

Proportional Reasoning (F)

A collection of 9-1 Maths GCSE Sample and Specimen questions from AQA, OCR, Pearson-Edexcel and WJEC Eduqas.

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Total Marks:	

1. Sam and two friends put letters in envelopes on Monday.

Monday
1hr ☐ ☐ ☐
2hr ☐ ☐ ☐

The three of them take two hours to put 600 letters in envelopes.

= 600

- (a) On Tuesday Sam has three friends helping.

each person does
100 per hour

Working at the same rate, how many letters should the four of them be able to put in envelopes in two hours?

$$4 \times 100 = 400$$

$$2 \times 400 = 800$$

(a) 800 [2]

- (b) Working at the same rate, how much longer would it take four people to put 1000 letters in envelopes than it would take five people?

4 people
400
400
200
2 1/2 hours

5 people
500
500
2 hours

(b) 30 mins [4]

- (c) Sam says

It took two hours for three people to put 600 letters in envelopes. If I assume they work all day, then in one day three people will put 7200 letters in envelopes because $600 \times 12 = 7200$.

Why is Sam's assumption not reasonable?

What effect has Sam's assumption had on her answer?

no its not reasonable to expect them to work for 12 hours. It will take longer.

[2]

2. The total weight of 3 tins of beans and 4 jars of jam is 2080 g.

The total weight of 5 tins of beans is 2000 g.

Work out the weight of 1 tin of beans and the weight of 1 jar of jam.

$$3B + 4J = 2080$$

$$880 \div 4 = 220$$

$$5B = 2000$$

$$1B = 400g$$

$$3B = 1200$$

$$2080 - 1200 = 880$$

tin of beans..... $400g$ g
jar of jam..... $220g$ g

[4]

3. A and B are two companies.

	Company A		Company B	
	Sales (£ millions)	Number of workers	Sales (£ millions)	Number of workers
2004	320	2960	48	605
2014	388	3200	57	640

The table shows some information about the sales of each company and the number of workers for each company in 2004 and in 2014

Which company had the most sales per worker in 2014, Company A or Company B?

You must show how you get your answer.

A

$$388,000,000 \div 3200$$

£121,250 per worker

B

$$57,000,000 \div 640$$

£89,062.50

Company A.

[3]

4. Water flows through a pipe at a rate of 20 gallons per minute.

1 gallon = 4.55 litres.

$$20 \div 60 = 0.3\bar{3} \text{ gallons/second}$$

Change 20 gallons per minute to litres per second.

Give your answer correct to 3 significant figures.

$$\begin{array}{l} \div 3 \downarrow 1 \text{ gallon} = 4.55 \text{ litres} \\ 0.3\bar{3} = 1.51\bar{6} \text{ litres/second} \end{array}$$

$$\dots\dots\dots 1.52 \text{ litres per second} \quad (3 \text{ s.f.}) \quad [2]$$

5. The mass of 40 cm³ of copper is 356 grams.

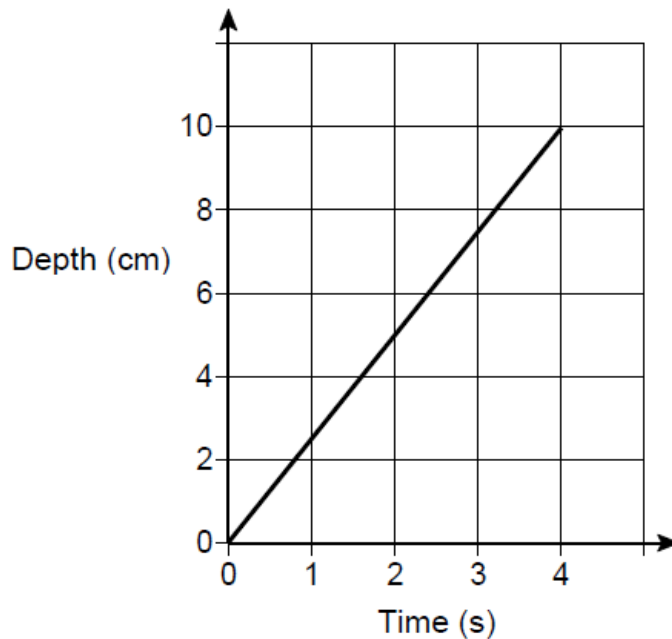
Work out the mass of 90 cm³ of copper.

$$\begin{array}{l} \div 4 \quad 40 \text{ cm}^3 = 356 \text{ grams} \\ \quad 10 \text{ cm}^3 = 89 \\ \times 9 \quad 90 \text{ cm}^3 = 801 \end{array}$$

$$\underline{801} \text{ grams} \quad [2]$$

6. Water is poured into a glass for 4 seconds.

The graph shows the depth of the water in the glass.



$$\begin{array}{l} 10 \div 4 \\ \frac{10}{4} = \frac{5}{2} \\ = 2.5 \end{array}$$

What is the rate of change of the depth of the water?

Circle your answer.

0.4 cm/s

1.25 cm/s

2.5 cm/s

10 cm/s

[1]

7. A building company used 24 workers to prepare a building site.

The site measured 30 acres and the work was completed in 10 days.

(a) The company is asked to prepare another site measuring 45 acres.

