Qualification Accredited

OCR
Oxford Cambridge and RSA

GCSE (9–1)

Examiners' report

MATHEMATICS

J560

For first teaching in 2015

J560/02 Summer 2024 series

Version 1

ocr.org.uk/maths

Contents

Introduction

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

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

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

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

Paper 2 series overview

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

A range of numerical methods were evident throughout candidates' responses. Methods such as column addition/subtraction, long multiplication and 'bus stop' division were seen regularly. Poor knowledge and application of negative numbers in basic arithmetic was notable, however.

Candidates found many of the later questions in the paper difficult to access, particularly those involving quadratic equations, area/perimeter and compound interest. A particular concern seen in multiple questions was the poor use of units, both in converting between two units (e.g. millilitres and litres) and understanding a unit's context (e.g. in Question 14 with the m/s^2 units of acceleration).

Many candidates also struggled with questions involving fractions of time, substituting into formulae (kinematic formulae knowledge was notably poor) and, in particular, finding a percentage of an amount (predominantly in the context of compound interest).

As in previous series, vector knowledge remains very weak and needs to improve (in this paper candidates were required to write column vectors based on drawn vectors).

Candidates were given a formulae sheet to use in the examination. In Question 24 there was some identification of its use, however it was also used inappropriately in Question 4 by some candidates.

Presentation overall was good, but some candidates do still write numbers particularly unclearly (mainly 4, 9, 3 and 5). The use of basic equipment such as a ruler (ideally 30 cm) and a pencil was improved from previous series, however appropriate use of compasses still needs to be addressed by some.

The response to 'You must show your working' questions continues to improve, however candidates still need to remember that even simple calculations should be written down in these questions for full marks.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
• showed each step of their working • had the appropriate equipment • used systematic methods to solve complex problems • worked with fractions of time • could work within a contextual mathematical situation.	• made basic numerical errors • could not link percentages, decimals and fractions appropriately • did not check their answers using inverse processes • did not attempt questions • did not use compasses or a 30 cm ruler.

Question 1 (a)

1 Work out.

(a) $6.3 + 4.7$

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

The vast majority of candidates gave the correct response, often retaining the decimal place (i.e. '11.0'). A number of candidates completed this question correctly without using column addition. A few approached the integers and decimals separately, but some of these added the decimals to 0.10 and gave an incorrect response of 10.10.

Question 1 (b)

(b) £4.50 – £0.27

(b) £ ..... **[1]**

The majority of candidates gave the correct response. Many used column subtraction, however a few used the 'borrowing' method and sometimes didn't cancel the 5 down to a 4, resulting in an incorrect response of £4.33.

Question 2 (a)

2 Work out.

(a) $^{-}7 - 4$

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

Many candidates gave the correct response here. Common incorrect responses were 11, $^{-}3$ and 3. Very few used a number line.

Assessment for learning

For candidates that struggle with negative numbers, encourage them to use a number line starting with the original number and then 'travelling' in the correct direction.

Question 2 (b)

(b) $^{-}42 \div 6$

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

This was answered correctly by most candidates. The common incorrect response was 7.

Question 2 (c)

(c) $(^{-}4)^2$

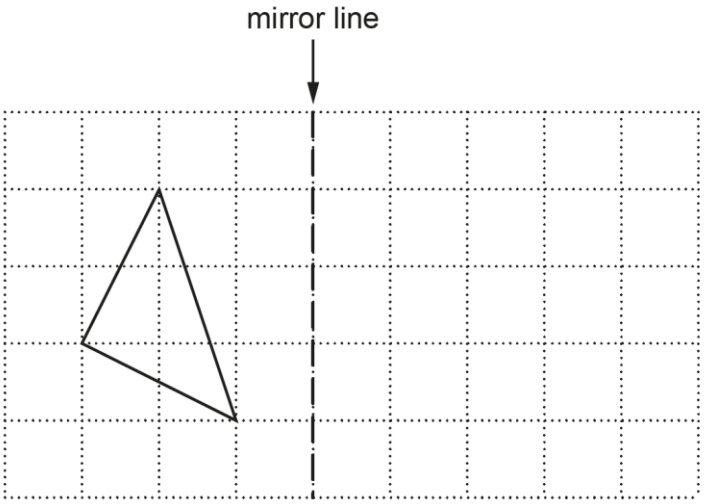
(c) ..... **[1]**

Response to this question varied, but were often incorrect. Responses of $^{-}16$, $^{-}8$ and 8 were very common.

Candidates continue to demonstrate a lack of knowledge with powers in this context. Very few candidates showed they understood that the question was asking $^{-}4 \times {}^{-}4$.

Question 3 (a)

3 (a) Reflect the triangle in the mirror line.



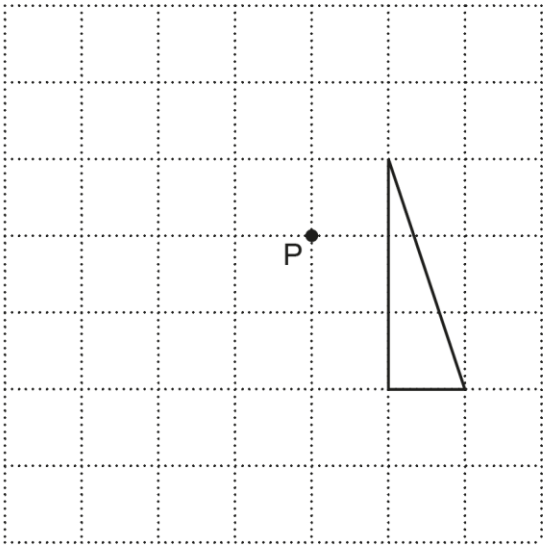
[2]

The vast majority of candidates answered correctly. Some candidates drew the reflection freehand however, occasionally leading to them being out of tolerance.

Incorrect attempts were often a translation of the original shape, with the top point in the correct place for the reflection. A few candidates reflected the triangle in a different vertical mirror line, which was given B1.

Question 3 (b)

(b) Rotate the triangle 90° anticlockwise around the point P.



[2]

Success in this part was more varied, with only around half giving a fully correct response.

