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OCR
Oxford Cambridge and RSA

GCSE (9–1)

Examiners' report

MATHEMATICS

J560

For first teaching in 2015

J560/01 Summer 2024 series

Version 1

ocr.org.uk/maths

Contents

Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. A selection of candidate answers is also provided. The reports will also explain aspects that caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

Where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.

A full copy of the question paper and the mark scheme can be downloaded from OCR.

Paper 1 series overview

This calculator paper is the first of the three papers taken by Foundation tier candidates for J560 GCSE (9-1) Mathematics.

The degree to which candidates' calculator use depends on the topic was noticeable. While many candidates showed great competence in using their calculator to convert a negative index and a standard form number into ordinary form, many still reverted to non-calculator methods to work out percentages and use repeated addition or subtraction rather than division. Some candidates appeared to not use a calculator at all, which commonly resulted in arithmetic errors and the loss of marks.

Candidates generally performed well on Questions 1 to 16 (although many struggled with Question 3).

Most questions appeared to be accessible for the majority and there was no evidence to suggest that lack of time was a factor, even for the less successful responses. Most made an attempt at the whole paper and questions towards the end were answered quite well.

Candidates should make sure their work is presented in a clear and concise way.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
• attempted all questions • showed complete methods and calculations, especially in questions that specifically requested working • used and understood correct mathematical terms, such as 'parallelogram', 'median' and 'range' • read the questions thoroughly and picked out the key information required • demonstrated good calculator skills • provided working in 'show your working' questions • used correct mathematical notation.	• did not read questions carefully • rounded prematurely, leading to inaccurate responses • did not check their work, nor consider whether an answer made sense in context • did not attempt all questions • did not present their working in order, but instead writing calculations and values randomly across the available space • did not know or use the correct formulae or the Formulae Sheet.

Question 1 (a)

1 Write down an example of each of the following.

(a) An even number.

(a) ..... **[1]**

Most responses were correct.

Question 1 (b)

(b) A multiple of 7.

(b) ..... **[1]**

Most responses were correct.

Question 1 (c)

(c) A cube number between 20 and 220.

(c) ..... **[1]**

Many correct answers were seen; however several wrote a square number (e.g. 100).

Assessment for learning

Candidates are required to understand the difference between square numbers and cube numbers.

Question 1 (d)

(d) A prime number less than 10.

(d) ..... **[1]**

Many correct answers were seen.

Question 2 (a)

2 Here is a list of five numbers.

10 12 4 3 6

(a) Write down the median.

(a) ..... **[1]**

The majority of candidates ordered the numbers by size and choose the middle value, arriving at the correct answer. A small number of candidates attempted to find the mean.

Question 2 (b)

(b) A sixth number is added to the list.
The range of the six numbers is 15.

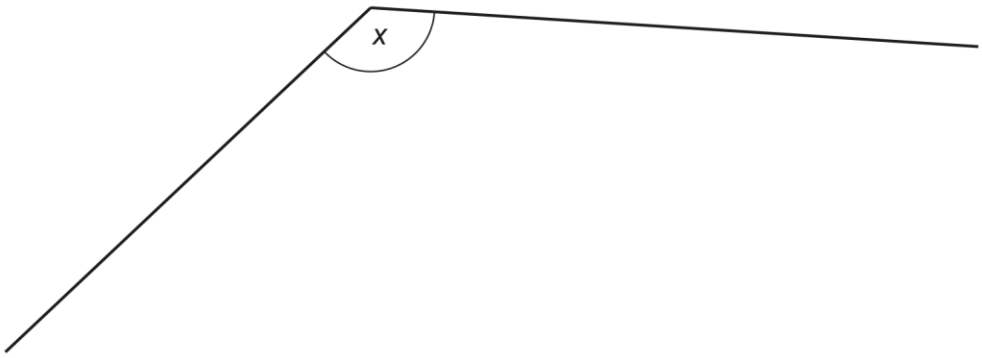
Work out a possible value for the sixth number.

(b) ..... **[2]**

Many gave the answer 18, with a small number giving -3.

Question 3 (a)

3 **(a)** Measure angle x.



(a) $x =$ ..... ° **[1]**

About half of the candidates could measure the 133° angle to within the required 2° tolerance. There were only a few responses of about 47°, through the wrong protractor scale being used. There may have been a significant number of candidates that did not have access to a protractor, based on the number of responses that appeared to be guesses (including some greater than 180° and others less than 90°).

Question 3 (b)

(b) The angles of a triangle are 27°, 126° and 27°.

Explain how you know the triangle is isosceles.

