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OCR
Oxford Cambridge and RSA

GCSE (9-1)

Examiners' report

MATHEMATICS

J560
For first teaching in 2015

J560/01 November 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 J560/01 series overview

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

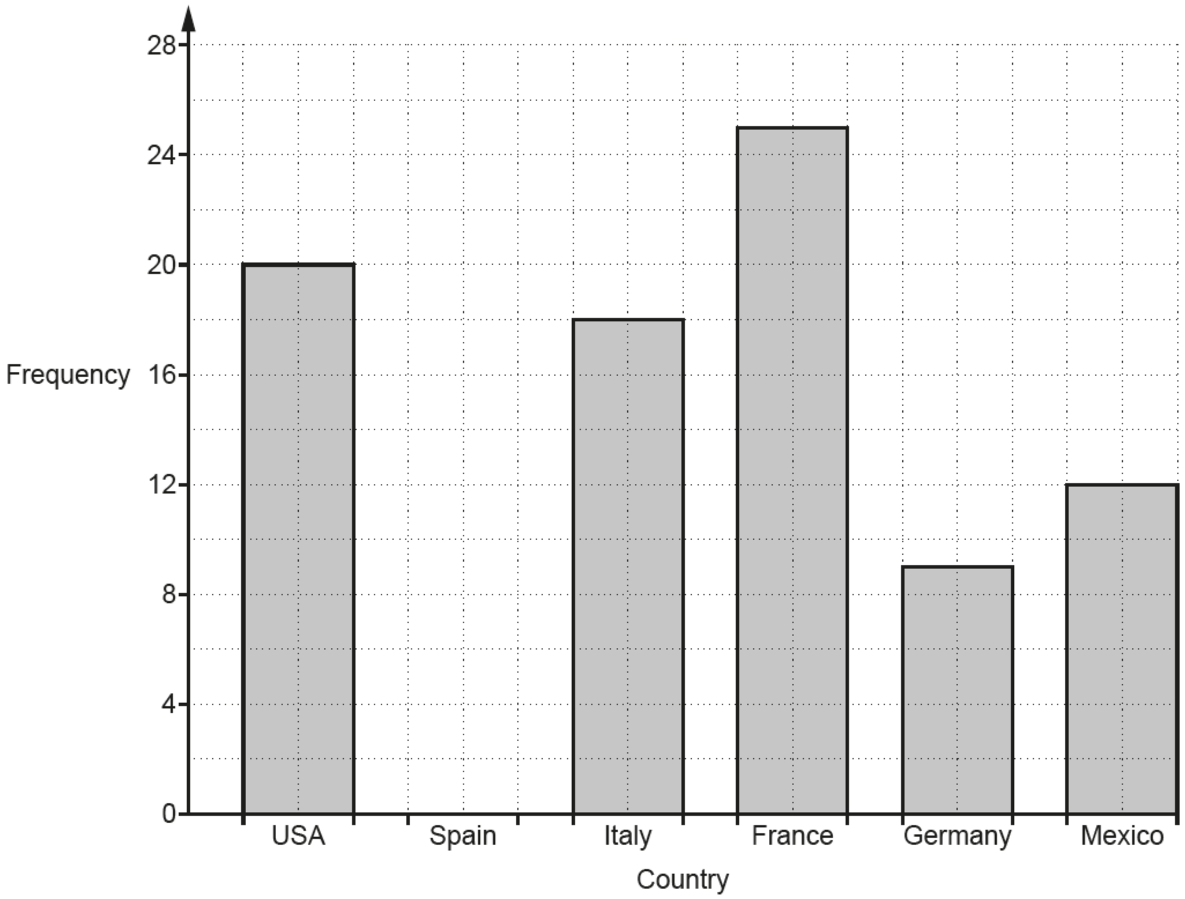
Most candidates were able to attempt every question and there was no evidence that time was a factor in failing to complete any work.

Working was shown by many candidates but a clear lack of method often led to a loss of marks. Even when a question stated working must be shown, several candidates failed to show full method. The work space, particularly on longer questions was often cluttered and working not clearly set out. Candidates should ensure that their work is set out in a clear and methodical way.

As this is a calculator paper it is a concern to see many candidates making arithmetic errors on simple calculations. Candidates need to understand and use calculator methods. For example, the percentage question was regularly attempted using long, non-calculator methods which often led to arithmetic errors or premature rounding.

Question 1(a)

1 Jodie asked some people to choose from six countries where they would most like to go on holiday.
The bar chart shows her results for five of the countries.



(a) 14 people answered Spain.

