



# (GCSE Maths)

Specimen Assessment Materials



If you'd like to discuss any aspect of our Specimen Assessment Materials do give us a call on 0161 957 3852.

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## This commentary highlights some of the key aspects of our specimen papers and shows the strategy behind our clean and clear approach to assessment.

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There are a number of features common to all of our papers for this new specification. Our aim is to provide students with a fair opportunity to demonstrate their knowledge and understanding. Some of the ways we're working to achieve this are:

### Clear language and layout

We have already removed unnecessary words from our recent exams, and have provided more space between questions to avoid 'frightening' students as they turn the page. These principles apply in this new specification.

### Settling students from the start

In each paper, about 8 marks (10%) will be allocated to multiple choice questions. Each paper starts with four of these. They help settle students into the exam, but they are not easy marks. Students will be able to build confidence by giving an answer, but the 'wrong' options will often highlight inappropriate methodology or approach. Including these questions allows us to test a greater breadth of content across our examinations.

### Formulae provided as they are required

There are no formulae sheets at the front of our papers. The Department for Education (DfE) requirements mean that students must know certain formulae. These include the trigonometry formulae, the quadratic formula and the formula for the area of a trapezium. A full list of the 'prescribed' formulae is an appendix to the specification. When a formula is required, and we are able to provide it, we will put this in the question, rather than challenging students to remember that they have a formulae sheet.

### Gradual ramping of demand as the paper progresses

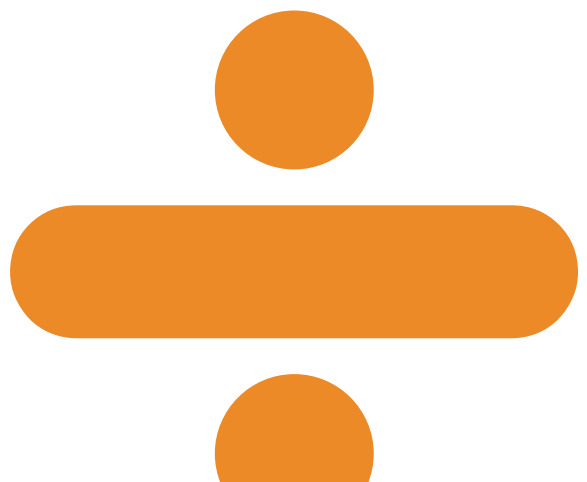
The demand of all AQA Maths papers increases steadily as students work through the paper.

- The first half of each tier F paper should contain many questions where students likely to achieve grades 1 and 2 can show their knowledge. The second half of each tier F paper will focus on questions that are designed to discriminate between grades 3,4 and 5, many of which will be common with tier H.
- The first half of each tier H paper will focus on grades 4,5 and 6, with at least 20 marks common with tier F. The second half of each tier H paper is designed to challenge and discriminate between the highest achieving students, targeting grades 7,8 and 9.

### Appropriate marks for each question

Some questions now have fewer marks than they had in the past. This is a deliberate approach based on what we have learned from performance data of current questions and the approach taken in other high achieving countries. This also reflects the changes in assessment objectives. We are very confident that we can assess the full breadth of content and skills in 80 mark papers, ensuring that every mark counts and is focussed on what we want to test.

We also don't want to hide the most accessible AO1 marks behind more difficult AO2 and AO3 marks so we will minimise these where possible, allowing us to ask more single mark AO1 questions elsewhere.



# Assessment objectives

| Assessment objectives  | Weighting  |            |
|--|------------|------------|
|  | Higher     | Foundation |
| <b>AO1</b><br><b>Use and apply standard techniques.</b><br><b>Students should be able to:</b> <ul style="list-style-type: none"> <li>• accurately recall facts, terminology and definitions</li> <li>• use and interpret notation correctly</li> <li>• accurately carry out routine procedures or set tasks requiring multi-step solutions</li> </ul>  | <b>40%</b> | <b>50%</b> |
| <b>AO2</b><br><b>Reason, interpret and communicate mathematically.</b><br><b>Students should be able to:</b> <ul style="list-style-type: none"> <li>• make deductions, inferences and draw conclusions from mathematical information</li> <li>• construct chains of reasoning to achieve a given result</li> <li>• interpret and communicate information accurately</li> <li>• present arguments and proofs</li> <li>• assess the validity of an argument and critically evaluate a given way of presenting information</li> </ul>   | <b>30%</b> | <b>25%</b> |
| <b>AO3</b><br><b>Solve problems within mathematics and in other contexts. Students should be able to:</b> <ul style="list-style-type: none"> <li>• translate problems in mathematical or non-mathematical contexts into a process or a series of mathematical processes</li> <li>• make and use connections between different parts of mathematics</li> <li>• interpret results in the context of the given problem</li> <li>• evaluate methods used and results obtained</li> <li>• evaluate solutions to identify how they may have been affected by assumptions made</li> </ul> | <b>30%</b> | <b>25%</b> |

# Paper 1

## Foundation Tier

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Paper 1 begins, like all our papers, with 4 multiple choice questions – these could be 4 completely discrete questions on different topics, or, like here, have some connection between some or all of them (Q1a, Q1b both on percentages). The benefit of always starting in this way is to give candidates a familiar style which offers reassurance when opening an exam paper. This settles students and allows them to always be able to attempt these opening questions. The psychological benefits of students feeling they have the early questions right should not be underestimated.

# GCSE MATHEMATICS (8300/1F)

# F

Paper 1 Foundation tier

Specimen 2015

Morning

Time allowed: 1 hour 30 minutes

## Materials

For this paper you must have:

- mathematical instruments

You may **not** use a calculator



## Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the bottom of this page.
- Answer **all** questions.
- You must answer the questions in the space provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

## Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer booklet.

Please write clearly, in block capitals, to allow character computer recognition.

Centre number

Candidate number

Surname

Forename(s)

Candidate signature \_\_\_\_\_

Answer **all** questions in the spaces provided.

1 (a) What is  $\frac{1}{5}$  as a percentage?

Circle your answer.

[1 mark]

1.5%

5%

15%

20%

1 (b) What is 0.9 as a percentage?

Circle your answer.

[1 mark]

0.009%

0.09%

9%

90%

2 There are 20 students.  
12 are boys.

What fraction are boys?

Circle your answer.

[1 mark]

$\frac{2}{3}$

$\frac{2}{5}$

$\frac{3}{5}$

$\frac{3}{4}$

- 3 Simplify  $x + 8x - 3x$   
Circle your answer.

[1 mark]

$5x$

$6x$

$7x$

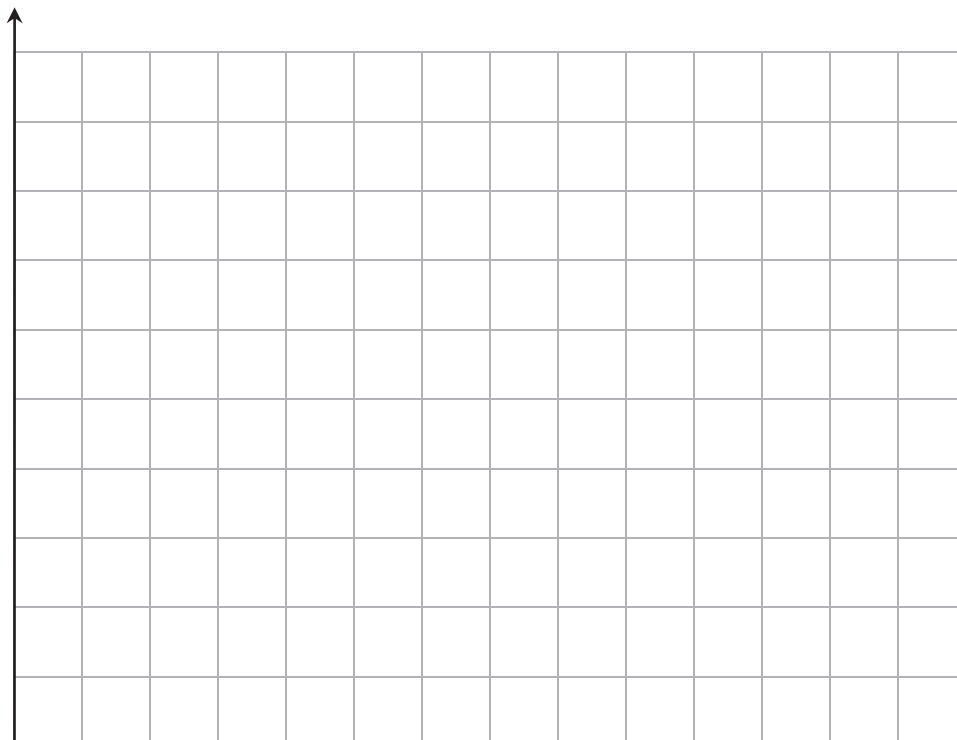
$12x$

- 4 The table shows how 25 students travel to school.

| Walk | Bus | Car | Taxi |
|------|-----|-----|------|
| 9    | 8   | 7   | 1    |

Draw a bar chart to show this information.

[4 marks]



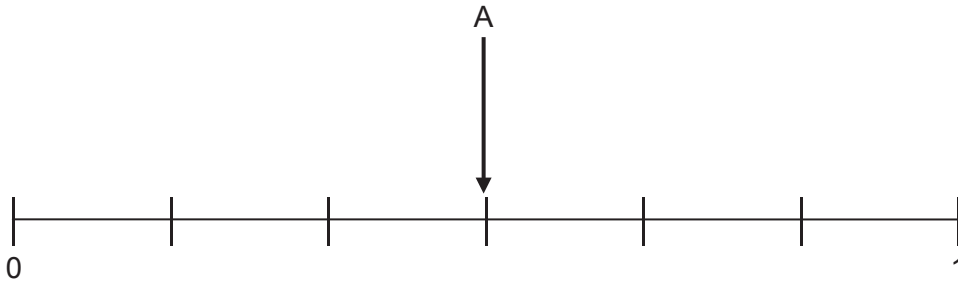
Q4 shows that questions testing AO2 (reason, interpret and communicate) can be relatively straightforward. Students need to take information and represent it in a different form which meets the communication strand of AO2. In this example, they also need to give suitable labels for both axes.

5 Here are three events for an ordinary fair dice.

- A Roll an odd number
- B Roll a number greater than 6
- C Roll an even number less than 3

Draw and label arrows to show the probabilities of events B and C on the probability scale.

**[2 marks]**





6 Work out  $23.7 - 2.5 \times 8$

[2 marks]

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Answer \_\_\_\_\_

7 Write these numbers in order starting with the smallest.

[1 mark]

2.3

2.33

2.03

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Answer \_\_\_\_\_

- 8 There are 20 counters in a bag.  
12 are red, 5 are green and the rest are white.

A counter is chosen at random.

Work out the probability that it is white.

[2 marks]

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Answer \_\_\_\_\_

- 9 On a school trip at least 1 teacher is needed for every 8 students.

Work out the **minimum** number of teachers for 130 students.

[3 marks]

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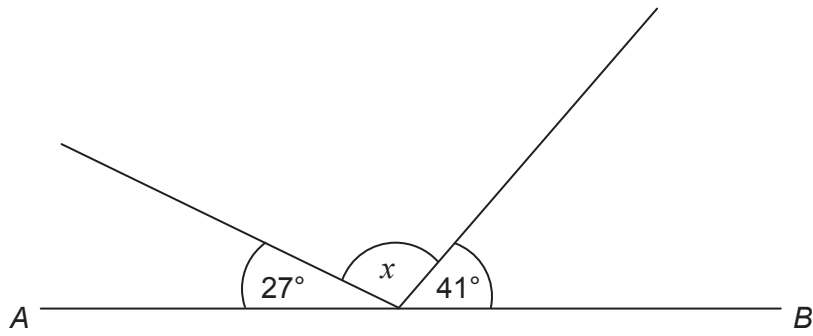
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Answer \_\_\_\_\_



Q9 requires students to realise that they are dealing with a ratio problem and they have to make sense of their calculation to give an answer that fits the context. This question has AO3 (problem solving) marks. We can assess AO3 in a way that is accessible to the majority of students.

10

Not drawn  
accurately

$AB$  is a straight line.

Work out the size of angle  $x$ .

[2 marks]

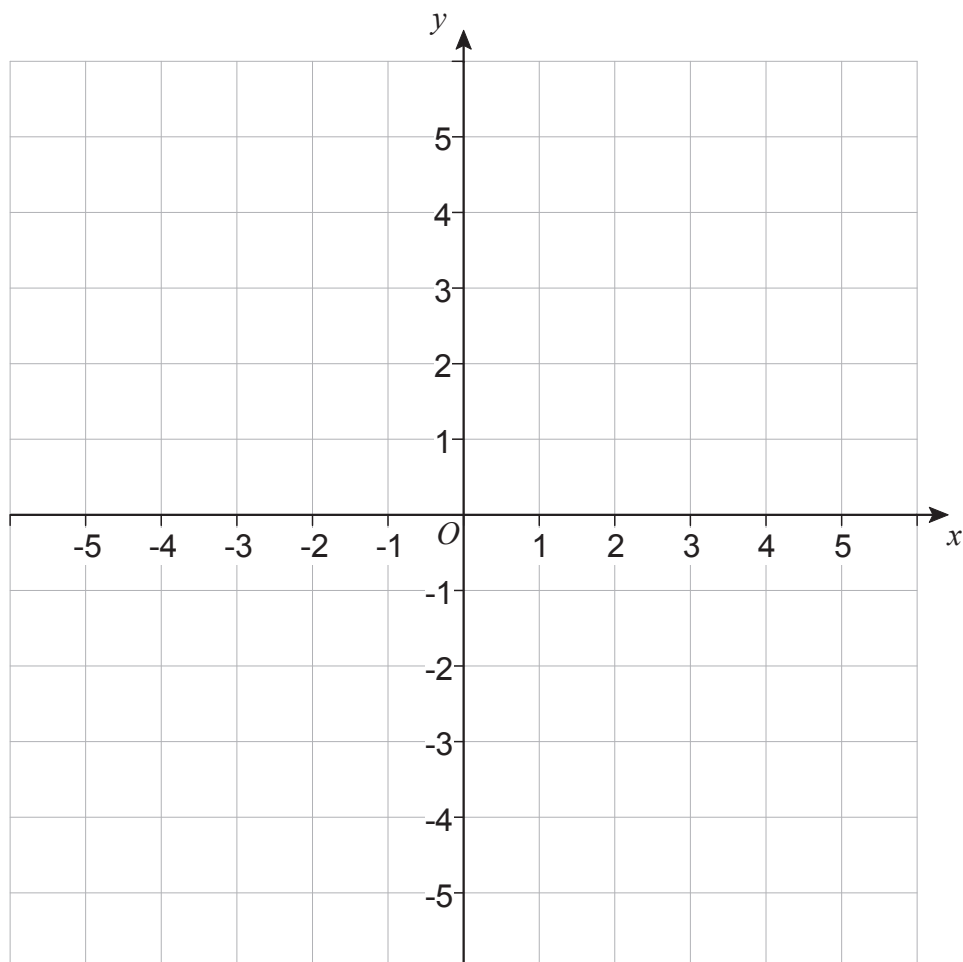
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Answer \_\_\_\_\_ degrees

Turn over for the next question

11 Here is a centimetre grid.



$A(3, 5)$ ,  $B(0, -3)$  and  $C(-5, 2)$  are three points.

