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GCSE (9-1)

*Examiners' report*

# *MATHEMATICS*

**J560**
For first teaching in 2015

## J560/03 Summer 2018 series

Version 1

# 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. 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 can be downloaded from OCR.

# Paper J560/03 series overview

J560/03 is the third and final paper in the foundation tier of the GCSE (9-1) Mathematics specification.

***Use of calculators***

In this paper it is expected that calculators will be used. Most candidates appeared to have a calculator although some non-calculator methods (not always successful) were seen.

Candidates should practice using calculator functions for finding cube roots and cubes. They should be able to use brackets, and calculate in standard form.

Marks for the paper covered much of the range, although few total marks were seen above 85 and the proportion rapidly declined past a total of 60 marks. Many of the questions in the first half of the paper appeared to be accessible to almost all candidates and the majority of candidates attempted every question.

It appeared that candidates had sufficient time to complete the paper as responses were seen to questions throughout.

Many candidates dealt well with the early questions to obtain many of the marks in questions 1 to 4. However, ratio and proportion presented a challenge to some candidates, particularly when ratios needed to be combined. Candidates handled listing and, subsequently, finding probabilities reasonably well and many were able to draw a pie chart within tolerance. Simple vectors were fairly well understood, although sometimes they were presented as though they were fractions. The understanding of combinations of vectors was not good and is an area for development. Candidates struggled to correctly combine algebraic terms and such errors as $4a + 6b = 10ab$ were not uncommon. Many candidates handled sequences well but some took shortcuts in extending a sequence such as adding terms together to obtain, erroneously, a term further in the sequence. Candidates that are more able understood Pythagoras' theorem but less able ones often added or subtracted sides without squaring. Proof is a topic that many foundation candidates found difficult.

Presentation, generally, is improving but there are still a few instances of figures which were not written well and some candidates continue to try to overwrite wrong answers rather than cross them out and start again. As a result, such answers are often ambiguous and can lead to a loss of marks. Candidates that are more able showed well organised and well presented working; all candidates should be encouraged to do this.

Candidates need to ensure they read each question carefully as many tried to calculate exact answers to question 19, and several did not realise that the operators and numbers $^-1$, $\times$ 2 and + 4 could not be combined together in question 7.

Candidates should practice giving accurate reasons. They should present these to their peers and criticise the accuracy of each statement.

## Question 1(a)

**1** **(a)** Write down the mathematical name of this triangle.
Choose from the list in the box.

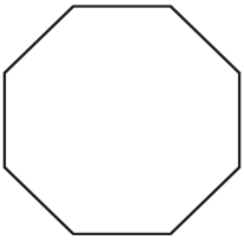
| |
|---|
| isosceles equilateral right-angled scalene |

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

This was often correctly answered. Equilateral was a common wrong answer.

## Question 1(b)

**(b)** Write down the order of rotation symmetry of this regular octagon.



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

This question was not answered well with 4 being a common wrong answer. Some candidates answered octagon, clockwise or 360; others drew lines of symmetry. A greater understanding of rotational symmetry is needed.

## Question 2(a)(i)

**2** **(a)** Write down.

**(i)** 3091 rounded to the nearest hundred

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

This was well done, with the vast majority of candidates rounding correctly. Some, however, rounded to the nearest 10, giving 3090, whilst others rounded to the nearest 1000, giving 3000. A smaller number simply gave 100.

## Question 2(a)(ii)

**(ii)** 3% as a decimal

**(ii)** ........................................................... **[1]**

This question was answered well, although 0.3 was a common wrong answer. A few candidates gave 0.03%, which is not correct.

## Question 2(a)(iii)

**(iii)** the cube root of 27

**(iii)** ........................................................... **[1]**

The term 'cube root' was not well understood as a significant number of candidates found this question difficult. Wrong answers included $3 \times 3 \times 3$, $3^3$, 9, 19 683 (from $27^3$) and 5.196 (from the square root of 27).

## Question 2(b)

**(b)** Complete the statement below using a number from this list.

$-2 \qquad 0 \qquad -6 \qquad 6$

$-5 >$ ........................................................... **[1]**

This was well answered but a significant number of candidates gave $^-2$ or 6 as the answer. Some did not read the question properly and listed all of the values.

## Question 2(c)

**(c)** Write the following numbers in order of size, smallest first.

0.4 0.5 0.06 0.444 0.46

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

This was often correct. Less able candidates put 0.06 in the wrong position, possibly confusing it with 0.6. The most successful candidates often wrote each decimal to 3 decimal places by adding zeros, before ordering. A common error was to think that 0.444 was bigger than 0.46 and less able candidates ignored place value and listed by reading the digits 0.4 0.5 0.06 0.46 0.444.