A number of candidates rotated the triangle 90° clockwise or 180° around Point P, or 90° anti-clockwise around a different centre of rotation (a translation of the expected correct response), all of which were given B1.

As in part (a), some candidates drew their triangle freehand, which did lead to incorrectly sized responses that were given 0 marks.

Assessment for learning

Candidate should always use a ruler to draw shapes. Candidates should also be aware that it is often beneficial to identify important points/vertices first, then connect them.

For all transformation questions, tracing paper should be available and its use is often advantageous. There are many exam questions across the previous series that candidates can use for practice (these can be viewed and assembled into classroom tests using OCR ExamBuilder; log in, select 'GCSE (9-1) Maths and use the filters to view 'Congruence and Similarity'>'Plane isometric transformations' questions).

Question 4

4 The radius of a circle is 3 cm.

Find the length of the diameter of the circle.

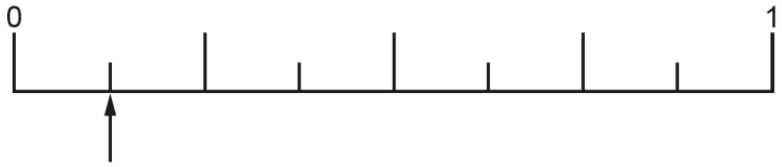
..... cm **[1]**

Many candidates were able to answer this question correctly. Common incorrect responses were 3 (from halving the radius) or 9 (from squaring it).

Some candidates tried to use one of the formulae given on the formulae sheet to complete this question, but those that did often gave an incorrect response.

Question 5 (a)

5 This probability scale shows the probability of picking a blue counter from a bag of counters.



(a) Write down, as a fraction, the probability of picking a blue counter.

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

Correct responses to this question were rare. Many either did not count the sections correctly, counted the vertical lines instead, or presumed that there were 10 sections.

Those that responded correctly almost always gave $\frac{1}{8}$, although a few gave a correct equivalent fraction.

Some candidates didn't follow the request for a fraction and gave a decimal instead.

Question 5 (b)

(b) On the probability scale above, mark with an arrow (↑) the probability of **not** picking a blue counter. **[1]**

Candidates were slightly more successful in this part than in (a). The request in the question was also frequently followed, with the vast majority of candidates identifying their answer with an arrow.

Question 6

6 A bathroom shower uses water at a rate of 15 litres per minute.

How much water is used in a bathroom shower that lasts 12 minutes?

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

The majority of candidates were able to achieve at least M1 with this question. The vast majority attempted 15 × 12, with many going on to achieve the correct answer of 180.

Those given M1 had generally either made a mistake in their long multiplication or attempted repeated addition and made at least one numerical error. Most attempting repeated addition added up 15 twelve times rather than 12 fifteen times.

Question 7 (a)

7 **(a)** Write 0.6 as a fraction in its simplest form.

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

The majority of candidates responded to this question. The most common responses however were $\frac{60}{100}$ or $\frac{6}{10}$, both receiving the B1.

Candidates who attempted a conversion often started incorrectly with $\frac{6}{100}$. There was evidence of poor fraction cancelling, resulting in many only being given B1. Some candidates responded with 60% rather than a fraction as requested.

Question 7 (b)

(b) Write $\frac{17}{5}$ as a mixed number.

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

Many gave the correct response here. Most attempts either did not show a method or wrote out multiplication tables.

There were however a number of misconceptions shown in this question. Incorrect responses included $2\frac{3}{5}$ and $3\frac{3}{5}$. Some candidates multiplied 17 by 5.

Question 8

8 Use one of these symbols $<$, $>$ or $=$ to make each statement true.

60 mm ..... 6 cm

320 g ..... 3.2 kg

$1\frac{3}{4}$ km ..... 17500 m

[3]

The vast majority of candidates attempted this question, however there was very little evidence of converting units to a common form. Those responses that did not achieve any marks often did not show any conversions.

Some candidates seemed to believe each of the three symbols had to be used once, rather than using an appropriate symbol for each statement (as has been seen in responses to similar questions in previous series).

Misconception

Candidates are **not required** to use every given symbol in questions such as this. Instead, they should separately consider which symbol is appropriate for each individual statement.

Question 9 (a)

9 Work out the following, giving each answer as a fraction in its simplest form.

(a) $\frac{7}{16} - \frac{1}{4}$

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

A large number of candidates attempted this question. There was however slightly lower success in this question compared to fraction subtraction questions in previous series, which could be partially because of the request for simplest form this year.

A number of candidates understood a common denominator was required, but they often did this by attempting to transform both fractions (mostly to a denominator of 64). Responses were then frequently not cancelled to the correct simplest form, so M1 was given many times.

Poorer responses gave $\frac{6}{12}$ or equivalent as their final response.

Assessment for learning

When fractions need to have a common denominator, students should review them first to see if both need to be transformed, or if it can be done by just transforming one of them. This can both save students time and reduce the likelihood of errors being made.

Question 9 (b)

(b) $\frac{5}{12} \div \frac{5}{9}$

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

A number of candidates struggled with this question. Some of those unsure how to divide fractions were able to access the SC1 mark for correctly converting to a common denominator.

Those who did have an appropriate method almost always showed the change from division to multiplication and the reciprocal of the second fraction. However, a number who divided correctly did not then simplify; $\frac{45}{60}$ or an equivalent fraction was often seen as the response, which was given B2.

Very few candidates cancelled common factors before multiplying the fractions.

Question 10 (a)

10 Simplify.

(a) $3y + 6x - y + 5x$

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

Many candidates were successful in this question.

Those that did not score 2 marks often scored B1 for $11x$, or less frequently for $2y$, in responses such as $11x - 2y$.

A number of candidates attempted to combine the x and y terms, for example $13xy$.