Show this information on the bar chart. **[1]**

Most candidates gave the correct answer.

Question 1(b)(i)

(b) Complete these sentences.

(i) .... was chosen by the fewest people. **[1]**

Most candidates gave the correct answer.

Question 1(b)(ii)

(ii) .... people chose France. **[1]**

Most candidates gave the correct answer.

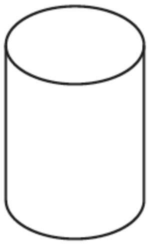
Question 1(b)(iii)

(iii) .... **more** people chose Italy than Mexico. **[1]**

Most candidates gave the correct answer. A small number gave the answer 5.

Question 2(a)

2 (a) Write down the mathematical name of this solid.



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

This was mostly answered correctly. The most common incorrect answer was cuboid.

Question 2(b)

(b) ABCD is a rectangle.

Not to scale

Add the correct mathematical symbol to the diagram to show that angle BCD is a right angle. **[1]**

The majority of candidates were able to use correct notation for a right angle. Several had not read the question carefully and labelled all 4 angles.

Question 3

3 Louiza changes £320 into euros.
£1 is worth 1.14 euros.

How many euros does she receive?

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

The majority of candidates gave the correct answer, with only a few using division rather than multiplication.

Question 4(a)(i)

4 **(a)** Write down each of the following.

(i) An even number.

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

This was mostly correct.

Question 4(a)(ii)

(ii) A factor of 25.

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

This was mostly correct. A common error was 50.

Question 4(a)(iii)

(iii) A prime number between 10 and 20.

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

Again, the majority of candidates were able to give the correct answer. The most common incorrect answer was 15.

Question 4(a)(iv)

(iv) A cube number.

(iv) .... **[1]**

About half of the candidates were able to answer this correctly. The most common error was to give a square number, usually 9.

Question 4(b)

(b) Find the highest common factor (HCF) of 35 and 91.

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

Many candidates were able to correctly identify the HCF as 7. It is clear many candidates cannot distinguish between HCF and LCM, with many writing out multiples.

Question 5(a)

5 **(a)** Write 3 : 57 as a ratio in its simplest form.

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

Most candidates gave the correct answer. Some gave the incorrect answer of 3 : 19.

Question 5(b)

(b) Bob and Chris share some money in the ratio 2 : 3.
Bob receives £8.

Work out how much Chris receives.

(b) £ .... **[2]**

Although many correct answers were seen, there were several candidates who added the 2 parts together not realising that they had been given Bob's part rather than the total.

Question 6(a)

6 Solve.

(a) $x - 6 = 4$

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

This was mostly correct.

Question 6(b)

(b) $\frac{12}{x} = 3$

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

This was mostly correct.

Question 7(a)

7 **(a)** Round 81.469 to 1 decimal place.

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

This was mostly correct.

Question 7(b)

(b) Round 0.005 694 to 3 significant figures.

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

This was answered less well than part (a). A general lack of understanding regarding the status of zeros was the common cause of incorrect answers. 0.006 and 5.694 were the most common errors.

Question 8

8 Here is a function.
The input is x and the output is y.

Write an algebraic expression for y in terms x.

y = ... **[2]**

Although many correct answers were seen, several candidates gave the inverse and others substituted numbers in.

Question 9

9 Liu wants to decorate some cakes with shapes.

She has 140 shapes.
Each shape is a star or a heart.
The ratio of the number of stars : number of hearts is 4 : 3.
She wants to put 5 stars and 4 hearts on each cake.

How many cakes can Liu decorate?
Show full working to support your answer.

.... **[5]**

This question required candidates to show full working, and many did so, scoring all 5 marks. Those who scored 4 marks often gave an answer of 31 for adding the 15 and 16. Some candidates stopped after finding 80 and 60. Almost all candidates scored 1 mark for 140 ÷ 7. Some candidates used a trial and improvement approach often unsuccessfully. Others simply used a combination of the numbers given in the question.

Exemplar 1 4 marks

9 Liu wants to decorate some cakes with shapes.

She has 140 shapes.
Each shape is a star or a heart.
The ratio of the number of stars : number of hearts is 4 : 3. = 7
She wants to put 5 stars and 4 hearts on each cake.

How many cakes can Liu decorate?
Show full working to support your answer.

140 / 7 = 20

20 x 4 = 80 stars
20 x 3 = 60 heart

80/5 = 16

60/4 = 15

16 + 15 = 31

31 [5]

This candidate shows full working, but adds 15 and 16 rather than choosing 15. This was seen often.