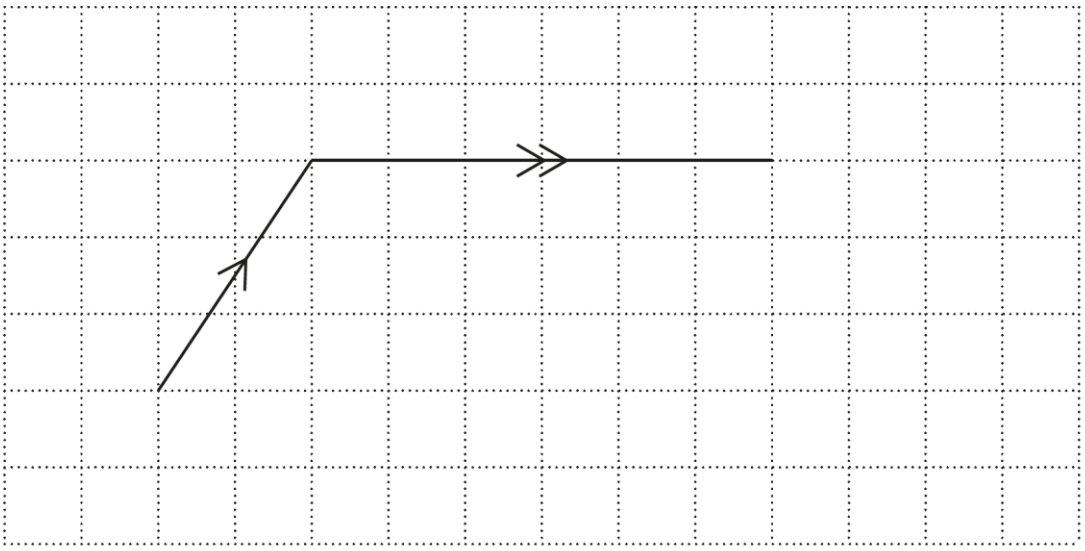
.....

..... **[1]**

The question gave angles, but it was fairly evident from the large number of comments referring to two equal sides that many candidates did not appreciate that an isosceles triangle also has two equal angles. Some candidates stated that 'the angles sum to 180', which is true of all triangles.

Question 3 (c) (i)

(c) The diagram shows two sides of a parallelogram drawn on a one-centimetre grid.



(i) Complete the drawing of the parallelogram.
Include notation to show that the drawing is a parallelogram. **[2]**

Many were able to correctly complete the parallelogram with the correct notation. The most common error was to draw a trapezium.

Question 3 (c) (ii)

(ii) Work out the area of the parallelogram.

(c)(ii) ..... cm^2 **[2]**

To be given marks here, candidates needed to have drawn a parallelogram in (c)(i). Use of a slant height for the perpendicular height was a common error. Some candidates found their shape's perimeter rather than area.

Question 4 (a)

4 Here are the first three dot patterns in a sequence.

Pattern 1 Pattern 2 Pattern 3

(a) Draw Pattern 4 in the sequence. **[1]**

Many candidates were able to draw pattern 4 correctly.

Question 4 (b)

(b) Without drawing, work out how many dots are in Pattern 10 of the sequence.
Explain how you worked out your answer.

.....

.....

..... **[2]**

Many recognised that the patterns increased by 3 dots and worked out the number of dots as 31. Some did not give a complete explanation, for example just stating 'add 3' rather than 'add 3 each time' or similar.

Question 5

5 A teacher writes down a number.
They subtract 6 from the number and then divide by 8.
Their answer is 81.

What number did the teacher write down?

..... **[2]**

Many correct responses were seen for this question. The most common incorrect response was 696, from adding 6 to 81 and then multiplying by 8.

Question 6 (a)

6 A play group offers four activities to their children.

Baking (B) Drawing (D) Exercise (E) Reading (R)

(a) Complete the list below to show all the possible combinations of two **different** activities.
You may not need all the answer lines.

B ..... and ..... D .....

..... and .....

..... and .....

..... and .....

..... and .....

..... and .....

..... and .....

