3.11 Proportional Reasoning Problem Set: 2-hour Pack

Calculators not allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

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

x	7	18
y	42	?

Work out the missing value.

(2)

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2 A recipe for 4 people uses 500 g of rice and 250 g of oats. Work out how much of each ingredient is needed for 14 people.

(3)

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3 A recipe for 12 people uses 325 g of sugar and 275 g of flour. Work out how much of each ingredient is needed for 18 people.

(3)

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4 A shop sells cereal in two sizes. Pack A is 300 g for £2.54. Pack B is 600 g for £1.39. Which pack is better value? You must show your working.

(3)

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5 A trader buys an item for £40 and sells it for £64. Work out the percentage profit.

(3)

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6 A shop reduces the price of a jumper by 20%. The original price was £45. Work out the sale price.

(2)

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7 A trader buys an item for £200 and sells it for £240. Work out the percentage profit.

(3)

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8 A shop sells coffee in two sizes. Pack A is 300 g for £1.47. Pack B is 800 g for £4.59. Which pack is better value? You must show your working.

(3)

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9 A trader buys an item for £25 and sells it for £28.75. Work out the percentage profit.

(3)

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10 A trader buys an item for £200 and sells it for £250. Work out the percentage profit.

(3)

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11 A trader buys an item for £80 and sells it for £112. Work out the percentage profit.

(3)

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12 In a survey, 40% of the people were left-handed pupils. There were 48 left-handed pupils. How many people were in the survey?

(3)

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13 A recipe for 6 people uses 400 g of flour and 125 g of butter. Work out how much of each ingredient is needed for 18 people.

(3)

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14 In a survey, 20% of the people were cyclists. There were 12 cyclists. How many people were in the survey?

(3)

---

15 A trader buys an item for £400 and sells it for £640. Work out the percentage profit.

(3)

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16 A runner completes a 10 km route in 50 minutes. What is their average speed in km/h? Give your answer to one decimal place.

(3)

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17 9 workers take 18 days to build a wall. All workers work at the same rate. How long would 6 workers take?

(3)

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18 A shop sells coffee in two sizes. Pack A is 300 g for £1.51. Pack B is 800 g for £4.46. Which pack is better value? You must show your working.

(3)

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19 A shop sells pasta in two sizes. Pack A is 500 g for £2.49. Pack B is 1500 g for £3.10. Which pack is better value? You must show your working.

(3)

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20 In a survey, 15% of the people were girls. There were 18 girls. How many people were in the survey?

(3)

---

21 A shop sells coffee in two sizes. Pack A is 400 g for £2.33. Pack B is 600 g for £2.54. Which pack is better value? You must show your working.

(3)

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22 A shop sells cereal in two sizes. Pack A is 400 g for £2.07. Pack B is 1000 g for £2.06. Which pack is better value? You must show your working.

(3)

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23 A shop sells rice in two sizes. Pack A is 400 g for £2. Pack B is 500 g for £3.03. Which pack is better value? You must show your working.

(3)

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24 A student increases the ingredients for a cake by a scale factor of 2.5. The original recipe uses 240 g of flour. How much flour is needed now? Give your answer in grams.

(3)

---

25 A metal alloy is made from copper and tin in the ratio 7:1. Work out how many kg of copper are in 48 kg of the alloy.

(2)

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26 A jacket priced at £80 is reduced by 35% in a sale. Work out the sale price.

(2)

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27 A crew of workers paints a fence at a steady combined rate of 12 metres per hour. Work out how many metres they paint in 2 hours 30 minutes.

(2)

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28 A charity shop prices donated books and DVDs in the ratio 5:2. If 210 items are donated in total in that ratio, work out how many are DVDs.

(3)

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29 A drink is diluted with concentrate and water in the ratio 1:9. A jug needs to hold 650 ml of the diluted drink. Work out how much concentrate is needed, in ml.

(3)

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30 A toy shop applies a 25% discount to a game, then adds a 4% handling fee to the discounted price. The original price is £60. Work out the final price, to the nearest penny.

(3)

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31 A van uses fuel at a rate of 8.5 litres per 100 km. Work out how many litres are needed for a 340 km journey.

(3)

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32 Work out 30% of £90.

(1)

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33 Two amounts are shared in the ratio 3:5. The total is 40. Work out the smaller share.

(1)

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34 A recipe is scaled up by a factor of 3. If the original amount of butter is 60 g, work out the new amount.

(1)

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35 A cyclist travels 15 km in 30 minutes at a steady speed. Work out the speed in km/h.