Exemplar 2 2 marks

9 Liu wants to decorate some cakes with shapes.

She has 140 shapes.
Each shape is a star or a heart.
The ratio of the number of stars : number of hearts is 4 : 3.
She wants to put 5 stars and 4 hearts on each cake.

How many cakes can Liu decorate?
Show full working to support your answer.

4 : 3
4 + 3 = 7
140 ÷ 7 = 20

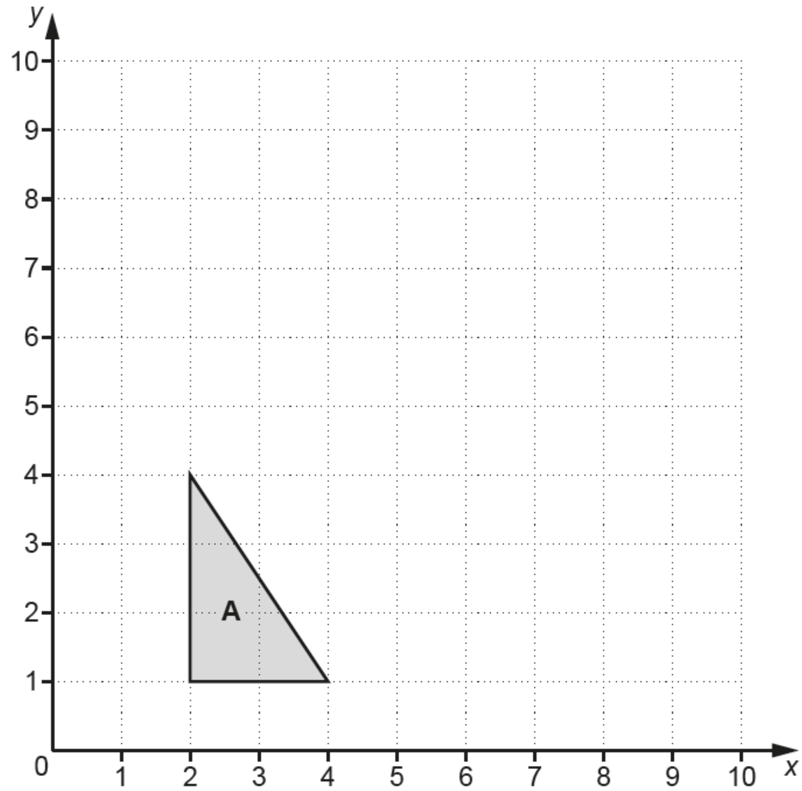
4 x 20 = 80
3 x 20 = 60

140 **[5]**

In this exemplar, the division of 140 by 7 is seen for 1 mark and the multiplication of 20 by 4 and 20 by 3 scores the second mark.

Question 10

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

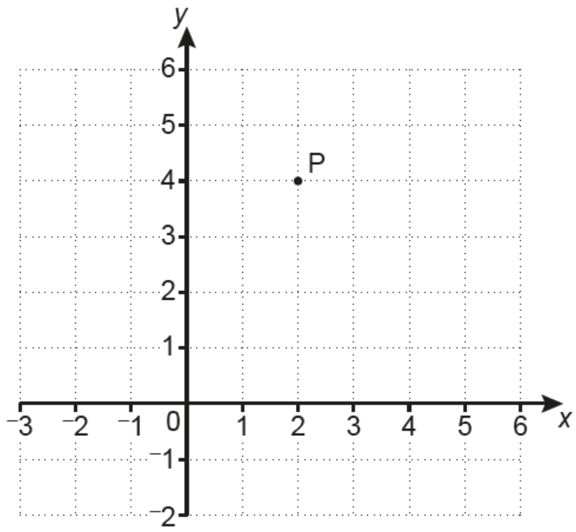


Enlarge triangle **A** with scale factor 2 and centre of enlargement (0, 0). **[3]**

Many candidates were able to use the scale factor correctly but few were able to use the correct centre of enlargement, so triangles of the correct size were frequently seen in the wrong position on the grid. Candidates who drew rays from the origin to the vertices of the given triangle often did not identify the correct points for the vertices in the final image. The most common error was to draw a triangle with vertices at (0, 0), (4, 0) and (0, 6).

Question 11(a)

11 Point P is shown on this grid.



(a) Write down the coordinates of point P.

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

This was mostly correct. A small number of candidates wrote (4, 2).

Question 11(b)

(b) Plot point Q at ($^-1$, 2). **[1]**

This was mostly correct with a small number of candidates reversing the coordinates.

Question 12

12 Use the formula

$$v = u + at$$

to find the final velocity, when

- the initial velocity is 8 m/s
- the acceleration is 3 m/s^2
- the time is 5 seconds.