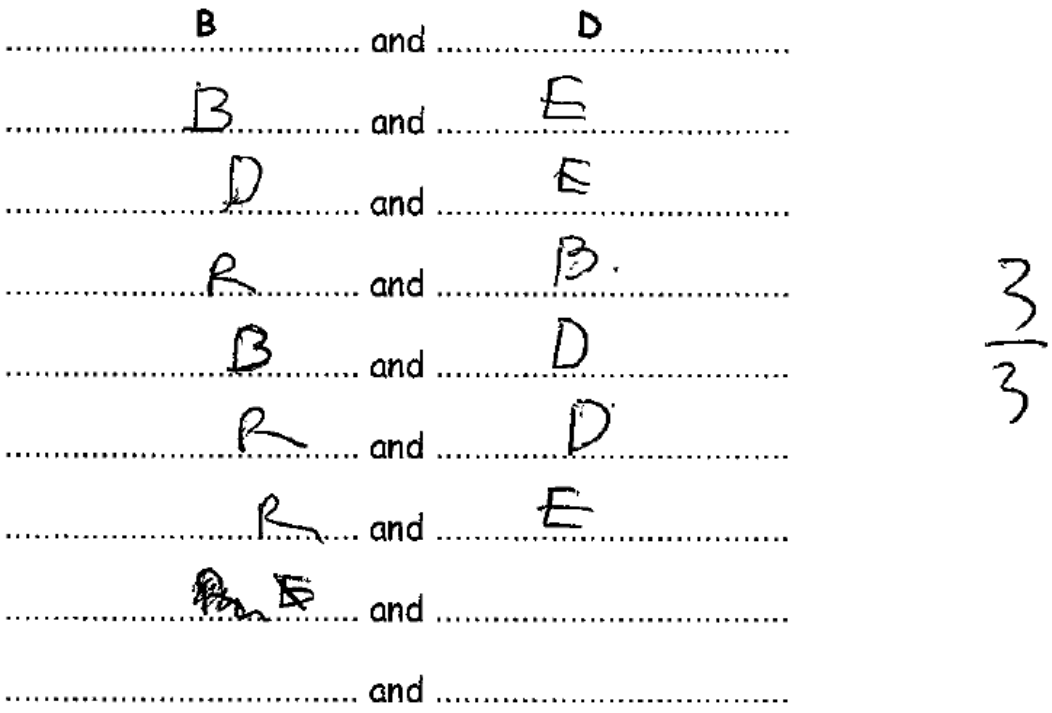
..... and .....

..... and .....

[2]

This question asked candidates to show all possible combinations, which many did. Some however repeated the given combination, or repeated a combination in a different order (e.g. giving both B E and E B).

Exemplar 1



This candidate repeats the given combination (B and D) and so has an incomplete list. This response is given 1 mark.

Question 6 (b)

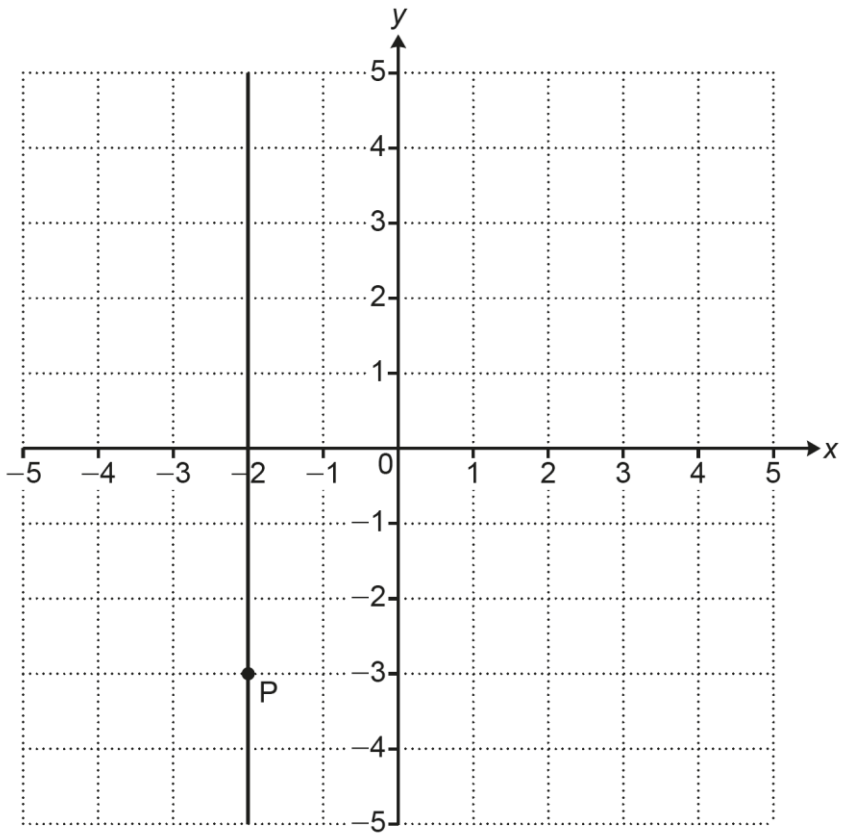
(b) Write down the fraction of the combinations that include Reading (R).

(b) ..... **[1]**

This part was generally well answered with either the correct probability from a correct set in part (a), or by applying a correct follow through. A small minority of candidates wrote a fraction with a denominator that equalled the number of letters listed (usually 12) rather than the number of combinations. Another common error was to exclude the combination given in the question.

Question 7 (a) (i) and (ii)

7 This grid shows a vertical line going through the point P.



(a) (i) Write down the coordinates of point P.