Question 10 (b)

(b) $5a \times 6b$

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

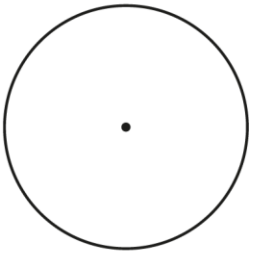
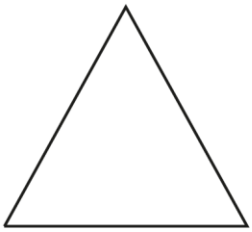
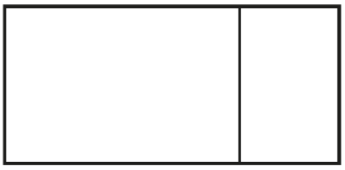
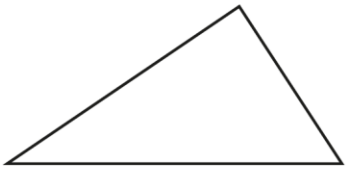
Candidates were even more successful here than part (a). Correct responses generally gave 30*ab*; very few gave 30*ba*.

Common errors seen in this question were omitting either the *a* or *b*, or adding the numerical components to give 11*ab*.

Question 11

11 The table shows the plan view and front elevation of some 3D solids.

Write the name of each 3D solid in the third column of the table.

Plan view	Front elevation	Name of 3D solid
		.....
		.....
		.....

[3]

Candidates found identifying these solids difficult. Often they just named the 2D shape seen in the front elevation. Some described the triangle seen in the front elevations, e.g. isosceles, equilateral, scalene or right-angled triangle. Some responses appeared to be naming shapes/solids at random.

The cone was the most successfully identified, followed by the cuboid. There were also a number of candidates who wrote 'circular based pyramid' for the cone and 'rectangular prism' for the cuboid (both of which were accepted).

A number of candidates had incorrect spelling, but this was not penalised.

Identifying the [triangular] prism was the greater challenge. Common incorrect responses included trapezium and pyramid.

Question 12 (a)

12 Complete each statement by writing the missing power in the box.

(a) $6^3 \times 6^4 = 6^{\square}$ **[1]**

This was answered very well by most. If an incorrect response was seen, it was generally 6^{12}.

A few candidates attempted to find the actual product of 6^3 and 6^4 or wrote out $6 \times 6 \times 6 \times 6 \times 6 \times 6 \times 6$.

Question 12 (b)

(b) $(2^2)^4 = 2^{\square}$ **[1]**

Candidates were less successful here than in part (a). The common incorrect response was 2^6.

When the correct answer was seen, it was almost given without working and so was presumably a mental calculation.

Assessment for learning

When teaching indices, the aim should be for understanding rather than 'rules' to apply.

e.g. $(2^4)^5 = 2^4 \times 2^4 \times 2^4 \times 2^4 \times 2^4$

This can help reduce memory burden and confusion between the rules, as well as further building the skill used in part (a) (which candidates showed a strong competency in). Additionally, it will help with more challenging questions, e.g. $(3x^3)^4$.

Question 13 (a)

13 **(a)** Work out the next term in this sequence.

1 3 6 10 .....

[1]

The vast majority gave a correct answer here.

Incorrect responses often came from finding the increase between just one pair of adjacent terms (either + 2, + 3 or + 4) and then applying that to the 10, resulting in responses of 12, 13 or 14.

Question 13 (b)

(b) In the Fibonacci sequence below, the next term is found by adding the two previous terms. The second term is 7, the third term is 10 and the fourth term is 17.

Work out the first and fifth terms of the sequence.

..... 7 10 17 ..... **[2]**

This was another highly successful question for candidates. Those that hadn't correctly answered part (a) often struggled here too, again using the + 3 or + 7 increase between the given numbers and so 4 and 0 were common incorrect responses for the first term and then 20 and 24 for the fifth term. A few made arithmetic slips and gave 26 or 28 for the fifth term.

Question 14

14 Use the formula

$v^2 = u^2 + 2as$

to find the final velocity when

- the initial velocity is 6 m/s
- the acceleration is 4 m/s^2
- the distance travelled is 8 m.

..... m/s **[3]**

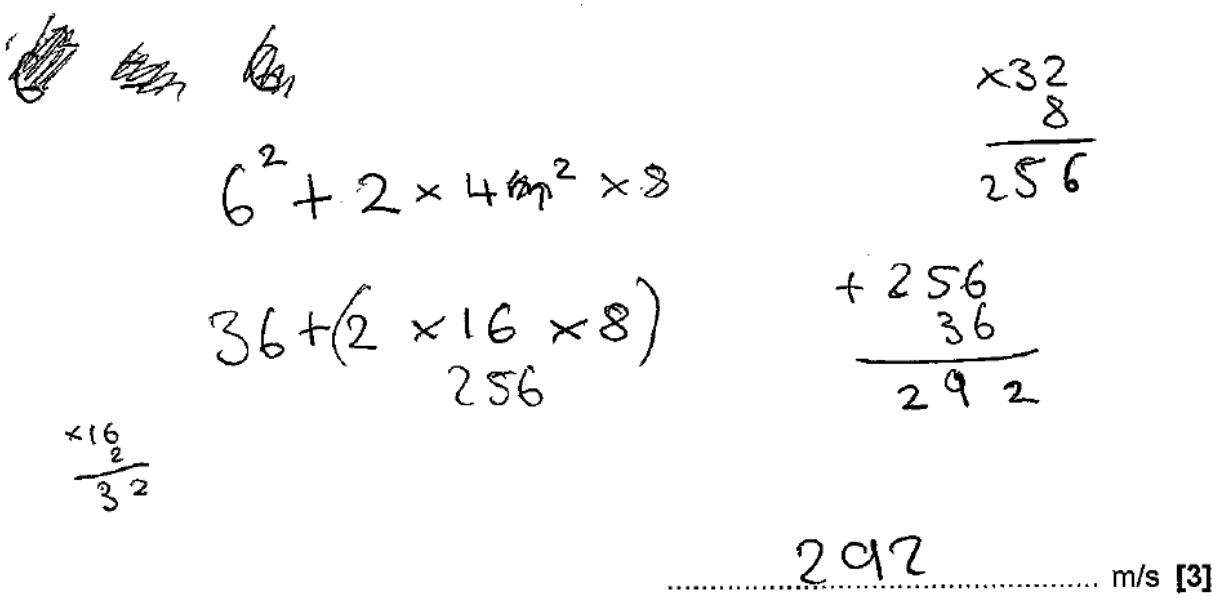
Candidates often struggled here and knowledge of kinematics formulae appeared to be very weak.

