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OCR
Oxford Cambridge and RSA

GCSE (9–1)

Examiners' report

MATHEMATICS

J560

For first teaching in 2015

J560/02 November 2023 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 which 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 our secure Teach Cambridge site.

Paper 2 series overview

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

The candidates who sat this exam series in almost all cases will have already sat the assessments in a previous series, with many having attempted it in the previous two or three series. Most candidates sitting this series are aiming for a pass at Grade 4, meaning a broad range of abilities compared to a summer series was not seen.

Numerical methods were evident throughout candidates' responses. One area to highlight though is the often incorrect use of place value when doing basic arithmetic. This was seen in many questions in this paper, for example Questions 1, 8 and 19.

It was pleasing to see that most candidates found the first 16 questions reasonably accessible and were able to show mathematical concepts in many areas. Many candidates found the latter questions in the paper difficult to access though, particularly setting up and solving equations, constructions, equations of straight line graphs, negative indices and Pythagoras' theorem. Other areas that many candidates struggled with were: angles on parallel lines; reversing the mean; simplifying basic algebraic fractions and rearranging the subject of a formula. One area that candidates found particularly challenging was describing transformations with correct mathematical terminology.

Candidates were given a formulae sheet to use in this series, though there was only one question on this paper where this would have aided candidates.

Presentation overall was good. Appropriate use of basic equipment (such as compasses, a ruler (30 cm) and a pencil) was however absent for some candidates. Questions that required drawing were completed in pen and not pencil by some candidates, which caused problems at times.

Candidate's responses to questions stating 'you must show your working' are improving. Candidates still however need to be reminded that even simple calculations should be written down in these questions.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
• showed each step of their working • had and used equipment necessary for complete questions on topics such as construction and drawing graphs • used systematic methods to solve complex problems • worked interchangeably with decimals, percentages and fractions • could work mathematically within a contextual situation.	• made basic numerical errors • could not link percentages, decimals and fractions appropriately • did not check their answers using inverse processes • could not identify appropriate place value when required.

Question 1 (a)

1 Work out.

(a) 45×100

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

Most candidates were able to answer this question correctly. Those that didn't, had often made errors in place value, e.g. 450 or 45 000.

Question 1 (b)

(b) $37 \div 100$

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

Many candidates were able to answer this correctly. Again, those that didn't often had place value errors and 0.037 and 3.7 were common incorrect responses. There were a few candidates who attempted 100 ÷ 37.

Question 1 (c)

(c) $2.36 + 1.79$

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

Most candidates were able to answer this correctly. Those that didn't often showed no column addition working, or when working was shown, often an error in the carrying was evident (e.g. forgetting to add the carried number).

Question 1 (d)

(d) $0.82 - 0.36$

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

Most candidates were able to answer this correctly. Those that didn't often showed no column subtraction workings, or when working was shown, the error was often to switch the 2 and 6 to arrive at an answer of 0.54.

Question 2 (a) (i)

2 (a) (i) Write down 50% of 80.

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

Most candidates answered this correctly, often without showing working. Some gave the incorrect response 40%.

Question 2 (a) (ii)

(ii) Use your answer to part **(a)(i)** to complete this statement.

50% of 80 is the same as ..... % of 160 **[1]**

Candidates often found accessing this difficult and seemed unsure how to link the information from part (a) (i) to complete the statement. Common incorrect responses were 40%, 50% and 100%.

Question 2 (b)

(b) Write 36 as a fraction of 120.
Give your answer in its simplest form.

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

Many candidates were able to access this question. Most were able to write the fraction $\frac{36}{120}$, however some were unable to simplify the fraction to its lowest terms; $\frac{9}{30}$ and $\frac{6}{20}$ were common final responses. An incorrect division was frequently seen in the simplification of the fraction. Often the factor that they were simplifying with wasn't shown.

Question 3 (a)

3 (a) Work out.

$$\frac{2}{3}+\frac{2}{3}$$

Give your answer as a mixed number.

(a) ..... **[2]**

Most candidates were able to access this question and the correct response was often seen. Many candidates however did not turn their top-heavy fraction into a mixed number, as requested. Some candidates did not recognise the simplicity of the question and despite the denominators already being equal, attempted to find a different common denominator (often 9). Several candidates improperly added the fractions to obtain $\frac{4}{6}$; a few then also incorrectly equated this to $1\frac{2}{6}$, which is equivalent to the correct answer, but as it resulted from an incorrect process, it cannot be given.

Question 3 (b)

(b) Work out.

$\frac{1}{4} \div \frac{1}{8}$

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

Many candidates were able to access this question. The most successful completed a 'Keep/Change/Flip' method. However, many converted the fractions to common denominators (e.g. $\frac{2}{8} \div \frac{1}{8}$) and were unable to use this to attain the correct response, picking up 1 out of the 2 marks. Another issue was candidates not recognising that a fraction line signifies division; $\frac{8}{4}$ and $\frac{4}{2}$ were often seen as final answers and were given 1 out of 2 marks.

