



Cambridge Assessment
International Education

Example Candidate Responses – Paper 3

Cambridge IGCSE / IGCSE (9-1)

Mathematics 0580 / 0980

For examination from 2020



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Introduction

The main aim of this booklet is to exemplify standards for those teaching Cambridge IGCSE / IGCSE (9-1) Mathematics 0580 / 0980, and to show how different levels of candidates' performance (high, middle and low) relate to the subject's curriculum and assessment objectives.

In this booklet, candidate responses have been chosen from the November 2020 series to exemplify a range of answers.

For each question, the response is annotated with a clear explanation of where and why marks were awarded or omitted. This is followed by examiner comments on how the answer could have been improved. In this way, it is possible for you to understand what candidates have done to gain their marks and what they could do to improve their answers. There is also a list of common mistakes candidates made in their answers for each question.

This document provides illustrative examples of candidate work with examiner commentary. These help teachers to assess the standard required to achieve marks beyond the guidance of the mark scheme. Therefore, in some circumstances, such as where exact answers are required, there will not be much comment.

The questions and mark schemes used here are available to download from the School Support Hub. These files are:

0580 November 2020 Question Paper 32

0580 November 2020 Mark Scheme 32

Past exam resources and other teaching and learning resources are available on the School Support Hub:

www.cambridgeinternational.org/support

How to use this booklet

This booklet goes through the paper one question at a time, showing you the high-, middle- and low-level response for each question. The candidate answers are set in a table. In the left-hand column are the candidate answers, and in the right-hand column are the examiner comments.

| Example Candidate Response – high | Examiner comments |
|---|--|
| <p>5 (a) Here are the weekly wages, in dollars, of the ten workers in an office.</p> <p style="text-align: center;"> 280 200 175 1180 95 182 238 256 194 250 95 175 182 194 200 238 250 256 280 1180 </p> <p>(i) Find the median.</p> <p style="text-align: center;"> $\frac{200 + 238}{2} = 219$ </p> <p style="text-align: right;">1 \$ 219 [2]</p> <p>(ii) Calculate the mean.</p> <p style="text-align: center;"> $\frac{3050}{10} = 305$ </p> <p style="text-align: right;">2 \$ 305 [2]</p> <p>(iii) For this office, explain why the mean is not a suitable average.</p> <p style="text-align: right;">3</p> <p style="text-align: center;"> Because there are no weekly wages for \$305. </p> <p style="text-align: right;">[1]</p> <p>(b) The stem-and-leaf diagram shows the ages of the workers in a factory.</p> <p style="text-align: center;"> 1 6 7 7 9 </p> | <p>1 The candidate gives a correct answer supported by complete and clear working. Mark for (a)(i) = 2 out of 2</p> <p>2 The candidate gives a correct answer supported by complete and clear working. Mark for (a)(ii) = 2 out of 2</p> <p>3 This is an 'explain why' question and requires an</p> <div style="border: 1px solid #f4a460; border-radius: 15px; padding: 10px; margin-top: 10px;"> <p>Examiner comments are alongside the answers. These explain where and why marks were awarded. This helps you to interpret the standard of Cambridge exams so you can help your learners to refine their exam technique.</p> </div> |
| <p>Answers are by real candidates in exam conditions. These show you the types of answers for each level. Discuss and analyse the answers with your learners in the classroom to improve their skills.</p> | |

How the candidate could have improved their answer

(a)(iii) The candidate needed to appreciate what is required in an 'explain why' question. In this question, the recognition that the extreme value of 1180 had a great effect on the mean was required.

This section explains how the candidate could have improved each answer. This helps you to interpret the standard of Cambridge exams and helps your learners to refine their exam technique.

Common mistakes candidates made in this question

- (a)(i) Using the unordered pair of 95 and 182 to get 138.5, leaving the ordered list without any further work, using 200 and 238 but obtaining answers of 438 and 319 (from $200 + 238 \div 2$ suggesting incorrect use of the calculator), with a small number finding the mean or range.

- (a)(ii) Leaving the answer as 3050, arithmetic errors in the calculation of the mean.

Often candidates were not awarded marks because they misread or misinterpreted the questions.

Lists the common mistakes candidates made in answering each question. This will help your learners to avoid these mistakes and give them the best chance of achieving the available marks.

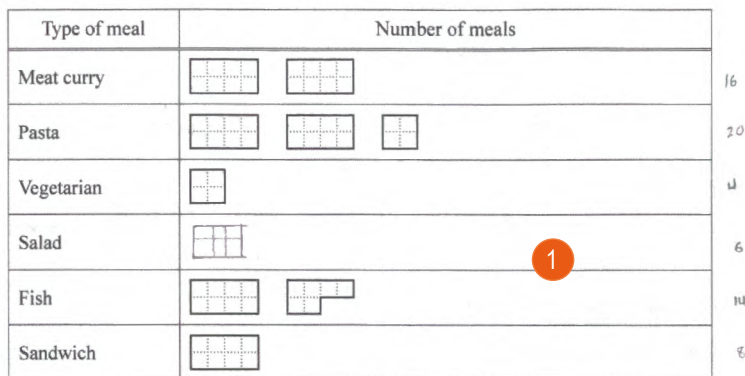
Question 1

Example Candidate Response – high

Examiner comments

1 George, Louis and Beatriz have a café.

- (a) George records the number of each type of meal sold. He draws a pictogram to show his results. All rows are complete except for Salad.



Key: = 8 meals

- (i) Six salads were sold.

Complete the pictogram.

- (ii) Write down which type of meal was sold most.

..... Pasta [1]

- (iii) Find the number of meals sold altogether.

..... 68 meals [1]

- (b) The café also sells drinks.

| Drinks | |
|-----------------|--------|
| Cup of tea | \$2.20 |
| Cup of coffee | \$2.80 |
| Bottle of juice | \$1.50 |
| Bottle of water | \$1.35 |

Johan buys 2 cups of tea, 1 bottle of juice and 1 bottle of water.

Calculate the change he receives from a \$10 note.

$$10 - 2(2.20) - 1.50 - 1.35 = 2.75$$

\$ 2.75 [2]

1 The candidate adds a clear and correct diagram to the pictogram and the mark is awarded. Mark for (a)(i) = 1 out of 1

2 The candidate gives a correct answer. Mark for (a)(ii) = 1 out of 1

3 The candidate gives a correct answer. Mark for (a)(iii) = 1 out of 1

4 The candidate gives a correct answer supported by full working. Mark for (b) = 2 out of 2

Example Candidate Response – high, continued

Examiner comments

(c) These are the opening times of the café.

| | |
|------------------|-----------------|
| Monday to Friday | 8 am to 6 pm |
| Saturday | 9.30 am to 3 pm |
| Sunday | Closed |

Work out the total number of hours the café is open in one week.