What type of triangle is  $ABC$ ?

You **must** show your working which may be on the diagram.

**[2 marks]**

Answer \_\_\_\_\_

12 (a) Circle the value of  $2^4$

[1 mark]

6

8

16

24

12 (b) Circle the value of  $5^3$

[1 mark]

15

25

53

125

12 (c) Circle the value of  $\sqrt{144}$

[1 mark]

12

14

72

288

13 Solve  $4x - 3 = 17$

[2 marks]

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$x =$  \_\_\_\_\_

**14** Jon has 78p  
Nat has £3.52

Nat gives Jon some money so that they both have the same amount.

How much does Nat give Jon?

**[2 marks]**

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Answer £ \_\_\_\_\_

- 15** A cinema has  
37 rows of seats  
23 seats in each row.

Tickets are £8 each.

The cinema has sold tickets for every seat.

*i* Q15 is a problem set in a realistic but familiar context, which will help students visualise the problem.

- 15 (a)** The manager estimates that £6400 was made from these tickets.

Use approximations to show how the manager did this.

**[1 mark]**

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- 15 (b)** Work out the exact amount of money raised from ticket sales.

**[4 marks]**

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*i* Some marks in part (b) are given for the decisions made in working through the problem (AO3). Others are given for accurate calculation (AO1).

Answer £ \_\_\_\_\_

- 15 (c)** Use your answer to part (b) to check whether the manager's estimate was sensible.

**[1 mark]**

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*i* Part (c) is an AO2 mark awarded for a correct check of a given result. In this instance, the decision on the merit of the estimate can go either way as long as reasonable justification is given for that decision. This rewards students' reasoning skills (which is what is being tested).

16 Here is a map of France.



Scale: 1 cm represents 80 km



**16 (a)** What is the three-figure bearing of Lyon from Bordeaux?

Circle your answer.

**[1 mark]**

005°

085°

095°

175°

**16 (b)** Work out the actual straight-line distance from Paris to Marseille.

**[2 marks]**

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Answer \_\_\_\_\_ km

**Turn over for the next question**

- 17 Here is some information about a group of children.

|              | Boys | Girls |
|--------------|------|-------|
| Left-handed  | 3    | 8     |
| Right-handed | 12   | 20    |

- 17 (a) Write down the number of left-handed girls to right-handed girls as a ratio.  
Give your answer in its simplest form.

[1 mark]

Answer \_\_\_\_\_ : \_\_\_\_\_

- 17 (b) What percentage of the boys are left-handed?

[2 marks]

Answer \_\_\_\_\_ %

- 18 Liam says,

“If you divide any multiple of 10 by 2 the answer **always** ends in 5”

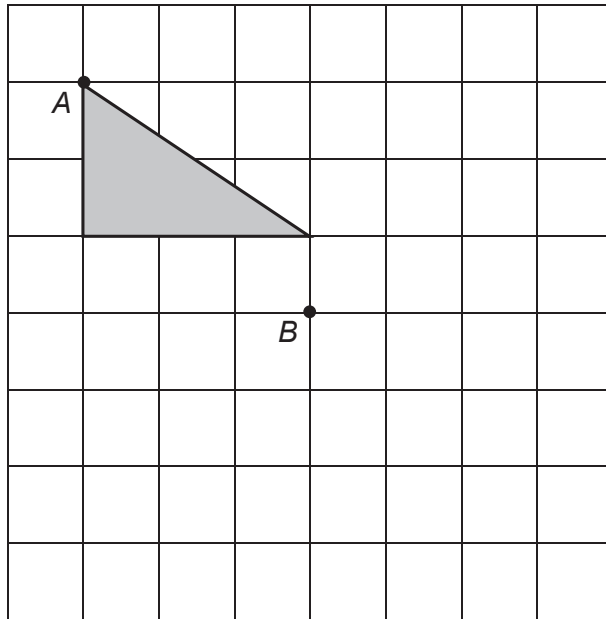
Is he correct?

Write down a calculation to support your answer.

[1 mark]

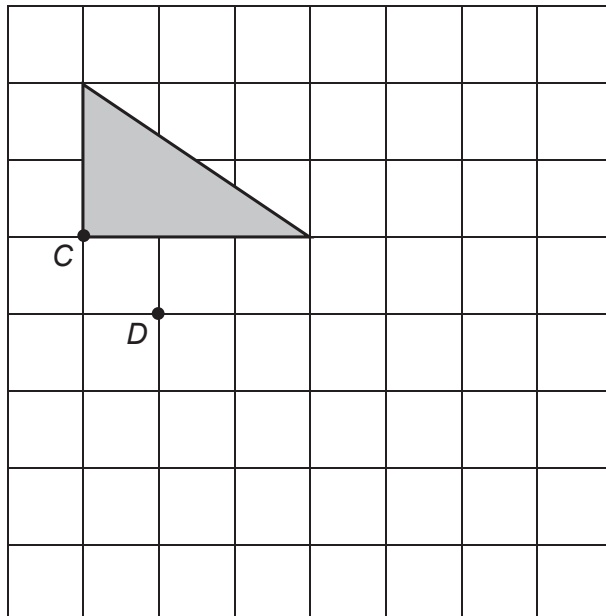
- 19 (a) Translate the triangle so that point  $A$  moves to point  $B$ .

[1 mark]



- 19 (b) Rotate the triangle  $90^\circ$  clockwise so that point  $C$  moves to point  $D$ .

[2 marks]



20 Here is a formula.

$$V = \frac{1}{2}x^2h$$

Work out the value of  $V$  when  $x = 11$  and  $h = 6$

[2 marks]

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Answer \_\_\_\_\_

21 Diaries are sold in boxes of 12

Pencils are sold in boxes of 10

Rulers are sold in boxes of 6

A teacher wants to buy the same number of diaries, pencils and rulers.

Work out the **smallest** number of boxes of each item he could buy.

[3 marks]

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\_\_\_\_\_ boxes of diaries

\_\_\_\_\_ boxes of pencils

\_\_\_\_\_ boxes of rulers

22 Which of  $\frac{2}{5}$  or  $\frac{5}{8}$  is closer in value to  $\frac{1}{2}$ ?

You **must** show your working.

[3 marks]

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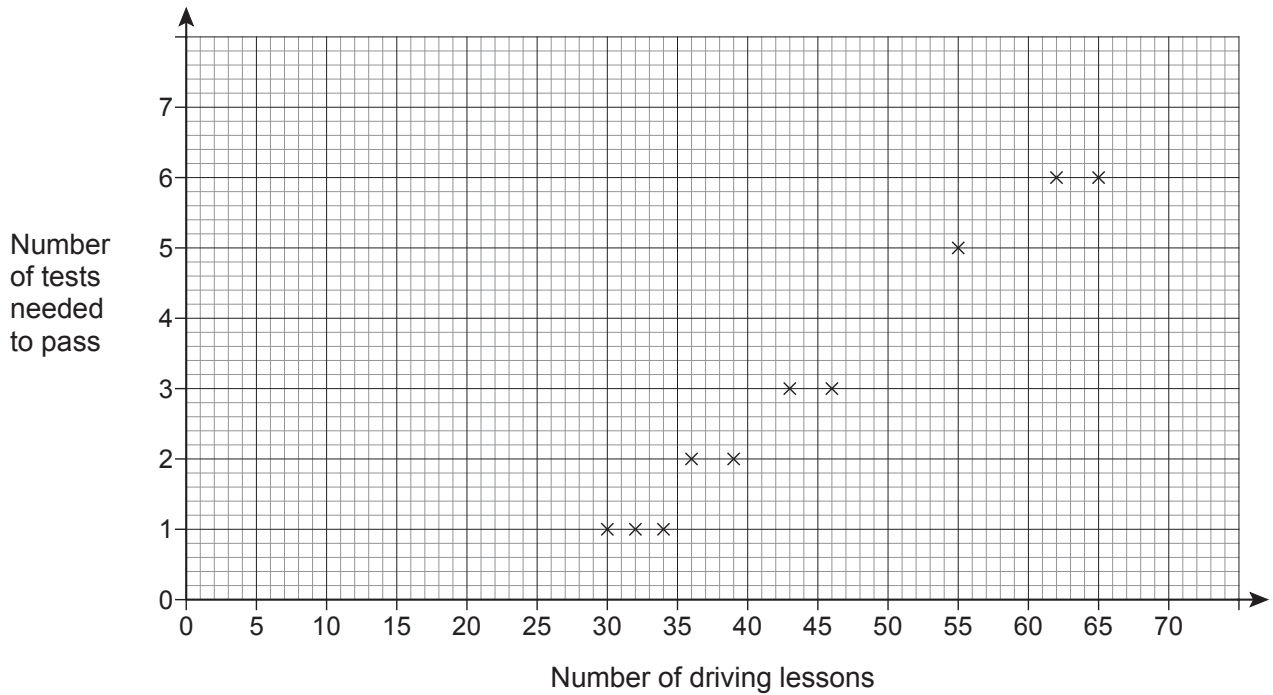
Answer \_\_\_\_\_

**Turn over for the next question**



Q22 is the first question in common with the higher tier, showing that we have reached the questions intended to discriminate between grades 4 and 5. This means we have the benefit of 21 questions designed just for Foundation students. This particular question assesses understanding of fractions and an ability to compare them. This can be done in various ways; changing the fractions to have a common denominator or converting them to decimals or percentages. Decisions have to be made about the method and the final comparison makes this an AO3 problem.

- 23** The scatter graph shows the number of driving lessons and the number of tests needed to pass by 10 people.



- 23 (a)** What proportion of the 10 people passed on their first test?

[1 mark]

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Answer \_\_\_\_\_

- 23 (b)** Describe the correlation.

Circle your answer.

[1 mark]

strong positive

weak positive

weak negative

strong negative



Q23 is a structured test of the understanding of scatter diagrams, some parts require sophisticated reasoning.

- 23 (c)** Use a line of best fit to estimate the number of tests needed to pass by a person who has 50 lessons.

**[2 marks]**

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Answer \_\_\_\_\_

- 23 (d)** Meera says,

“I can use the trend to predict the number of driving tests needed to pass for any number of driving lessons.”

Comment on her statement.

**[1 mark]**

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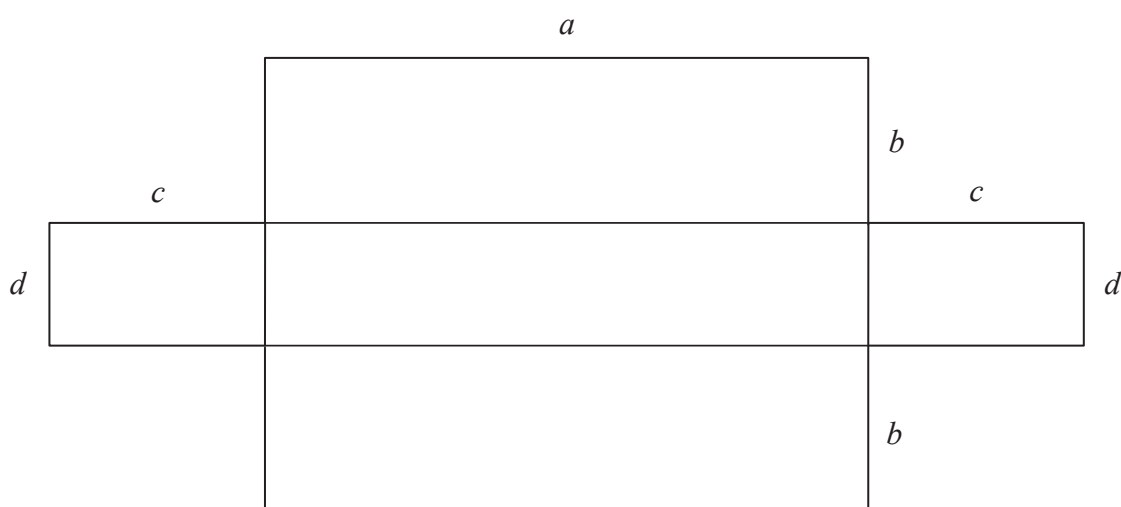
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**Turn over for the next question**