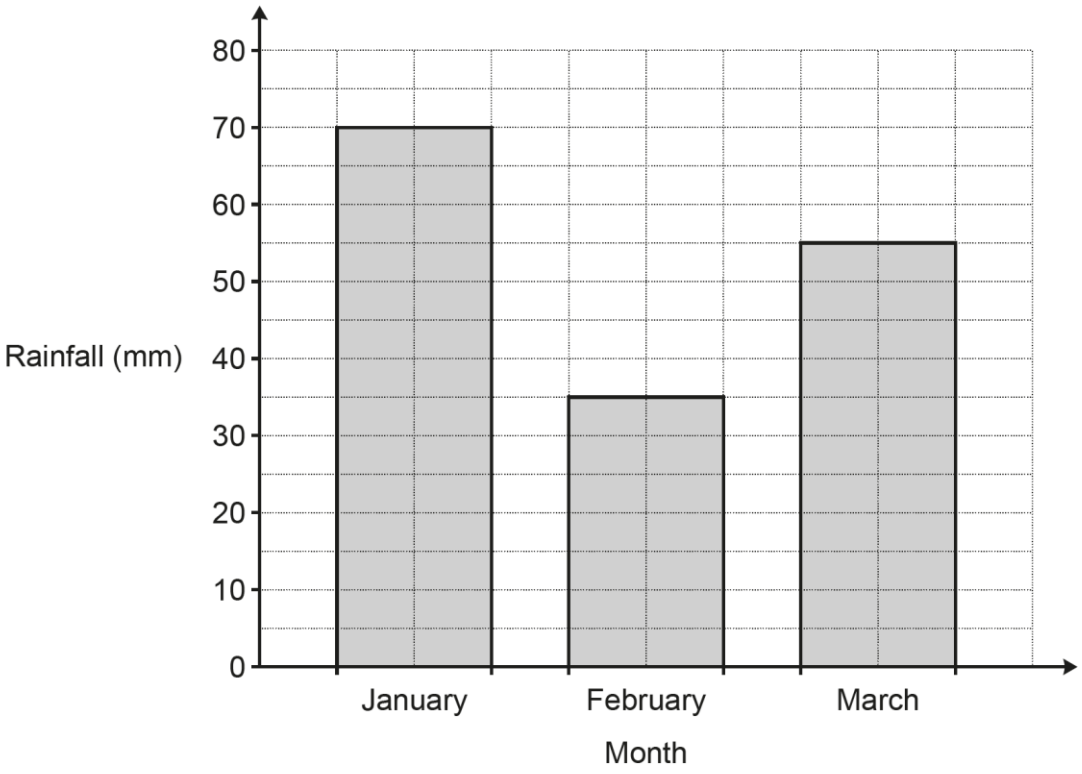
Assessment for learning

The fraction line and division are interchangeable.

Using fraction line and division interchangeably will allow for greater progress for candidates in an exam context. Where possible, simplification of a division calculation before dividing can lead to a simpler division. Links can also be made to simplifying algebraic fractions and powers of 10.

Question 4 (a)

4 The bar chart shows the rainfall, in millimetres (mm), for a city in the first three months of the year.



(a) Write down the amount of rainfall in February.

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

Most candidates gave the correct reading from the bar chart.

Question 4 (b)

(b) Write in its simplest form the ratio
amount of rainfall in February : amount of rainfall in March.

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

Most candidates correctly identified the values of 35 and 55 and wrote them as a ratio. Many were also able to write this in its simplest form, however the common error seen was leaving the ratio as 35 : 55. Some candidates incorrectly simplified the ratio to 6 : 11 or 5 : 9. There were also a few candidates that incorrect read the amount of rainfall in March from the bar chart.

Question 4 (c)

(c) The total amount of rainfall in January and February was the same as the total amount of rainfall in March and April.

Work out the amount of rainfall in April.

(c) ..... mm **[3]**

Most candidates identified the 3 values needed and these generally came to the correct answer. There were however a few who calculated 70 + 35 and did nothing further. Only a few were unable to access this part and these often had the correct numbers 70, 35 and 55 shown somewhere in the three parts of the question, for which they were given a mark.

Writing on diagrams

When reading from diagrams, encourage candidates to write their reading on the diagram and then rewrite it where appropriate in the questions.

This will allow them to self-assess their readings from the diagram later and also when checking through questions.

Question 5

5 Complete the three missing values on this multiplication grid.

×	-5	9
-4	20	
		-54

[3]

Most candidates were able to access marks here, with many being given full marks. Those who scored highly often used written methods for the multiplication/division instead of answering the question mentally. Errors with multiplying or dividing directed numbers were frequently seen, often incorrectly calculating $^{-}54 \div 9$ to be 6 (although these did often go on to pick up follow through marks, for example using the 6 they had obtained to correctly calculate $6 \times {}^{-}5$ to be $^{-}30$). A few candidates did not seem familiar with the concept of multiplication grids, resulting in incorrect and seemingly random attempts.

Exemplar 1

5 Complete the three missing values on this multiplication grid.

$9 \times 5 = 45$
$9 \times 6 = 54$

×	-5	9
-4	20	-36
6	-30	-54

[3]

This candidate has correctly entered $^{-}36$ into the top right box and is given B1. The candidate incorrectly identifies the other factor of $^{-}54$ as 6, resulting in B0. However, the candidate correctly uses this to obtain $^{-}30$ as the result of *their* $^{-}6 \times {}^{-}5$, resulting in a further B1. The candidate was given 2 marks in total.

Question 6

6 Three adults, Amos, Beth and Charlie, are comparing their age in years.

Amos is 32.
Beth is 48.
The mean age of Amos, Beth and Charlie is 50.

Work out the age of Charlie.

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

Candidates struggled to access this question. Trial and improvement was the common method seen, rather than a more direct approach based on an appreciation of how a mean is calculated. The most common misconception was to focus on the numbers given in the question, with the majority interpreting that Charlie was 50; the calculation 32 + 48 + 50 was consequently often seen, followed by an attempt to divide 130 by 3. Candidates who wrote 3 × 50 = 150 (or just went straight ahead and wrote the number 150 without a calculation) generally went on to be given full marks.

Question 7

7 Which is smaller, 65% or $\frac{16}{25}$?

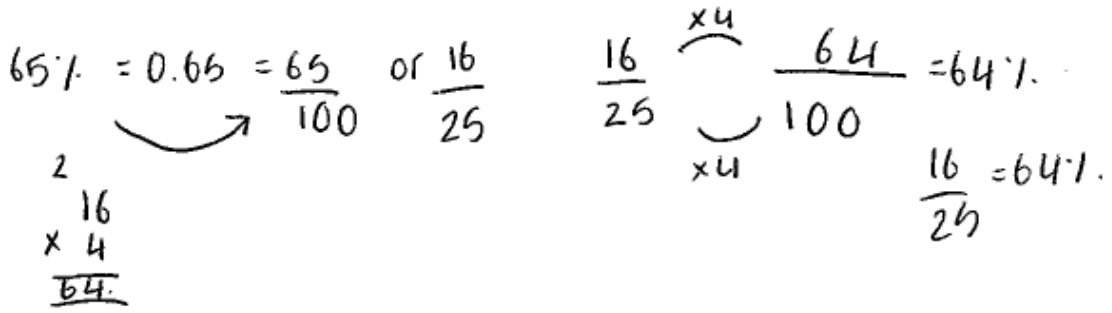
Show your working and give a reason for your answer.