$1 \text{ day} = 11 \text{ hrs}$
 $5 \text{ days} = 55 \text{ hrs}$
 $Sat = 6 \frac{1}{2} \text{ hrs}$
 $55 + 6 \frac{1}{2} = 61 \frac{1}{2} \text{ hrs}$
 $\text{Total} = 61 \frac{1}{2} \text{ hrs}$
 $\dots\dots\dots 61 \frac{1}{2} \dots\dots\dots \text{hours [2]}$

5 Although the multiplication by 5 and the addition show elements of the correct method, the candidate makes two errors in the times. The weekday figure should be 10 hours and the Saturday figure should be 5½ hours.
Mark for (c) = 0 out of 2

(d) One week the café makes a profit of \$1027.
George, Louis and Beatriz share this profit in the ratio George : Louis : Beatriz = 7 : 4 : 2.

Calculate the amount of money they each receive.

$7 + 4 + 2 = 13$
 $1027 = 13$
 $1027 \div 13 = 79$
 $G : 79 \times 7 = 553$
 $L : 79 \times 4 = 316$
 $B : 79 \times 2 = 158$
 $\text{George } \$ \dots\dots\dots 553$
 $\text{Louis } \$ \dots\dots\dots 316$
 $\text{Beatriz } \$ \dots\dots\dots 158$ [3]

6 The candidate supplies a model answer showing the correct method.
Mark for (d) = 3 out of 3

(e) In 2019 the rent for the café was \$7275.
In 2020 the rent is \$7566.

Calculate the percentage increase in the rent.

$7566 - 7275 = 291$
 $= \frac{291}{7275} \times 100\%$
 $= 4\%$
 $\dots\dots\dots 4 \dots\dots\dots \% [2]$

7 The candidate provides a correct answer with full and correct working shown.
Mark for (e) = 2 out of 2

(f) George drives 315 km from the café to the airport.
The journey takes 3 hours 30 minutes.

Calculate his average speed.

$315 \div 3.5 = 90 \text{ km/h}$
 $\dots\dots\dots 90 \dots\dots\dots \text{km/h [1]}$

8 The correct answer is given. The candidate uses the correct formula and correctly converts 3 hours 30 minutes to 3.5 hours.
Mark for (f) = 1 out of 1

Total mark awarded = 11 out of 13

How the candidate could have improved their answer







(c) A timeline showing that 8am to 12pm to 6pm is 4 hours + 6 hours = 10 hours might have helped.

Example Candidate Response – middle

Examiner comments

1 George, Louis and Beatriz have a café.

- (a) George records the number of each type of meal sold. He draws a pictogram to show his results. All rows are complete except for Salad.

| Type of meal | Number of meals |
|--------------|--|
| Meat curry |  16 |
| Pasta |  24 |
| Vegetarian |  8 |
| Salad |  6 |
| Fish |  14 |
| Sandwich |  8 |

Key:  = 8 meals

- (i) Six salads were sold.

Complete the pictogram.

- (ii) Write down which type of meal was sold most.

Pasta [1]

- (iii) Find the number of meals sold altogether.

68 [1]

- (b) The café also sells drinks.

| Drinks | |
|-----------------|--------|
| Cup of tea | \$2.20 |
| Cup of coffee | \$2.80 |
| Bottle of juice | \$1.50 |
| Bottle of water | \$1.35 |

Johan buys 2 cups of tea, 1 bottle of juice and 1 bottle of water.

Calculate the change he receives from a \$10 note.

$$\begin{aligned}
 &2.20 \times 2 \\
 &1.50 \\
 &1.35 \\
 \hline
 &4.4 + 1.50 + 1.35 \\
 &= 7.25 \\
 &10 - 7.25 = 2.75
 \end{aligned}$$

\$ 2.75 [2]

1 The candidate adds a clear and correct diagram to the pictogram and is awarded the mark. Mark for (a)(i) = 1 out of 1

2 The candidate gives the correct answer. Mark for (a)(ii) = 1 out of 1

3 The candidate gives the correct answer. Mark for (a)(iii) = 1 out of 1

4 The candidate supplies a model response, showing the complete and correct method, leading to the correct answers. Mark for (b) = 2 out of 2

Example Candidate Response – middle, continued

Examiner comments

(c) These are the opening times of the café.

| | |
|------------------|-----------------|
| Monday to Friday | 8 am to 6 pm |
| Saturday | 9.30 am to 3 pm |
| Sunday | Closed |

Work out the total number of hours the café is open in one week.

Monday - Friday : $10 \times 5 = 50$
 Saturday : 5.30×5.30 } = 55.30
 hours [2]

5 A correct method is provided by the candidate, but the final answer of 55.30 hours uses unacceptable notation for a time period. Only the method mark is awarded. The correct answer of 55.5 hours or $55\frac{1}{2}$ hours is needed for both marks. Mark for (c) = 1 out of 2

(d) One week the café makes a profit of \$1027. George, Louis and Beatriz share this profit in the ratio George : Louis : Beatriz = 7 : 4 : 2.

Calculate the amount of money they each receive.

79 $\frac{1027}{13}$ $1027 \div 13 = 79$
 (each)
 George : $79 \times 7 = 553$ George \$ 553
 Louis : $79 \times 4 = 316$ Louis \$ 316
 Beatriz : $79 \times 2 = 158$ Beatriz \$ 158 [3]

6 The candidate supplies a model response, showing a complete and correct method, leading to the correct answers. Mark for (d) = 3 out of 3

(e) In 2019 the rent for the café was \$7275. In 2020 the rent is \$7566.

Calculate the percentage increase in the rent.

$\frac{7566 - 7275}{7275} \times 100 = \frac{291}{7275} \times 100 = 3.99$
 $\frac{7566}{7275} \times 100 = 104.1$
% [2]

7 The candidate uses an incorrect method leading to the incorrect answer of 96.1%. No marks are awarded. A partial method is also seen in the working which, if finished off as $104 - 100$, would give the correct answer of 4%. When candidates offer two methods, examiners mark the method that leads to the answer on the answer line. Mark for (e) = 0 out of 2

(f) George drives 315 km from the café to the airport. The journey takes 3 hours 30 minutes.

Calculate his average speed.