This work has to be completed in 15 days.

Calculate the least number of workers the company should employ for this work.

$$10 \text{ days} = 240 \text{ 'days'}$$

$$= 30 \div 240 = \frac{30}{240} = \frac{1}{8} \text{ acre/man/day}$$

$$45 \div \frac{1}{8} = 360 \text{ man'days}$$

$$360 \div 15 = \underline{24 \text{ men}}$$

[3]

(b) State one assumption you have made in your answer to part (a).

How would your answer to part (a) change if you did not make this assumption?

I have assumed the rate of work remains the same.

[2]

8. A team of examiners has 48 000 examination papers to mark.

It takes each examiner 1 hour to mark approximately 16 papers.

(a) The chief examiner says that a team of 25 examiners could mark all 48 000 papers in 8 days.

What assumption has the chief examiner made?

You must show all your calculations to support your answer.

1 examiner = 1 hour = 16 papers

$48000 \div 25 = 1920 \text{ papers each}$

$1920 \div 8 = 240 \text{ per day}$

$240 \div 16 = 15 \text{ hours a day}$

They have assumed examiners will work for 15 hours per day

[4]

(b) Why is the chief examiner's assumption unrealistic?

What effect will this have on the number of days the marking will take?

it is unrealistic to work 15 hours per day, so it will take longer.

[2]

9. There are 5 grams of fibre in every 100 grams of bread.

A loaf of bread has a weight of 400 g.

There are 10 slices of bread in a loaf.

Each slice of bread has the same weight.

Work out the weight of fibre in one slice of bread.

$$\begin{array}{l|l} \text{fibre} & \text{bread} \\ 5\text{g} & 100\text{g} \\ 1\text{g} & = 20\text{g} \\ 2\text{g} & = 40\text{g} \end{array} \quad \begin{array}{l} \text{Other} \\ 95\text{g} \end{array}$$

2g

[3]

10. A bakery makes 480 pizzas and 2400 rolls each day.

In 1 hour each baker can make 20 pizzas or 75 rolls.

Each baker works for 8 hours a day.

a) Work out the minimum number of bakers needed each day.

pizzas (20/hour)

rolls (75/hour)

$$480/20$$

$$= 24 \text{ bakers}$$

$$2400/75$$

$$= 32$$

32 bakers are required.

[4]

b) The bakery makes some changes.

In 1 hour each baker now makes 10% more pizzas or 20% more rolls.

Pizzas are sold for £2.50

pizzas (22)

rolls (90)

Rolls are sold for 8p

The manager does these calculations.

Making pizzas for 1 hour

$$10\% \text{ more pizzas} = 20 + 2 = 22 \text{ pizzas}$$

$$\text{Sales of pizzas} = 22 \times £2.50 = £55$$

Making rolls for 1 hour

$$20\% \text{ more rolls} = 75 + 15 = 90 \text{ rolls}$$

$$\text{Sales of rolls} = 90 \times 8 = £720$$

$$\text{Total from sales} = £55 + £720 = £775$$

$$£62.20$$

$$\begin{array}{l} 10\% = 7.5 \\ 15\% = 15 \end{array}$$

Check his working, correct any mistakes and write out the correct calculations below.

Making pizzas for 1 hour

10% more pizzas = 2 = 22 pizzas

Sales of pizzas = $22 \times 2.50 = £55$

Making rolls for 1 hour

20% more rolls = 15 $15 + 75 = 90$

Sales of rolls = $90 \times 0.08 = 7.20$

Total from sales = $55 + 7.20 = £62.20$

[4]

CREDITS AND NOTES

Question	Awarding Body	Question	Awarding Body
1	OCR	10	AQA
2	Pearson Edexcel		
3	Pearson Edexcel		
4	Pearson Edexcel		
5	AQA		
6	AQA		
7	WJEC Eduqas		
8	WJEC Eduqas		
9	Pearson Edexcel		

Notes:

These questions have been retyped from the original sample/specimen assessment materials and whilst every effort has been made to ensure there are no errors, any that do appear are mine and not the exam board's (similarly any errors I have corrected from the originals are also my corrections and not theirs!).

Please also note that the layout in terms of fonts, answer lines and space given to each question does not reflect the actual papers to save space.

These questions have been collated by me as the basis for a GCSE working party set up by the GLOW maths hub - if you want to get involved please get in touch. The objective is to provide support to fellow teachers and to give you a flavour of how different topics "could" be examined. They should not be used to form a decision as to which board to use. There is no guarantee that a topic will or won't appear in the "live" papers from a specific exam board or that examination of a topic will be as shown in these questions.



Links:

AQA <http://www.aqa.org.uk/subjects/mathematics/gcse/mathematics-8300>

OCR <http://ocr.org.uk/gcsemaths>

Pearson Edexcel <http://qualifications.pearson.com/en/qualifications/edexcel-gcses/mathematics-2015.html>

WJEC Eduqas <http://www.eduqas.co.uk/qualifications/mathematics/gcse/>

Contents:

This version contains questions from:

AQA – Sample Assessment Material, Practice set 1 and Practice set 2

OCR – Sample Assessment Material and Practice set 1

Pearson Edexcel – Sample Assessment Material, Specimen set 1 and Specimen set 2

WJEC Eduqas – Sample Assessment Material