Almost all candidates were aware they needed to substitute the values into the formula, but the majority did so incorrectly. Another common error was candidates believing that the acceleration needed to be squared because of its unit (hence using 16 for the acceleration).

Of those that did substitute correctly, some didn't apply BIDMAS rules and added before multiplying. A number of candidates didn't square root to then get their final answer (this was given 2 marks if their calculation was otherwise correct).

Some candidates calculated $2 + a + s$ rather than $2 \times a \times s$.

Exemplar 1



This exemplar demonstrates some of the common errors. The candidate substitutes correctly into the formula, however they misinterpret the units for acceleration and use 4^2. They carry out their calculation correctly, but then do not square root their answer (writing 'v^2 =' in their working could have avoided this).

The response was given M1 for 6^2.

Question 15 (a)

15 Compost is used to grow plants.
Ivan has a sack containing 50 litres of compost.
He uses this compost to fill pots for his plants.

(a) Ivan fills six large pots each holding 7.5 litres.

Work out how much compost is left in the sack.

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

The majority of candidates responded and achieved at least M1. Most attempted 6 × 7.5, with many correctly reaching 45 and then subtracting this from 50.

Where errors were made, it was often a mistake in their long multiplication or through repeated addition (most that attempted repeated addition added up 7.5 six times, but some tried 6 seven and a half times). Some candidates didn't subtract their calculation result from 50, for example giving 45 as their answer.

Question 15 (b)

(b) Ivan uses the remaining compost to fill small pots each holding 400 ml.

Work out the maximum number of small pots Ivan can fill with the remaining compost.

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

Those who achieved the correct answer for part (a) were regularly able to score at least M2 here in part (b). The context of this question seemed to help candidates access the question. Many different approaches were used by candidates, including short division, repeated subtraction and repeated addition.

There was good evidence of candidates making their division easier for themselves. For example, after $\frac{5000}{400}$ was seen, a number of candidates attempted $\frac{50}{4}$.

Many candidates picked up the M2 for a correct method without a correct answer, but the B2 was rarely given as almost all that reached '12.5' then went on to the correct answer and full marks.

Those who struggled were often able to score M1 for a correct conversion, generally for converting their (a) into millilitres although some converted 400ml into litres. As in Question 11, some candidates however struggled to convert correctly between relevant units; the most common error here was using 1L = 100ml.

Assessment for learning

While repeated addition and/or subtraction is rarely the most efficient approach, to support its marking we have drawn up specific marking guidance that can be used where needed. It appears in the J560/02 mark scheme appendix this year and allows for a consistent approach to be made by both markers as well as those marking student mocks. It may also be beneficial to familiarise candidates with the required working they must show in order to be given method marks where needed.

Question 15 (c)

(c) Work out how much compost will then be left in the sack.

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

Candidates successful in parts (a) and (b) almost always achieved the correct answer here, often by using their working out from part (b).

'Follow Through' from both (a) and (b) was credited and some candidates with errors in part (a) and/or part (b) correctly complete the calculation *'their* (a) × 1000 – *their* (b) × 400' to pick up the 2 marks.

A significant number of candidates did not respond, however these were almost always those who didn't respond to part (b) or didn't complete it fully.

Exemplar 2

(a) Ivan fills six large pots each holding 7.5 litres.

Work out how much compost is left in the sack.

50.0
− 45.5
04.5L

7.5
× 6
45.5

45.5L cut

(a) 4.5 ..... litres **[2]**

(b) Ivan uses the remaining compost to fill small pots each holding 400 ml.

Work out the maximum number of small pots Ivan can fill with the remaining compost.

4.5L = 4500ML

400 ⟌ 4500 = 4 ⟌ 45.100 (11.25)

(b) 11 ..... **[3]**

(c) Work out how much compost will then be left in the sack.

400
× 11
400
+ 4000
4400

4400ML used 4.5 − 4.4 = 0.1L
100ML

4.4L to 4.5L

(c) 0.25 100 ..... ml **[2]**

This candidate's response to (a) is incorrect, but they write 7.5 × 6 and it leads to the value on the answer line, so M1 is given.

In (b), M2 is given for '*their* (a) × 1000 ÷ 400'. They simplify this calculation to the equivalent 45 ÷ 4.

In part (c) we look for Follow Through ('FT') from their parts (a) and (b). They correctly carry out '*their* (a) × 1000 – *their* (b) × 400' (their subtraction calculation is in litres, but it is correct) and so B2FT is given.

Question 16 (a)

16 The table shows how much Amaya earns per hour.

Work done on Monday to Friday	£20.15 per hour
Work done on Saturday or Sunday	£30.23 per hour

One week Amaya works for $40\frac{1}{3}$ hours between Monday and Friday and then for $4\frac{1}{4}$ hours on Saturday.

(a) Amaya says

I will earn at least £900 for my work this week.

By rounding each value to the nearest integer, use estimation to show that Amaya may be correct. **[5]**

Many did not follow the instruction to round given in this question and subsequently struggled. Those who did successfully round the values generally arrived at a correct response.

Long multiplication was often used for 40 × 20, but repeated addition was sometimes used for 4 × 30.

Responses that did not round (or did not round correctly) were frequently given M1M1 for showing working to multiply the wage by the hours worked for both the weekdays and the weekend. Some that hadn't rounded attempted to partition the values to simplify their working. For example, dividing £20.15 by 3 to get the pay per $\frac{1}{3}$ of an hour, then adding it to *their* £20.15 × 40, or similarly for the Saturday pay.

A few omitted their working altogether and just wrote 800 and 120. The questions asks candidates to '…show that Amaya may be correct' and just writing values is insufficient to show this.