24 A shape is made from rectangles.

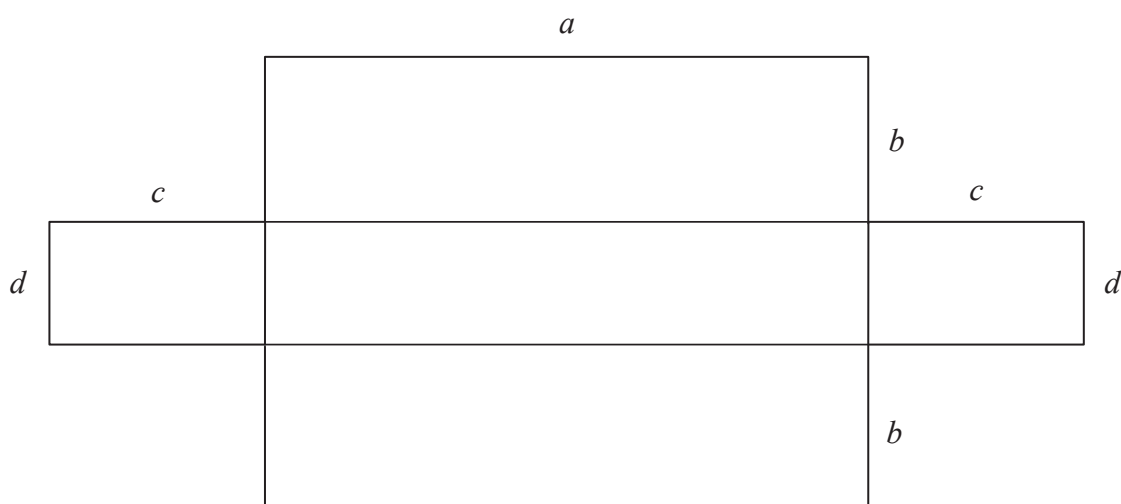
24 (a) On the diagram below shade an area represented by the expression  $ab$

[1 mark]



24 (b) On the diagram below shade an area represented by the expression  $ad + cd$

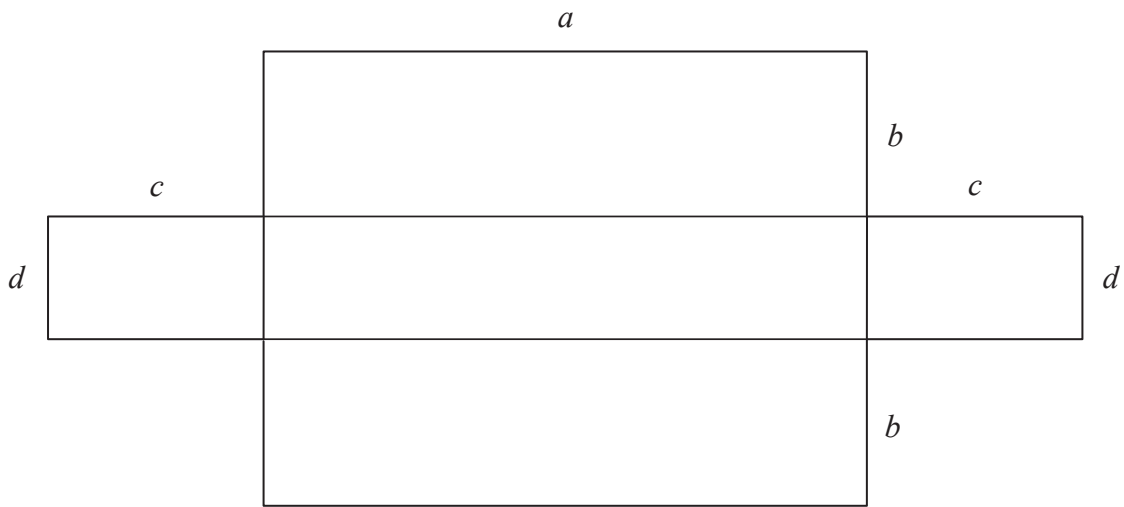
[1 mark]



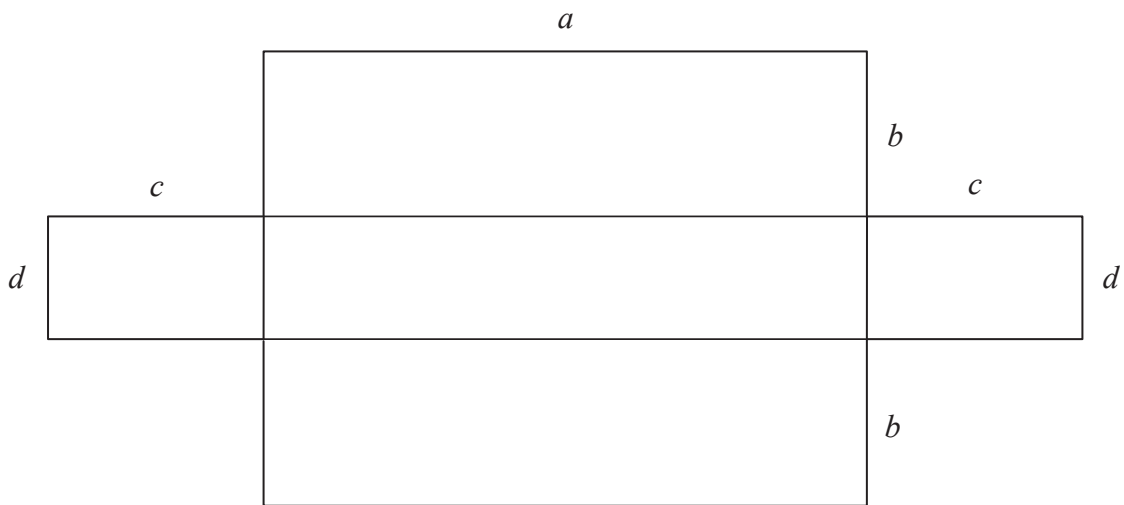
*i* Q24 assesses algebraic concepts and notation in a geometrical context.



- 24 (c) On the diagram below shade the area represented by the expression  $d(a + 2c)$  [1 mark]



- 24 (d) Write down an expression for the area of the whole shape. [1 mark]



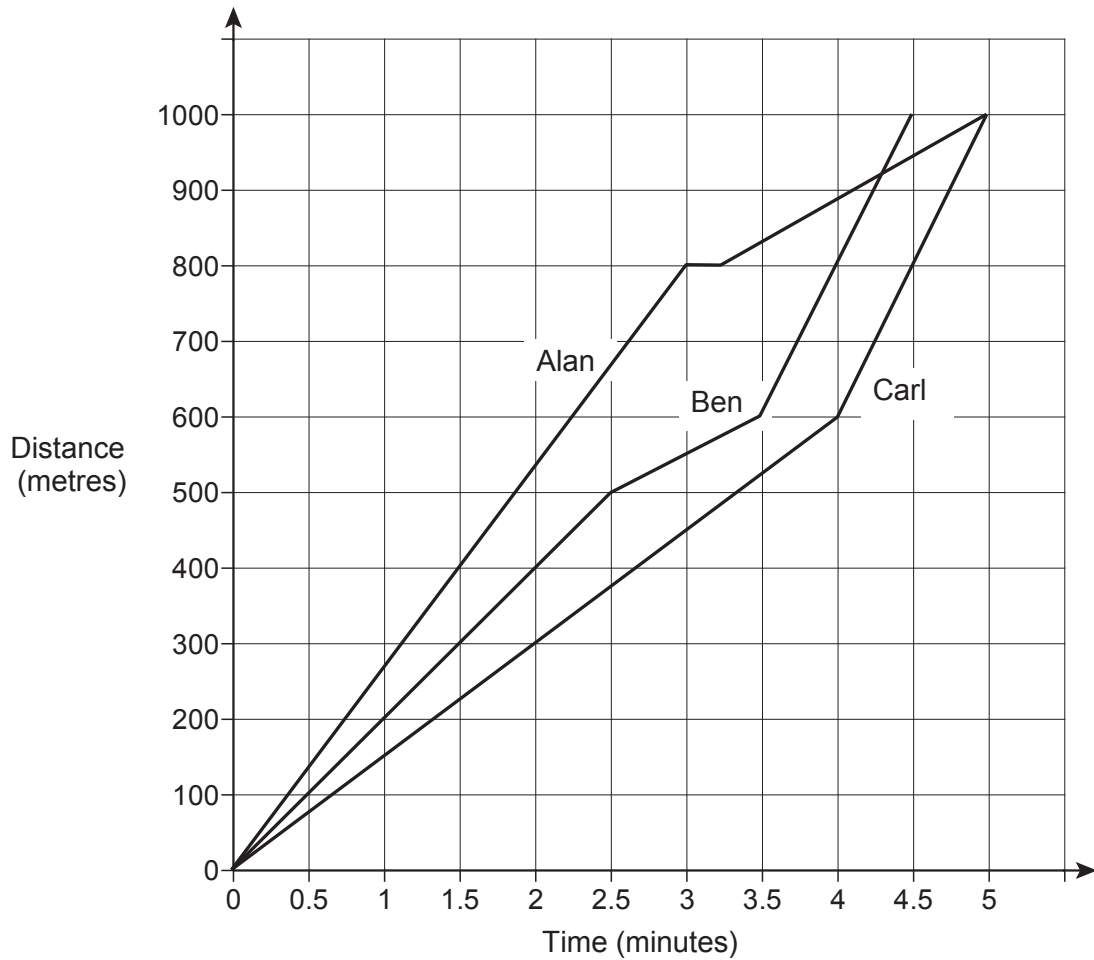

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Answer \_\_\_\_\_

- 25** Alan, Ben and Carl ran a 1000 metre race.  
The distance-time graph shows the race.



- 25 (a)** Who won the race?  
Give a reason for your answer.

**[1 mark]**

Answer \_\_\_\_\_

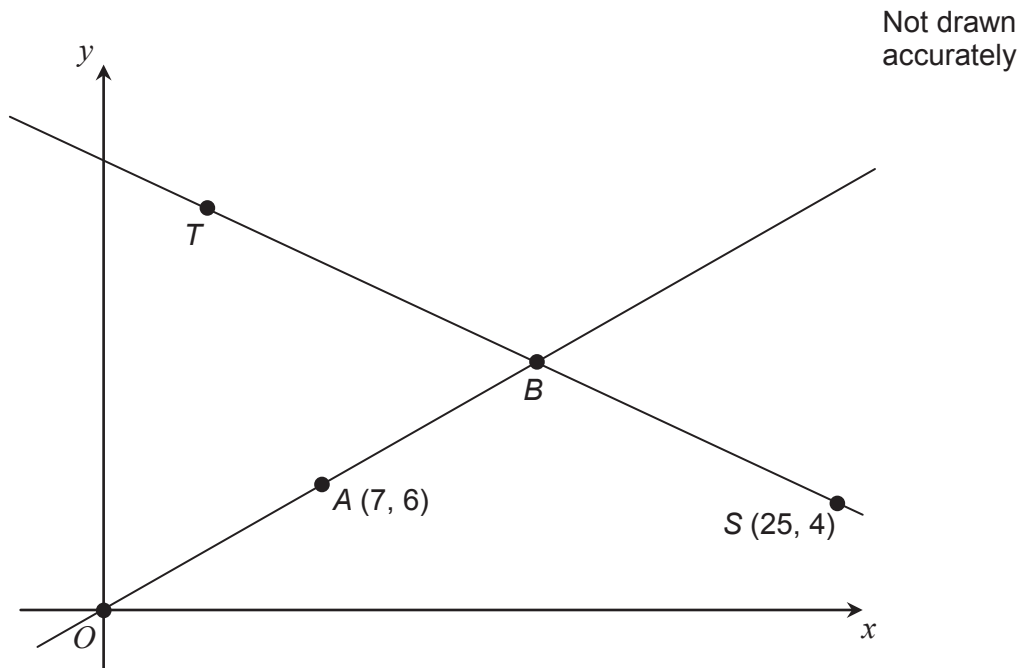
Reason \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



- 26** Two straight lines are shown.  
 A is the midpoint of  $OB$ .  
 B is the midpoint of  $TS$ .



Work out the coordinates of  $T$ .

[3 marks]

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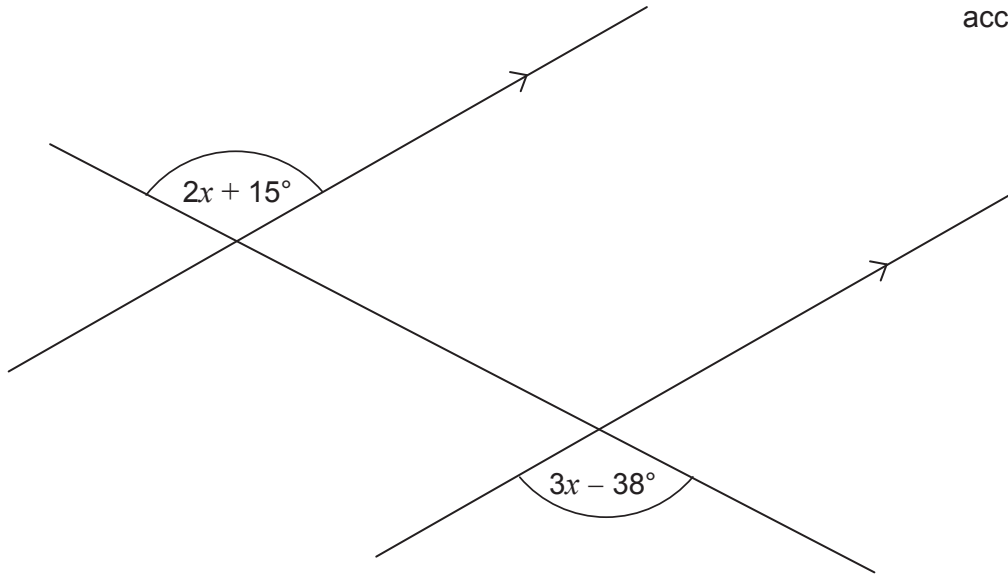
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Answer ( \_\_\_\_\_ , \_\_\_\_\_ )

**i** Q26 is a problem where students need to connect ideas about simple coordinate geometry and decide on their own strategy.

27

Three straight lines are shown.

Not drawn  
accuratelyWork out the value of  $x$ .**[3 marks]**

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Answer \_\_\_\_\_

28

$$2x + 3y = 15.5$$

$$x + y = 6$$

Work out the values of  $x$  and  $y$ .