(a)(i) (..... , ...) **[1]**

(ii) Plot the point (4, −1). **[1]**

Both parts (a) (i) and (ii) were answered correctly by the majority of candidates. Those candidates not given both marks had usually got the x- and y-coordinates in the wrong order. In (a) (ii), a few candidates plotted (4, 1) instead of (4, –1).

Question 7 (b)

(b) Write down the equation of the vertical line going through point P.

(b) ..... **[1]**

Many candidates did not understand how to write the equation of a vertical line. Again, some confused *x* and *y*, giving '*y* = 2'.

Question 8 (a)

8 Here is a formula.

$a = b(c + d)$

(a) Find the value of a when $b = 3$, $c = 7$ and $d = 5$.

(a) $a =$ ..... **[1]**

Many correct responses were seen. A common error was to substitute the values into the equation, but not to calculate the value.

Question 8 (b)

(b) Find the value of c when $a = 30$, $b = 4$ and $d = 6$.

(b) $c =$ ..... **[3]**

Some candidates were able to give the correct response. Others gained 1 mark, usually for 30 = 4(*c* + 6) and then making errors multiplying out the bracket.

Question 9

9 A bag only contains red counters and blue counters.

$\frac{3}{7}$ of the counters are red.

There are 20 blue counters.

Complete the table to show the fraction of the counters that are blue and the number of red counters.

	red	**blue**
fraction	$\frac{3}{7}$	.....
number	.....	20

[3]

Many candidates were given all 3 marks (often without any working seen). Of those who were not given 3 marks, many were given 1 for $\frac{4}{7}$. Candidates were very rarely given 2 marks; if they did it was usually from giving $\frac{4}{7}$ and stating either 5 or 35 when attempting to work with ratio.

Question 10 (a)

10 **(a)** Write the ratio 14 : 35 in its simplest form.

(a) ..... : ..... **[1]**

Many candidates gave the correct response to this. Others realised that both 14 and 35 were multiples of 7, but made an error in their calculations (giving an answer such as '7 : 5').

Question 10 (b)

(b) The scale of a map is 1 : 25 000.

Two castles are 6 kilometres apart on the ground.

Work out how far apart the two castles are on the map.
Give your answer in centimetres.

(b) ..... cm **[3]**

This part proved more challenging than (a), with few candidates given marks. Successful candidates usually started by converting 6 km to cm, however only a minority of candidates carried out the correct process and many made errors in the conversions. Some recognised that division was required and gained M1 for 'figs 6' ÷ 'figs 25', but were unable to go on to reach the correct final response. Many candidates just calculated 6 × 25 000 and gave an answer of 'figs 150 000'.

Question 11

11 Sam eats 30% of a 600 g pack of cereal every day.

Sam has no cereal left.
The cereal is no longer sold in 600 g packs.
Instead, the cereal is now sold in 400 g packs.

Sam wants to continue to eat the same amount of cereal every day.

Work out the **minimum** number of 400 g packs of cereal that Sam must buy to have enough for 7 days.
You must show your working.

..... 400 g packs **[5]**

Many candidates showed their work in a clear and logical way and were given 5 marks. Successful candidates usually started by finding 30% of 600 and then multiplied by 7 to find the amount of cereal consumed in 7 days as 1260 g. Some candidates then used repeated subtraction to reach their final answer, rather than division.

Question 12

12 Increase £95 by 16%.

£ ..... **[3]**

Many candidates had clearly used the correct multiplier on their calculator and gave the correct answer. Some found 16% of 95, but then did not add this on to £95 and just gave an answer of £15.20. A significant number still attempt to use 'non-calculator' methods for percentage questions however, for example finding 10%, 5% and 1% of £95 and then adding these together. Unfortunately, as has often been the case previously, errors were frequently made and many candidates did not show their calculations, resulting in loss of marks. Candidates are expected to use appropriate calculator methods on this paper.

Exemplar 2

12 Increase £95 by 16%.

10% = 9.5

1% = 0.095

6% = 0.57

9.5 + 0.57 = 10.07

10.07 + 95

= 105.07

£ 105.07 **[3]**

In this response, the candidate makes an error in breaking down the percentages and does not reach the correct answer. They do not show their method to obtain the percentages and no marks are given.

Question 13

13 50 students are asked how many books they have read this month.
The table shows the results.

Number of books	Frequency	
0	11	
1	8	
2	10	
3	8	
4	7	
5	6	
Total	50	

Work out the mean number of books read this month by the 50 students.

..... **[3]**

Some candidates were able to give the correct response. The main error in working out the 'books × frequency' products was to have '0 × 11 = 11', which then led to a total number of books read as 121 rather than 110.

Misconception

Several candidates either divided the total of students (50) by the number of groups (6), or divided the total number of books read (110) by the number of groups.

Question 14

14 A machine makes 15 boxes in 12 minutes.
The machine works continuously.

Work out how many boxes are made by this machine in 7 hours.