$S = \frac{D}{T}$
 $S = \frac{315}{3.30}$
 $S = 95.4$
 km/h [1]

8 Although the candidate uses the correct formula of Distance/Time, the common error of converting 3 hours 30 minutes to 3.30 instead of 3.5 hours is made. Mark for (f) = 0 out of 1

Total mark awarded = 9 out of 13

How the candidate could have improved their answer







- (c) The candidate needed to use correct mathematical notation for a time period.
- (e) The candidate needed a better understanding of the methodology for percentage increase/decrease.

Example Candidate Response – low

Examiner comments

1 George, Louis and Beatriz have a café.

- (a) George records the number of each type of meal sold. He draws a pictogram to show his results. All rows are complete except for Salad.

| Type of meal | Number of meals |
|--------------|--|
| Meat curry |  |
| Pasta |  |
| Vegetarian |  |
| Salad |  1 |
| Fish |  1 |
| Sandwich |  |

Key:  = 8 meals

- (i) Six salads were sold.

Complete the pictogram.

- (ii) Write down which type of meal was sold most.

Pasta **2** [1]

- (iii) Find the number of meals sold altogether.

68 **3** [1]

- (b) The café also sells drinks.

2.20

| Drinks | |
|-----------------|--------|
| Cup of tea | \$2.20 |
| Cup of coffee | \$2.80 |
| Bottle of juice | \$1.50 |
| Bottle of water | \$1.35 |

$$\begin{array}{r}
 4.40 \\
 + 1.50 \\
 \hline
 5.90 \\
 + 1.35 \\
 \hline
 7.25
 \end{array}$$

Johan buys 2 cups of tea, 1 bottle of juice and 1 bottle of water.

Calculate the change he receives from a \$10 note.

$$\begin{array}{r}
 10.00 \\
 - 7.25 \\
 \hline
 2.75
 \end{array}$$

2.75 **4** [2]

1 The candidate adds an acceptable and correct diagram to the pictogram.

Mark for (a)(i) = 1 out of 1

2 The candidate gives the correct answer.

Mark for (a)(ii) = 1 out of 1

3 The candidate gives the correct answer.

Mark for (a)(iii) = 1 out of 1

4 The candidate's working is shown in stages, providing a complete and correct method, leading to the correct answer.

Mark for (b) = 2 out of 2

Example Candidate Response – low, continued

Examiner comments

- (c) These are the opening times of the café.

| | |
|------------------|-----------------|
| Monday to Friday | 8 am to 6 pm |
| Saturday | 9.30 am to 3 pm |
| Sunday | Closed |

Work out the total number of hours the café is open in one week.

5 88 hours [2]

- (d) One week the café makes a profit of \$1027.
George, Louis and Beatriz share this profit in the ratio George : Louis : Beatriz = 7 : 4 : 2.

Calculate the amount of money they each receive.

George \$ ~~553~~ 6
 Louis \$ 316
 Beatriz \$ 156 [3]

- (e) In 2019 the rent for the café was \$7275.
In 2020 the rent is \$7566.

Calculate the percentage increase in the rent.

7 96 % [2]

- (f) George drives 315 km from the café to the airport.
The journey takes 3 hours 30 minutes.

Calculate his average speed.

$s = \frac{315}{\cancel{210} 210}$ km/h [1]
 $= 1.5$ 8
 $, 0.025$

5 The answer is incorrect and there is no working to show how the candidate arrived at the answer. Mark for (c) = 0 out of 2

6 The answers that the candidate gives for George and Louis are both correct. The answer for Beatriz is incorrect and the candidate supplies no working to support their result. Mark for (d) = 2 out of 3

7 The candidate supplies an incorrect answer which suggests that an incorrect method was used. Mark for (e) = 0 out of 2

8 The candidate provides no answer on the answer line and no correct value is seen in the working. The correct formula is used but the value of 1.5 is in km/min and should be multiplied by 60 not divided by 60. Mark for (f) = 0 out of 1

Total mark awarded = 7 out of 13

How the candidate could have improved their answer

- **(c)** The answer may have been improved by first working out the hours for the weekdays and for Saturday. Use of a timeline such as showing that 8am to 12pm to 6pm is 4 hours + 6 hours = 10 hours may have helped.
- **(d)** The response would have been improved by showing the method used clearly in the working space, and this may have avoided the possible arithmetic slip or transcription error.
- **(e)** The candidate needed a more developed understanding of the methodology for percentage increase/decreases.
- **(f)** The answer would have been improved by noting that the answer required was in km/h and changing the journey time of 3 hours 30 minutes to 3.5 hours.

Common mistakes candidates made in this question

- **(a)(i)** This was well answered with almost all candidates adding six connected squares correctly onto the pictogram. The candidates who were not awarded marks had either not connected their six squares, had the wrong number of squares or had not made a response.
- **(a)(ii)** The majority of candidates gave the correct response.
- **(a)(iii)** The majority of candidates obtained the correct answer of 68.
- **(b)** Leaving the answer as \$7.25, costing the wrong drinks or amount of drinks bought.
- **(c)** Weekday hours of 2, 11 or 14, Saturday hours as 6.5 or 12.5, omitting to multiply the weekday hours by 5, or multiplying by 7, and unacceptable final answers of 55.30 or 55.3.
- **(d)** The most common error was candidates finding, $\frac{1027}{7}$, $\frac{1027}{4}$ and $\frac{1027}{2}$ rather than first dividing by the total parts (2 + 4 + 7).
- **(e)** Using 7566 as the original amount and finding a decrease to 96.2% or a reduction of 3.85%, answer of 2.91% from $\frac{7566-7275}{100}$, and final answers left as 104 or 0.04.
- **(f)** The use of incorrect formulas such as time ÷ distance and time × distance, incorrect time conversions to 3.3 hours, and use of 210 minutes.

Question 2

Example Candidate Response – high

Examiner comments

2 (a)

4.8 x 10 = 48

kn m cm mm

Measure the length of this line in millimetres.

48 mm [1]

1 The candidate gives a correct answer with suitable working. Mark for (a) = 1 out of 1

(b)

(i) Measure the size of angle x .

360 - 137 = 223

223 [1]

2 The candidate gives a correct answer with suitable working. Mark for (b)(i) = 1 out of 1

(ii) Write down the mathematical name of this type of angle.

Reflex angle [1]

3 The candidate gives a correct answer. Mark for (b)(ii) = 1 out of 1

(c)

NOT TO SCALE

ABC is a straight line and BCD is an isosceles triangle.