**[3 marks]**

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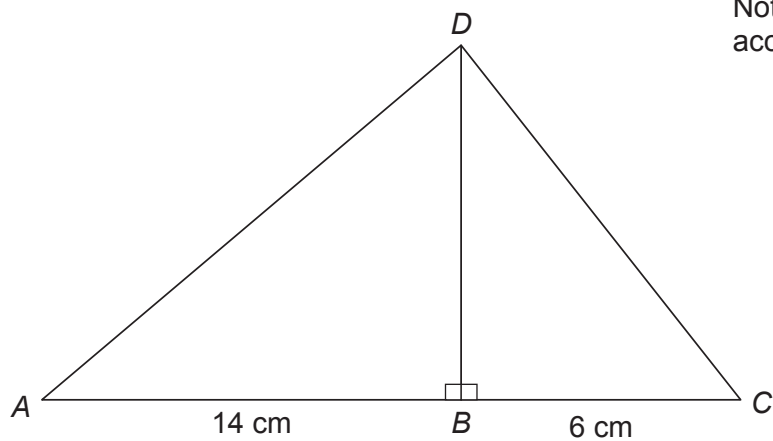
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$$x = \underline{\hspace{10em}}$$

$$y = \underline{\hspace{10em}}$$

- 29 In the diagram the area of triangle  $ABD$  is  $56 \text{ cm}^2$



Not drawn  
accurately

Work out the length of  $CD$ .

[4 marks]

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Answer \_\_\_\_\_ cm

**END OF QUESTIONS**

*i* The final questions are designed to differentiate between those worthy of a grade 4 and those worthy of a grade 5. They are challenging for Foundation, but we are very careful to make sure that we minimise wording. This means that those students who can do this maths see what they have to do and don't get sidetracked by unnecessary context or structure.





# Paper 2

## Foundation Tier

# GCSE MATHEMATICS (8300/2F)

# F

Paper 2 Foundation tier

Specimen 2015

Morning

Time allowed: 1 hour 30 minutes

### Materials

For this paper you must have:

- a calculator
- mathematical instruments.



### Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the bottom of this page.
- Answer **all** questions.
- You must answer the questions in the space provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

### Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer booklet.

Please write clearly, in block capitals, to allow character computer recognition.

Centre number       Candidate number

Surname

Forename(s)

Candidate signature \_\_\_\_\_

Answer **all** questions in the spaces provided.

**1** How many grams are there in 2.5 kilograms?

Circle your answer.

**[1 mark]**

0.0025

250

2005

2500

**2** Which of these can be written as  $\frac{a}{b}$  ?

Circle your answer.

**[1 mark]**

$b \div a$

$a - b$

$a \div b$

$b - a$

**3** Solve  $3x = 36$

Circle your answer.

**[1 mark]**

$x = 6$

$x = 12$

$x = 33$

$x = 108$

4 What is the value of the digit 7 in 3.72?

Circle your answer.

[1 mark]

$$\frac{1}{70}$$

$$\frac{7}{10}$$

$$\frac{1}{7}$$

$$\frac{7}{100}$$

5 Write down all the factors of 18

[2 marks]

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Answer \_\_\_\_\_

**6** A hotel charges

£59 per night for a room

£6.95 for breakfast

£12.50 for an evening meal.

Liz stays at the hotel for 5 nights.

She has 3 breakfasts and 1 evening meal.

How much does she pay altogether?

**[4 marks]**

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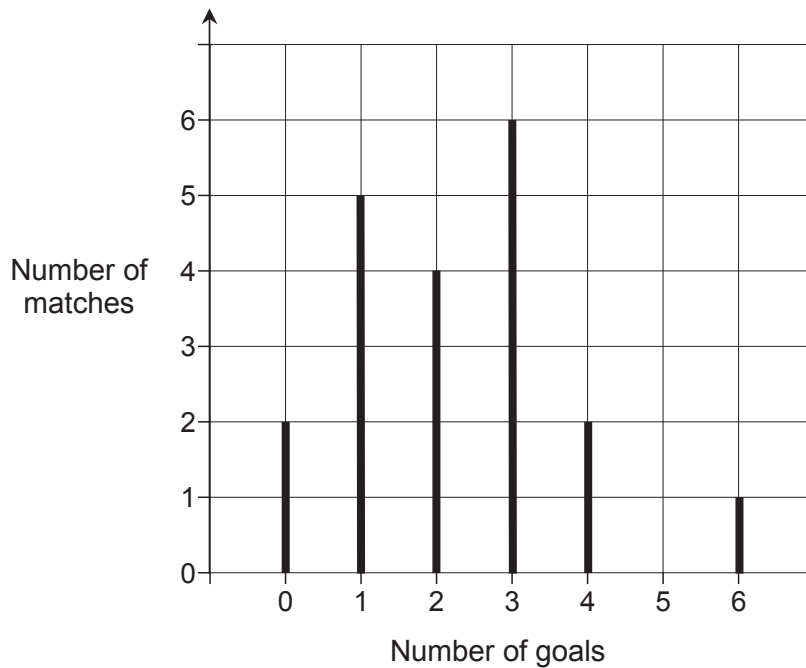
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Answer £ \_\_\_\_\_



Q6 is a good example of a new AO1 question, which would have previously been considered an AO2. The question is clearly multi-step and in context but does not have any significant element of problem solving or mathematical communication and as such is a set of routine steps.

- 7 The line graph shows the number of goals scored by a hockey team.



*i* Q7 is a familiar test of interpreting a statistical diagram. Although AO2, many students will be comfortable working through it.

- 7 (a) Which number of goals is the mode?

[1 mark]

Answer \_\_\_\_\_

- 7 (b) How many matches did the hockey team play altogether?

[2 marks]

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Answer \_\_\_\_\_

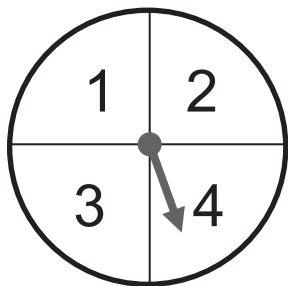
- 7 (c) In one of the matches, this team won by 5 goals.

What was the score in that match?

[1 mark]

Answer \_\_\_\_\_

- 8 A game is played with a fair spinner.



*i* Q8 is also AO2, with part (b) specifically testing the part of that Assessment Objective that refers to 'assessing the validity of an argument'. Notice the subtle difference between this part and Q12b, which is AO3, and meets the requirement to 'evaluate solutions to identify how they may have been affected by assumptions made'.

The player spins the spinner **twice**.

The score is the difference between the two numbers.

- 8 (a) Complete the table to show the scores.

[2 marks]

|             |   | First spin |   |   |   |
|-------------|---|------------|---|---|---|
|             |   | 1          | 2 | 3 | 4 |
| Second spin | 1 |            |   | 2 |   |
|             | 2 |            |   |   |   |
|             | 3 | 2          |   |   |   |
|             | 4 |            |   |   |   |

- 8 (b) The player **loses** if the score is 0 or 1  
The player **wins** if the score is 2 or 3

Amy says,

“Two scores win and two scores lose, so the chance of winning is evens.”

Is Amy correct?

Tick a box.

Yes  No

Give a reason for your answer.

[2 marks]

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- 9 A drink is mixed in the ratio

lemonade : orange : cranberry = 6 : 3 : 2

What fraction is orange?

Circle your answer.

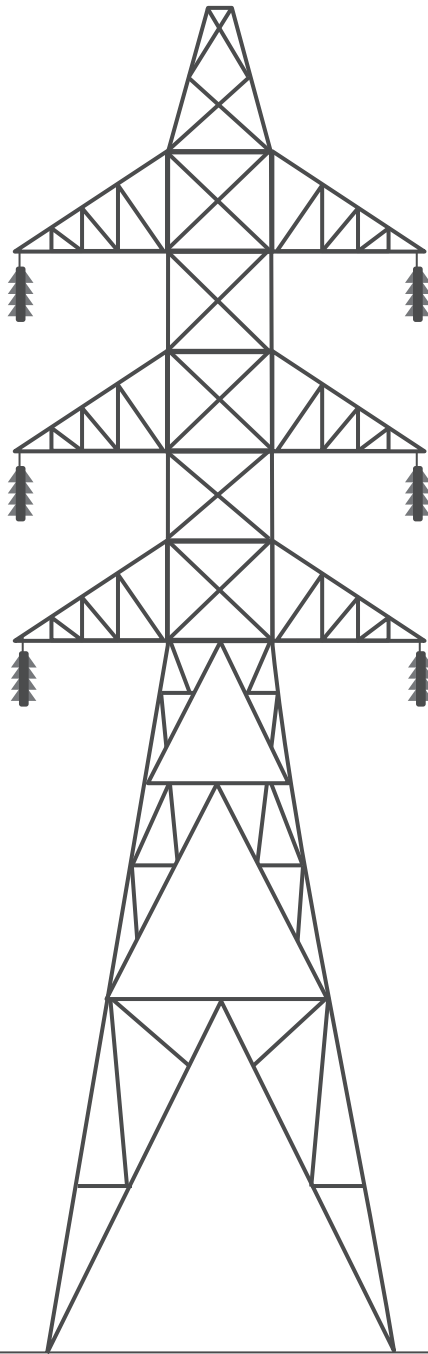
[1 mark]

$\frac{3}{8}$        $\frac{2}{11}$        $\frac{3}{11}$        $\frac{6}{11}$

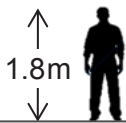


10

Drawn to scale



*i* Q10 assesses the AO2 skill of making an inference (rather than a deduction) from given information. The subtle difference between these two strands of AO2 is that a deduction must be absolute and correct, while an inference is only likely to be correct. Again we see the benefit of AO2 being set in a scenario which students will find familiar.



Use the height of the man to estimate the height of the pylon.

**[2 marks]**

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Answer \_\_\_\_\_ metres

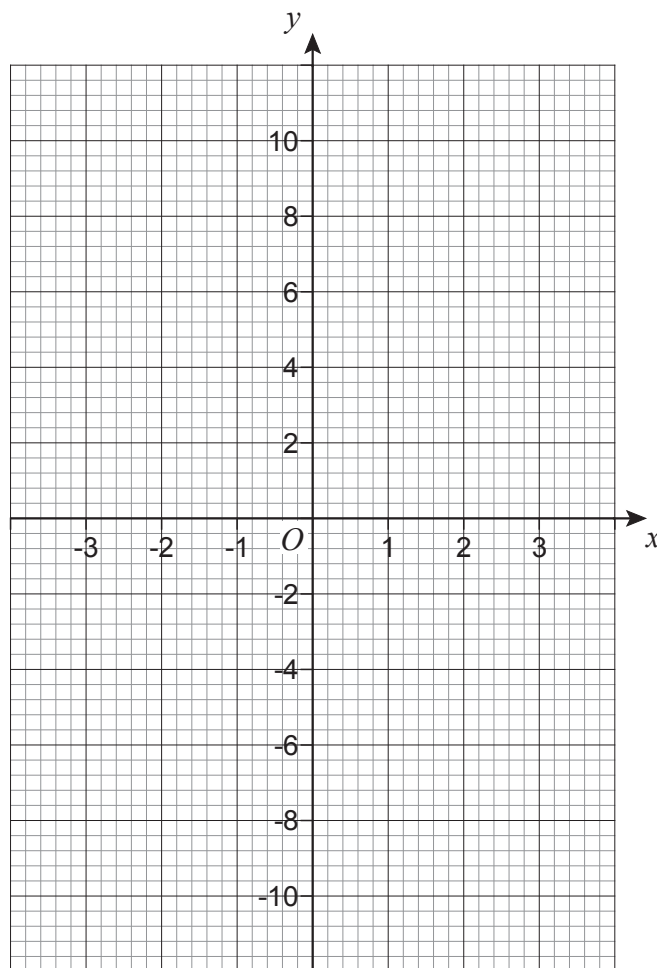
11 (a) Complete the table for  $y = 3x + 1$

[2 marks]

|     |    |    |    |   |   |   |   |
|-----|----|----|----|---|---|---|---|
| $x$ | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| $y$ | -8 |    | -2 |   | 4 |   |   |

11 (b) On the grid draw the graph of  $y = 3x + 1$  for values of  $x$  from -3 to 3

[2 marks]



11 (c) Solve  $x = 3x + 1$

[2 marks]

$x =$  \_\_\_\_\_

- 12** Jody's pay is £315 per week.  
She works for  $37\frac{1}{2}$  hours per week.

- 12 (a)** Work out her **hourly** rate of pay.

[2 marks]

---



---

Answer £ \_\_\_\_\_

- 12 (b)** Jody wants to work out her **yearly** pay.

She says,

“There are 4 weeks in a month, so I will multiply £315 by 4

There are 12 months in a year, so I will multiply the answer by 12

$£315 \times 4 \times 12 = £15\ 120$ ”

Does her method give the correct amount for her yearly pay?

Tick a box.

No, her yearly  
pay is more

Yes

No, her yearly  
pay is less

Show working to support your answer.

[2 marks]

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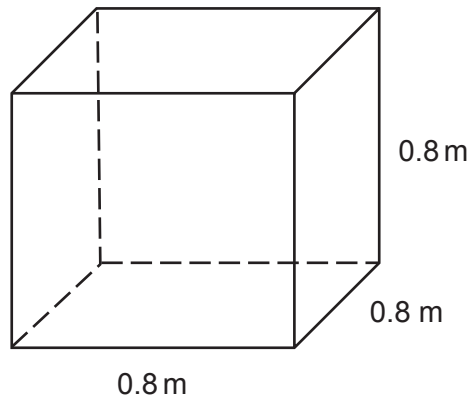


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- 13 A cube has edges of length 0.8 metres.



Work out its volume in **cubic centimetres**.

[2 marks]

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Answer \_\_\_\_\_  $\text{cm}^3$

- 14 Three whole numbers have a total of 100  
The first number is a multiple of 15  
The second number is ten times the third number.

Work out the three numbers.

[3 marks]

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Answer \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**15** Kim pays the same amount for each song she downloads.

In March she pays £35.60 for 40 songs.

In April she pays £66.75

How many songs did she download in April?