## Question 3(a)

**3** Calculate.

**(a)** $\frac{3.6}{1.2 - 0.3}$

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

This was frequently correct although 2.7 was a common wrong answer. This answer came from candidates not using brackets correctly with their calculator and entering values in the order seen.

## Question 3(b)

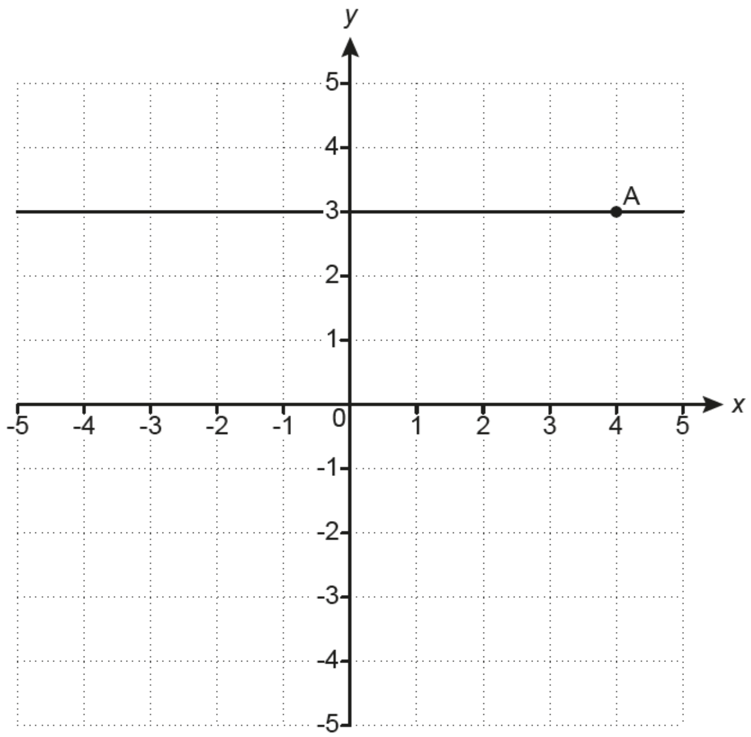
**(b)** $\sqrt{12.25^3}$
Give your answer correct to 1 decimal place.

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

Many correct answers were seen, although some candidates did not round their exact answer or truncated it to 42.8. 43 and 43.9 were common errors.

## Question 4(a)(i)

**4** This grid shows a horizontal line going through the point A.




**(a)** **(i)** Write down the coordinates of point A.

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

Almost all candidates gave the correct answer with a small number reversing the coordinates.

## Question 4(a)(ii)

**(ii)** Plot the point ($^-2$, 3). **[1]**

This was usually well done with the same reversal of coordinates sometimes seen, though not always by candidates who had reversed the coordinates in part (i). Plotting the point at ($^-3$, $^-2$) was also seen.

## Question 4(b)

**(b)** Write down the equation of the horizontal line going through point A.

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

This was not answered well by candidates with many unable to give an equation of any form. Common wrong answers were $x = 2$ and $y = 3$, $x = 3$, $y = x$ and just 3.

Some candidates wrote the coordinates given in part (a) and many left the answer space blank.

## Question 5

**5** *Tea Biscuits* can be bought in packets of 20 or packets of 24.
All biscuits are identical in size and quality.

| 20 *Tea Biscuits* for £1.50 | 24 *Tea Biscuits* for £1.80 |
|---|---|

Nada says

The packet of 24 biscuits is better value.

Is Nada correct?
Show how you decide.

Nada is .................................. because...........................................................................................

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

This was the point at which things became more challenging for many candidates. The question could be answered in many ways. The most common was to find the price per biscuit or the number of biscuits per £ (although almost all who did this thought that it was the price per biscuit). Many candidates did this correctly but, having achieved identical values from each pack, did not correctly interpret the result often saying, "Nada was correct as, even though the biscuits cost the same, you got more in the larger pack". A wide range of methods were seen, some of which were demonstrated successfully using clear working. Some less able candidates found the difference in price only and then could go no further than to say that the second cost 30p more but gave 4 more biscuits.

## Question 6(a)

**6** You are given that $5y = 4x$.

**(a)** Find the value of $y$ when $x = 10$.

**(a)** $y =$ .......................................................... **[2]**

Many correct answers were seen although not always accompanied by working. Although most candidates wrote 40, this was often given as the answer rather than equating it to $5y$. Lower ability candidates sometimes showed the result of the substitution as 410. The answer 12.5 was seen fairly regularly from substituting $y$ rather than $x$ as 10.