.... m/s **[2]**

The candidates who were familiar with the formula, and therefore able to substitute the given values correctly, almost always went on to arrive at the correct answer. However, there were also a large number of incorrect responses. A considerable number of candidates did not know how to substitute the given values into the formula, with most thinking that v was the initial velocity. The units of acceleration also created difficulties, with many thinking it was necessary to find 3^2 or to square at some intermediate stage in their calculation. Centres are reminded that candidates should be familiar with this and other formulae listed in the specification.

Question 13

13 Calculate the circumference of a circle with diameter 10 cm.

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

This was well answered with the majority of candidates scoring at least 1 mark for 10π. The most common error was to use the formula for area rather than diameter.

Question 14(a)(i)

14 (a) Find the value of x in each of the following.

(i) $a^4 \times a^3 = a^x$

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

Question 14(a)(ii)

(ii) $(b^4)^3 = b^x$

(ii) $x = $ .... **[1]**

These parts were often correct. The most common errors were to confuse whether the sum or product of the indices was required. Some candidates gave an answer that included a base, for example a^7 or b^{12}, rather than giving the value of x.

Question 14(b)

(b) Factorise fully.

$18x^2 + 9x$

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

Part (b) was significantly less well done. A very large number of candidates did not seem to know what was required here; they performed a variety of attempts at algebraic manipulation but did not make any attempt to factorise the given expression. Those who did factorise correctly often did not factorise the expression fully, but were able to gain credit for a correct partial factorisation.

Question 15(a)

15 Tea bags of similar quality are sold in three different sized packs:

Small Pack	Medium pack	Large pack
80 tea bags for £2.10	150 tea bags for £3.55	220 tea bags for £5.25

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

.... because ....

.... **[4]**

There were many methods that could be employed in order to arrive at a correct decision regarding the value for money offered by the three sizes for packs of tea. Division of cost and quantity in various forms gave sets of three values that could be compared and to this end many candidates managed to score 2 or 3 of the 4 marks available. The main problem was that candidates did not always understand the significance of their final answers. For example, dividing 80 by 2.10 gave the number of tea bags (38.095..) that could be purchased for £1 if the small pack was used. This was often quoted as the cost per tea bag and if considered incorrectly often resulted in an incorrect decision being made. Again, the response required a method to be shown and failure to do this could result in lost marks. Rounding values for medium and large often resulted in the same values (42) for both packs meaning that a suitable comparison could not be made.

Question 15(b)

(b) Explain why someone may buy a pack which is not the best value for money.

....

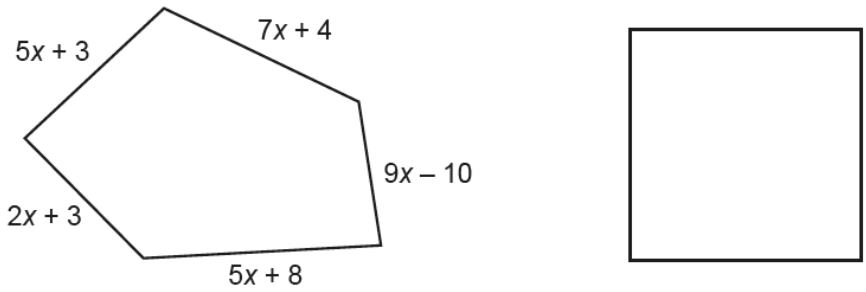
.... **[1]**

Most candidates were able to give a sensible reason for not buying the most economic pack, usually referring to the quantity required by the purchaser.

Question 16

16 The perimeter of the pentagon is equal to the perimeter of the square.

Not to scale



Find an expression for the length of one side of the square.
Give your answer in terms of x in its simplest form.

.... **[4]**

Most candidates made an attempt to find the total of the expressions to find the perimeter of the pentagon, however algebraic and arithmetic errors were seen quite frequently. Relatively few candidates realised the need to divide their expression for perimeter by 4 in order to find the length of one side of the square.

17 James works from 2pm until 8.30pm on both Thursday and Friday.
He is paid £12 per hour.

On Saturday he is paid $1\frac{1}{2}$ times this hourly pay.

He works for 5 hours on Saturday.

Calculate how much James earns **in total** for these three days.

£ .... **[6]**

Question 17

Several candidates were able to work out the number of hours James worked on Thursday and Friday before correctly calculating the correct amount of money (£246) earned for the three days. Common errors included working out an incorrect time period for the two weekdays, times of 6 hours and 7.5 hours were quite common, and using 6.3 for 6 h 30 m in the calculation. Some candidates who managed to work out a correct wage often forgot that there were two days (Thursday and Friday) and only gave the pay for one of the days (£78).