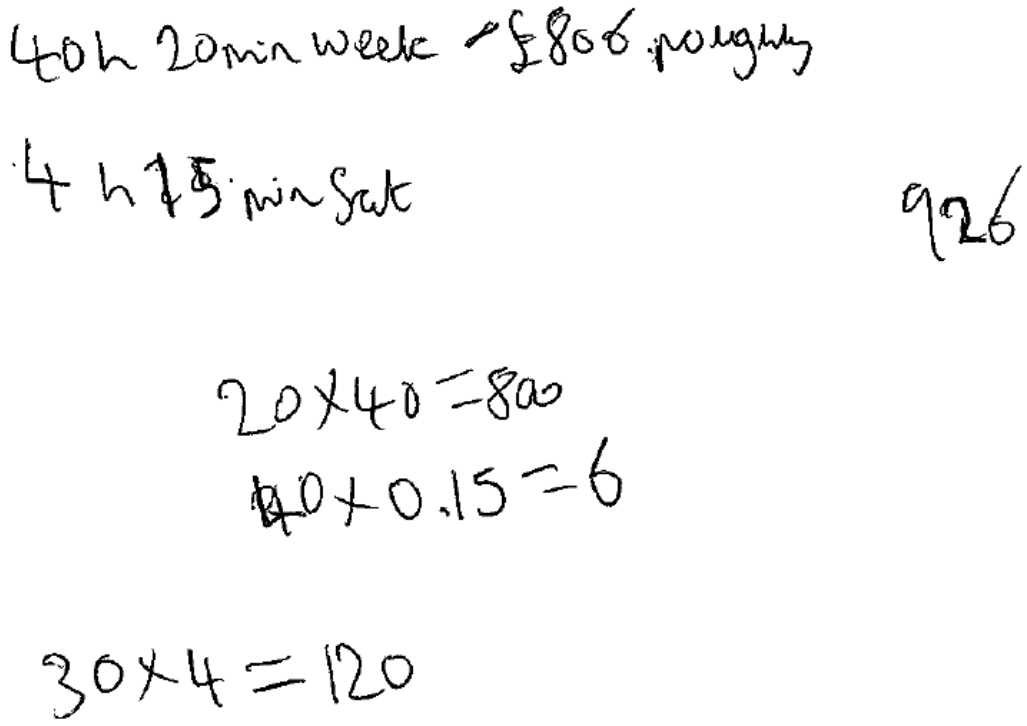
There were a number of common issues seen in candidates working.

1. Candidate working out was often poorly presented and in some cases this resulted in values being used incorrectly or omitted.

2. Converting units of time continues to be a challenge for many. Many correctly converted $\frac{1}{3}$ hour to 20 minutes or $\frac{1}{4}$ hour to 15 minutes, but then incorrectly used 40.20 and 4.15 in calculations.

3. Some tried to divided $40\frac{1}{3}$ by 5, in an attempt to find the hours worked each day from Monday to Friday. This was often rounded to 8 hours worked per day, then multiplied by the wage (either £20 or £20.15) and this then finally multiplied by 5 to give pay across the weekdays.

Exemplar 3



At a glance it might look like this candidate has rounded all the values, but in fact they have not rounded the £20.15 wage. Instead, they have partitioned it and multiply both partitions by 40.

Three rounded figures is sufficient for the B1 however, so it is given.

M1 is given for '40 × *their* 20', as even though they have not rounded 20.15, they carry out a valid multiplication (20.15 is noted in the mark scheme's guidance column as acceptable here).

The second M1 is also given for '30 × 4'.

A1 is then given for 120. The A2 is not given as even though '800' is seen in the response, it is part of their partitioned calculation and the final result for the weekday earnings is £806.

This candidate is given 4 marks in total.

Question 16 (b)

(b) Give **one** reason why your working in part **(a)** shows that Amaya can be **certain** of earning at least £900 for her work in this week.

.....

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

Many candidates did not attempt this question. The majority struggled to access the contextual nature in relation to what they had been asked to do in part (a). Even those with full marks in (a) struggled to understand why Amaya can be 'certain'.

Most relied on their response to part (a), often just repeating working here.

A number of candidates stated Amaya would earn a certain amount during the week, so adding her earnings from the weekend would take the weekly earnings over £900.

Some referenced rounding down the hours worked, but not the hourly rate, while others referenced rounding down the hourly rate, but not the hours worked.

Question 17

17 Work out.

$1.2 \div 0.03$

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

The vast majority struggled with place value here.

A number of candidates recognised the value of changing the calculation to $\frac{120}{3}$, however these almost always spoilt it by then dividing by 100 or 10 000 (10 000 because they had multiplied each number by 100) to give a final answer of 0.4 or 0.004.

Some attempted the 'bus stop' method, but dividing by 0.03 proved too difficult. Some however did repeatedly add 0.03 correctly to reach the correct answer.

Exemplar 4

This exemplar shows the common misconception of candidates unnecessarily trying to 'reverse' their correct conversion by dividing at the end.

Misconceptions such as this should be explored with students by considering how calculations are equivalent.

Question 18 (a)

18 Kai has these four number cards.

Kai takes two of the cards at random without replacement and finds the positive difference between the two numbers.

(a) Complete the table to show all of the possible differences.

		First card			
	Difference	0	2	5	9
Second card	0		2	5	9
	2	2		3	
	5	5			
	9	9			

[2]

Many candidates achieved full marks here. There were some instances where B1 was given for 3 or 4 correct entries.

A common mistake was to also fill in the shaded cells, but as long as these were all '0' full marks could still be earned.

Some candidates filled in the three bottom left cells with negative values, which should have been identified as incorrect from the numbers already pre-populated (as well as the question stating 'positive difference').

Question 18 (b)

(b) Find the probability that Kai takes two cards with a difference that is an even number or a factor of 10.

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

Candidates found this question difficult, with a high proportion not responding at all.

'Follow Through' from incorrect responses to part (a) was allowed, although in practice there were few occasions when this led to marks being given.

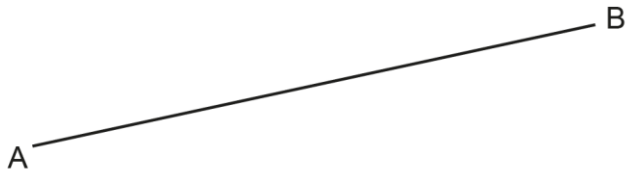
Candidates who had included 0 in their table did not count it as being an even number. Some counted a difference of 2 twice (both as an even number and as a factor of 10).

Very few indicated the differences they were identifying in the table (for example by writing them down or highlighting/ticking them in the table).

Question 19

19 **Using ruler and compasses only**, construct the perpendicular bisector of the line AB.