(1)

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Mark scheme · 3.11 Proportional Reasoning Problem Set: 2-hour Pack

Question 1

42 ÷ 7 = 6	M1
108 cao	A1

Answer: **108**

Question 2

scale factor 14/4 or amount for 1 person	M1
1750 g of rice	A1
875 g of oats	A1

Answer: **1750 g of rice, 875 g of oats**

Question 3

scale factor 18/12 or amount for 1 person	M1
487.5 g of sugar	A1
412.5 g of flour	A1

Answer: **487.5 g of sugar, 412.5 g of flour**

Question 4

price per gram or grams per penny for one pack	M1
same measure for the other pack (or both scaled to a common weight)	M1
Pack B, with a correct comparison	A1

Answer: **Pack B**

Question 5

profit of £24 found	M1
£24 ÷ £40 x 100	M1
60% profit cao	A1

Answer: **60% profit**

Question 6

Calculate 20% of 45 or find 80%: 45 x 0.2 = 9 or 45 x 0.8 = 36	M1
£36 cao	A1

Answer: **£36**

Question 7

profit of £40 found	M1
£40 ÷ £200 x 100	M1
20% profit cao	A1

Answer: **20% profit**

Question 8

price per gram or grams per penny for one pack	M1
same measure for the other pack (or both scaled to a common weight)	M1
Pack A, with a correct comparison	A1

Answer: **Pack A**

Question 9

profit of £3.75 found	M1
£3.75 ÷ £25 x 100	M1
15% profit cao	A1

Answer: **15% profit**

Question 10

profit of £50 found	M1
£50 ÷ £200 x 100	M1
25% profit cao	A1

Answer: **25% profit**

Question 11

profit of £32 found	M1
£32 ÷ £80 x 100	M1
40% profit cao	A1

Answer: **40% profit**

Question 12

40% = 48 so 1% = 1.2	M1
1.2 x 100	M1
120 cao	A1

Answer: **120**

Question 13

scale factor 18/6 or amount for 1 person	M1
1200 g of flour	A1
375 g of butter	A1

Answer: **1200 g of flour, 375 g of butter**

Question 14

20% = 12 so 1% = 0.6	M1
0.6 x 100	M1
60 cao	A1

Answer: **60**

Question 15

profit of £240 found	M1
£240 ÷ £400 x 100	M1
60% profit cao	A1

Answer: **60% profit**

Question 16

Convert 50 minutes to hours: 50/60 = 5/6 h or 0.833... h	M1
Compute speed 10 / (50/60) = 10 x 60/50 = 12 km/h	M1
12.0 km/h cao to one decimal place	A1

Answer: **12.0 km/h**

Question 17

9 x 18 = 162 worker-days	M1
162 ÷ 6	M1
27 days cao	A1

Answer: **27 days**

Question 18

price per gram or grams per penny for one pack	M1
same measure for the other pack (or both scaled to a common weight)	M1
Pack A, with a correct comparison	A1

Answer: **Pack A**

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Question 19

price per gram or grams per penny for one pack	M1
same measure for the other pack (or both scaled to a common weight)	M1
Pack B, with a correct comparison	A1

Answer: **Pack B**

Question 20

15% = 18 so 1% = 1.2	M1
1.2 x 100	M1
120 cao	A1

Answer: **120**

Question 21

price per gram or grams per penny for one pack	M1
same measure for the other pack (or both scaled to a common weight)	M1
Pack B, with a correct comparison	A1

Answer: **Pack B**

Question 22

price per gram or grams per penny for one pack	M1
same measure for the other pack (or both scaled to a common weight)	M1
Pack B, with a correct comparison	A1

Answer: **Pack B**

Question 23

price per gram or grams per penny for one pack	M1
same measure for the other pack (or both scaled to a common weight)	M1
Pack A, with a correct comparison	A1

Answer: **Pack A**

Question 24

Multiply 240 by 2.5: 240 x 2.5 = 240 x (5/2) = 120 x 5 = 600	M1
Method shown with correct arithmetic	M1
600 g cao	A1

Answer: **600 g**

Question 25

total parts 7+1 = 8, one part = 48/8 = 6	M1
42 kg cao	A1

Answer: **42 kg**

Question 26

method: 80*0.65 or find 35% and subtract	M1
52 (pounds) cao	A1

Answer: **£52**

Question 27

convert 2 hours 30 minutes to 2.5 hours	M1
30 m cao	A1

Answer: **30 m**

Question 28

total parts 5+2 = 7, one part = 210/7 = 30	M1
DVDs = 2*30	M1
60 DVDs cao	A1

Answer: **60 DVDs**

Question 29

total parts 1+9 = 10, one part = 650/10 = 65	M1
concentrate is 1 part so 65	M1
65 ml cao	A1

Answer: **65 ml**

Question 30

apply the discount: 60*0.75 = 45	M1
apply the fee: 45*1.04	M1
46.80 (pounds) cao	A1

Answer: **£46.80**

Question 31

method: 8.5/100 * 340 or (340/100)*8.5	M1
compute 340*8.5 = 2890 then divide by 100	M1
28.9 litres cao	A1

Answer: **28.9 litres**

Question 32

27 (pounds) cao	B1

Answer: **£27**

Question 33

15 cao	B1

Answer: **15**

Question 34

180 g cao	B1

Answer: **180 g**

Question 35

30 km/h cao	B1

Answer: **30 km/h**

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