**[2 marks]**

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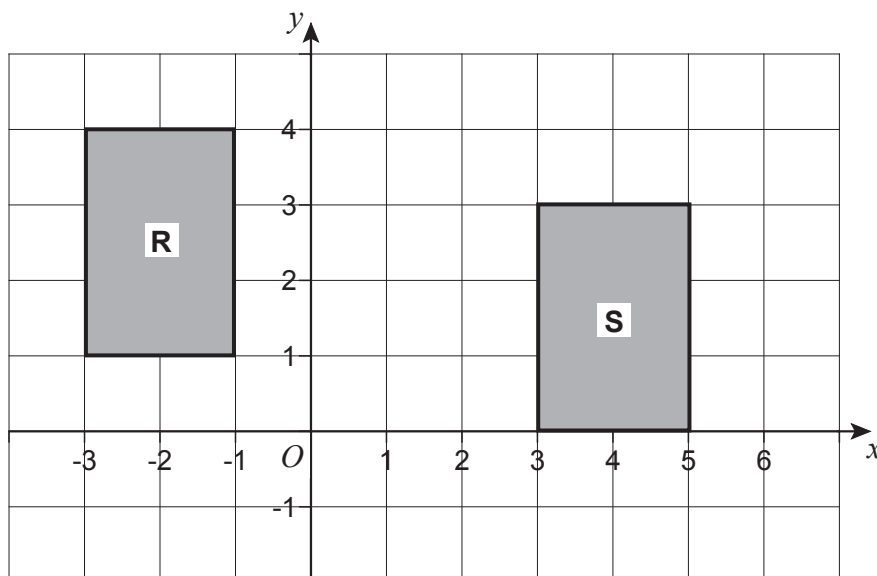
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Answer \_\_\_\_\_

**16**



Circle the vector that translates shape **R** to shape **S**.

**[1 mark]**

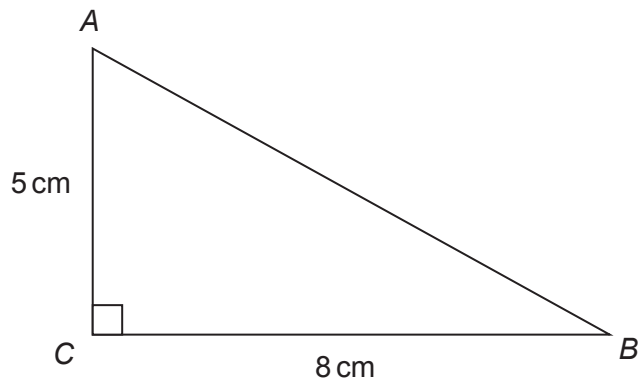
$$\begin{pmatrix} 1 \\ -6 \end{pmatrix}$$

$$\begin{pmatrix} 6 \\ -1 \end{pmatrix}$$

$$\begin{pmatrix} -1 \\ 6 \end{pmatrix}$$

$$\begin{pmatrix} -6 \\ 1 \end{pmatrix}$$

17

Not drawn  
accurately17 (a) How long is side  $AB$ ?

Tick a box.

[1 mark]

Between 5 cm and 8 cm

8 cm

Between 8 cm and 13 cm

More than 13 cm

17 (b) Work out the area of triangle  $ABC$ .

[1 mark]

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Answer \_\_\_\_\_  $\text{cm}^2$

- 18** I am thinking of a prime number.  
Its digits add up to a square number.

Write down a prime number that I could be thinking of.

**[2 marks]**

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Answer \_\_\_\_\_

- 19 Toilet rolls come in packs of 4 and 9



£1.89



£3.99

Which pack is better value?

You **must** show your working.

[3 marks]

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Answer \_\_\_\_\_

**Turn over for the next question**

*i* Q19 is a typical 'better value' question which, in the new specification, has elements of both AO2 and AO3 – constructing a chain of reasoning and interpreting the result in the context of the problem. It is an important aspect of the assessment where students show that they can set out their working clearly, systematically and coherently. These questions always have a multitude of possible approaches and these will all be rewarded by the structure of and the principles within the mark scheme.



**20** Increase 4200 by 38%

**[2 marks]**

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Answer \_\_\_\_\_

**21** The table shows information about journeys A and B.

Complete the table.

**[2 marks]**

|          | <b>Distance travelled</b> | <b>Time taken</b> | <b>Average speed</b> |
|----------|---------------------------|-------------------|----------------------|
| <b>A</b> | 32 miles                  |                   | 64 mph               |
| <b>B</b> |                           | 1 hour 20 minutes | 42 mph               |

22

50 people took a test.

Before the test, they predicted whether they would pass or fail.

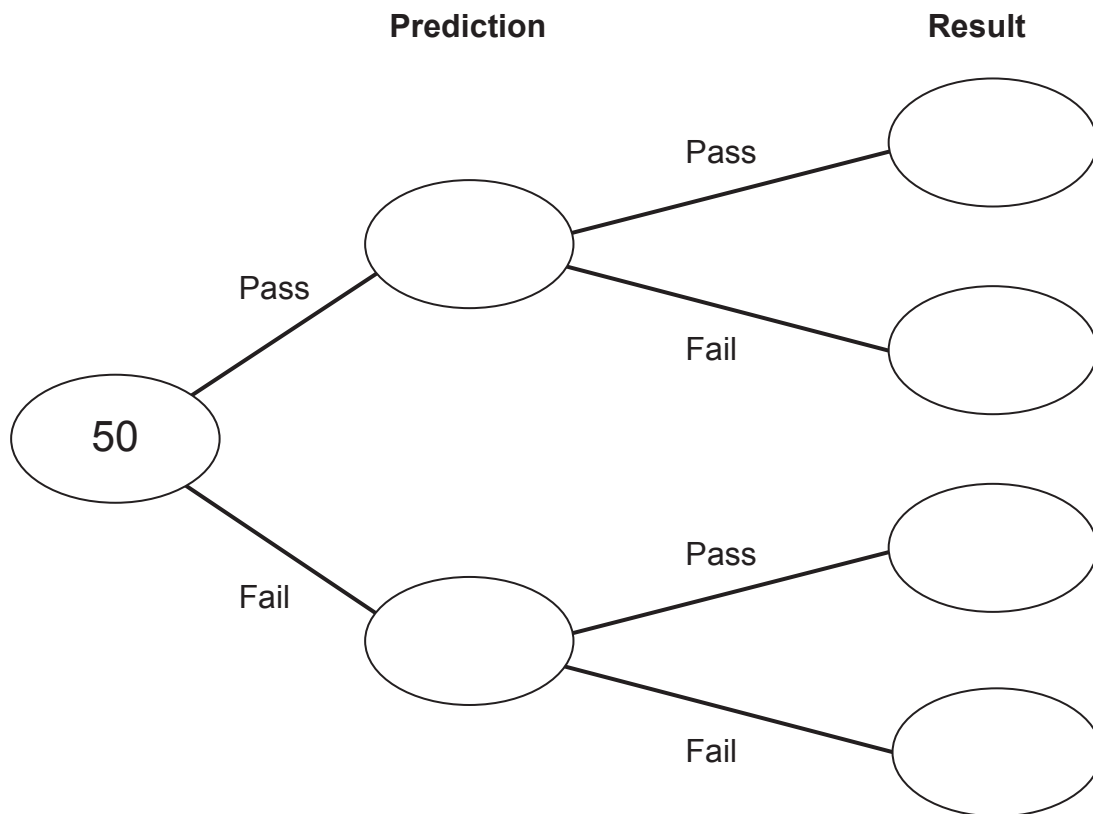
30 people predicted they would pass.

26 of the people who predicted they would pass did pass.

37 people passed altogether.

Complete the frequency tree.

[2 marks]



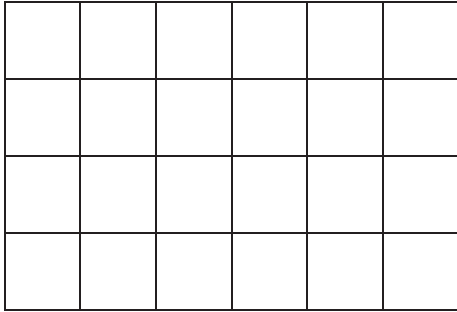
**Turn over for the next question**



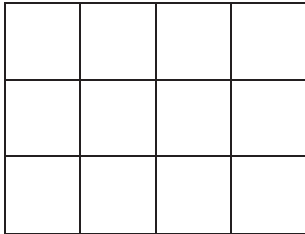
Q22 shows how we might test the new topic of frequency trees. You'll see detailed guidance related to expectations of different content references in the Teaching Guidance document, which is part of our free resource package, available to all AQA centres. We can see the benefit of the experience of our writing team who can take new content and immediately set it in an accessible way.

**23** A solid cuboid is made from **centimetre cubes**.

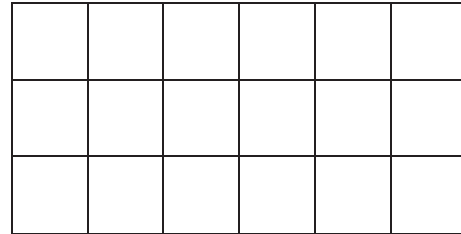
The plan view, front elevation and side elevation are shown.



Plan view



Front elevation



Side elevation

How many centimetre cubes were used to make the cuboid?

**[2 marks]**

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Answer \_\_\_\_\_

- 24** The times that 80 customers waited at a supermarket checkout are shown.

| Time, $t$ (minutes) | Frequency |
|---------------------|-----------|
| $0 \leq t < 2$      | 32        |
| $2 \leq t < 4$      | 19        |
| $4 \leq t < 6$      | 20        |
| $6 \leq t < 8$      | 7         |
| $8 \leq t < 10$     | 2         |

- 24 (a)** In which class interval is the median?

Circle your answer.

[1 mark]

$0 \leq t < 2$

$2 \leq t < 4$

$4 \leq t < 6$

$6 \leq t < 8$

- 24 (b)** The manager of the supermarket says,

“90% of our customers wait less than 6 minutes.”

Does the data support this statement?

You **must** show your working.

[2 marks]

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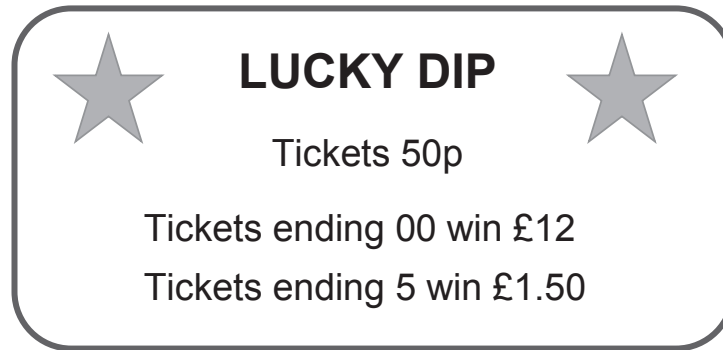
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Answer \_\_\_\_\_

25 Tomas ran a Lucky Dip stall.



There were 750 tickets, numbered 1 to 750

Tomas sold **all** the winning tickets, and **some** of the losing tickets.

He made a profit of £163

How many **losing** tickets did he sell?

[6 marks]

*i* No question has more than 6 marks in our papers, Q25 is an example of that maximum mark tariff. This is a problem to solve with a lot to do, but one where we hope most students will be able to make some progress.

You may notice that many questions carry a lower maximum mark than in the past. For example:

- a standard question may have been given 3 marks in the past, but experience tells us that almost all students get either 0, 1 or 3, so we may now make it a 2 mark question. Similarly, on recent papers Q17b (area of a triangle) would have been marked as M1, A1, with almost all students scoring 0 or 2. This is now a 1 mark question.
- a problem solving question may have featured a number of marks for accurate calculations in the past. Such marks are now required to be classed as AO1. The mark scheme concentrates on awarding marks for decision making and method choice with perhaps only a single mark for accuracy. In this way, we are properly testing problem solving skills and not risking AO1 marks being 'lost' in a problem.
- the main benefits of doing this are to enable students to display as much of their knowledge and their skills as possible. Too few questions and/or too many high tariff questions will make the assessment less reliable and student performance will vary much more from paper to paper. We think having around 30 questions on each of our papers is a huge positive and will enable students to really show what they know.

Answer \_\_\_\_\_

26 Here are two column vectors.

$$\mathbf{f} = \begin{pmatrix} 4 \\ 5 \end{pmatrix} \quad \mathbf{g} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$$

Work out  $3\mathbf{f} - 2\mathbf{g}$

[2 marks]

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Answer \_\_\_\_\_

**Turn over for the next question**

 Questions 26, 28, 29 and 31 show how we will test material new to Foundation in a way that is realistic for the tier, with the (minimal) context in Q31 perhaps helping students to understand and respond to the question.

27 Write 280 as a product of its prime factors.

[2 marks]

Answer \_\_\_\_\_

28 Expand and simplify  $(y + 5)(y - 4)$

[2 marks]

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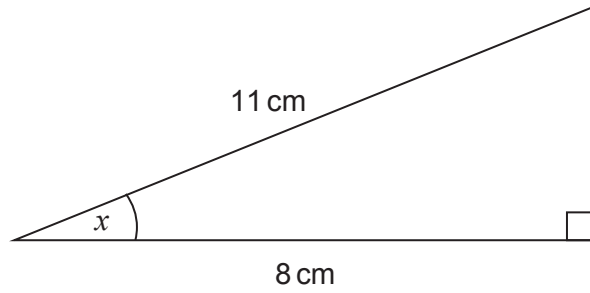
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Answer \_\_\_\_\_

- 29 (a) Work out the size of angle  $x$ .

Not drawn  
accurately



[2 marks]

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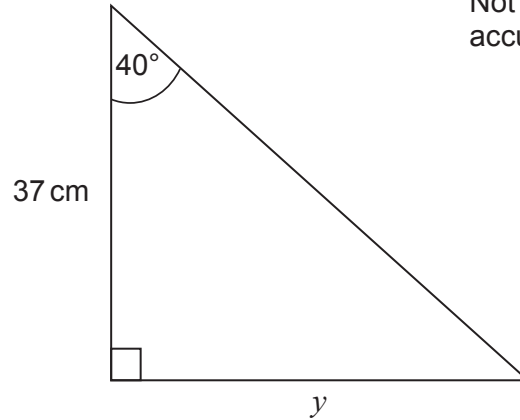


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Answer \_\_\_\_\_ degrees

- 29 (b) Work out length  $y$ .