..... **[4]**

Many candidates were given full marks on this question. The most common approach was to calculate the number of boxes made in 1 hour (75) and multiply this by 7. Some calculated 75, but did not know how to progress further. Some didn't respond or produced non-logical calculations that suggested they didn't know how to answer the question.

Question 15

15 The population of an island is 47 000 people.
The area of the island is $560\,km^2$.

Calculate the population density of the island in people per km^2.

..... people per km^2 **[2]**

The majority of candidates performed the correct calculation and those that did almost always arrived at the correct response (it was rare for a candidate to choose 83 as their response). The common errors were either using 560^2 in their calculation or working out 560 ÷ 47 000.

Question 16

16 A sports team scored 400 points.

The defenders scored $\frac{1}{10}$ of the points.

The midfielders and the forwards scored the remainder of the points in the ratio 1 : 5.

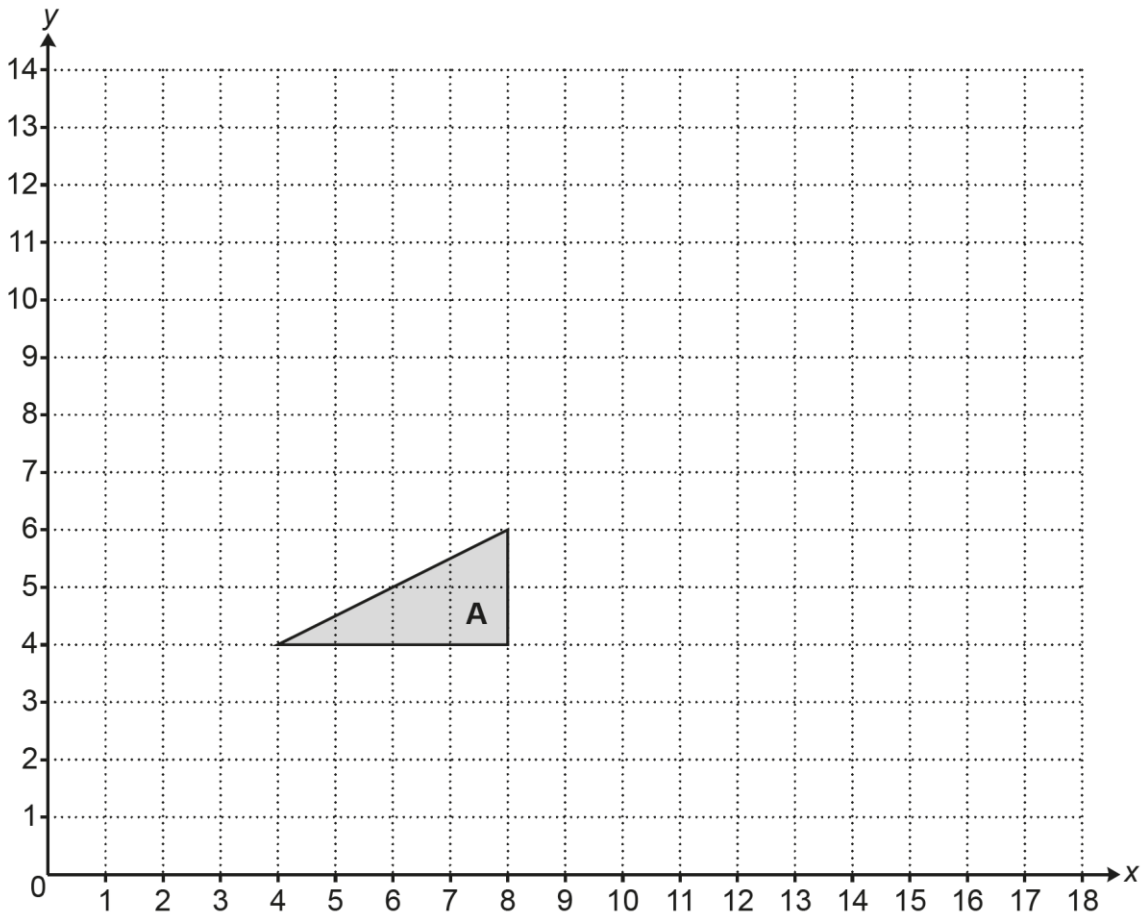
Find the percentage of the 400 points that were scored by the forwards.
You must show your working.

..... % **[5]**

This question required candidates to show their working and the majority of those who reached the correct answer showed sufficient working to gain full marks. Of those who didn't reach full marks, most found that 360 points were scored by the midfielders and the forwards, but many struggled to share this into the ratio 1 : 5 (often dividing 360 by 5 rather than 6).