..... is smaller because .....

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

Most candidates were able to access this question, often being given 1 mark for a single correct conversion. Many candidates attempted to get two comparable figures, however candidates struggled to attain the second. The most common approach was attempting to convert 65% to a fraction in its lowest form (rather than a common denominator approach) and this rarely led to full marks. The most successful approach was to find the percentage equivalent to $\frac{16}{25}$.

Exemplar 2



16/25 ..... is smaller because ...percentage when converted... to a percentage it is smaller than 65%. ..... **[3]**

This candidate has an answer of $\frac{16}{25}$ along with a correct conversion of it to 64%, so was given 3 marks. Even if the candidate had not found 64%, they still reached two correct comparable figures of $\frac{65}{100}$ and $\frac{64}{100}$, which with $\frac{16}{25}$ as the answer would still have been given 3 marks.

Question 8 (a)

8 Complete each statement.

(a) $24.2 \div 0.5 =$ ..... **[1]**

There were very few correct answers given to this question and many candidates demonstrated a lack of understanding of division by numbers smaller than 1. A common misinterpretation was carrying out 24.2 ÷ 2, leading to 12.1. Many candidates who attempted to double 24.2 or use a 'bus stop' method of division often had issues with the place value of the answer, leading to the correct digits 484 however with the decimal point in the wrong place, e.g. 0.484.

Question 8 (b)

(b) ..... × 4 = 12.08 **[2]**

Many candidates realised that the calculation could be inversed and used a 'bus stop' method. Those that did this were often successful and given 2 marks, however a mark was given for just writing a correct division. The most common error seen was an answer of 3.2, occasionally even after a correct answer had been found in a division calculation.

Question 9 (a)

9 **(a)** Four apples cost £1.80.

Find the cost of five of these apples.

(a) £ ..... **[2]**

Most candidates were able to access the question, with many being given full marks. The most common method seen was to find the unitary price using the 'bus stop' method. Candidates then either added the cost of one apple on to £1.80, or multiplied the cost by 5. The most common misconceptions were to divide £1.80 by 5 instead of by 4, or to multiply £1.80 by 5.

Question 9 (b)

(b) By rounding each value to **one** significant figure, estimate the cost of 8.2 kg of bananas at 73p per kg.
Give your answer in pounds.

(b) £ ..... **[3]**

Most candidates rounded at least one of the numbers correctly. Rounding 8.2 kg to 8 kg was done well, however a few rounded to 9 kg instead. A few candidates did not show their rounding of 73p in the working space and went onto complete 8 × 7 = 56. Struggles with place value were also evident, with responses of £0.56, 56p or £56 seen. The most common issues were candidates not rounding 73p to 1 significant figure and just using 73p in a calculation, or not acknowledging the request to round at all and attempting 8.2 × 73.

Assessment for learning

Candidates should show their rounded numbers **before** they use them in calculations.

Here, a first step should have been:

8.2kg ≈ 8kg

73p ≈ 70p

Question 10 (a)

10 Choose a word from this list which best describes each statement.

Equation Expression Formula Inequality Term

(a) $2b + 2w$ **(a)** ..... **[1]**

Candidates showed a lack of algebraic understanding here. The most common response was 'equation'.

Question 10 (b)

(b) $\pi r^2 = 30$ **(b)** ..... **[1]**

Candidates seemed to consider π as an algebraic term here rather than an irrational number. The most common response was 'Formula'. When 'Equation' was used in part (a), candidates appeared reluctant to repeat it in this part, rendering the mark inaccessible; these candidates generally responded with 'Expression' instead.

Question 11

11 A bag contains only red, green and blue counters.

- 8 of the counters are red.
- 15 of the counters are green.
- The rest of the counters are blue.

Sam chooses one counter at random from the bag.

The probability that this is a green counter is $\frac{3}{8}$.

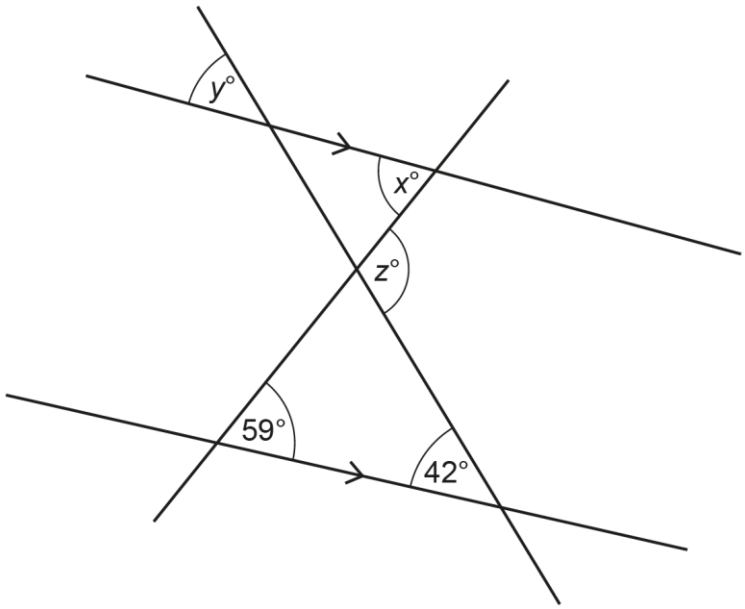
Work out the number of blue counters in the bag.

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

Most candidates were unable to access this question. Candidates struggled to work with a simplified probability and to use a reverse process from the probability to the total number of counters in the bag. A few candidates were able link the information together to state that $\frac{3}{8} = 15$ and these generally went on to be given all 4 marks. Few candidates used equivalent fractions ($\frac{3}{8} = \frac{6}{16} = \frac{9}{24} = \frac{12}{32} = \frac{15}{40}$) to reach the answer. Many candidates attempted trials with a number for blue counters (often 7, from 15 – 8), but when this didn't work for them it was often abandoned.