Not drawn  
accurately



[2 marks]

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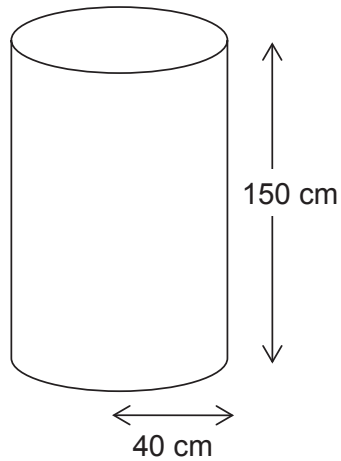
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Answer \_\_\_\_\_ cm



30

A water tank is a cylinder with radius 40 cm and depth 150 cm



Not drawn  
accurately

It is filled at the rate of 0.2 litres per second.

1 litre = 1000 cm<sup>3</sup>

Does it take longer than 1 hour to fill the tank?

You **must** show your working.

[4 marks]

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Answer \_\_\_\_\_

- 31** The value of a second-hand car is £8000  
Each year it loses 20% of its value at the start of that year.  
Work out its value in 5 years time.

**[3 marks]**

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Answer £ \_\_\_\_\_

**END OF QUESTIONS.**

**There are no questions printed on this page**

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**

# Paper 3

## Foundation Tier

# GCSE MATHEMATICS (8300/3F)

# F

Paper 3 Foundation tier

Specimen 2015

Morning

Time allowed: 1 hour 30 minutes

**Materials**

For this paper you must have:

- a calculator
- mathematical instruments.



**Instructions**

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the bottom of this page.
- Answer **all** questions.
- You must answer the questions in the space provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

**Information**

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer booklet.

Please write clearly, in block capitals, to allow character computer recognition.

Centre number

Candidate number

Surname

Forename(s)

Candidate signature \_\_\_\_\_

Answer **all** questions in the spaces provided.

- 1 Circle the decimal that has the same value as  $\frac{4}{5}$

[1 mark]

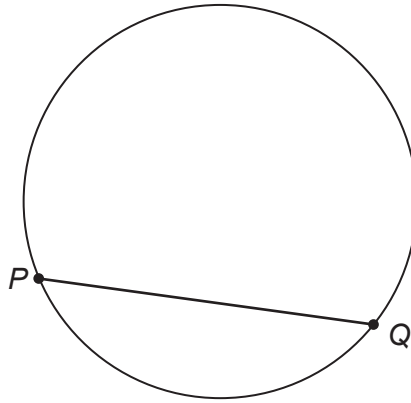
0.04

0.4

0.45

0.8

- 2 Circle the word that describes the straight line  $PQ$ .



[1 mark]

chord

diameter

radius

tangent

**3**  $x = 2500$  to the nearest 100

Circle the smallest possible value of  $x$ .

**[1 mark]**

2449

2450

2495

2499

**4** What is one quarter of 5 hours?

Tick a box.

**[1 mark]**

1 hour 15 minutes

115 minutes

1 hour 25 minutes

125 minutes

**Turn over for the next question**

5 Simplify  $6w - 5x - 4w - 2x$

[2 marks]

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Answer \_\_\_\_\_

6 Beth uses these four cards to make 4-digit numbers.



How many **different** 4-digit numbers can she make that are greater than 8000?

[2 marks]

Answer \_\_\_\_\_



Q6 has one of the marks allocated to AO3 for 'translate problems from mathematical contexts into a process'. We haven't included working lines, as an open response space is more suitable for this question. In some cases we have opted for faint ruled lines for many questions which allows those who want it, the structure for their response. Not having any lines for standard questions leaves students completely in the dark about how long a possible response might be. This use of background lines is a real benefit to students.

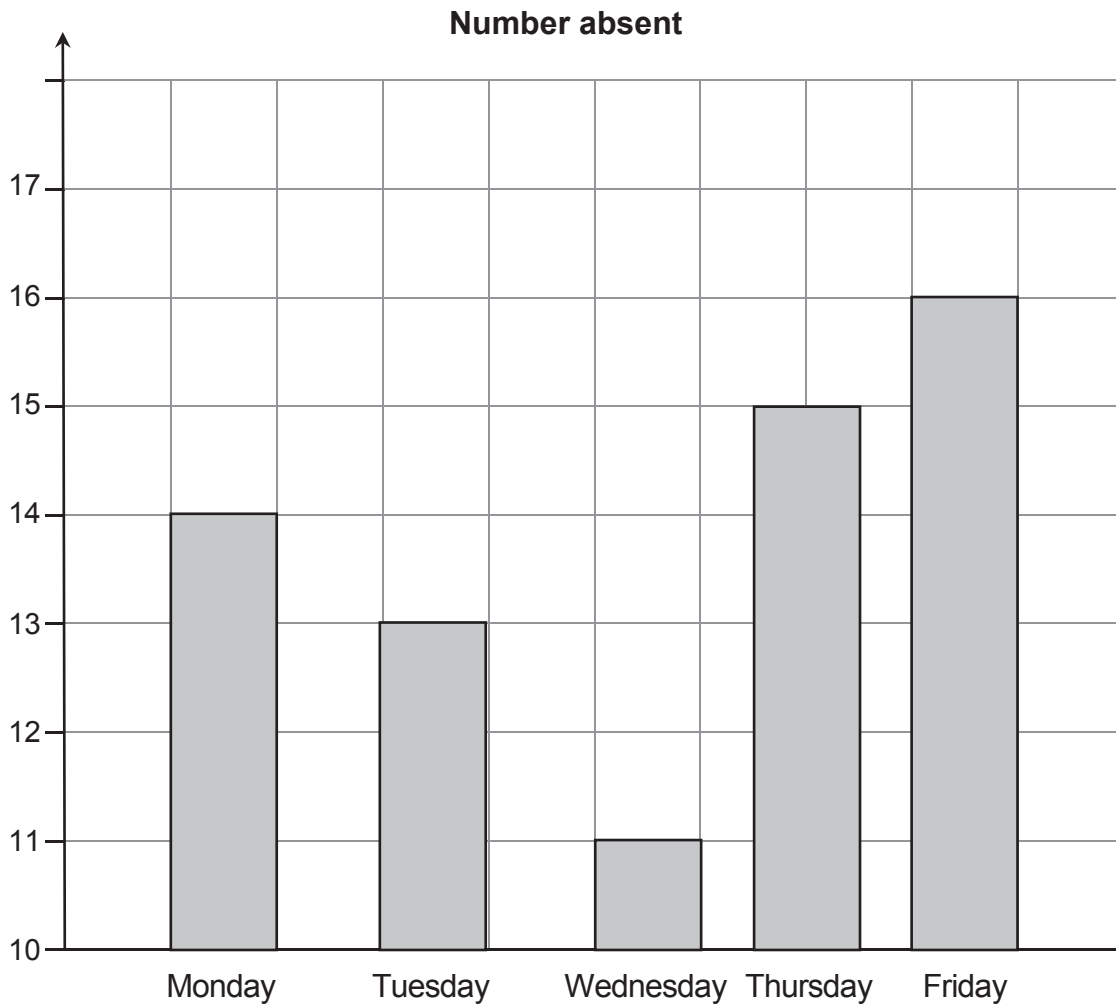
One of the specific elements in AO2 is the need to be able to show the skill of 'critically evaluating a given way of presenting information'. Q7 shows how we can test this using a misleading or erroneous statistical diagram. These prepare students well for the real world of data and its use in the media.



- 7 The table shows the number of Year 11 students who were absent in one week.

|               | Monday | Tuesday | Wednesday | Thursday | Friday |
|---------------|--------|---------|-----------|----------|--------|
| Number absent | 14     | 13      | 11        | 15       | 16     |

Jack uses this information to draw a bar chart.



Write down **two** mistakes that he has made.

**[2 marks]**

Mistake 1 \_\_\_\_\_

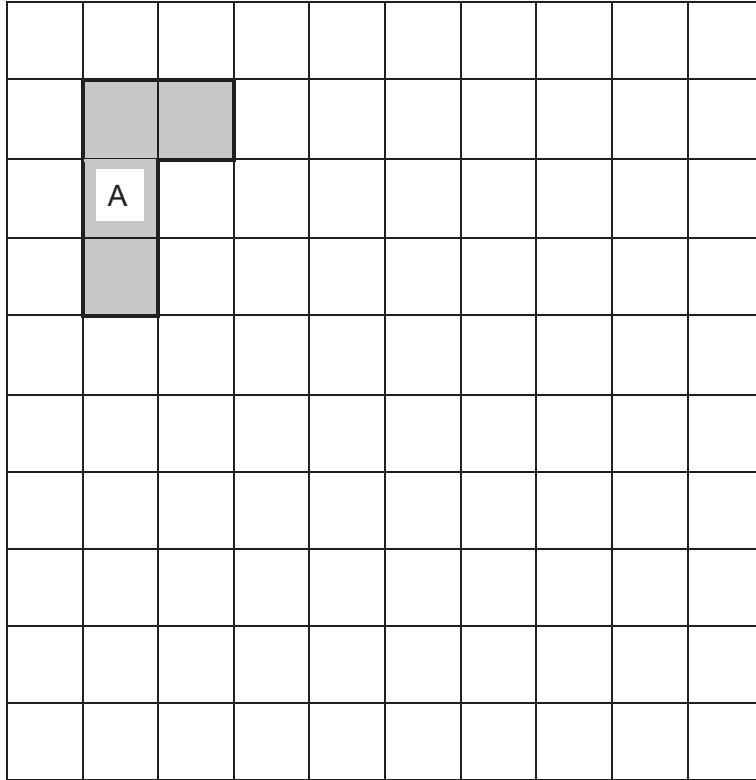
\_\_\_\_\_

Mistake 2 \_\_\_\_\_

\_\_\_\_\_

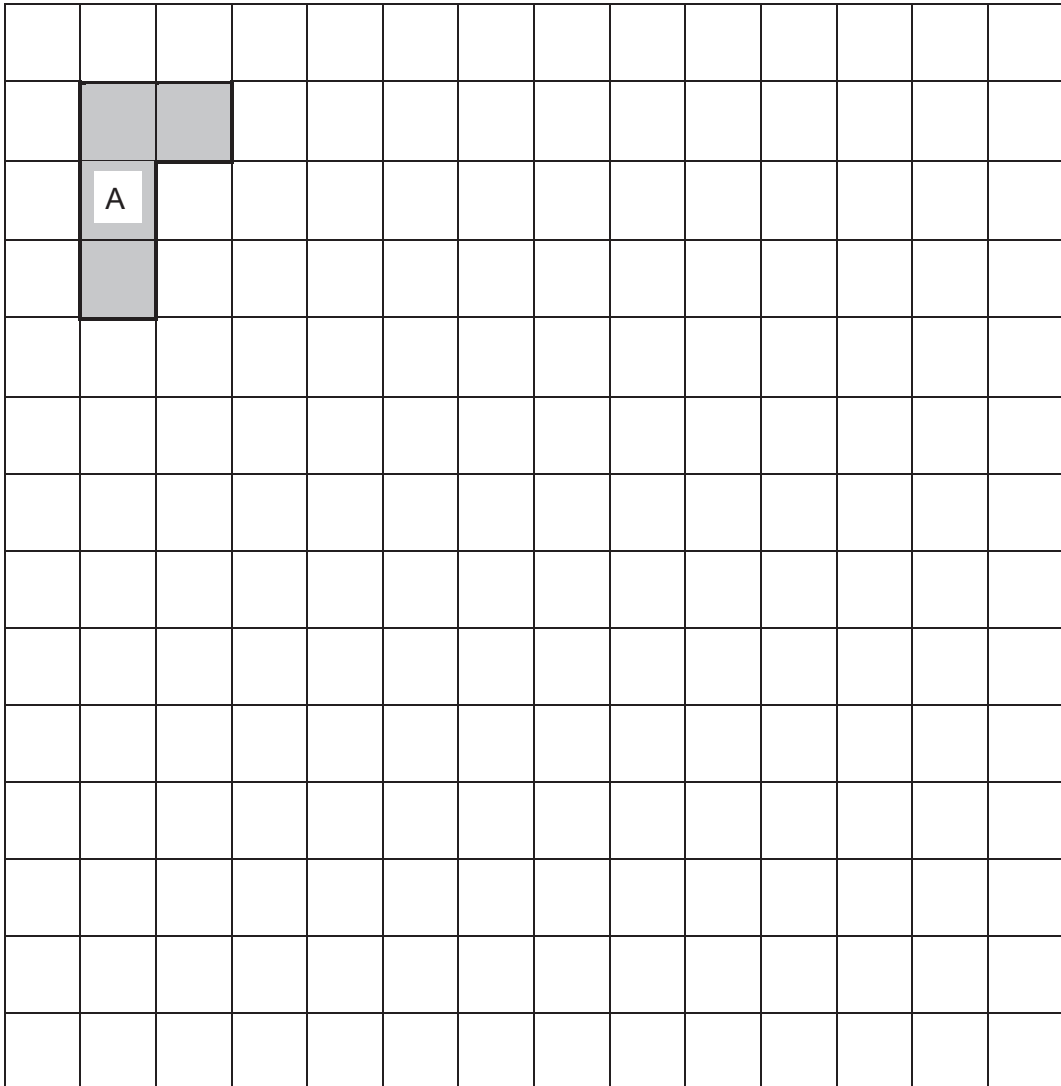
- 8 (a) On the grid draw a shape that is a reflection of shape A.  
Show your mirror line.

[1 mark]



8 (b) On this grid draw a shape that is an enlargement of shape A.

[1 mark]



Turn over for the next question

9 (a)



How many DVDs do you get for £35?