Find the value of x .

$180 - 26 = \frac{154}{2} = 77$

$180 - (77 + 77) = 26$

$x = 103$ [2]

4 The candidate gives a correct answer with suitable working. Mark for (c) = 2 out of 2

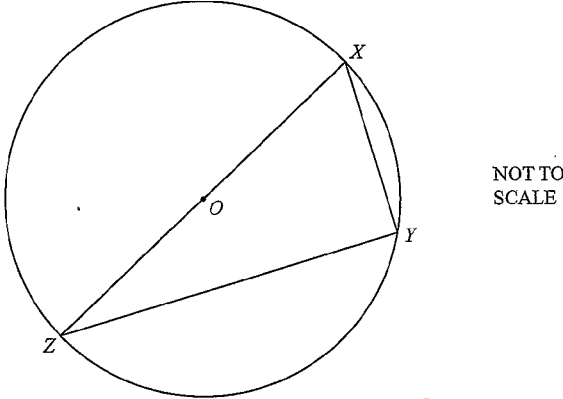
(d) Work out the size of one interior angle of a regular 16-sided polygon.

$$\frac{(n-2)180}{n}$$

$$= \frac{(16-2)180}{16} = 157.5^\circ$$

157.5 [2]

5 The candidate gives a correct answer with suitable working. Mark for (d) = 2 out of 2

| Example Candidate Response – high, continued | Examiner comments |
|---|---|
| <p>(e)</p>  <p>NOT TO SCALE</p> <p>(i) Complete this statement. 6</p> <p>X, Y and Z are points on theCircumference..... of the circle, centre O. [1]</p> <p>(ii) Give a reason why angle XYZ is 90°. 7</p> <p>It is an right angle triangle. [1]</p> <p>(f) A circle has diameter 6 cm.</p> <p>Calculate the area of the circle. Give the units of your answer.</p> <p>$A = \pi r^2$</p> <p>$A = 3.142 \times 3^2$</p> <p>$A = 28.3 \text{ cm}^2$28.3..... cm² [3] 8</p> | <p>6 The candidate gives a correct answer. Mark for (e)(i) = 1 out of 1</p> <p>7 While the candidate gives a correct statement for the triangle XYZ, they are not answering the question. When asked to give a reason, a standard geometric reason is required which, here, would be ‘the angle in a semicircle is 90 degrees’. Mark for (e)(ii) = 0 out of 1</p> <p>8 The candidate supplies a model answer using the correct formula, a suitable value for π and sensible rounding. Mark for (f) = 3 out of 3</p> <p>Total mark awarded = 11 out of 12</p> |

How the candidate could have improved their answer

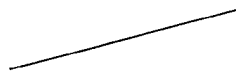
(e)(ii) The candidate needed to give the reason using the correct geometric terminology from the syllabus.

Example Candidate Response – middle

Examiner comments

2 (a)

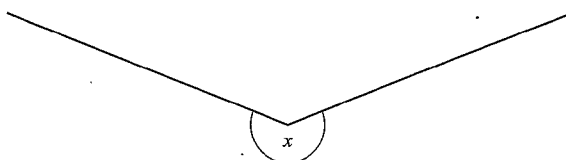
Measure the length of this line in millimetres.



1

~~4.8~~ 4.8 mm [1]

(b)



(i) Measure the size of angle x.

$$180 - 139 = 360 - 139 = 221$$

2

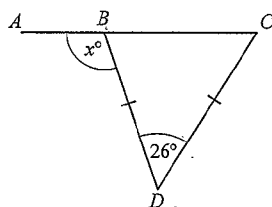
~~221~~ 223° [1]

(ii) Write down the mathematical name of this type of angle.

3

obtuse angle [1]

(c)



NOT TO SCALE

ABC is a straight line and BCD is an isosceles triangle.

Find the value of x.

$$26 + 2x = 180$$

$$2x = 180 - 26$$

$$2x = 154$$

$$x = 77$$

$$x = 180 - 77$$

$$x = 103$$

4

x = 103° [2]

(d) Work out the size of one interior angle of a regular 16-sided polygon.

$$16 \times 180$$

$$\frac{180}{16} = 11.25$$

5

11.25° [2]

1 The candidate incorrectly expresses their answer in centimetres rather than in millimetres.
Mark for (a) = 0 out of 1

2 The candidate gives a correct answer.
Mark for (b)(i) = 1 out of 1

3 The candidate gives an incorrect answer.
Mark for (b)(ii) = 0 out of 1

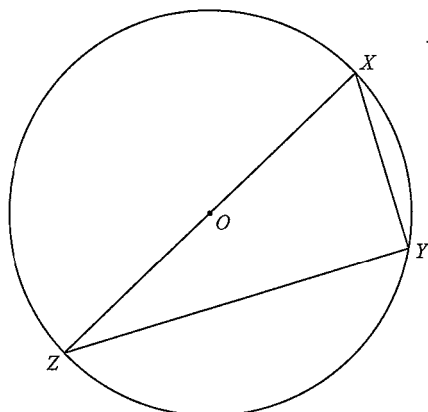
4 The candidate's working shows a correct method with the double use of 'x' condoned as they reach the correct answer.
Mark for (c) = 2 out of 2

5 The candidate uses an incorrect method.
Mark for (d) = 0 out of 2

Example Candidate Response – middle, continued

Examiner comments

(e)



NOT TO SCALE

(i) Complete this statement.

X, Y and Z are points on the corners / edges of the circle, centre O. [1]

(ii) Give a reason why angle XYZ is 90°.

Because XYZ is a right angled triangle, thus is 90° [1]

(f) A circle has diameter 6 cm.

Calculate the area of the circle.
Give the units of your answer.

$$A = \pi r^2 \rightarrow \pi \times 3^2$$

$$\pi \times 6^2 = 28.2$$

$$= 113.0 \text{ cm}^2$$

28.2
113.0 cm² [3]

6 The candidate uses incorrect mathematical terminology. Mark for (e)(i) = 0 out of 1

7 The candidate gives a correct statement for the triangle XYZ, but this does not answer the question set. When asked to give a reason, a standard geometric reason is required which, here, would be 'the angle in a semicircle is 90 degrees'. Mark for (e)(ii) = 0 out of 1

8 A correct formula is shown in the working but the value of 28.2 given by the candidate is outside the accuracy range required. Two marks are awarded, one for the method, and one for the correct units. Mark for (f) = 2 out of 3

Total mark awarded = 5 out of 12

How the candidate could have improved their answer

- **(d)** The candidate needed a better understanding of the interior angles of polygons.
- **(e)** The candidate should have given the reason using the correct geometric terminology from the syllabus.
- **(f)** The answer would have been improved by writing down the calculator answer to the calculation to more than three figures in the working, and then correctly rounding to 3 significant figures.