Question 18

18 Doctor Jones starts an appointment every 20 minutes.
Doctor Warholm starts an appointment every 35 minutes.

The first appointment for both doctors starts at 8.30 am.

.... **[4]**

The most common approach was to list appointment times for each doctor, this frequently led to the correct answer. However, many candidates either made errors in calculating the times or abandoned their list before reaching the next common appointment time.

Exemplar 1 — 1 mark

18 Doctor Jones starts an appointment every 20 minutes.
Doctor Warholm starts an appointment every 35 minutes.

The first appointment for both doctors starts at 8.30 am.

What is the next time that they have an appointment start at the same time?

20 minutes	35 minutes
8:30	8:30
8:50	9:05
9:10	9:30
9:30	10:05

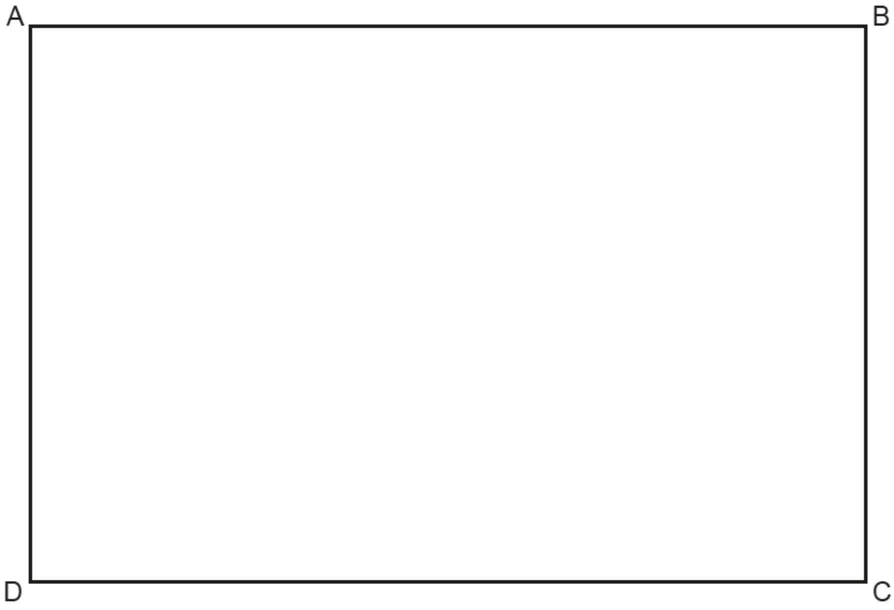
.................9.30................. **[4]**

This exemplar is from a low scoring candidate. They score 1 mark for correctly listing three correct times in the first list.

Question 19

19 The scale drawing shows Katy's garden ABCD.

Scale: 1 cm represents 5 m



Katy places a statue in the garden.

The statue is

- more than 30 m from D
- closer to CB than AB.

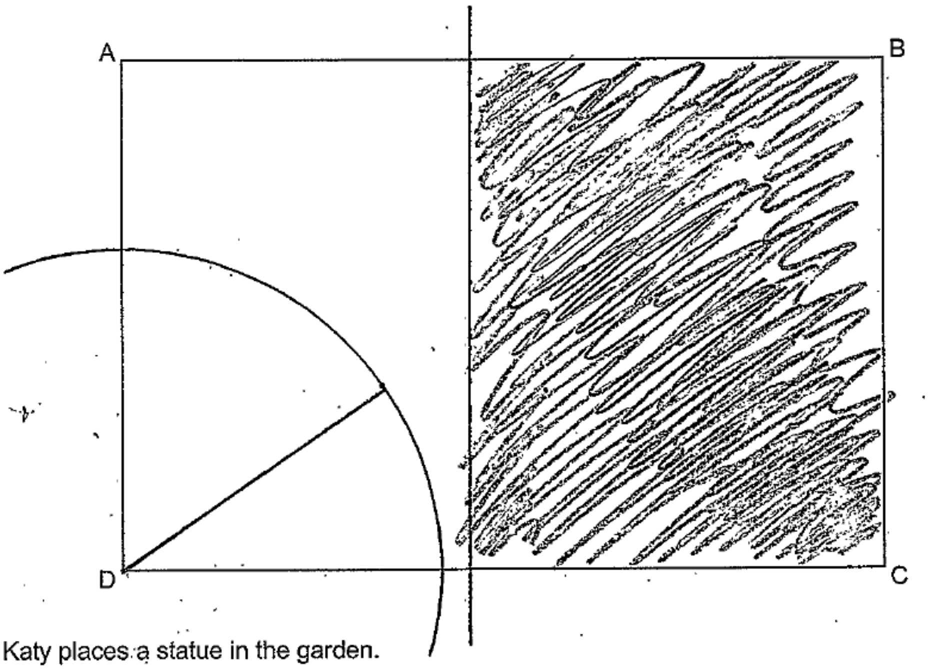
Construct and shade the region where the statue could be placed.
Show all your construction lines. **[5]**