Question 12 (a) (i)

12 The diagram shows two straight lines crossing a pair of parallel lines.



Not to scale

(a) (i) Find the value of x.
Give a geometrical reason for your answer.

x = ... because .....

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

Candidates showed a lack of knowledge of angles within parallel lines. Very few candidates were able to give the correct value of x. The reasons given were frequently incorrect and often were not a valid parallel line angle rule, e.g. 'opposite angles'. Some candidates stated a correct angle reason here, however struggled with the subsequent parts of the question.

Question 12 (a) (ii)

(ii) Find the value of y.
Give a geometrical reason for your answer.

y = ... because .....

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

Very few candidates gave the correct value of y. As in (a) (i), reasons given were often incorrect or were not valid rules. Some candidates had reversed the answers for part (a) and part (b). There was little evidence of candidates attempting to break down a complex diagram using equipment such as highlighters to help them visually access the diagram.

Assessment for learning

Use highlighters to show alternate/allied (co-interior)/corresponding angles on a diagram. This should help candidates to approach more complex diagrams visually.

Question 12 (b)

(b) Find the value of z.

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

Few candidates were able to access this question. Successful responses generally identified the top angle of the lower triangle to be 79° and then used a number of stages to correctly get z = 101. Many started by correctly adding 59 + 42, but it was rare for candidates to identify that this gave them the value of z (using the exterior angle of a triangle rule). Many of these instead calculated 180 – 101 and the resulting value of 79° was a common wrong response. Candidates who had an incorrect value for angle x often attempted to find the angle from here. Many candidates who had struggled with parts (a) (i) and (ii) simply skipped this part.

Assessment for learning

Re-drawing the relevant parts of the diagram in the working space could have helped break down the question into a simpler problem, involving angles in a triangle and angles on a straight line.

Question 13 (a)

13 (a) Work out.

3^4

(a) ..... **[2]**

Candidates were highly successful in this question, with correct responses frequently seen. Candidates that gave a correct answer often wrote 3 × 3 × 3 × 3 in the space provided. The most common error was to work out 3^5, even after writing 3 × 3 × 3 × 3 (seemingly considering the first calculation of 3 × 3 as a single '3'). Some candidates struggled to multiply numbers by 3, even when using column multiplication. Very rarely was the common error '3 × 4 = 12' seen.

Question 13 (b)

(b) Simplify.

$$\frac{5x^2}{x}$$

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

Candidates struggled to access this question and often gave a numerical response (e.g. '25'), or just rewrote the question in the form '$5x^2 \div x$'. There was little evidence that candidates understood that they should cancel common factors, using the same method as for numerical fractions.

Question 13 (c)

(c) Rearrange this formula to make x the subject.

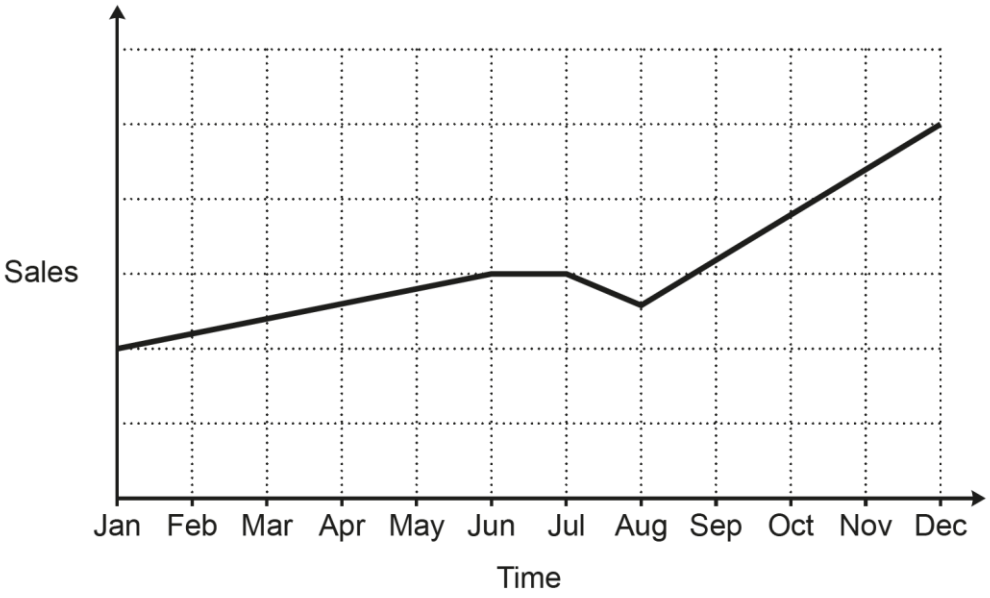
$$y = \frac{x}{5} + 2$$

(c) ..... **[2]**

Candidates showed a lack of knowledge or clear processes here. Most attempted multiple steps at once and when an error was made this often resulted in zero marks, since there was no correct first step seen, or no option to award 'correct' follow through from an incorrect first step to a second step if the first step isn't shown. Often, candidates just switched the y and the x.

Question 14 (a)

14 A sales representative and a manager discuss this graph of sales over the last year.



(a) The sales representative says

I can tell from the graph that, over the last year, sales have risen every month.

Is the sales representative correct?
Give a reason for your answer.

..... because .....

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

This was the first of the questions common with the Higher tier J560/05 and proved to be a successful question for most candidates. Most correct responses detailed the dip in sales either in July, in August or from July to August. Some candidates referenced the constant sales from June to July, but this was often accompanied by a reference to the dip afterwards too. There were a few candidates who referenced this dip incorrectly, e.g. it dipped from June to August.

Question 14 (b)

(b) The manager says

I can tell from the graph that sales are now more than double what they were at the start of the year.

Is the manager correct?
Give a reason for your answer.