[3 marks]

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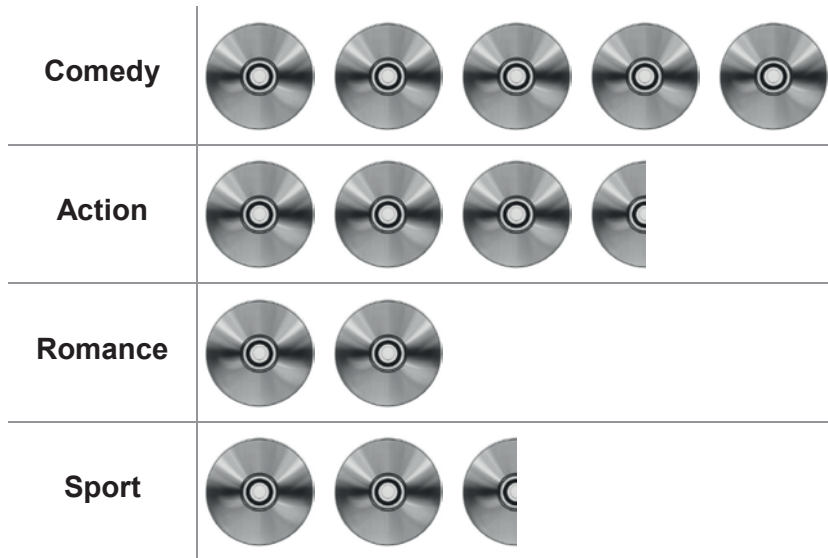
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Answer \_\_\_\_\_



Q9(a) shows problem solving in a familiar context, where the implications of an offer need to be carefully understood and considered before simple mathematics can be applied and a correct answer given in the context of the question. This is a very accessible yet realistic approach requiring genuine thought from a Foundation student for full marks.

- 9 (b) The pictogram shows some information about DVDs.  
The key is missing.



The total number of DVDs is 260

Work out the number of **Sport** DVDs.

[4 marks]

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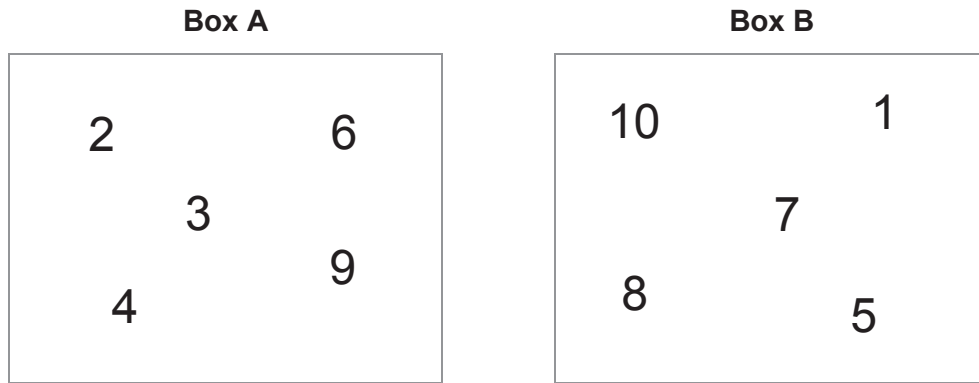
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Answer \_\_\_\_\_

10



**Two** of the numbers move from Box A to Box B.

The total of the numbers in Box B is now **four** times the total of the numbers in Box A.

Which **two** numbers move?

[2 marks]

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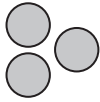
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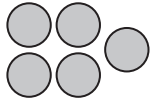
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Answer \_\_\_\_\_ and \_\_\_\_\_

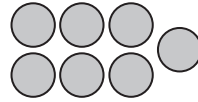
- 11 The diagram shows a sequence of patterns.



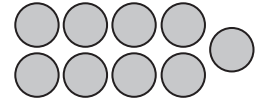
Pattern 1



Pattern 2



Pattern 3



Pattern 4

- 11 (a) Work out the number of circles in Pattern 6

[1 mark]

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Answer \_\_\_\_\_

- 11 (b) Complete the rule below.

[1 mark]

$$\text{Number of circles} = \text{Pattern number} \times \square + \square$$

- 11 (c) Which Pattern number has 51 circles?

[1 mark]

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Pattern \_\_\_\_\_

**12** In 2012 electricity cost 15p per unit.  
A family used 3729 units.

In 2013 electricity cost 17p per unit.  
The family used 3506 units.

How much **more** did the family pay for electricity in 2013?

**[3 marks]**

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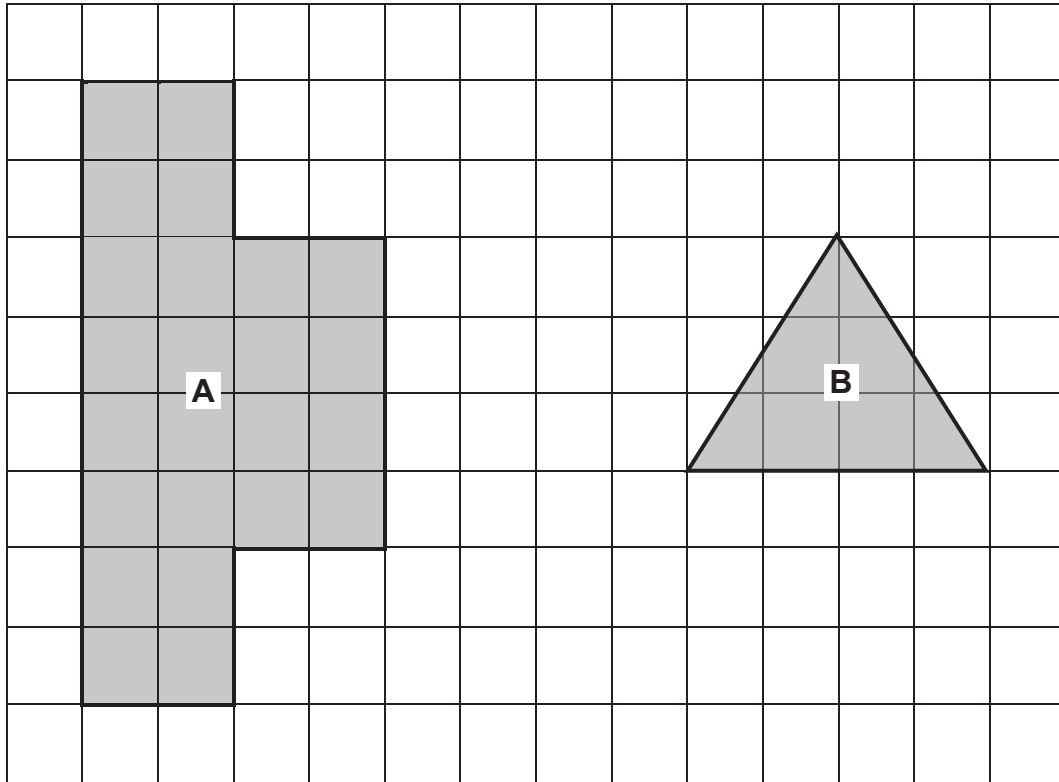
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Answer £ \_\_\_\_\_



13



Work out area of shape A : area of shape B

Give your answer in its simplest form.

[3 marks]

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Answer \_\_\_\_\_ :

14 Work out 258% of 6300

[2 marks]

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Answer \_\_\_\_\_

15 You are given that


$$a = 3 \text{ and } b = 5$$

Tick whether each statement is true or false.

Give a reason for each answer.

[2 marks]

| Statement    | True | False | Reason |
|--------------|------|-------|--------|
| $ab = 35$    |      |       |        |
| $2b^2 = 100$ |      |       |        |

 Q15 requires valid reasons to be given as marks will not be awarded for just stating true or false.

**16**

Joe says,

“There are only two numbers between 160 and 200 that have 15 as a factor.”

Show that he is wrong.

**[2 marks]**

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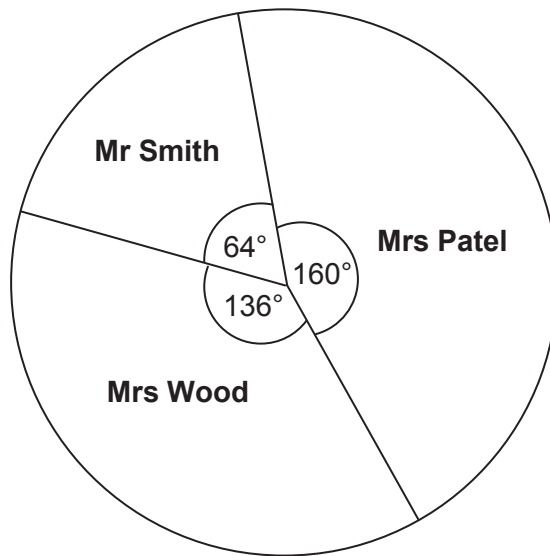
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**Turn over for the next question**

- 17 The pie chart shows the share of votes for candidates in a council election.

**Council Election Results**



There were 5220 votes in total.

Work out the number of votes for Mrs Patel.

**[2 marks]**

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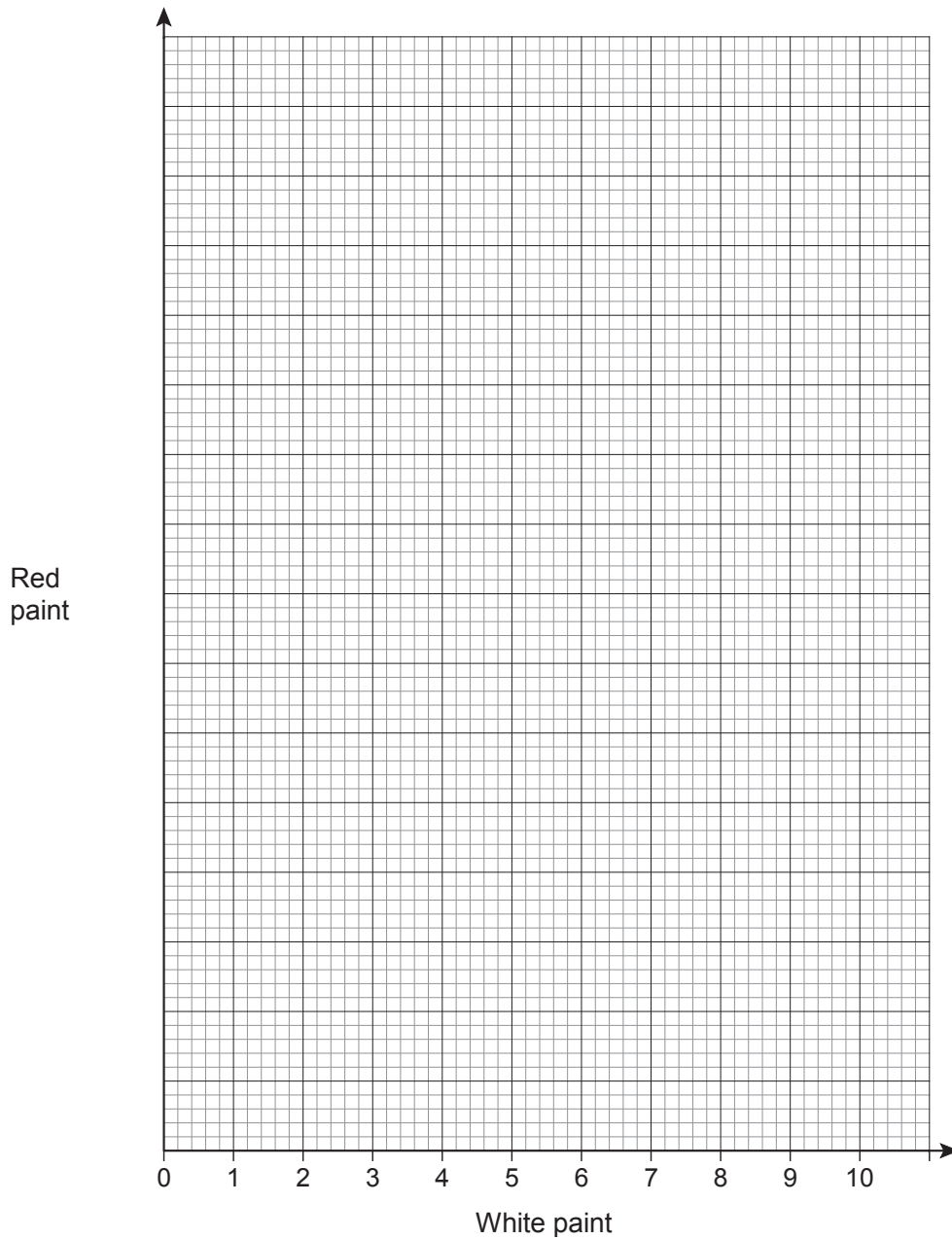
Answer \_\_\_\_\_

**18** White paint and red paint are mixed together in the ratio 2 : 3

**18 (a)** Draw a graph that can be used to work out the amount of red paint needed given the amount of white paint.

Your graph **must** show up to 10 litres of white paint.

**[3 marks]**



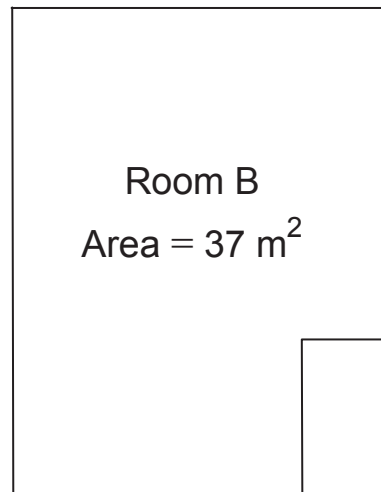
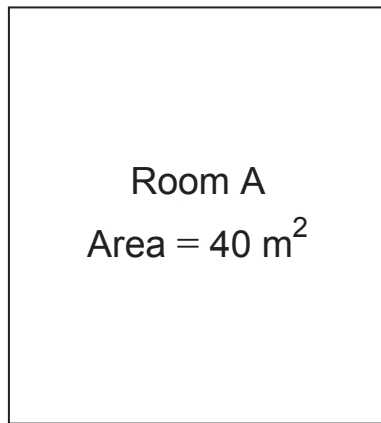
**18 (b)** How much red paint needs to be mixed with 9 litres of white paint?

