 50 cm³ of the metal.

(2)

---

22 Ben is paid £7.50 per hour. He works 43 hours in a week. How much is he paid?

(2)

---

23 Ria earns £254.10 for 22 hours of work. Work out her hourly rate of pay.

(2)

---

24 A block has a mass of 970 g and a volume of 100 cm³. Work out its density in g/cm^3.

(2)

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

x	2	13
y	6	?

Work out the missing value.

(2)

---

26 Mia runs 200 km in 4 hours. Work out her average speed in km/h.

(2)

---

27 A tap fills a container at a rate of 20 litres per minute. How long does it take to put 240 litres into the container?

(2)

---

28 A metal has a density of 5 g/cm^3. Work out the mass of 40 cm^3 of the metal.

(2)

---

29 A block has a mass of 1080 g and a volume of 100 cm^3. Work out its density in g/cm^3.

(2)

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30 One of a type of ticket costs £0.34. Work out the cost of 6 of them.

(1)

---

31 A pump moves water at 12 litres per minute. How many litres does it move in one hour?

(2)

---

32 y is directly proportional to x. When x = 7, y = 28. Work out the value of y when x = 16.

(2)

---

33 A tap fills a bucket at a rate of 6 litres per minute. How many litres does it deliver in 25 minutes?

(2)

---

34 y is directly proportional to x. When x = 3, y = 21. Work out the value of y when x = 19.

(2)

---

35 A tap fills a container at a rate of 5 litres per minute. How long does it take to put 150 litres into the container?

(2)

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

x	6	11
y	42	?

Work out the missing value.

(2)

---

37 A train travels at an average speed of 40 km/h for 1 hour 30 minutes. How far does it travel?

(2)

---

38 A recipe for 6 people uses 450 g of rice and 3 eggs.

(a) Work out how much rice is needed to serve 8 people. **(2)**

.....

(b) Work out how many eggs are needed to serve 15 people. Give a sensible whole number of eggs. **(2)**

.....

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39 A car uses fuel at a rate of 1 litre per 14 km. Petrol costs £1.48 per litre.

(a) How many litres of fuel are needed for a 420 km journey? **(1)**

.....

(b) Find the total cost of the fuel for this journey. **(2)**

.....

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40 It takes 5 builders 12 days to build a wall, all working at the same constant rate. Assuming the same rate of work, how many days would it take 8 builders to build an identical wall?

(3)

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41 The ratio of Ali's age to Beth's age is 3 : 5. In 4 years' time, the ratio of their ages will be 2 : 3. Find their current ages.

(4)

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Mark scheme · 3.1 Ratio, Proportion and Rates of Change: 2-hour Pack