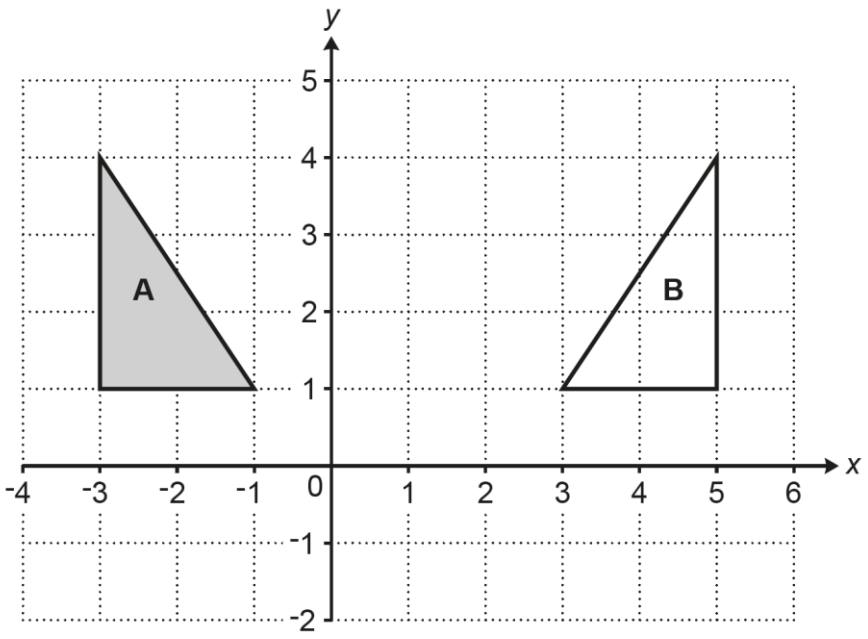
..... because .....

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

Most candidates did not answer this question correctly, not acknowledging the lack of data on the chart or on the vertical axis. Many candidates responded 'yes' and so couldn't be given the mark. Of those who responded 'no', many gave reasons such as 'sales tripled' or 'sales are one square more than double' and so gave no recognition that the scale (and any data) was absent.

Question 15

15 Triangle **A** and triangle **B** are drawn on the coordinate grid.



Describe fully the **single** transformation that maps triangle **A** onto triangle **B**.

.....

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

Most responses lacked mathematical terms to describe their transformation. Instead of 'Reflection', many candidates used 'Flipped' or 'Mirror[ed]' and often with a description of how many 'boxes' the triangle had moved as a result. Few gave the line of reflection and often a coordinate on the correct line was referenced instead, e.g. (1, 1). A few candidates were given the SC1 for drawing the line $x = 1$.

Question 16 (a) (i)

16 **(a)** Here are the first five terms of a sequence.

4 8 12 16 20

(i) Write down the next term of the sequence.

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

Almost all candidates responded to this correctly. A few wrote the *n*th term formula as the answer. Some gave more than just the next term.

Question 16 (a) (ii)

(ii) Kai says

All of the terms in the sequence are even numbers.
402 is an even number.
Therefore, if the sequence is continued, 402 will be in the sequence.

Is Kai correct?
Give a reason for your decision.

..... because .....

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

The most successful candidates referred to 402 not being in the 4 times table. There were also many responses that stated '100 × 4 = 400 so the next would be 404'. Of the responses that could not be given, statements that it 'goes up in fours' without referencing 402 were common.

Question 16 (b) (i)

(b) Here are the first five terms of another sequence.

0.25 0.5 1 2 4

(i) Write down the next term of the sequence.

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

Many candidates were able to identify the term-to-term rule to reach a correct answer. However, common errors were 7 and 6.

Question 16 (b) (ii)

(ii) Explain how you worked out your answer.

.....

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

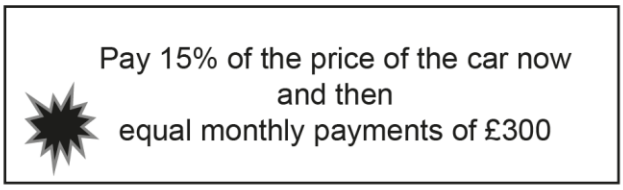
Candidates with a correct response in (b) (i) almost always achieved the mark in this part. Those with an incorrect response in (b) (i) of 7 usually followed it with an explanation here suggesting they had only considered the later three terms shown and not the two decimal terms. Those with an incorrect response in (b)(i) of 6 usually here stated the term-to-term rule 'add 2', as if they were only considering the final two terms shown.

Question 17

17 A motorist wants to buy a new car but does not have enough money.

The price of the car is £16 000.

The motorist sees this notice for a deal on the car they want to buy.
The number of equal monthly payments is hidden.



Work out the number of monthly payments if the total cost of the car to the motorist is £17 400.
You must show your working.

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

Most candidates attempted the question and almost all of these appreciated the requirement 'You must show your working'. A number of attempts incorrectly began with finding 15% of 17 400; this led to the loss of a mark and made the number work more demanding. Many candidates were successful at finding the 15%, however errors in finding 10% and/or 5% were fairly frequent and since most candidates simply wrote values without a method/calculation, marks for method could not be given.