Example Candidate Response – low

Examiner comments

2 (a)

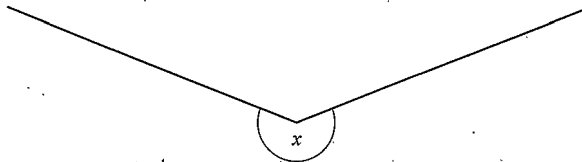
Measure the length of this line in millimetres.

$$4-4 \div 100 = 0.044$$

1 0.044 mm [1]

1 The candidate supplies an incorrect answer following an inaccurate measurement and an incorrect attempted conversion. Mark for (a) = 0 out of 1

(b)



(i) Measure the size of angle x .

2 137° [1]

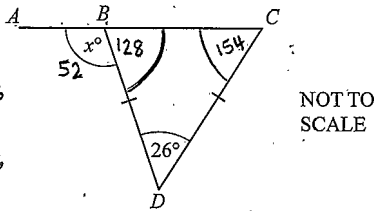
2 The candidate gives an incorrect answer following the correct measurement of the wrong angle. Mark for (b)(i) = 0 out of 1

(ii) Write down the mathematical name of this type of angle.

3 Reflex angle [1]

3 The candidate gives a correct answer. Mark for (b)(ii) = 1 out of 1

(c)



$$\begin{aligned} BCD &= 180 - 26 \\ &= 154 \\ CBD &= 154 - 26 \\ &= 128 \end{aligned}$$

ABC is a straight line and BCD is an isosceles triangle.

Find the value of x . $x = 180 - 128 = 52$

4 52° [2]

4 Although the need to find the angle CBD is recognised, the candidate's working shows incorrect methods used to find the angles BCD and CBD . Mark for (c) = 0 out of 2

(d) Work out the size of one interior angle of a regular 16-sided polygon.

$$\begin{aligned} &(n-2) \times 180 \\ &= (16-2) \times 180 \\ &= 2520 \end{aligned}$$

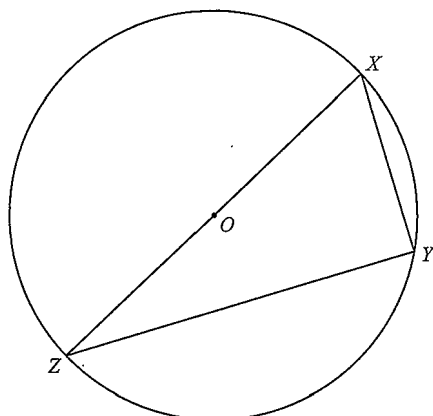
5 2520 [2]

5 The candidate's working shows an incomplete method. Mark for (d) = 0 out of 2

Example Candidate Response – low, continued

Examiner comments

(e)



NOT TO SCALE

(i) Complete this statement.

X, Y and Z are points on the radius of the circle, centre O. [1]

(ii) Give a reason why angle XYZ is 90°.

..... because angle XYZ is right angle + triangle = 90°. [1]

(f) A circle has diameter 6 cm.

Calculate the area of the circle.
Give the units of your answer.

$$\begin{aligned} &\pi^2 \times 6 \\ &= 59.21762641 \\ &= 59.2 \text{ cm}^2 \end{aligned}$$

..... 59.2 cm² [3]

6 The candidate uses an incorrect term.
Mark for (e)(i) = 0 out of 1

7 Even allowing for the slight confusion between angles and triangles in the answer given, the candidate does not answer the question set. When asked to give a reason, a standard geometric reason is required which, here, would be 'the angle in a semicircle is 90 degrees'.
Mark for (e)(ii) = 0 out of 1

8 The candidate uses an incorrect formula. One mark is awarded for the correct units stated.
Mark for (f) = 1 out of 3

Total mark awarded = 2 out of 12

How the candidate could have improved their answer

- **(c)** The answer could have been improved by initially considering what the information ' BCD is an isosceles triangle' said about the angle properties of this triangle.
- **(d)** The answer could have been improved by considering whether 2520 degrees is a sensible answer for the size of one interior angle. The candidate should improve knowledge on polygons and angles.
- **(e)** The candidate needed to give the reason using the correct geometric terminology from the syllabus.
- **(f)** The candidate needed to use a correct mathematical formula to find the area of the circle.

Common mistakes candidates made in this question

- **(a)** Common errors included 0.48, 480 and 4800.
- **(b)(i)** Answers such as 220° which were outside the accuracy limits, 137° from measuring the obtuse angle only, 53° and 180° .
- **(b)(ii)** The most common wrong responses were obtuse, acute and reflect, as well as a variety of other mathematical words.
- **(c)** Although a good number of correct answers were seen common errors included $180^\circ - 26^\circ = 154^\circ$, a final answer of 77° and the use of 360° rather than 180° .
- **(d)** Finding the exterior angle as 22.5, the total interior angles as 2520, and the incorrect use of 16×180 , 16×360 , 14×360 , $\frac{2520}{14}$ and $\frac{180}{16}$.
- **(e)(i)** Answers such as radius, diameter, chord, tangent and descriptions such as inside, within, around or on the edge of the circle.
- **(e)(ii)** Common errors included 'it's a right-angled triangle', 'the triangle is inside the circle', 'it is on a tangent' and a number of non-mathematical descriptions or reasons.
- **(f)** The use of incorrect formulas such as πd , $\frac{1}{2} \pi r^2$, using the diameter value of 6 for the radius, inaccuracies resulting from using π as 3.14 or $\frac{22}{7}$ rather than the 3.142 as stated in the rubric or their calculator value, and answers of 113. A good number were able to score a mark for giving the correct units, but many gave cm, cm^3 or no units at all.

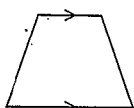
Question 3

Example Candidate Response – high

Examiner comments

3 (a) Write down the mathematical name for this

(i) quadrilateral,



1

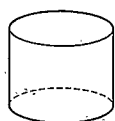
trapezoid

[1]

1 The candidate uses an unacceptable name; the correct name for this quadrilateral is trapezium.

Mark for (a)(i) = 0 out of 1

(ii) solid.



2

cylinder

[1]

2 The candidate gives a correct answer.

Mark for (a)(ii) = 1 out of 1

(b) The area of a square is 64cm^2 .