## Question 6(b)

**(b)** Write $y$ in terms of $x$.

**(b)** $y =$ .......................................................... **[1]**

This question was not answered very well by candidates, and the answer space was often left blank. Very little method was seen.

A very few candidates repeated the equation from part (a) and attempted to rearrange it. Common errors were to repeat the answer from part (a) or to give $4x – 5$, $y = x$ and, occasionally, $\frac{4}{5}$ as the answer.

## Question 7(a)(i)

**7** **(a)** Frances has three cards: Ace (A), King (K) and Queen (Q).
She shuffles these cards and deals them one at a time.

**(i)** List all the different orders in which she can deal the cards.
One possible order is already shown in the table.
You may not need to use all the rows.

| **First card** | **Second card** | **Third card** |
|---|---|---|
| A | K | Q |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

**[2]**

Many correct answers were seen with most candidates working methodically. A very few candidates repeated the given result and less able candidates gave only two further outcomes. Some candidates, after giving some or all of the expected outcomes, then gave outcomes using repeats of the same card, such as KAA or KKK.

## Question 7(a)(ii)

**(ii)** Find the probability that, in the three cards Frances deals, the King (K) is dealt **immediately** after the Queen (Q).

**(ii)** ........................................................... **[1]**

Again, many good answers were seen. A common error was to give an answer of $\frac{1}{6}$ or to give the answer as a ratio. A few candidates used words such as unlikely and others mistakenly gave their answer as a probability out of 18, presumably because there were 18 letters in the table in part (i).

Candidates should be made aware that ratio is not an acceptable form for probability.

## Question 7(b)

**(b)** A counter has 3 on one side and 5 on the other.
Lena flips the counter.
She then picks one of these three cards at random.

$-1$ $\times 2$ $+4$

Lena puts the card next to the counter and works out the answer.

For example 5 $\times 2$ gives the answer 10.

Find the probability that Lena gets an answer **less than 8**.
You must show your working.

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

Higher ability candidates gave clear lists of outcomes and the correct answer was then commonly seen. A number of candidates made numerical errors, such as $5 - 1 = 6$. Some candidates thought that outcomes such as $^{-}1 \times 2 = {}^{-}2$ were possible and either gave a list of these, which were not acceptable, or included them within a list of correct outcomes. In all cases, these candidates lost marks.

Some candidates made one list and then started again. In such cases, candidates should cross out the incorrect list so that it is clear which list is to be marked. Quite a few candidates gave a correct probability based on their incorrect list and were able to score the SC mark.

## Question 8(a)

**8** Two groups of students go on a water sport holiday.
Each student chooses one activity.

Students in **Group A** choose from Diving, Swimming, Paddleboarding and Kayaking.
Their choices are to be shown in a pie chart.

**(a)** Complete this table for Group A.

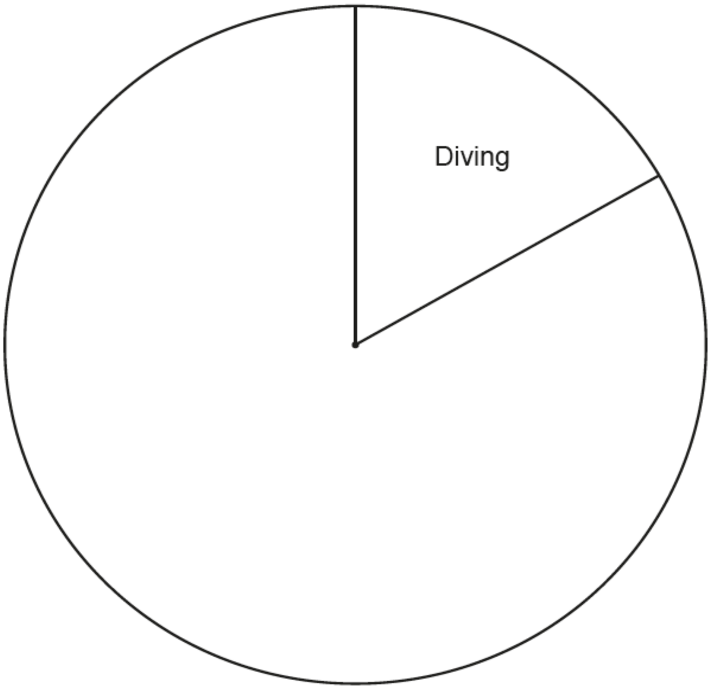
| Activity | Number of students | Angle of sector |
|---|---|---|
| Diving | 5 | 60° |
| Swimming | | 120° |
| Paddleboarding | | |
| Kayaking | 9 | 108° |

**[4]**

Most candidates scored marks on this question, with many scoring full marks. Often the angle was correct and sometimes 10 for swimming. Many candidates did not show working.