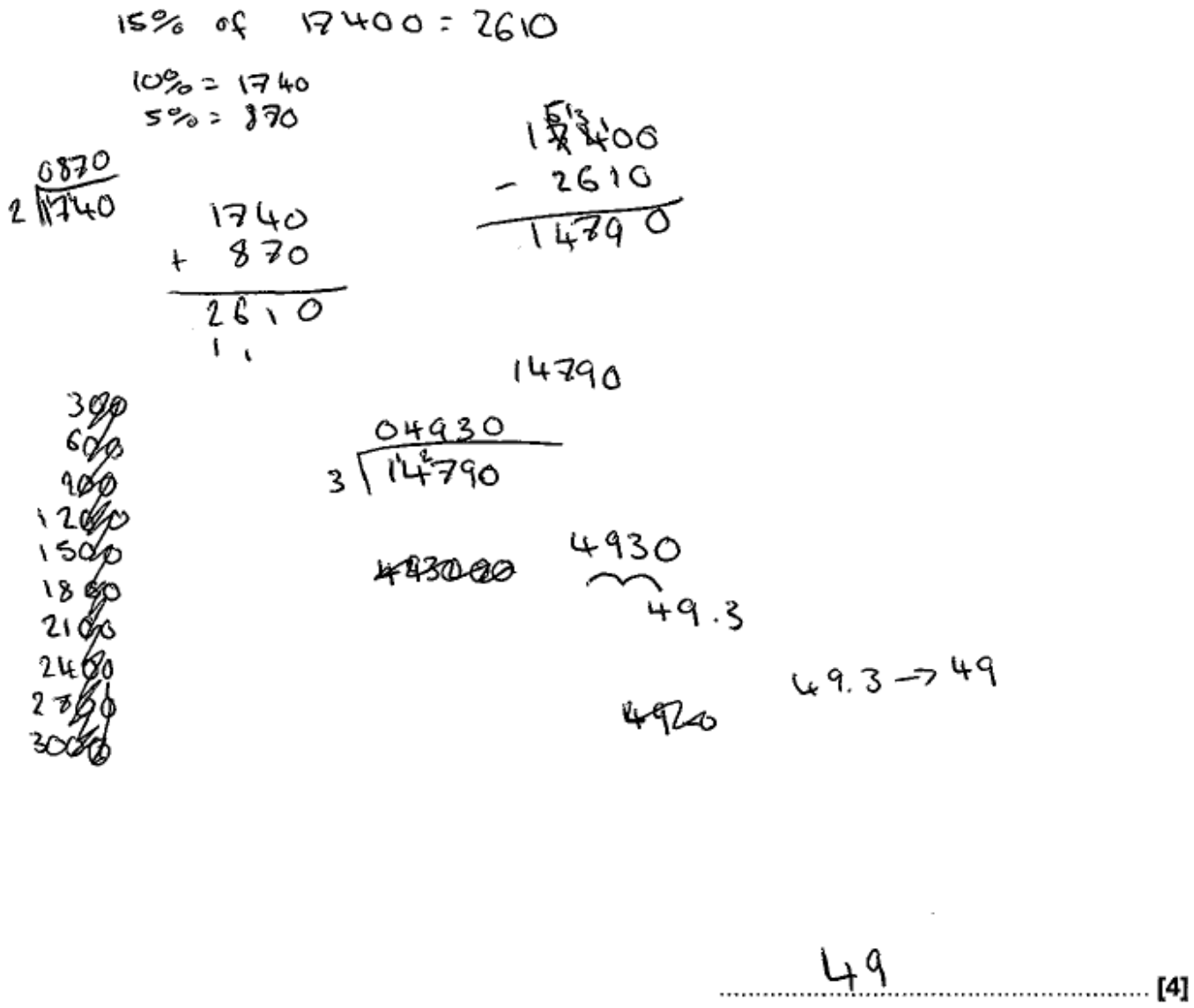
Of those that found a value for 15%, some did not subtract it from 17 400, or subtracted it from 16 000 instead. Some started with their 15% and attempted to add multiples of £300 up to £17 400, but there were some that incorrectly added up to £16 000 instead. A 'bus stop' method would have implied division at this stage, which some candidates attempted.

Assessment for learning

The fraction line and division are interchangeable.

The concept referenced in Question 3 (b) above regarding division and fraction lines would have helped candidates here too. The division $\frac{15000}{300}$ here could have been simplified and an easier division of $\frac{150}{3}$ completed.

Exemplar 3



This candidate uses 17 400 in all parts of their solution, which we treat as a misread. The candidate correctly finds 15% of 17 400 to be 2610, which scores B2. They then subtract this from 17 400 and divide by 300 (in stages), so M1 is given and the answer they arrive at is correct for the values used. As this is a misread however, deduct 1 B or A mark in candidates' working, as per the marking instructions at the front of the mark scheme. In this case the candidate scores B2M1A0 and so 3 marks are given.

Question 18 (a)

18 A box contains only red, green and black pens.
The ratio of red pens to green pens to black pens is 1 : 4 : 11.

(a) Work out the percentage of the pens that are green.

(a) ..... % **[2]**

Most candidates who achieved marks in this question picked up the M1 for $\frac{4}{16}$. Common errors were to see $\frac{4}{100}$, or for a candidate to write $\frac{4}{16}$ yet calculate 16 ÷ 4, leading to an incorrect answer of 40%.

Question 18 (b)

(b) There are 24 more green pens than red pens.

Work out the total number of pens in the box.

(b) ..... **[4]**

Candidates often struggled to access this question and many did not attempt it. Very few candidates were able to recognise the '24 more' was referencing the difference between red and green pens. Those that did generally carried out 24 + 4 and then used 28 green pens in an incorrect attempt at an equivalent ratio. Most marks given were for the use of a number of red pens to generate an equivalent ratio, most commonly six red pens to then reach 6 : 24 : 66. Some candidates used the 'boxes' method to help them visualise the problem and answer the question, but often resulting in incorrect answers.

Question 19

19 A solid wooden block has a volume of 900 cm^3.
The density of the wood is 0.7 g/cm^3.

Calculate the mass of the wooden block.
Give the units of your answer.