Only a small number of candidates scored all 5 marks. Candidates must use a pair of compasses and a ruler for construction questions. A correct angle bisector that defined the region that is closer to CB than AB was very rare and examples where correct construction was shown were even less evident. More candidates gained either 1 or 2 marks for the arc centre D. There was a general lack of understanding regarding the construction required to meet the conditions described in the question.

Exemplar 1 1 mark

19 The scale drawing shows Katy's garden ABCD.

Scale: 1 cm represents 5 m



Katy places a statue in the garden.

The statue is

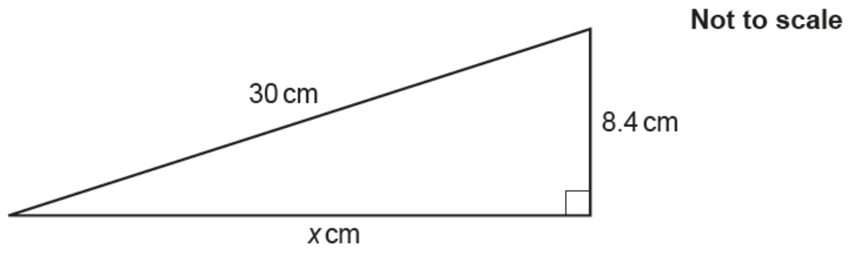
- more than 30 m from D
- closer to CB than AB.

Construct and shade the region where the statue could be placed.
Show all your construction lines. **[5]**

This candidate has shown an understanding that there is a region with a boundary from D, which is defined by an arc, and they score 1 mark for this. Had they drawn the arc the correct length they would have scored 2 marks.

Question 20

20 Here is a right-angled triangle.



Work out the value of x.

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

This question was not well answered, with only a minority of candidates reaching the correct answer. Those who did attempt to use Pythagoras' theorem often added 30^2 and 8.4^2 rather than subtracting. A number of candidates attempted to use trigonometric ratios but were not able to work through all the necessary steps to arrive at the required length. There were a wide variety of completely incorrect methods, including methods involving adding or subtracting the given values without any attempt at squaring; 30 – 8.4 = 21.6 was a common response. There were also attempts to use the formula for the area of a triangle and cases where candidates included values from angles, often 90, in their calculations.

Question 21

21 Shari buys a box of 60 candles for £125.
She sells the candles for £2.25 each.

Calculate her percentage profit.

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

This was another question where a number of different approaches could lead to a correct answer. Many candidates were able to use one method effectively and obtain the correct answer of 8%. It was quite common to see responses that arrived at a correct profit of £10 for the batch of 60 candles or 0.16666…(0.17p) for each candle. With 2 of the 4 marks earned many of these candidates did not convert the profit into a percentage $\left(\frac{10}{125}\times 100\right)$ often using inappropriate calculations such as $\frac{10}{135}$ or $\frac{125}{135}$. It was quite rare for 0 marks to be scored with many candidates giving £135 for the total sale price.

Exemplar 1 — 2 marks

21 Shari buys a box of 60 candles for £125.
She sells the candles for £2.25 each.

Calculate her percentage profit.

125 ↓ +£10

$60 \times 2.25 = 135$

$\frac{1}{10}$ of 135

$\frac{1}{12}$ of $135 = 11.25$

$13.5 \times 1 =$?

13.5

$\frac{1}{13}$ of $13.5 = 10$

13.5 .... % **[4]**

This candidate shows the amount of profit (£10) for 2 marks, but does not calculate this as a percentage profit. They tried to find a percentage of 135 rather than 125, which was a common error.