Question 17

17 Triangle **A** is drawn on the grid below.



Enlarge triangle **A** with scale factor $\frac{1}{2}$ and centre of enlargement (0, 0). **[3]**

There were very few fully correct responses here; even those with the correct scale factor often placed their triangle at (0, 0), (2, 0) and (2, 1). A few candidates were given 2 marks for a triangle drawn with a correct centre of enlargement, but incorrect scale factor. The majority of candidates were only given B1, for a proportional enlargement with an incorrect centre.

Question 18

18 Solve $7x - 3 < 11$.

Show your solution on the number line.

[4]

Many of those that attempted the inequality algebraically were successful in finding the critical value of 2, either with an equals sign or the correct inequality. Most candidates correctly used a hollow circle on their representation, although some lost a mark for drawing their arrow or line to the right rather than the left.

Question 19

19 Work out.

$$\sqrt[3]{\frac{19.5^4 - 18^2}{1.45}}$$

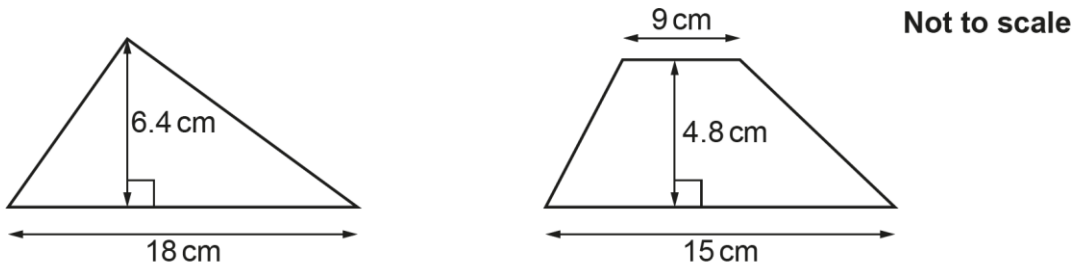
Write your answer correct to **4** significant figures.

..... **[3]**

This question was testing candidates' calculator use. Some candidates used their calculator efficiently and gained full marks for 46.34, although many arrived at 46.3374… and then did not round to the required degree of accuracy. Others calculated a square root rather than a cube root, while others calculated the square root and then multiplied it by 3 (leading to the common incorrect response of 946.27…).

Question 20

20 The diagram shows a triangle and a trapezium.



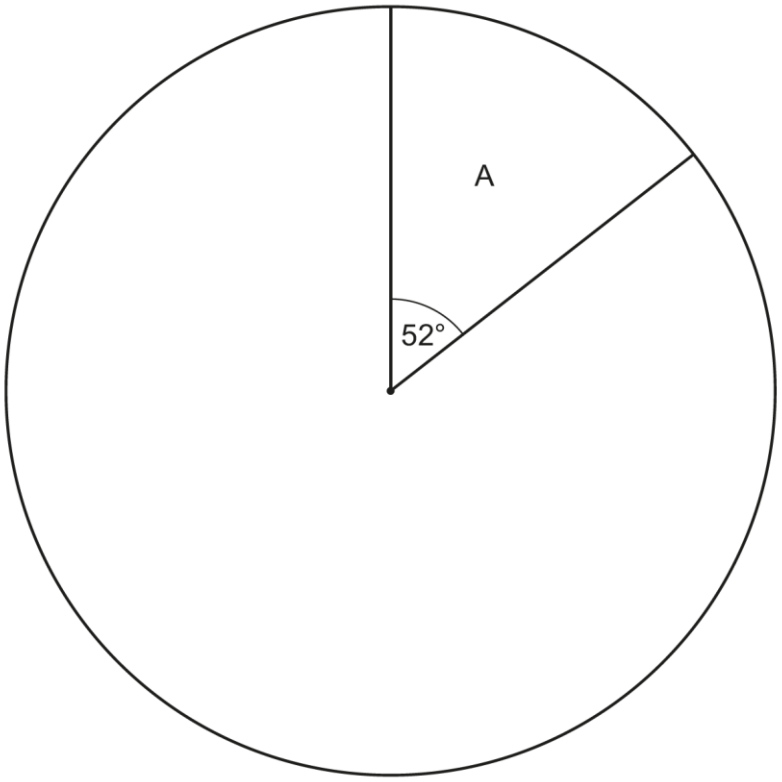
Show that they have the same area. **[3]**

Many candidates were given full marks for showing their working and finding both areas as 57.6 cm^2. However, it was not uncommon for candidates to omit the '$\frac{1}{2}\times$' in working out one of the areas. The area of the triangle was found more successfully than that of the trapezium. Some candidates appeared to be unaware that the formula for the area of a trapezium was given on the Formulae Sheet.

Question 21 (a) (i)

21 A school is deciding on a charity to support.
Each student at the school votes for one of four charities, A, B, C or D.
The results are to be shown in a pie chart.