.... **[3]**

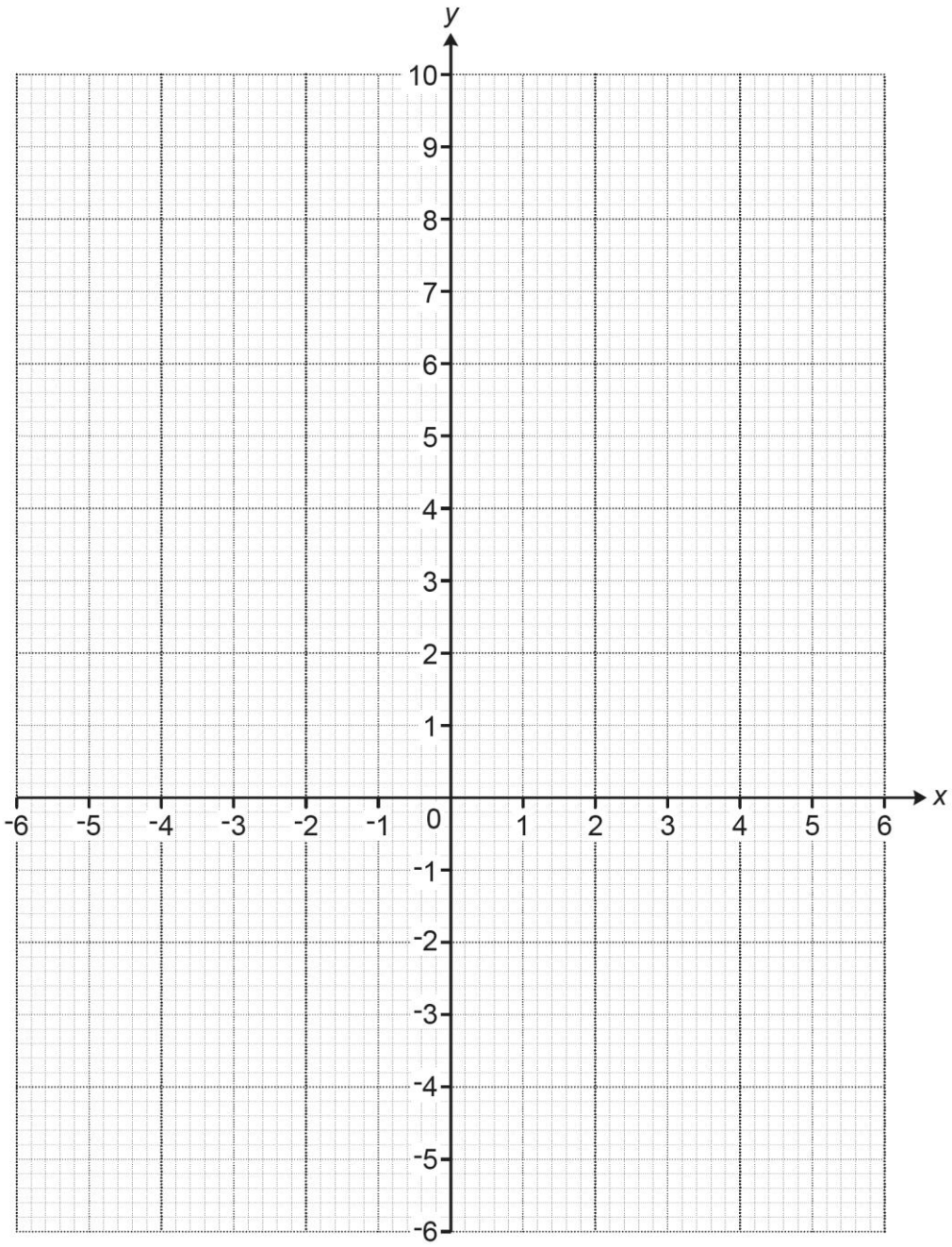
Candidates often struggled to show an appreciation for the context of the question and many did not attempt it. There were very few candidates that showed understanding of density = $\frac{\text{mass}}{\text{volume}}$. Candidates often picked up a mark for an attempt to multiply the two values, however most of these struggled with the place value of the calculation. Very few candidates wrote a correct unit for their calculation, with many writing 'g^3'.

Question 20

20 Here is a table of values for $y = \frac{6}{x} + 2$.

x	-6	-3	-2	-1	1	2	3	6
y	1	0	-1	-4	8	5	4	3

Draw the graph of $y = \frac{6}{x} + 2$ for $-6 \leqslant x \leqslant 6$, $x \neq 0$.



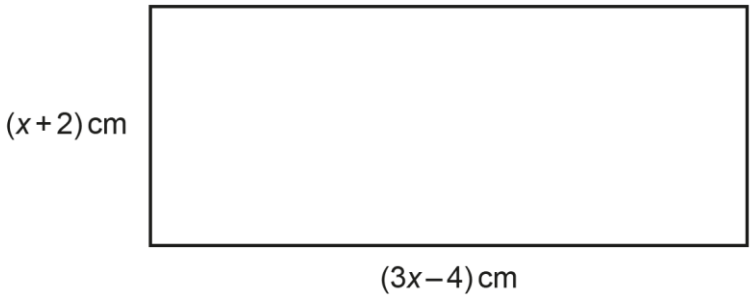
[3]

Of the candidates attempting the question, the vast majority were given B2 for plotting 7 or 8 plots within tolerance. Some candidates used large crosses or large blobs however, meaning the accuracy of their plotting was sometimes in doubt.

Many did not demonstrate that they knew what a reciprocal graph should look like and joining the two correct sections of the graph together through the origin was common. Many candidates did not attempt this question.

Question 21

21 The diagram shows a rectangle with length $(3x-4)$ cm and width $(x+2)$ cm.



Not to scale

The length of the rectangle is twice the width of the rectangle.

Calculate the area of the rectangle.
You must show your working.

..... cm^2 **[6]**

There were very few candidates that recognised the need to set-up and solve an equation here and very few marks were given.

There was frequent evidence of very poor algebraic skills. Often a candidate would 'simplify' the expressions given in the question and state '$x + 2 = 2x$' and '$3x - 4 = -2x$'.

Most candidates achieving marks did so for trial and improvement methods. Rarely was evidence seen to give marks for finding the value of x, but marks were given for substituting their value of x into the expressions for the width and length and subsequently multiplying these together.

A few did reach 10 and 20, but not algebraically and so were given a maximum of 2 marks for multiplying their length of 20 by their width of 10.

The most common misconception was to work with the area $(x + 2)(3x - 4)$ immediately.

Question 22 (a)

22 A teacher is planning a theme day for the 500 pupils at their school.
The teacher asks a sample of 20 pupils from year 8 which theme they would prefer.

The results are shown in the table.