Question 1

£10.48 ÷ 4 = £2.62	M1
£94.32 ÷ £2.62	M1
36 cao	A1

Answer: **36**

Question 2

y = kx with k = 42 ÷ 7 = 6	M1
90 cao	A1

Answer: **90**

Question 3

y = kx with k = 6 ÷ 2 = 3	M1
33 cao	A1

Answer: **33**

Question 4

12 x 20	M1
240 litres cao	A1

Answer: **240 litres**

Question 5

converts the time to hours	M1
72 ÷ 1.5	M1
48 km/h cao	A1

Answer: **48 km/h**

Question 6

£37.45 ÷ 7 = £5.35	M1
£187.25 ÷ £5.35	M1
35 cao	A1

Answer: **35**

Question 7

15 x 60	M1
900 litres cao	A1

Answer: **900 litres**

Question 8

150 ÷ 25	M1
6 minutes cao	A1

Answer: **6 minutes**

Question 9

y = kx with k = 54 ÷ 9 = 6	M1
24 cao	A1

Answer: **24**

Question 10

£20.45 ÷ 5 = £4.09	M1
£143.15 ÷ £4.09	M1
35 cao	A1

Answer: **35**

Question 11

£23.31 cao	B1

Answer: **£23.31**

Question 12

7.3 x 5	M1
36.5 g cao	A1

Answer: **36.5 g**

Question 13

60 ÷ 5	M1
12 minutes cao	A1

Answer: **12 minutes**

Question 14

y = kx with k = 12 ÷ 2 = 6	M1
84 cao	A1

Answer: **84**

Question 15

£5.67 ÷ 7 = £0.81	M1
£45.36 ÷ £0.81	M1
56 cao	A1

Answer: **56**

Question 16

£2.35 cao	B1

Answer: **£2.35**

Question 17

168 ÷ 7 = 24 words per minute	M1
840 ÷ 24	M1
35 minutes cao	A1

Answer: **35 minutes**

Question 18

volume = mass ÷ density	M1
62.4 ÷ 7.8	M1
8 cm³ cao	A1

Answer: **8 cm^3**

Question 19

£265.20 ÷ 26	M1
£10.20 cao	A1

Answer: **£10.20**

Question 20

£10.20 x 43	M1
£438.60 cao	A1

Answer: **£438.60**

Question 21

6.2 x 50	M1
310 g cao	A1

Answer: **310 g**

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Question 22

£7.50 x 43 **M1**
£322.50 cao **A1**
Answer: **£322.50**

Question 23

£254.10 ÷ 22 **M1**
£11.55 cao **A1**
Answer: **£11.55**

Question 24

970 ÷ 100 **M1**
9.7 g/cm^3 cao **A1**
Answer: **9.7 g/cm^3**

Question 25

6 ÷ 2 = 3 **M1**
39 cao **A1**
Answer: **39**

Question 26

200 ÷ 4 **M1**
50 km/h cao **A1**
Answer: **50 km/h**

Question 27

240 ÷ 20 **M1**
12 minutes cao **A1**
Answer: **12 minutes**

Question 28

5 x 40 **M1**
200 g cao **A1**
Answer: **200 g**

Question 29

1080 ÷ 100 **M1**
10.8 g/cm^3 cao **A1**
Answer: **10.8 g/cm^3**

Question 30

£2.04 cao **B1**
Answer: **£2.04**

Question 31

12 x 60 **M1**
720 litres cao **A1**
Answer: **720 litres**

Question 32

y = kx with k = 28 ÷ 7 = 4 **M1**
64 cao **A1**
Answer: **64**

Question 33

6 x 25 **M1**
150 litres cao **A1**
Answer: **150 litres**

Question 34

y = kx with k = 21 ÷ 3 = 7 **M1**
133 cao **A1**
Answer: **133**

Question 35

150 ÷ 5 **M1**
30 minutes cao **A1**
Answer: **30 minutes**

Question 36

42 ÷ 6 = 7 **M1**
77 cao **A1**
Answer: **77**

Question 37

40 x 1.5 **M1**
60 km cao **A1**
Answer: **60 km**

Question 38

(a) 450/6 x 8 (correct method, or equivalent scaling) **M1**
(a) 600 g cao **A1**
(a) Answer: **600 g**
(b) 3/6 x 15 = 7.5 (correct method) **M1**
(b) 8 eggs, with reason that eggs must be whole, ft oe **A1**
(b) Answer: **8 eggs**

Question 39

(a) 30 litres cao **B1**
(a) Answer: **30 litres**
(b) 30 x 1.48 (correct method, ft from part a) **M1**
(b) £44.40 cao **A1**
(b) Answer: **£44.40**

Question 40

5 x 12 = 60 (total builder-days for the job) **M1**
60 / 8 (correct inverse proportion method) **M1**
7.5 days cao **A1**
Answer: **7.5 days**

Question 41

Sets up ages as 3x and 5x and forms the equation (3x+4)/(5x+4) = 2/3 **M1**
Correctly cross-multiplies and simplifies to 9x+12 = 10x+8 or equivalent **M1**
x = 4 **A1**
Ali = 12 and Beth = 20 cao **A1**
Answer: **Ali = 12 years old, Beth = 20 years old**

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