Work out the length of one side of the square.

$$A = lw$$

$$64 = lw$$

$$64\text{cm}^2 = 8 \times 8$$

3

8

cm [1]

3 The candidate gives a correct answer.

Mark for (b) = 1 out of 1

(c) The length, l , of a rectangle is 3 cm longer than the width, w .
The perimeter of the rectangle is 26 cm.

Calculate the length, l , and the width, w .

$$\begin{aligned} \text{set length} &= x+3 \\ \text{width} &= x \end{aligned}$$

$$x+3 + x+3 + x+x = 26\text{ cm}$$

$$4x+6 = 26\text{ cm}$$

$$4x = 20\text{ cm}$$

$$x = 5\text{ cm (width)}$$

$$x+3 = 5+3$$

$$= 8\text{ cm (length)}$$

4

$$l = 8 \text{ cm}$$

$$w = 5 \text{ cm [3]}$$

4 The candidate produces a model answer showing good use of algebra.

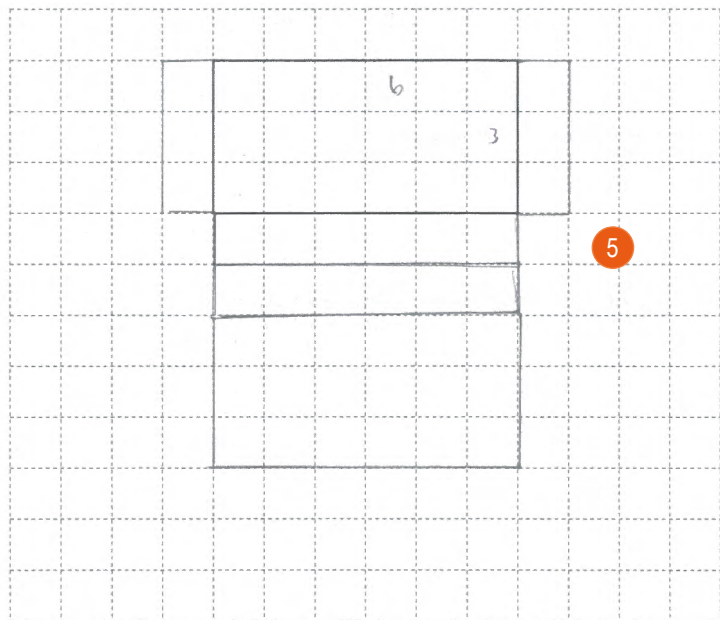
Mark for (c) = 3 out of 3

Example Candidate Response – high, continued

Examiner comments

(d) A cuboid measures 6 cm by 3 cm by 1 cm.

(i) On the 1 cm² grid, draw an accurate net of this cuboid. One face has been drawn for you.



$$2(lw) + 2(wh) + 2(lh)$$

[3]

(ii) Calculate the surface area of the cuboid.

$$\begin{aligned} & 2(lw) + 2(wh) + 2(lh) \\ & = 2(6 \times 3) + 2(3 \times 1) + 2(6 \times 1) \\ & = 2(18) + 2(3) + 2(6) \\ & = 36 + 6 + 12 \\ & = 54 \text{ cm}^2 \end{aligned}$$

6

..... 54 cm² [2]

5 The candidate's net has only 3 correct faces properly positioned. The remaining 2 faces are correct in size but are incorrectly positioned. Mark for (d)(i) = 1 out of 3

6 The candidate gives a model answer showing the formula used along with correct substitution and calculation. Mark for (d)(ii) = 2 out of 2

Total marks awarded = 8 out of 11

How the candidate could have improved their answer

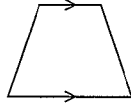
The candidate needed to use the vocabulary of polygons, as given in the syllabus.

Example Candidate Response – middle

Examiner comments

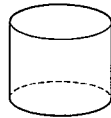
3 (a) Write down the mathematical name for this

(i) quadrilateral,



1 Parallelogram
Trapezium [1]

(ii) solid.



2 Cylinder [1]

(b) The area of a square is 64 cm^2 .

Work out the length of one side of the square.

$$A = l \times b$$

$$64 = l \times b$$

$$\frac{64}{4} = 16 \text{ cm}$$

3 16 [1]

(c) The length, l , of a rectangle is 3 cm longer than the width, w .
The perimeter of the rectangle is 26 cm.

Calculate the length, l , and the width, w .

$$P = l + w + l + w \text{ or } P = 2l + 2w$$

~~$$26 = 2l + 2w$$~~

~~$$23 = 2l + 2w$$~~

~~$$23 = 2l + 2w$$~~

$$P = 2 \times 8 + 2 \times 5$$

$$= 26 \text{ cm}$$

4
5
 $l = 8 \text{ cm}$
 $w = 5 \text{ cm}$ [3]

1 The candidate replaces a correct answer with an incorrect one. The mark cannot be awarded. Mark for (a)(i) = 0 out of 1

2 The candidate gives a correct answer. Mark for (a)(ii) = 1 out of 1

3 The candidate gives an incorrect answer with the final line of working suggesting that the perimeter may have been used. Although the first line of the working is correct, the significance that the shape is a square is not appreciated. Mark for (b) = 0 out of 1

4 The first line of the candidate's working shows the correct formula stated. The deleted working shows an attempt at an algebraic solution, but the significance of 'length is 3 cm longer than the width' was not appreciated despite the underlining of this statement.

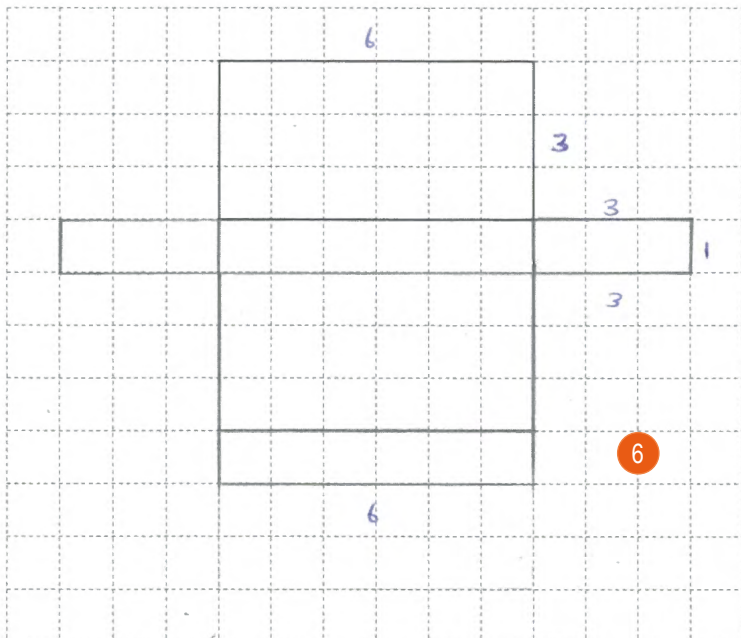
5 The two answers given are correct, and probably obtained by a valid trial and improvement method. Mark for (c) = 3 out of 3

Example Candidate Response – middle, continued

Examiner comments

(d) A cuboid measures 6 cm by 3 cm by 1 cm.