## Question 8(b)

**(b)** Complete the pie chart for Group A.




**[2]**

Most candidates appeared to have the use of a ruler and protractor and used these within tolerance. Many candidates gained 2 marks or 1 mark (often for the 'swimming' sector measured and correctly labelled) and it was rare to find the question not answered.

## Question 8(c)

**(c)** One student in Group A changes activity.
There is now a new modal activity for Group A.

Write down the student's original activity and new activity.

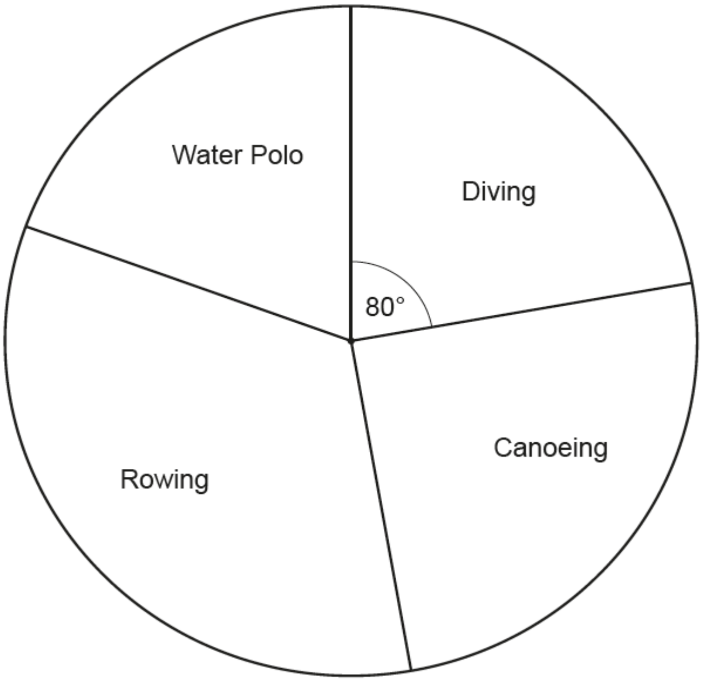
original activity.........................................

new activity......................................... **[1]**

Few candidates could answer this correctly. It was rare to see any numerical support for the given response. Some candidates made no response. It appeared that candidates did not understand the question as answers such as Diving and Modal were seen and some included sports not in the question. Responses to question 17 indicated that the majority of candidates understood the term 'mode' but did not understand the concept of a modal activity in this context.

## Question 8(d)

**(d)** The choices made by **Group B** are shown in this pie chart.




A teacher thinks more students chose Diving in Group B than in Group A.

Give a reason why the teacher may be wrong.

..........................................................................................................................................

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

Many good responses were given involving a comment about different numbers in each group. Some candidates said that the number of degrees per person could be different but did not say why. A common response was that the teacher was wrong because people changed their minds and/or activities. A number agreed with the teacher and said that 80° is bigger than 60°.

## Question 9

**9** The length, $a$, of a pencil is 15.3 cm, correct to 1 decimal place.

Complete the error interval for the length of the pencil.

.................... $\leqslant a <$ ..................**[2]**

This relatively new topic was not answered very well and only a small number of correct answers were seen. Many wrong responses included answers given to only 1 decimal place. Candidates who gave an answer of 15.25 and 15.34 were credited 1 mark.

## Question 10(a)

**10** 4 people take 3 hours to paint a fence.

Assume that all people paint at the same rate.

**(a)** How long would it take one of these people to paint the same fence?

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

A small proportion of candidates gave the correct answer of 12 hours. 45 minutes, from 180 ÷ 4, 0.75 and 1.33 given in various forms were common wrong answers. Many candidates clearly did not understand this topic and did not realise that 1 person would take longer than 4 people to do the same job.

## Question 10(b)

**(b)** How long would it take 5 people to paint the same fence?
Give your answer in hours and minutes.

**(b)** …………… hours …………… minutes **[4]**

The second part of this question was not well understood and candidates did not have the skills to solve the problem. Working revealed candidates using the given numbers in a variety of ways.

A common error was to multiply the 45 minutes from part (a) by 5 to obtain 225 minutes and then change this to 3 hours and 45 minutes. Candidates did not consider that it should take 5 people less time. Other candidates subtracted 45 minutes from 180 and found 135 minutes and wrote 2 hours 15 minutes. This at least had the merit of being a shorter time than 3 hours.

There were the usual errors such as $135 \div 60 = 2.25$ so 2 h 25 min and 3.75 hours became 4 hours and 15 minutes. Some of those who used the correct method finished by equating 2.4 hours to 2 h 40 min.