Leave your construction lines visible.



[2]

A large proportion of candidates did not attempt this question, but those that did commonly had a correct approach.

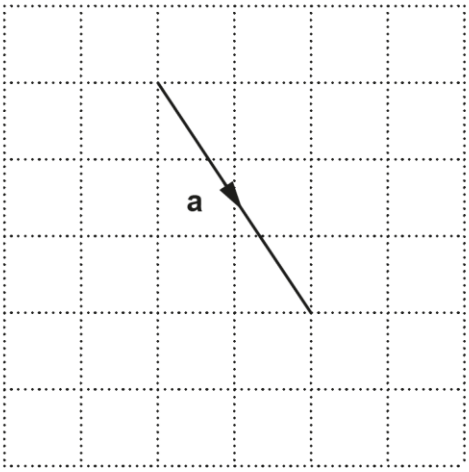
As in previous series, some candidates used equipment inappropriately (for example, not tightening their compasses so the arcs from each end didn't have the same radius) and there were some responses with a number of attempts seen.

Some had the correct approach, but their arcs either did not cross or just touched at the line's mid-point.

Some drew the correct arcs, but then didn't draw a perpendicular bisector (these were given B1). Almost no candidates drew a correct perpendicular bisector without arcs (but those that did were given B1 for it).

Question 20 (a)

20 Vector **a** is drawn on this grid.



(a) Write vector **a** as a column vector.

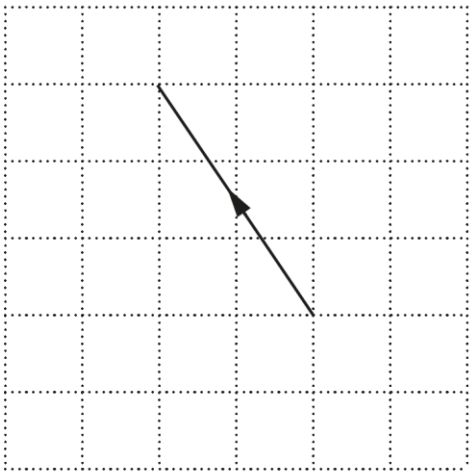
(a) $\begin{pmatrix} & \\ & \end{pmatrix}$ **[2]**

Candidates had difficulty here, but a number correctly identified either the horizontal or vertical component for B1. The common error was to give the vertical component as positive, i.e. $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$. Others gave the reverse vector $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$.

The misconception of writing a vector as a fraction has been highlighted in previous series and again occurred on numerous occasions here. If the components were correct however, SC1 was given.

Question 20 (a)

(b) A vector is drawn on this grid.



Write this vector in terms of **a**.

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

This question proved to be the most challenging of the whole paper.

The majority that attempted it gave a numerical response. Some of these were written in vector notation. Some were the reverse of their response to (a).

Question 21 (a)

21 (a) Ryan makes a journey of 200 miles from his home to the coast.

$\frac{1}{10}$ of the journey is on roads with a speed limit of 40 miles per hour.

40% of the journey is on roads with a speed limit of 50 miles per hour.

The remainder of the journey takes a time of 1 hour 30 minutes.

Ryan leaves home at 08 50 and does not exceed the speed limits on the journey.

Find the earliest time that Ryan could arrive at the coast.

You must show your working.

(a) ..... **[6]**

The majority of candidates found this question a challenge.

Most that made an attempt scored M1 and M1 for identifying 20 [miles] and 80 [miles]. Some of these candidates were able to correctly calculate it would take 30 [minutes] to drive the 20 mile distance, but many had trouble with $\frac{80}{50}$ due to its non-integer solution.

Those that did correctly carry out $\frac{80}{50}$ often then struggled to convert 1.6 hours into minutes. The M2 could be given for showing either the correct division or a correct result, but some didn't show their division and just wrote an incorrect time, which couldn't be credited.

Often candidates just took the numbers written on each line and used them in a calculation, e.g. $\frac{1}{10} \times 40$ (mph) = 4 'miles'.

Some of those that correctly found 20 [miles] subtracted it from the total journey distance (e.g. 200 - 20 = 180, then going on to calculate 40% of 180).

Question 21 (b)

(b) Write down an assumption you have made when working out the answer to part **(a)**.

.....

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

A significant number of candidates did not respond here.