This pie chart shows the sector for charity A.
Twice as many students voted for charity C than charity B.
Twice as many students voted for charity D than charity C.



(a) (i) Show that the sector for charity B will have an angle of 44°. **[2]**

Some candidates were able to successfully show this, but others stopped at 360 – 52. Several did not attempt this part of the question.

Question 21 (a) (ii)

(ii) Complete the pie chart. **[3]**

Many drew a correct and fully-labelled pie chart and were given 3 marks. Some drew inaccurate angles, suggesting a lack of knowledge of how to use a protractor. Some had not realised the pie chart should only have four sectors. Several were given 1 mark for one correct sector.

Question 21 (b)

(b) 39 students voted for charity A.

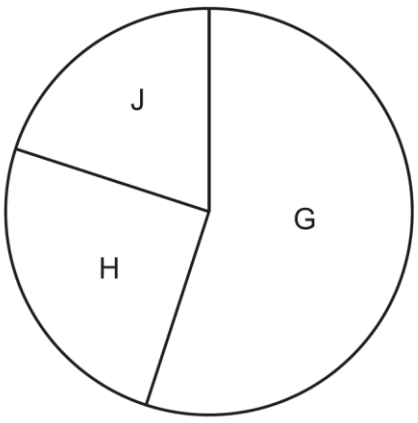
Calculate the total number of students at the school.

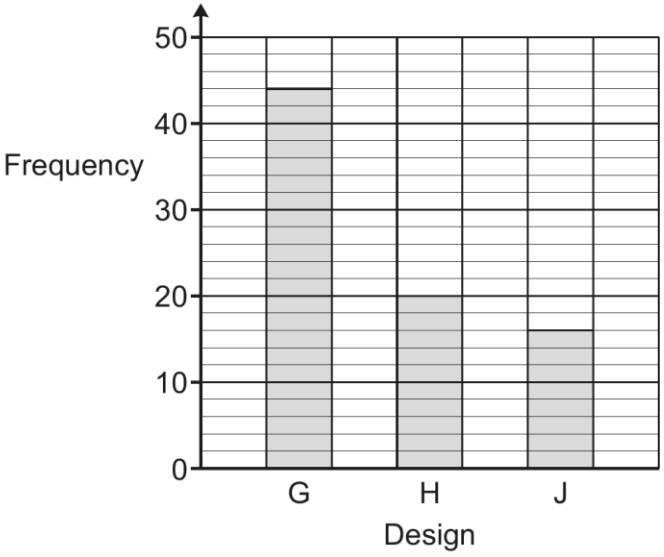
(b) ..... **[2]**

Many candidates knew how to answer this question and were given 2 marks. A common error was to calculate 52 ÷ 39 and then multiply by 360, leading to a response of 480.

Question 21 (c) (i)

(c) The school asks 80 of the students to choose a new logo from three designs G, H and J. The same results are shown in a pie chart and in a bar chart.





(i) Give one **advantage** of using the pie chart rather than the bar chart.

.....

..... **[1]**

Some candidates recognised that it was easier to see the proportions as a part of the whole, but many stated you could see the largest group clearly (which is equally true of the bar chart).

Question 21 (c) (ii)

(ii) Give one **disadvantage** of using the pie chart rather than the bar chart.

.....

..... **[1]**

More candidates gained the mark in this part than in (c)(i), usually from a reference that the exact values cannot be seen.

Question 22

22 The same dog food is sold in three different sized packs.
The diagram shows the price of each pack.

Which pack is the best value for money?
Show how you decide.

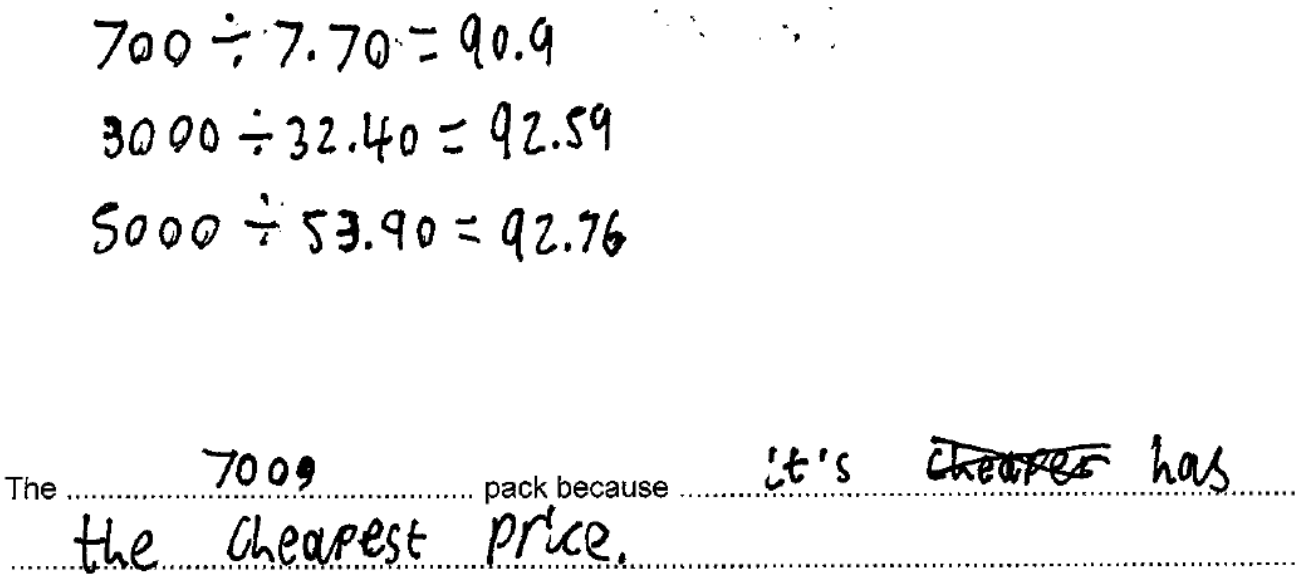
The ..... pack because .....