Theme	Number of pupils
Sport	7
Art and design	3
Recipes	2
Music and movies	8

(a) Describe **two** disadvantages of the teacher's sampling method.

1. .....

.....

2. .....

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

Many candidates were able to access the question, often referencing the small sample with statements such as 'they haven't asked enough students' or 'they have only asked 20'. There were however some incorrect statements describing a need to ask the total population of 500 pupils. Many candidates were able to reference that only one year group had been asked with statements like 'they should ask all the year groups' or 'only Year 8 have been asked'. It was rare to see gender considered in answers. Common errors made by candidates regularly referenced the table or ways to display the data.

Question 22 (b)

(b) Using the results from the table, the teacher estimates that 175 pupils in the school would prefer a sport theme.

Here is the teacher's method.

$$\frac{7}{20} \times 500 = 175$$

Write down **one** assumption the teacher has made when making their estimate.

.....

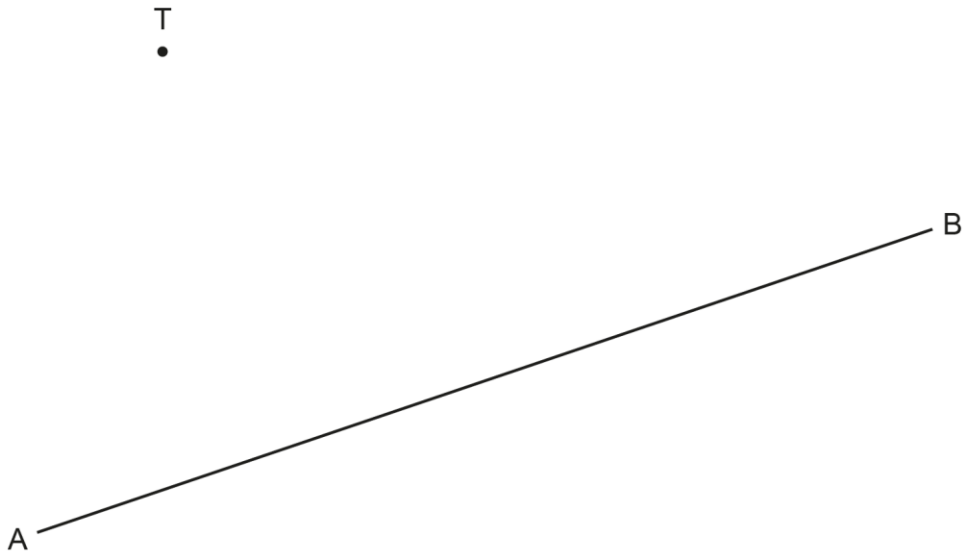
..... **[1]**

Most candidates were not able to identify the proportionality requirements of the question. Common wrong answers were 'all students will take part' and '175 students prefer a sports theme'.

Question 23 (a)

23 The diagram shows a town T and a straight road AB.

Scale: 2 cm represents 1 km



A new straight road is built from town T to the road AB.
The road is the shortest possible distance from town T to the road AB.

(a) Using ruler and compasses only, construct the road from town T to the road AB. **[2]**

Candidates struggled with the nature of this question and the fact that no method was indicated. Very few candidates recognised the need for construction, even though 'ruler and compasses' was mentioned and written in bold. Of those that did attempt a response with compasses, most drew an arc of 6.5 cm from T, but then often did not know how to complete the construction from this. Many of those who picked up a mark achieved the B1 for a perpendicular line that was within tolerance, but without construction arcs.

Question 23 (b)

(b) The new road costs £200 000 per kilometre to build.
The road constructor says

The new road will cost over £600 000 to build.

Show that the road constructor is incorrect.

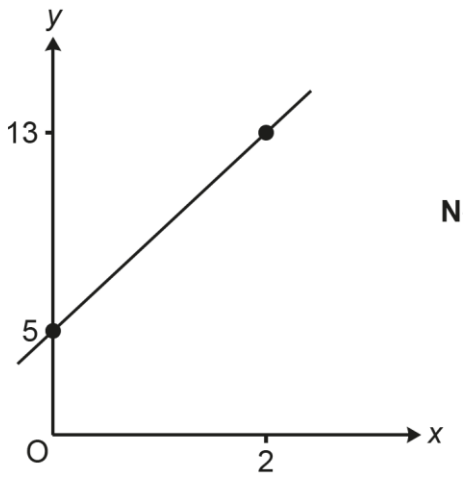
.....

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

Candidates struggled with this, however greater success was seen here than in part (a). B1FT was given for measuring their line within tolerance. Many candidates however struggled to divide their decimal measurement by 2, for example a measurement of 5.5 cm was often equated to 2.25 km or 2.5 km (often presumably attempted mentally as division by 2 was rarely seen on the page). Some candidates used the alternate method of calculating that the budget would build a 3 km road and identifying that this was longer than the road length on their diagram. It was also common for *their* roads to be A to T, B to T or A to B.

Question 24

24 A straight line passes through the points (0, 5) and (2, 13).



Not to scale

Find the equation of the line in the form $y = mx + c$.

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

There was a lack of knowledge demonstrated by candidates in this question and it was often omitted. Those who did attempt the question often added or subtracted the numbers given on the axis to try to find an answer. Where candidates scored, it was often a mark for identifying the *y*-intercept as 5.

Question 25

25 $2^7 \times 2^m = \frac{1}{2}$

Find the value of *m*.

m = ... **[2]**

Candidates very rarely recognise that this question was a negative indices question and that changing the $\frac{1}{2}$ to 2^{-1} was needed. Many did not respond and most of those that did made an attempt to evaluate 2^7.

Question 26

26 A triangle has sides of length 6 cm, 10 cm and 12 cm.

Is this a right-angled triangle?
Show how you decide.

..... because .....

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

Most attempts at this question tried to use a 'scale drawing', but without using compasses as would have been required. Very few candidates linked the mention of a right-angled triangle and being given three side lengths to their knowledge of Pythagoras' theorem. Often, candidates attempted to use angles in a triangle.

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