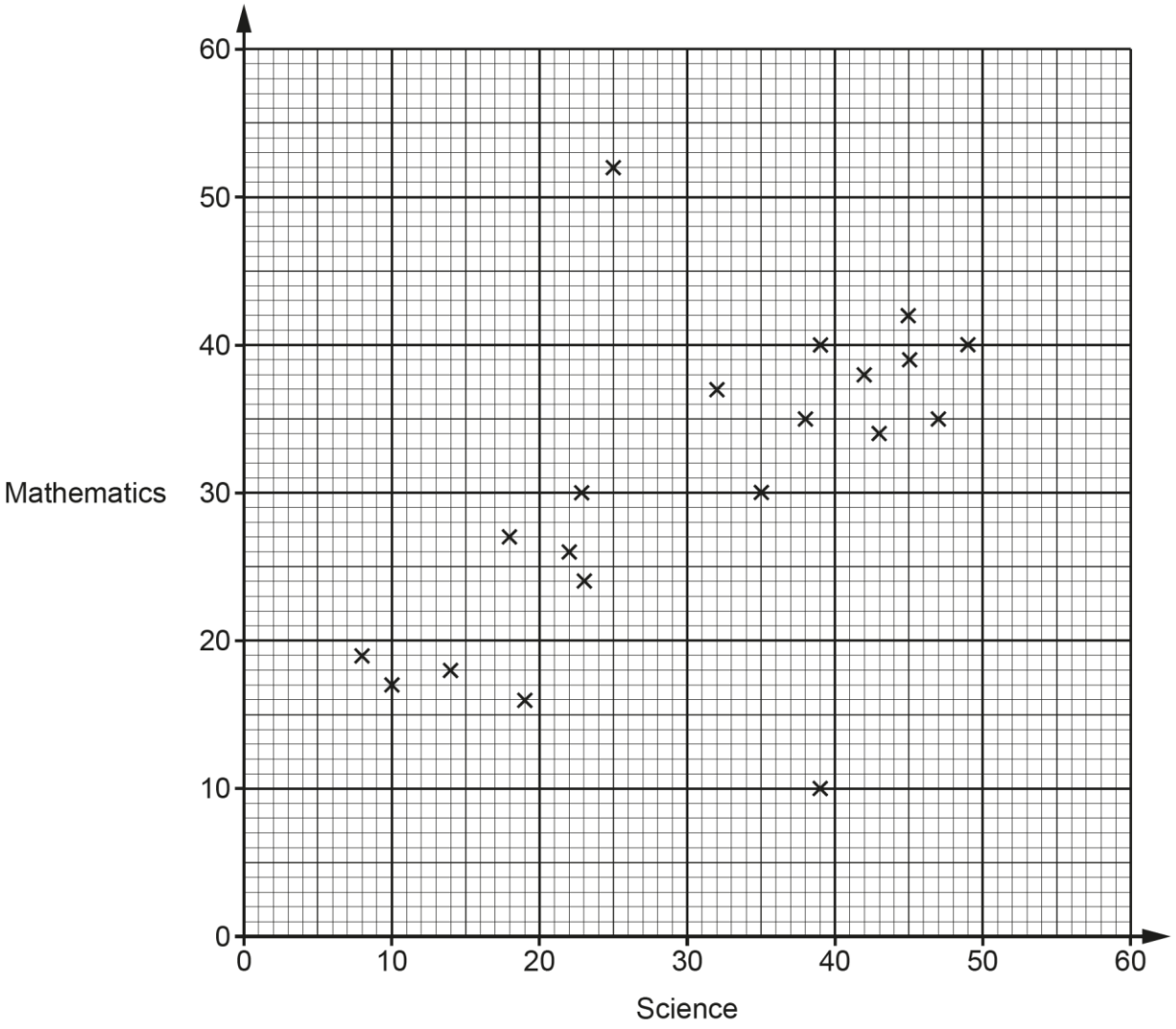
The stronger responses stated 'there were no stops taken' or 'the speed limit was driven at all the way through the journey'.

Weaker responses often repeated information given in part (a), for example '50% of the journey takes 1 hour 30 mins'.

Many candidates attempted to describe traffic. Comments such 'there was no traffic' scored 0, but if they said how the traffic might affect the journey then it could be credited.

Question 22 (a)

22 The scatter diagram shows the test scores for 20 pupils in Science and Mathematics.



(a) Describe the type of correlation shown in the scatter diagram.

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

Many candidates correctly described the correlation, sometimes included embellishments such as weak, or strong.

Some attempted to describe the relationship rather than the correlation, for example 'one goes up as the other one goes up', 'increasing' or 'ascending'.

Question 22 (b)

(b) One pupil took the Science test but was then ill during the Mathematics test and had to leave early.

On the scatter diagram, circle the point that is most likely to represent this pupil. **[1]**

The vast majority indicated the correct data point at (39, 10). The common incorrect response was (25, 52).

Any indication of all points greater than 30 for both tests was ignored here, as this working was linked to part (e).

Question 22 (c)

(c) By drawing a line of best fit, estimate the test score in Mathematics for a pupil who scored 28 in the Science test.

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

Responses to this question were notably poorer than similar questions in previous series.

Those that drew an appropriate line of best fit almost always read an acceptable estimation of the test score from it and gained 2 marks.

A significant number however drew their line of best fit to go through the origin at (0, 0). Of these, a number were able to successfully read from their line of best fit and correctly state a 'Follow Through' estimate. Not all candidates drew a line from 28 on the science test axis up to their line of best fit, instead attempting to do it 'by eye'.

There was however less evidence of smaller rulers (e.g. 15 cm) being used than in previous series, as well as also fewer dashed or dotted lines seen.

Question 22 (d)

(d) Explain why using the scatter diagram to estimate the test score in Mathematics for a pupil who scored 60 in Science may be unreliable.

.....

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

Stronger responses often referred to the lack of data at 60 marks for science, or that the data stopped at 49 marks.

Common incorrect responses were 'the graph does not go that far' and comments about comparability between ability in the two subjects, e.g. 'being good at maths does not mean you will be good at science'.

Question 22 (e)

(e) Find the percentage of the 20 pupils who scored less than 30 marks in **both** Science and Mathematics.

(e) ..... % **[3]**

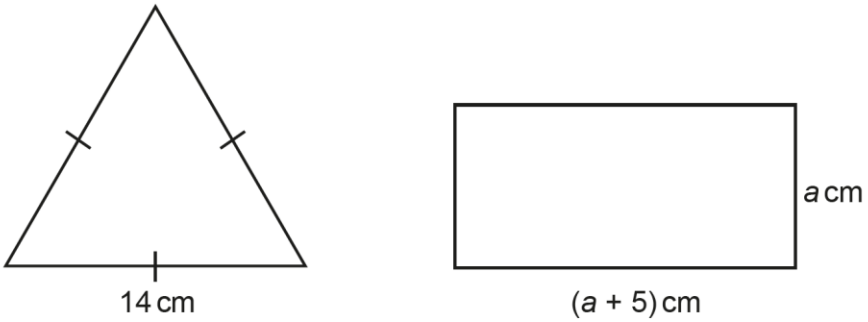
Many candidates accessed this question, often 'circling' points needed on the scatter diagram. Most wrote a fraction such as $\frac{7}{20}$ and then transformed it to have a denominator of 100, before writing the correct percentage.

Some included the point that they 'marked' on the graph when estimating in part (c), leading to $\frac{8}{20}$. These often scored SC1 for correctly converting their fraction to its equivalent percentage.

Some candidates attempted to only use percentages and found this too difficult, but often could be given B1 for 7 [pupils].

Question 23

23 The diagram shows an equilateral triangle and a rectangle.



Not to scale

The equilateral triangle has the same perimeter as the rectangle.

Find the value of a.

$a =$ ..... **[4]**

Multiple errors were made by candidates in responding to this. Some only used two lengths of the rectangle in their expression for the perimeter of the rectangle. Poor algebraic working was also seen, such as '$a + a = a^2$'.