(i) On the 1 cm² grid, draw an accurate net of this cuboid.
One face has been drawn for you.



[3]

(ii) Calculate the surface area of the cuboid.

$$\begin{aligned}
 A &= l \times b \times w \times 6 \\
 &= (6 \times 3 \times 1) \times 6 \\
 &= 108
 \end{aligned}$$

7

..... 108 cm² [2]

6 The candidate draws a fully correct net and full marks are awarded.
Mark for (d)(i) = 3 out of 3

7 The candidate uses an incorrect formula, and no marks are awarded.
Mark for (d)(ii) = 0 out of 2

Total mark awarded = 7 out of 11

How the candidate could have improved their answer

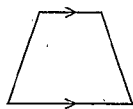
- (b) The answer would have been improved by writing the first line as $A = s \times s$.
- (d)(ii) The candidate needed to use a correct mathematical formula to find the surface area of the cuboid.

Example Candidate Response – low

Examiner comments

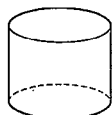
3 (a) Write down the mathematical name for this

(i) quadrilateral,



1 Trapezium [1]

(ii) solid.



2 Cylinder [1]

(b) The area of a square is 64 cm^2 .

Work out the length of one side of the square.

$$8 \times 8 = 64$$

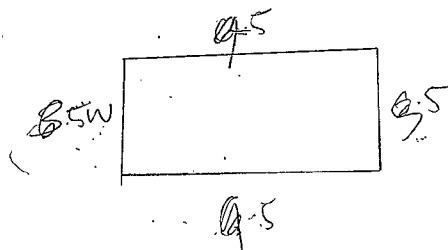
$$L \times L = \dots$$

$$8 \times 8 = 64 \text{ cm}^2$$

3 8 cm [1]

(c) The length, l , of a rectangle is 3 cm longer than the width, w . The perimeter of the rectangle is 26 cm.

Calculate the length, l , and the width, w .



4 $l = 9.5$ cm
 $w = 3.5$ cm [3]

1 The candidate gives a correct answer. Mark for (a)(i) = 1 out of 1

2 The candidate gives a correct answer. Mark for (a)(ii) = 1 out of 1

3 The candidate gives a correct answer. Mark for (b) is 1 out of 1

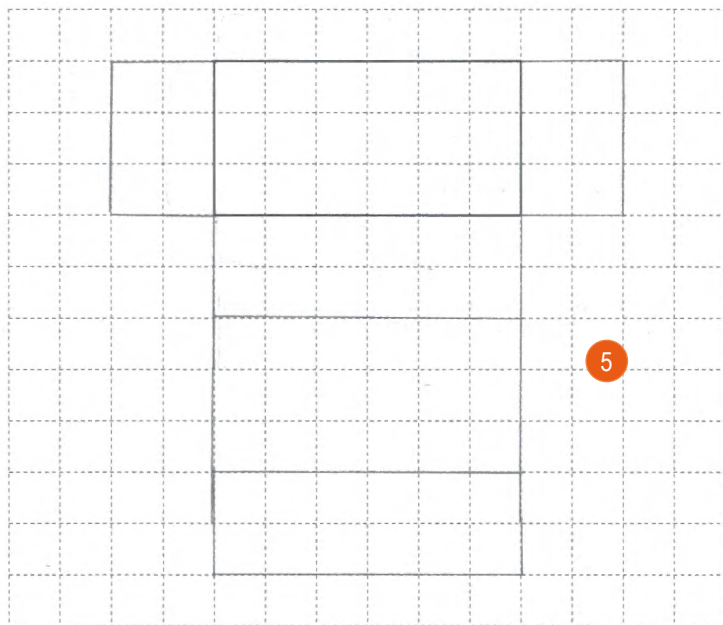
4 The candidate supplies incorrect answers with no evidence of how they were calculated. One mark is awarded as $9.5 + 3.5 = 13$, which does satisfy one of the two given conditions. Mark for (c) = 1 out of 3

Example Candidate Response – low, continued

Examiner comments

(d) A cuboid measures 6 cm by 3 cm by 1 cm.

(i) On the 1 cm² grid, draw an accurate net of this cuboid.
One face has been drawn for you.



[3]

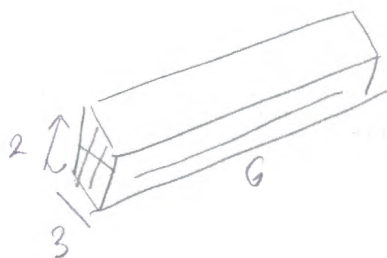
(ii) Calculate the surface area of the cuboid.

$$L \times B \times H$$

$$6 \times 3 \times 2$$

6

..... 36 cm² [2]



5 Although the candidate draws a correct net for a cuboid, it is not for the cuboid required by the question. Only the 6 cm by 3 cm face is correctly positioned.
Mark for (d)(i) = 0 out of 3

6 The candidate uses the formula for volume and not the surface area.
Mark for (d)(ii) = 0 out of 2

Total mark awarded = 4 out of 11

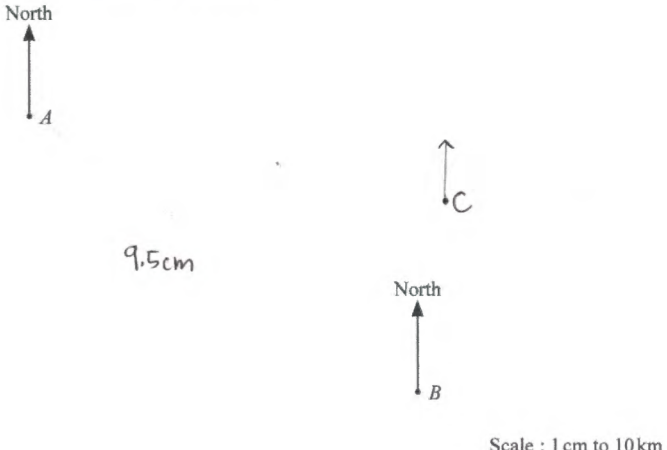
How the candidate could have improved their answer

- **(c)** The candidate needed to translate the given information into a correct initial algebraic equation.
- **(d)(ii)** The candidate should have used a correct mathematical formula to find the surface area of the cuboid.