## Question 11(a)

**11** A recipe for flapjacks uses only oats, butter and syrup, in the ratio 3 : 2 : 1.

**(a)** Pirin makes 1.5 kg of flapjacks.
He uses 600 g of butter.

Has Pirin followed this recipe?
Show how you decide.

..........................................................................................................................................

..........................................................................................................................................

..........................................................................................................................................

..........................................................................................................................................

..........................................................................................................................................

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

This question assessed understanding of ratio. A significant minority of candidates answered the question succinctly in a few lines. Some correct methods were seen that demonstrated a competent grasp of ratio. Most candidates could correctly convert 1.5 kg to grams or 1800 g into kilograms, although some did not state units. The most common method was to equate 2 shares in the ratio with 600 g, find one share (300 g) and then work out the total (1800 g). Often this was done by finding 900 g of oats and 300 g of syrup and adding 900, 600 and 300 rather than just $300 \times 6$.

Some took 600 g away from the total and then divided 900 g by 4, giving syrup as 225 g and then oats as 675 g. However, incorrect conclusions often followed that did not compare these values with what they should have been.

Some incorrect starting points were to put the 600 g under the wrong component in the ratio or to take it as the whole amount and divide by 6.

Candidates are advised to annotate their working and cross out unused working. Numbers frequently appeared and examiners had to deduce what they represented by usage. It helps when crediting marks if the values are annotated in such ways as 900 g of oats.

## Question 11(b)

**(b)** Using this recipe, 200 g of syrup are needed to make 10 flapjacks.
Find the mass of **oats** needed to make **15** of these flapjacks.

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

This question was not well answered by candidates. A few correct answers were seen without working.

Candidates often scored 1 mark for 300 g of syrup in 15 flapjacks or 600 g of oats in 10 biscuits but could not progress to the second stage of the problem. A second read through of the question may have highlighted what needed to be found, especially as the crucial word and figure were highlighted. A number of candidates gained a mark for using a scale factor of 1.5, although this was often through the process of halving and adding on. A small number of candidates thought that this question connected with part (a) and used 1500 g in their working.

## Question 12(a)

**12** **(a)** $\overrightarrow{PQ} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$

Work out $5\overrightarrow{PQ}$.

**(a)** $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ **[1]**

| |
|---|
| Nearly half of the candidates answered this correctly. An error was to include a vinculum, as though this was a fraction, and some treated it as a fraction by only multiplying the top number. A few gave $5\begin{pmatrix} 3 \\ 4 \end{pmatrix}$ and did not score the mark. Lower ability candidates did not attempt the question. |

## Question 12(b)

**(b)** Find the values of *h* and *k*.

$$\begin{pmatrix} h \\ 5 \end{pmatrix} + \begin{pmatrix} 2 \\ k \end{pmatrix} - \begin{pmatrix} 3 \\ 3 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

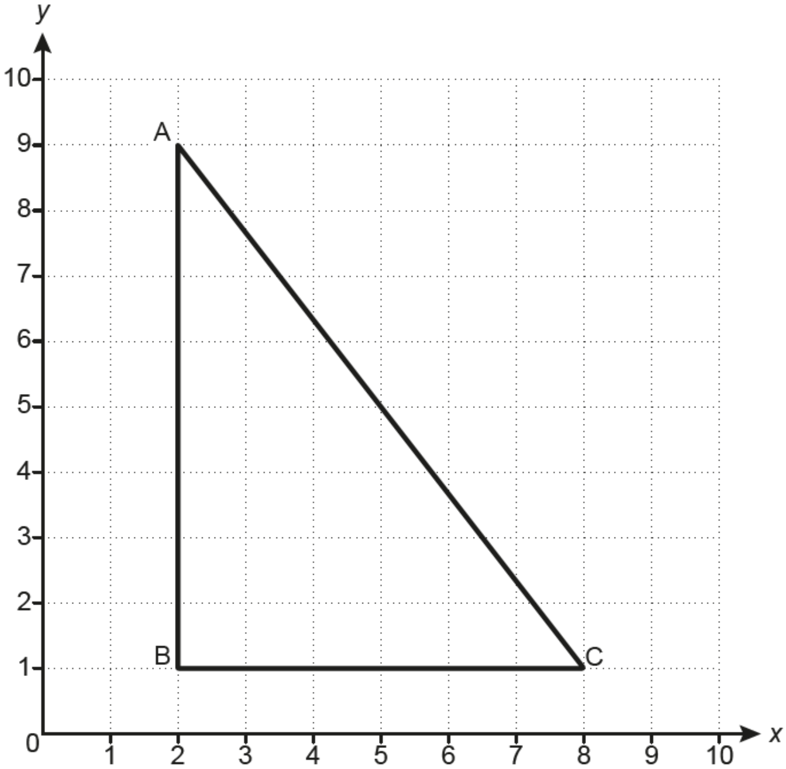
**(b)** $h =$ ...........................................................