.....

..... **[3]**

Some candidates could not correctly convert 700 grams into kilograms. Many candidates understood how to make a valid comparison, but some calculated three comparable figures and then lost the final mark as they incorrectly interpreted their values.

Exemplar 3



This candidate had three comparable figures, but was unable to interpret them to identify which pack was the best value.

Question 23

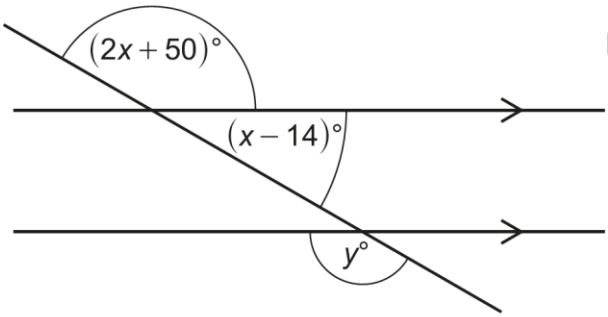
23 A garage is 5 metres long, correct to the nearest metre.
A car is 4.5 metres long, correct to 1 decimal place.

Show that the car may **not** fit in the garage. **[3]**

Only a few candidates were given 3 marks, with many not making any attempt to give an answer. A few candidates wrote a correct value for either the car or garage and were given 1 mark. Others wrote multiple values, but didn't make it clear which were associated with the car and which were associated with the garage. Some wrote a list or gave boundaries that included unacceptable values and so were given 0 marks.

Question 24

24 The diagram shows a straight line crossing two parallel lines.



Not to scale

Find the value of y.
You must show your working.

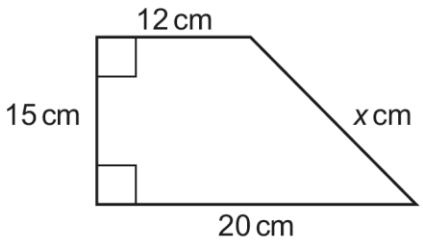
$y =$ ..... **[5]**

Although there were a few fully correct solutions, many candidates did not see the link between $2x + 50$, $x - 14$ and 180 and so struggled to form the initial equation. Those who managed to set up the equation often went on to solve it correctly and find x as 48°, but then frequently did not know how to proceed.

Some candidates were given SC1 for $y = 2x + 50$.

Question 25

25 The diagram shows a trapezium.



Not to scale

Calculate the value of x.

$x =$ ..... **[4]**

This question was only correctly answered by a few candidates, which were those who recognised it as a Pythagoras' theorem problem. Many candidates tried to use the area of a trapezium formula, responding as if it was an area question rather than one to find a length. Some candidates added the given lengths together and gave the response 47 cm, or did some other combination of calculations with the lengths on the diagram.

Question 26

26 Solve the simultaneous equations.

$4x - y = 24$

$2x + 3y = 26$

$x =$ .....

$y =$ ..... **[3]**

This question was a more accessible question than others on this topic have been, since the two solutions were low integer values rather than decimals. Several candidates were given all 3 marks. Fully correct formal algebraic methods were rare, but many candidates demonstrated they understood what is meant by simultaneous equations and were able to find the solutions by inspection. Others were able to find a pair of values that satisfied one equation and were given SC1.

Question 27

27 Write the following in order of size, smallest first.

0.2 2^{-2} 2×10^{-2}

Show how you decide.

..... , ... , ... **[3]**

smallest

Many candidates converted the values into a comparable form and wrote the values in the correct order, and were given full marks. A small number had made the correct conversions, but did not reference these when ordering the values.

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