Question 22(a)

22 Hector can run 400 metres in 66 seconds.

(a) Use this information to show that he could run 5 kilometres in less than 14 minutes. **[4]**

There were some excellent responses, with steps shown in a logical order. However, in many cases the work was muddled and difficult to follow. A significant number of candidates had difficulty converting from seconds to minutes, for example assuming that 66 seconds was 1.6 minutes or that 825 seconds was 8.25 minutes. Some candidates did not check their answers for sense, with examples of 5 km completed in a few seconds or 100 m taking several minutes. Many candidate were able to score at least M1 for a correct distance conversion. Many were able to obtain 825 seconds for the equivalent time to complete the 5 km but did not convert the 14 minutes to 840 seconds to make it comparable. Most candidates that attempted to convert 825 seconds into minutes made a mistake with the units often thinking that 13.75 was 13 minutes 75 seconds. From here, some considered this to still be less than 14 minutes but others then changed this to 14 minutes 15 seconds and stated that he could not do it which was illogical given that the question said he could. Some candidates used the speed approach, but very few managed this successfully.

Question 22(b)

(b) Hector tries to run 5 kilometres in less than 14 minutes.

Give one reason why he might not achieve this.

....

.... **[1]**

Most candidates were able to offer sensible reasons in part (b). These usually involved a suggestion of a change in running speed due to tiredness, the increased distance or the need to take a break. Some suggested that injury or unfavourable terrain might cause Hector to stop or slow down. A small number of candidates seemed to feel that it would not be physically possible for anyone to run that distance at all.

Question 23

23 Here are the interest rates for two bank accounts.

Northern Savings Bank (NSB)	Central Alliance Bank (CAB)
2.5% per year **compound interest**	2.7% per year **simple interest**

Mia puts £6400 in each account.

Calculate the difference in value between the two accounts after 8 years.
Give your answer correct to the nearest penny.

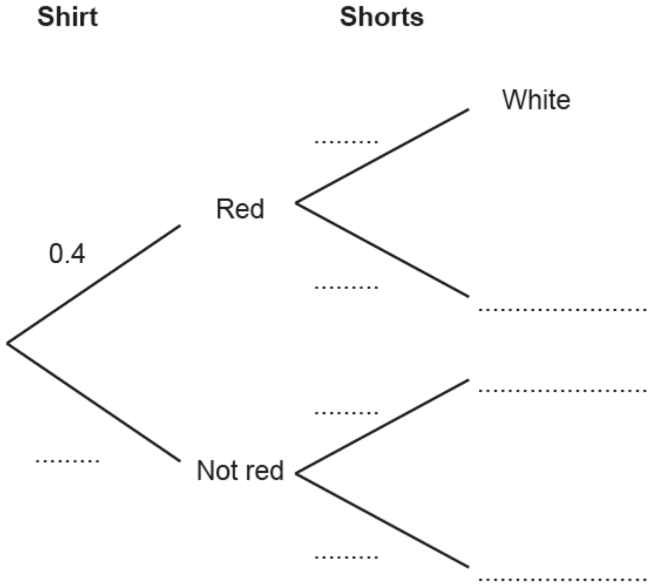
£ .... **[6]**

A completely correct answer required total accuracy and the efficient use of a calculator. Only a small number of candidates scored all 6 marks. The envisaged approach was to see the compound interest with 6400×1.025^8 and simple interest with $6400 + 6400 \times 0.027 \times 8$. Subtracting the two results would give the £15.38 required. A few candidates used a lengthy approach that inevitably involved some premature rounding thus losing the final accuracy mark. A large number of candidates gained at least 1 mark for a subtraction of the two amounts of interest obtained. A variety of errors were made in calculating both forms of interest often involving the incorrect use of 2.5 or 2.7 as a multiplier e.g. $6400 \times 2.5 \times 8$. Presentation was an issue for some candidates who produced a page full of calculations that were difficult to follow. Candidates should be encouraged to use the formula for calculating compound interest.

Question 24(a)

24 Romelu picks a shirt and shorts.
The probability he picks a red shirt is 0.4.
The probability he picks white shorts is 0.7.

(a) Complete the tree diagram.



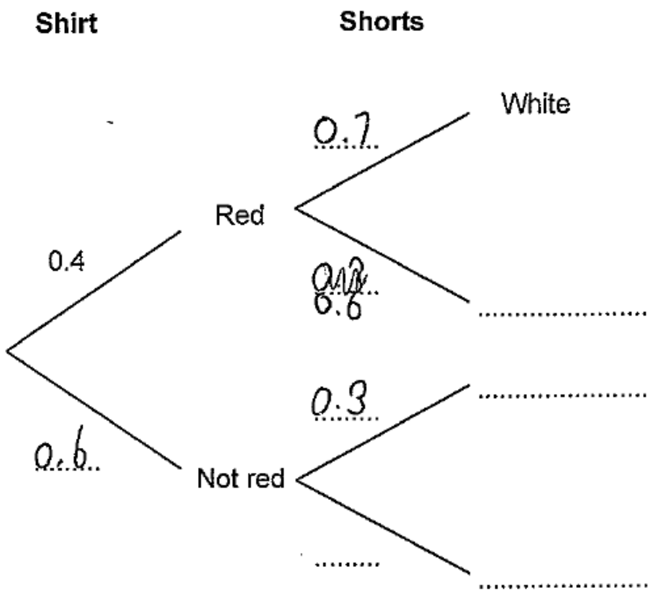
[3]