$k =$ ........................................................ **[2]**

| |
|---|
| Around the same proportion of candidates scored 0 marks as scored 2 marks. Some scored 1 mark for giving *h* correctly but giving the negative value of *k* proved more difficult. Those who wrote out the calculations were generally more successful. Again, a number of vectors contained fraction lines. |

## Question 12(c)(i)

**(c)** Triangle ABC is drawn on a coordinate grid.




$\overrightarrow{AB} = \begin{pmatrix} 0 \\ -8 \end{pmatrix}$

**(i)** Use the diagram to complete this vector sum.

$$\overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{CA} = \begin{pmatrix} 0 \\ -8 \end{pmatrix} + \begin{pmatrix} \quad \\ \quad \end{pmatrix} + \begin{pmatrix} \quad \\ \quad \end{pmatrix} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$$

**[2]**

This question tested the understanding of vectors. Clearly many candidates found writing a vector a challenge and few gave the correct vectors for either $\overrightarrow{BC}$ or $\overrightarrow{CA}$. Some had the x and y reversed. Again, a number of vectors contained fraction lines. An error amongst those who did write vectors was to write $\overrightarrow{BC}$ as $\begin{pmatrix} 0 \\ 6 \end{pmatrix}$.

A large number of candidates did not attempt the question.

## Question 12(c)(ii)

**(ii)** Give a reason why the answer to the sum could be written down **without doing any working**.

........................................................................................................................

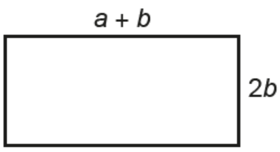
........................................................................................................................ **[1]**

Very few candidates gave the correct response. There was little evidence of understanding that the sum of the vectors beginning and ending at the same point would be zero. Many talked about not needing to do working because it was simple or on a grid and all that was needed was counting.

## Question 13(a)(i)

**13** In this question, assume all dimensions are in centimetres.

Jess and Pete have many rectangular tiles.
Each tile has length $a + b$ and width $2b$.




**Not to scale**

**(a)** Jess joins three tiles together to make a larger rectangle, as shown.

**Not to scale**

**(i)** Write an expression for the perimeter of her rectangle.
Give your answer in its simplest form.

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

Many candidates did not show clear working. Some wrote $a + b$ and $2b$ on all lengths of the diagram. After that, little was shown, although a few did write a sum of appropriate lengths to gain 1 mark. Often, after seeing letters on the diagram, answers such as $9a^4b^2$ were given, demonstrating no understanding of algebraic rules of combination. Some reached $6a + 10b$ and then wrote $16ab$. Despite the perimeter of the rectangle being emboldened, some candidates tried to add ALL lengths together. There were some instances of candidates starting with the correct simplified answer and then apparently combining the two terms to form an area expression; this looked like a change of method rather than an error in the simplification.

## Question 13(a)(ii)

**(ii)** An expression for the **area** of her rectangle is $6ab + 6b^2$.

Factorise this expression fully.

**(ii)** ........................................................... **[2]**

This standard question was answered better than the first and final parts. Some candidates did not take out the highest common factor and gained 1 mark. A small number of candidates left the final expression as $6b(1a + 1b)$ but still scored the mark. The error $6a(a + b)$ was fairly common. Around a quarter of the candidates did not attempt the question.

## Question 13(b)

**(b)** Pete joins some tiles together to make a different rectangle.
The area of his rectangle is $8ab + 8b^2$.

Draw a possible arrangement of tiles for Pete's rectangle.
Write down expressions for the length and for the width of the rectangle.

length = ...........................................................

width = ........................................................ **[5]**



Most candidates did not demonstrate a strategy to tackle this problem.

Very few found the area of one tile ($2b(a + b) = 2ab + 2b^2$) to relate to the given area and few attempted to factorise the given area ($8b(a + b)$). Either strategy could have led to a straightforward answer. Most candidates drew rectangles, usually 4 by 1, and attempted to write expressions for the areas produced. Few gained full marks. Some gained part marks for a correct number of rectangles or an expression for a correct length or width. A few candidates had a pair of correct expressions for the length and width but did not attempt the matching diagram. Some candidates drew several rectangles and then could not decide which one was their preferred solution.

A common error was to write numbers such as length = 8 and width = 4.

## Question 14(a)

**14** Here are the first four terms of a sequence.

6 10 14 18

**(a)** Write down the next term.

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

This was usually correct.