Some were able to set-up and solve the equation $4a + 10 = 42$ correctly. A number of these then also substituted their value for a into their formula for the rectangle perimeter, to check their answer was correct.

A large number of candidates were given M1 for showing 14×3 [= 42cm].

Many candidates used trials or reverse flow methods to find the correct answer. The fact that the missing number was an integer meant that these were often successful, but those who used these methods and made errors often couldn't be given method marks that could have been given had they worked algebraically.

As with similar questions previously, some calculated area instead of perimeter.

Question 24

24 Charlie invests £1200 at a rate of 5% per year compound interest.

Show that the total amount of interest Charlie will have received after 2 years is £123. **[4]**

Many calculated 5% of 1200 correctly and were given M1B1, however a high proportion of these then went on to treat the question as simple interest and multiplied this result by two (often accompanied by a statement that 'Charlie did not receive £123 interest'). Candidates should realise that if they don't arrive at a value that they have been asked to 'Show', it likely means they have made an error in their response.

Some candidates employed the formula given on the formulae sheet, but errors were often made in the addition of 1 and $\frac{5}{100}$ or calculating 1.05^2.

Some attempted to work backwards from the £123 rather than using the £1200.

Question 25

25 A machine makes bolts that should be 30.0 mm long, correct to 1 decimal place.

Jane checks the accuracy of the machine by taking a random sample of 10 of the bolts.
Here are the lengths, in mm correct to 1 decimal place, of the bolts in Jane's sample.

29.5 29.1 30.0 30.0 30.2 30.0 30.0 30.0 30.5 30.0

The machine makes 2000 of these bolts that day.

Jane says

6 of the 10 bolts in the sample are of the correct length. That is 60%.
Therefore, 1200 of the 2000 bolts will be of the correct length because that is 60%.

Give a reason why Jane's claim may be unreliable.

.....

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

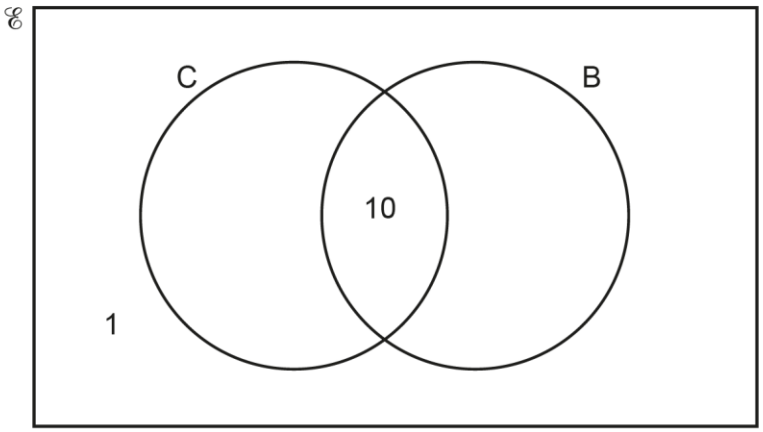
Many candidates attempted to describe that this sample may not be representative, but struggled with communication. Often incorrect statements about picking the bolts 'randomly' was the reason identified, or suggestions of the percentage or the rounding being incorrect.

The most successful responses focused on the small nature of the sample, however few such responses were seen.

Question 26

26 In a survey, 50 people were asked whether they have a car (C) or a bicycle (B).

The Venn diagram shows some of the results.



The ratio of those that **only** have a car to those that **only** have a bicycle is 2 : 1.

One of the 50 people is chosen at random.

Find the probability that they have a **bicycle**.
You must show your working.

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

A good proportion of candidates picked up marks here, often M1M1A1 and often subsequently B1 too.

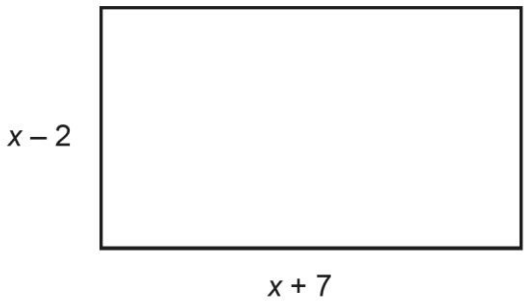
Many candidates showed the use of 'bus stop' method when completing $\frac{39}{3}$. Some however disregarded the 1 and attempted $\frac{40}{3}$.

Where the B1 was given, it was almost always for $\frac{p}{50}$ rather than $\frac{23}{k}$.

Poorer responses often attempted to divide 50 into the ratio 2 : 1, although some of these were able to go on to give a fractional answer with 50 as the denominator, scoring the B1.

Question 27 (a)

27 In this question, all lengths are in centimetres.



Not to scale

The area of the rectangle is $70\,\text{cm}^2$.

(a) Show that $x^2 + 5x - 84 = 0$. **[4]**

This question was a challenge for almost all candidates. There was a high proportion who did not attempt it and marks were not given regularly.

The majority of attempts worked with the given equation rather than using the information provided to arrive at that equation.

Some candidates attempted to find the perimeter of the shape (in contrast with Question 23 earlier).

Question 27 (b) (i)

(b) (i) Solve by factorising.

$x^2 + 5x - 84 = 0$

(b)(i) $x =$ ..... or $x =$ ..... **[3]**

Responses to this question were much less successful than similar questions in previous series, notably with the otherwise high performing candidates. This may be due to the negative integer in the quadratic.

Some candidates attempted to make use of factor pairs of $^-84$, but often struggled to make progress.

Factorisations such as $(x - 84)(x + 1)$ and $(x - 12)(x + 7)$ were seen and given M1, with some candidates then correctly solving them to receive the B1 also for Follow Through.

Often 'factorisations' just used the numbers 5 and 84 within the backets, without attempts to identify numbers with the relevant sum and/or product.

Some candidates wrote correct solutions without any factorising, which could be given B1 only.

Poorer attempts often attempted to rearrange the equation rather than trying to factorise it.

Question 27 (b) (ii)

(ii) Find the length of the longer side of the rectangle.

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

Those with a correct answer for part (b)(i) generally scored the mark here, along with some 'Follow Through' marks being given to candidates with incorrect (b)(i) responses.

A common response was '$x + 7$', the expression given on the rectangle in the question.

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