Many candidates correctly labelled the first branch as 0.6. Many candidates attempted to use a mixture of 0.4, 0.6, 0.3 and 0.7 on the second tier of branches. The labels proved particularly problematic with 'red' rather than 'not white' being seen on a large number of scripts, some gave other random colours, while others wrote numbers in the final column.

Exemplar 1 — 1 mark

24 Romelu picks a shirt and shorts.
The probability he picks a red shirt is 0.4.
The probability he picks white shorts is 0.7.

(a) Complete the tree diagram.



[3]

This candidate scores 1 mark for correctly labelling 0.6 on the first branch. Candidates of all abilities should be encouraged to attempt every question; this exemplar and the one for question 27 show that lower ability candidates can score at least some marks on the later questions.

Question 24(b)

(b) Calculate the probability that Romelu picks a red shirt but does not pick white shorts.

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

Correct answers to part (b) were seen on very few scripts. Many candidates who had incorrectly labelled the tree diagram in part (a) went on to use their values correctly in part (b). Most attempted to add rather than multiply probabilities with 0.7 being a common answer.

Question 25

25 Marcin buys 7 rulers and 15 crayons for £7.
A ruler costs 12p more than a crayon.

Find the cost of one crayon.

cost of one crayon = ... p **[5]**

It was envisaged that candidates would use algebra to determine the cost of one crayon, although very few actually used algebra to solve this question. Despite this, a large number of candidates managed to score part marks by following an alternative arithmetic method. Incorrect responses obtained from trial and improvement were plentiful and candidates should be discouraged from using this method.

Question 26

26 Here are the first four terms of a sequence.

28 23 18 13

Find the *n*th term of the sequence.

.... **[2]**

This question proved to be difficult for the majority of candidates. Many showed the value 5 or − 5, but only a minority had − 5n. A very common response scoring 0 was 33n – 5 which implies some knowledge but a lack of execution.

Question 27(a)

27 72 children are asked whether they have a laptop or an iPad.

- 31 have a laptop.
- 48 have an iPad.
- 12 have both.
- 5 have neither.

(a) Represent this information on a Venn diagram.

$\mathscr{E}$

[3]

Question 27(b)

(b) One of the children is chosen at random.

Write down the probability that they have an iPad but not a laptop.

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

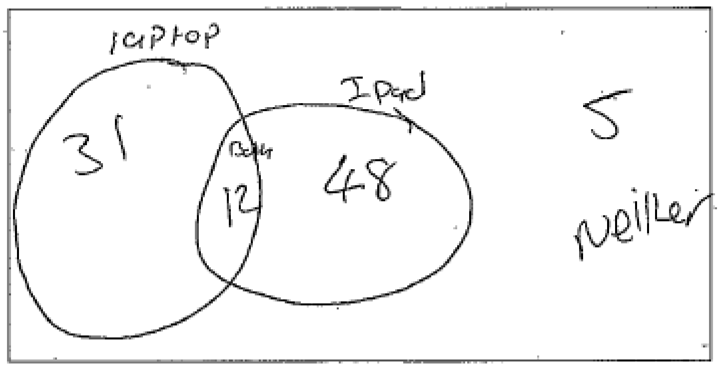
Most candidates understood the idea of a Venn diagram and constructed the "circles" correctly in part (a). Those who entered the correct values usually went on to score 2 marks for the required probability in part (b). The most common error was to use 31, 12 and 48 as their entries in the three sections with 5 as the remaining figure inside the rectangle but away from the "circles". This scored 1 mark for one correct entry in part (a) and the use of $\frac{48}{72}$ in part (b) enabled a further 2 marks for the follow through from their Venn diagram.

Exemplar 1 1 mark

27 72 children are asked whether they have a laptop or an iPad.

- 31 have a laptop.
- 48 have an iPad.
- 12 have both.
- 5 have neither.

(a) Represent this information on a Venn diagram.



[3]

This candidate demonstrates they understand what is meant by a Venn diagram. They have placed both 5 and 12 correctly, either of these would have scored 1 mark. The common misunderstanding is not subtracting 12 from both 31 and 48.

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