## Question 14(b)

**(b)** Write an expression for the *n*th term.

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

Fewer than half the candidates gave a correct answer. Some gave 4$n$ to gain 1 mark. The common errors were $n$ + 4 and 2$n$ + 4.

## Question 14(c)

**(c)** Explain why 511 is **not** a term in the sequence.

...........................................................................................................................

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

Many correctly spotted that 511 was odd or that numbers in the sequence were always even. A common mistake was to write that 511 was not in the four times table. A few used 4$n$ + 2 to show that the value of $n$ was a decimal and so could not be a term in the sequence. Some reached the value 127.25 from this method but did not explain that a decimal value for $n$ was not possible.

## Question 14(d)

**(d)** Find the term in the sequence that is nearest to 511.

**(d)** ............................................................ **[3]**

Less than half of the candidates found 510. Many candidates did not show their working. Some candidates who did not have a correct formula in part (b) used a range of correct approaches to build up the sequence. Some repeatedly added 4 on their calculators to reach 510 but, when attempted to justify the result on paper, wrote incorrect working.

Some used incorrect methods to extend the sequence, such as finding a further term in the sequence and then finding multiples of it, adding such multiples together and so on. A very few used $4n + 2$ to find a position near to 511 and then find 510. Some used $4n + 2$ in a trial and improvement system. A few candidates found 510 in their working but then gave the position (127) as their answer.

## Question 15

**15** In July the price of a holiday is £500.
In August the price increases by 25%.
In September the price drops to £500 again.

Work out the percentage decrease from the August price to the September price.

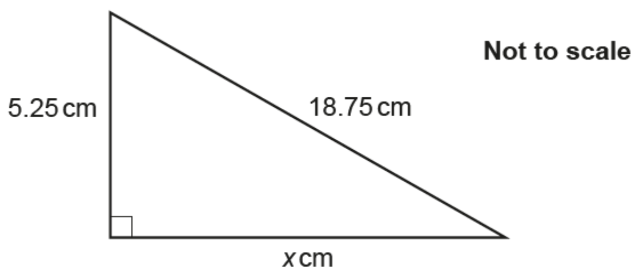
.......................................................... % **[4]**

Many candidates gained 2 marks for finding 125% of £500 (£625). Most candidates used a calculator to do this. A few, reasonably annotated, non-calculator methods were seen.

A much smaller proportion of candidates proceeded to the answer. 25% was a common wrong answer, and some candidates scored 3 marks for reaching 80%.

## Question 16

**16** Here is a right-angled triangle.




Work out the value of $x$.

$x$ = ........................................................... **[3]**

This standard question was well answered by higher ability candidates. Most candidates, who knew what to do, used Pythagoras. Some attempted a trigonometric solution but this usually was unsuccessful. Candidates using trigonometry tended to struggle to find an appropriate angle, often because of a lack of clarity in their working. Many lower ability candidates, when attempting Pythagoras, subtracted or added the sides without squaring.

## Question 17

**17** Ping chooses four numbers.

The mode of these four numbers is 8, the range is 7 and the mean is 11.

Find Ping's four numbers.

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

This question, that was common with higher tier, saw well distributed marks. Around a third of candidates gave four numbers meeting one of the conditions, such as 8, 8, 7 and 2. Of the rest, another third met a second condition, such as the range being 7 or the total being 44. Lower ability candidates did not always give four numbers and were unsure how to use the mean and range.

## Question 18

**18** A box contains only red, blue and green pens.
The ratio of red pens to blue pens is 5 : 9.
The ratio of blue pens to green pens is 1 : 4.

Calculate the percentage of pens that are blue.

…………………………….. % **[4]**

This question also appeared on higher tier. It placed ratio in the context of a problem and most candidates were unable to produce a sensible answer.

The common error was to add the four elements of the ratios and write $\frac{10}{19}$.

Around a quarter of candidates did not attempt the question and the modal mark was 0.

## Question 19

**19** Asha worked out $\dfrac{326.8 \times (6.94 - 3.4)}{59.4}$.

She got an answer of 19.5, correct to 3 significant figures.

Write each number correct to 1 significant figure to decide if Asha's answer is reasonable.

.......................................................................................................................................

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

This question, which also appeared on higher tier, saw a reasonable distribution of marks. Many candidates saw the request to write the values correct to 1 significant figure, as they often gave 7 and 3 in the bracket. This scored them 1 mark. However, they were less able to deal with 300 and 60. Others ignored this request and simply worked out the exact value and scored no marks. There was confusion between 1 significant figure and 1 (or 2) decimal places. Many candidates simply processed the original numbers in their calculators and assumed that the answer was reasonable.

It is vital that candidates read the question carefully in order to answer the actual question asked.