**[1 mark]**

Answer \_\_\_\_\_ litres

19

A children's nursery uses one room for babies and one room for toddlers.



Not drawn  
accurately

Each baby needs at least  $3.5 \text{ m}^2$  of floor space.

Each toddler needs at least  $2.5 \text{ m}^2$  of floor space.



Q19 presents a problem, then provides a solution. Students must check and compare the two options, always working within the context. This has the benefit of a sense check for students that they have carried out the calculations correctly.

Show that the **total** number of children allowed is larger if  
the toddlers are in Room A  
and the babies are in Room B.

**[4 marks]**

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**Turn over for the next question**

**20**

Work out the next term of this quadratic sequence.

**[2 marks]**

4

12

24

40

\_\_\_\_\_


Answer \_\_\_\_\_



- 21** The perimeter of an isosceles triangle is 25 cm  
The length of each side, in cm, is a prime number.

Work out the lengths of the sides of the **two** possible isosceles triangles.

**[4 marks]**

 Q21 is an example of a question connecting two areas of mathematics within a problem. At the targeted level (grades 4 and 5), students would be expected to understand the meaning of isosceles and prime and be able to access the problem. It includes a mark for 'evaluating the results obtained' as it is important for the student to check that their answers meet the given criteria. The white space for a sketch, working lines, and a clear final answer space, is intended to give students the opportunity for sketches and numerical testing as they see fit.

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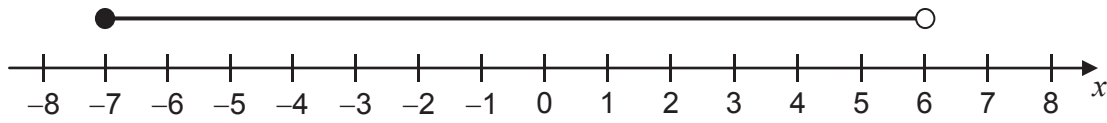
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First triangle      \_\_\_\_\_ cm      \_\_\_\_\_ cm      \_\_\_\_\_ cm

Second triangle      \_\_\_\_\_ cm      \_\_\_\_\_ cm      \_\_\_\_\_ cm

22 Circle the inequality shown by the diagram.

[1 mark]



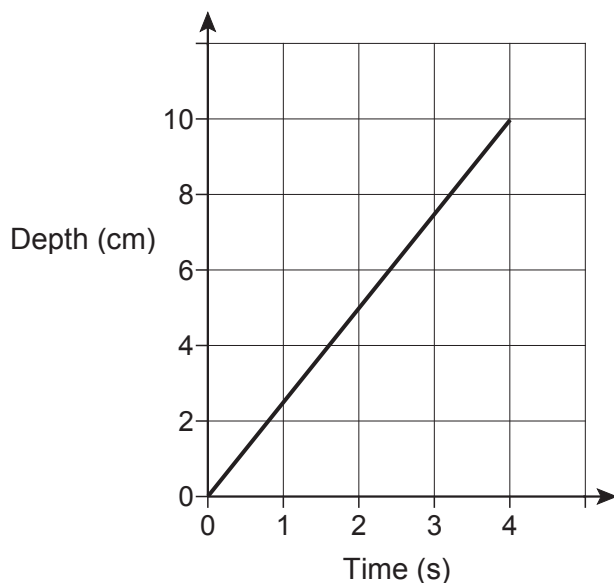
$-7 < x < 6$

$-7 \leq x < 6$

$-7 < x \leq 6$

$-7 \leq x \leq 6$

23 Water is poured into a glass for 4 seconds.  
The graph shows the depth of the water in the glass.



What is the rate of change of the depth of the water?  
Circle your answer.

[1 mark]

0.4 cm/s

1.25 cm/s

2.5 cm/s

10 cm/s

24 Here is an ordinary dice.



24 (a) Ali is going to throw the dice six times.

He says,

“I will get one of each number.”

Give a reason why he could be wrong.

[1 mark]

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24 (b) Lucy throws the dice 50 times.

Her results are shown.

|                      |   |   |    |   |   |    |
|----------------------|---|---|----|---|---|----|
| <b>Number thrown</b> | 1 | 2 | 3  | 4 | 5 | 6  |
| <b>Frequency</b>     | 7 | 4 | 12 | 5 | 9 | 13 |

Work out the relative frequency of throwing an odd number.

[2 marks]

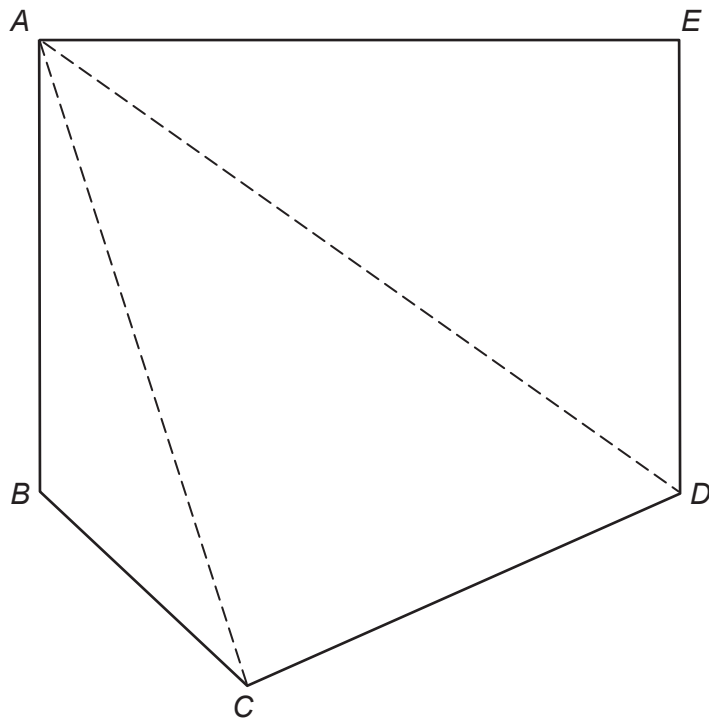
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Answer \_\_\_\_\_

- 25 Polygon  $ABCDE$  is divided into triangles as shown.



Not drawn accurately

Use the triangles to work out the sum of the interior angles of polygon  $ABCDE$ .

You **must** show your working.

[2 marks]

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Answer \_\_\_\_\_ degrees

 Q25 shows how the derivation of a geometric fact can be tested in a way that is suitable for Foundation tier students. We can offer them some way in to this type of problem at this level.

**26** In a school, 60% of the students are girls.

50% of the girls walk to school.

20% of the boys walk to school.

What percentage of the students walk to school?

**[3 marks]**

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Answer \_\_\_\_\_ %

**27 (a)** Factorise fully  $9a^2 - 6a$

**[2 marks]**

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Answer \_\_\_\_\_

**27 (b)** Solve  $x^2 - 12x + 20 = 0$

**[3 marks]**

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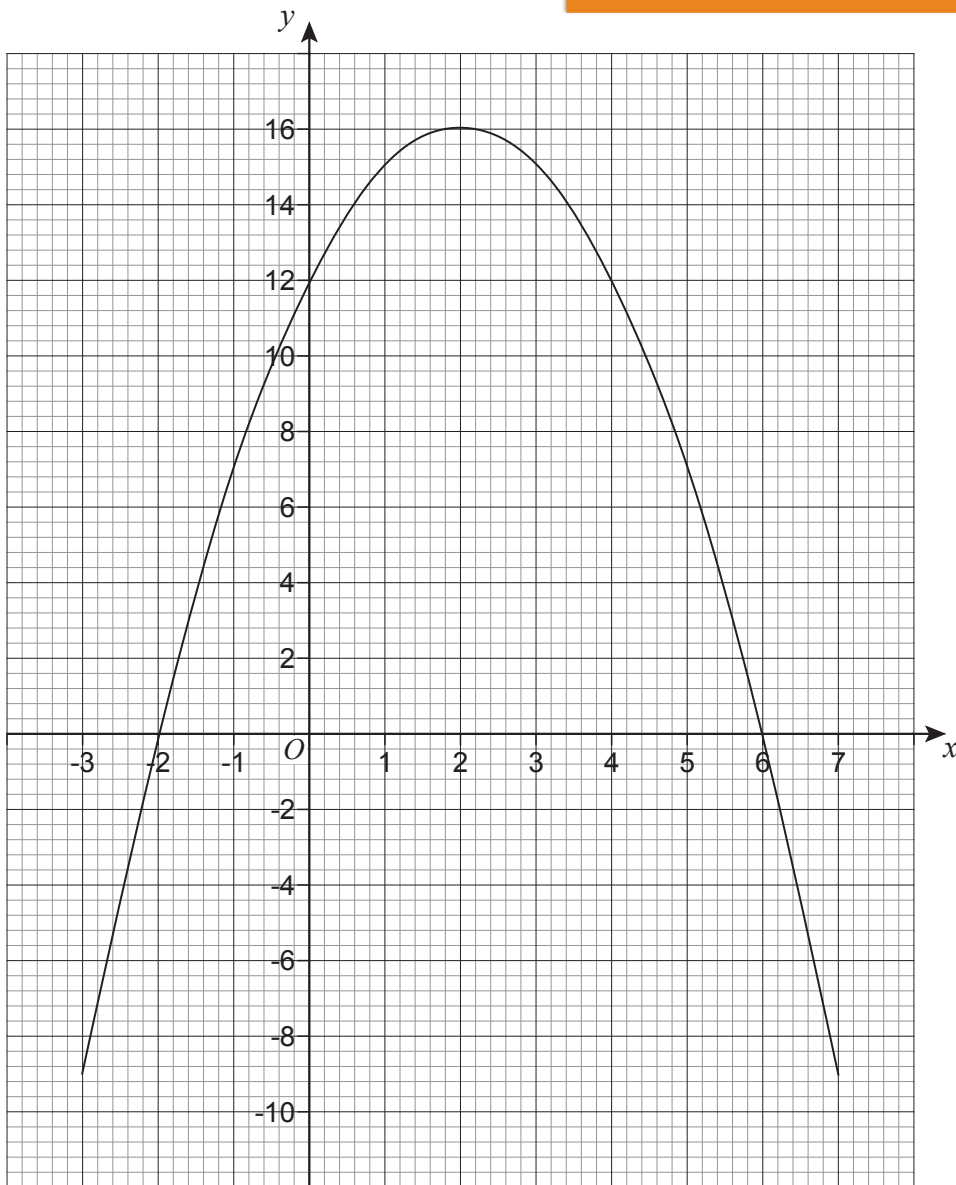
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Answer \_\_\_\_\_

28

The graph  $y = a + bx - x^2$  is shown.

*i* Q28 requires the understanding and application of terminology new to this tier (turning points and roots). Multiple choice questions encourage students to tackle this question.



28 (a) Circle the coordinates of the turning point of the curve.

[1 mark]

(-2, 0)

(0, 12)

(2, 16)

(6, 0)

28 (b) Circle the value of  $a$ .

[1 mark]

-2

12

16

6

28 (c) Circle the two roots of  $a + bx - x^2 = 0$

[1 mark]

-2 and 6

2 and -6

2 and 6

-2 and -6

29 Adam and six other men ran a race.

The times, in seconds, of the six other men are shown.

9.75

9.79

9.80

9.88

9.94

9.98

The mean time for **all** seven men was 9.83 seconds.

Did Adam win the race?

You **must** show your working.

[3 marks]

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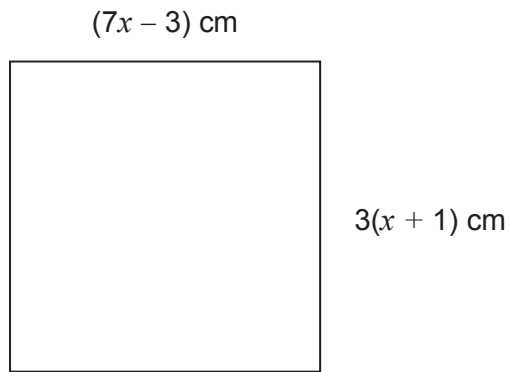
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- 30 The diagram shows a square.



Work out the length of one side of the square.

**[4 marks]**

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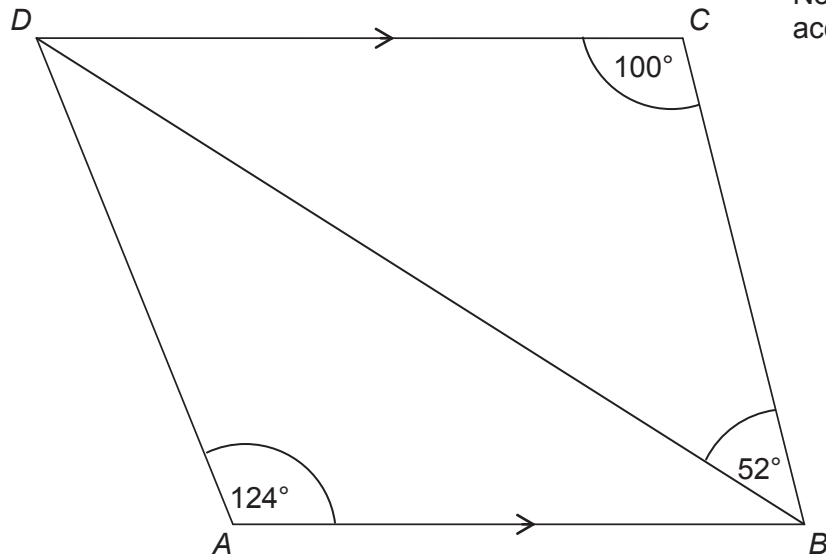
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Answer \_\_\_\_\_ cm



- 31 In the diagram,  $DC$  is parallel to  $AB$ .



Not drawn accurately

Show that triangle  $ABD$  is isosceles.

[3 marks]

**i** Q31 shows how we can test the ability to construct 'chains of reasoning' within the AO2 proof continuum. While students can gain the first two marks simply by correctly annotating the diagram, to get the last mark they must show an understanding of the criteria to be fulfilled if the triangle is isosceles.

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**END OF QUESTIONS**

**There are no questions printed on this page**

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ANSWER IN THE SPACES PROVIDED**