## Question 20(a)

**20 (a)** Show that $a^5 \times (a^3)^2$ can be expressed as $a^{11}$. **[2]**

This question, which also appeared on higher tier, also saw around half the candidates gaining one or two marks. Many gave $a^6$ to gain 1 mark but few explained that $a^5 \times a^6$ meant that the indices should be added to give $a^{11}$.

## Question 20(b)

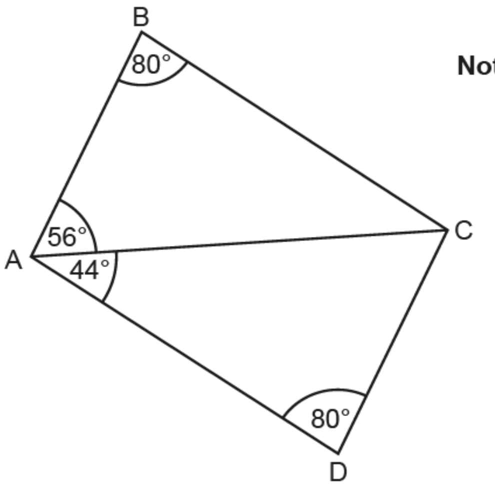
**(b)** Write $\frac{1}{125} \times 25^9$ as a power of 5.

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

This question was not answered well by most candidates. Very few realised that $125 = 5^3$ and that $25^9$ was $(5^2)^9$. The most common tactic was to work out the calculation on the calculator and then proceed no further.

## Question 21

**21** The diagram below shows two triangles.




**Not to scale**

Prove that triangle ABC is congruent to triangle ACD.

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

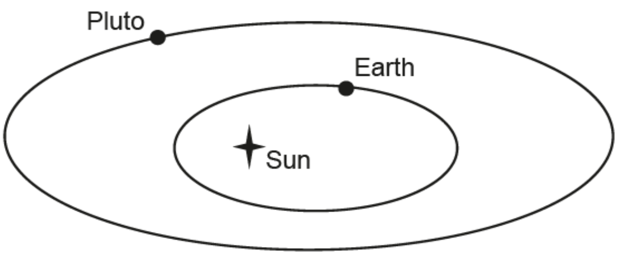
Most foundation candidates understood the term congruent and attempted to answer the question, which also appeared on higher tier. Many scored 1 or 2 marks for correctly identifying angle ACB as 44° and angle ACD as 56° (often on the diagram) and for realising that angle ADC = angle ABC.

Most candidates did not use formal notation correctly and many referred to C = 44 or ACB = 44 (omitting the word angle) or made incomplete/inaccurate statements such as 'triangles add up to 180'; rather than 'angles in a triangle add up to 180°'. Very few offered a formal proof. Candidates frequently used incorrect terminology such as Z angles.

If candidates are to do well in these types of questions it is vital that they are taught to use correct notation and that they make accurate statements.

## Question 22(a)

**22** Earth and Pluto go around the Sun.
Their distance to the Sun varies.




**Not to scale**

The table shows the closest distance that Earth and Pluto get to the Sun.

| | **Closest distance to the Sun (km)** |
|---|---|
| Earth | $1.47 \times 10^8$ |
| Pluto | $4.44 \times 10^9$ |

**(a)** Show that the closest distance of Pluto to the Sun is roughly 30 times the closest distance of Earth to the Sun. **[2]**

Many candidates offered a response to this question. A large number changed the values from standard form to ordinary numbers to answer the question, and some then went no further. Some divided the larger distance by the smaller distance and obtained a result of 30.2.... . More practice in entering standard form numbers into calculators would benefit candidates.

Candidates need to realise that, in a 'Show that' question, they should not use what they are asked to show (in this case 30) in the working. Many gained the special case mark when they assumed the result and worked out Earth's distance × 30 to show this nearly equated to Pluto's distance. Some multiplied Pluto's distance by 30.

Candidates working with ordinary numbers were invariably accurate with the number of zeros. A small number of candidates working with ordinary numbers then decided to change an answer back into standard form making an error in the conversion.

## Question 22(b)

**(b)** Give a reason why we **cannot** use this information to say

The distance of Pluto to the Sun is always
30 times the distance of Earth to the Sun.

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

A comment recognising that other distances are possible is what examiners were looking for here. Responses such as 'because it's not exact', 'we can't measure it' and 'because it isn't 30' were common. Some candidates said, 'because it's an ellipse' but did not explain the effect of this. Other statements such as 'they both move' and 'the orbits change' were made but candidates did not link these comments to the impact on distance.

Candidates should be given the chance to offer accurate responses to questions such as these, and also to criticise the accuracy of these statements.

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