Common mistakes candidates made in this question

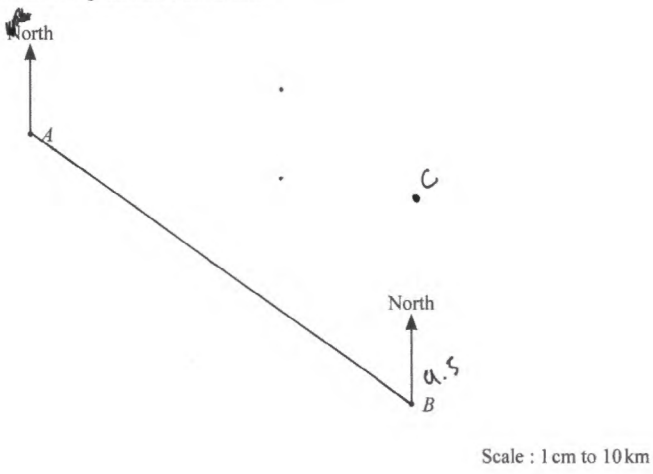
- **(a)(i)** There were many varied incorrect answers with the most common being parallelogram, rhombus and parallel.
- **(a)(ii)** Incorrect answers were varied with cuboid, circle and prism the most common.
- **(b)** Common errors included $\frac{64}{4} = 16$, $\frac{64}{2} = 32$, $64^2 = 4096$ and $64 \times 4 = 256$.
- **(c)** Incorrect answers were often based on 6.5, from $26 \div 4$, giving $6.5 \pm 3 = 35$ and 9.5, or 6.5 and 19.5. Some based their answers on 13 giving 13 and 5, 13 and 10 or $13 \pm 3 = 10$ and 16. Others started from $26 - 6 = 20$ then $20 \div 2 = 10$, usually giving 10 and 3 as the answer.
- **(d)(i)** Common errors included nets consisting of 6 by 3 rectangles placed above and below the given face and 3 by 3 squares drawn on either side, the inclusion of rectangles measuring 6 by 2, the omission of the 6 by 3 side, and occasionally a 3D sketch of a cuboid or one or two separate rectangles.
- **(d)(ii)** Common errors included 18 from 3×6 (the area of the given face), or $3 \times 6 \times 1$ (the volume of the cuboid), and 27.

Question 4

| Example Candidate Response – high | Examiner comments |
|---|--|
| <p>4 (a) Sami travels to work by bus. The bus leaves the bus station at 0735.</p> <p>(i) It takes Sami 23 minutes to walk from his house to the bus station. Work out the latest time Sami can leave his house.</p> <p style="text-align: right;">1 0712 [1]</p> <p>(ii) The bus journey takes 41 minutes. Work out the arrival time of the bus.</p> <p style="text-align: right;">2 0816 [1]</p> <p>(b) The scale drawing shows the positions of two towns, <i>A</i> and <i>B</i>. The scale is 1 centimetre represents 10 kilometres.</p>  <p style="text-align: right;">3 $9.5 \times 10 = 95$ 95 km [2]</p> <p>(ii) Town <i>C</i> is 85 km from town <i>A</i> on a bearing of 100°. On the scale drawing, mark the position of town <i>C</i>.</p> <p style="text-align: right;">4 [2]</p> | <p>1 The candidate gives a correct answer. Mark for (a)(i) = 1 out of 1</p> <p>2 The candidate gives a correct answer. Mark for (a)(ii) = 1 out of 1</p> <p>3 The candidate measures accurately and completes a correct conversion. Mark for (b)(i) = 2 out of 2</p> <p>4 The candidate's scale drawing shows the correct position of town <i>C</i>. Mark for (b)(ii) = 2 out of 2</p> <p>Total mark awarded = 6 out of 6</p> |

How the candidate could have improved their answer

The candidate produced an answer that was awarded full marks, but in (b)(ii), the candidate could have drawn the bearing line on the diagram.

| Example Candidate Response – middle | Examiner comments |
|---|---|
| <p>4 (a) Sami travels to work by bus. The bus leaves the bus station at 0735.</p> <p>(i) It takes Sami 23 minutes to walk from his house to the bus station. Work out the latest time Sami can leave his house.</p> <p style="text-align: right;">① <u>07 12</u> [1]</p> <p>(ii) The bus journey takes 41 minutes. ^{3.16} Work out the arrival time of the bus.</p> <p style="text-align: right;">② <u>08.16</u> [1]</p> <p>(b) The scale drawing shows the positions of two towns, <i>A</i> and <i>B</i>. The scale is 1 centimetre represents 10 kilometres.</p>  <p style="text-align: right;">Scale : 1 cm to 10 km</p> <p>(i) Work out the actual distance between town <i>A</i> and town <i>B</i>.</p> <p style="text-align: right;">③ <u>9.5</u> km [2]</p> <p>(ii) Town <i>C</i> is 85 km from town <i>A</i> on a bearing of 100°. On the scale drawing, mark the position of town <i>C</i>.</p> <p style="text-align: right;">④ [2]</p> | <p>① The candidate gives a correct answer. Mark for (a)(i) = 1 out of 1</p> <p>② The candidate gives a correct answer. Mark for (a)(ii) = 1 out of 1</p> <p>③ The answer of 9.5 seen on the answer line and on the scale drawing shows that the candidate has measured correctly, but does not convert to km to find the actual distance as required. Mark for (b)(i) = 1 out of 2</p> <p>④ The point <i>C</i> marked on the scale drawing is on the correct bearing but not at the correct distance. Mark for (b)(ii) = 1 out of 2</p> <p>Total mark awarded = 4 out of 6</p> |

How the candidate could have improved their answer

(b)(ii) The candidate could have drawn the bearing line before marking the point *C* at the correct distance.

Example Candidate Response – low

Examiner comments

- 4 (a) Sami travels to work by bus.
The bus leaves the bus station at 0735.

- (i) It takes Sami 23 minutes to walk from his house to the bus station.

Work out the latest time Sami can leave his house.

0735 - 25 minutes

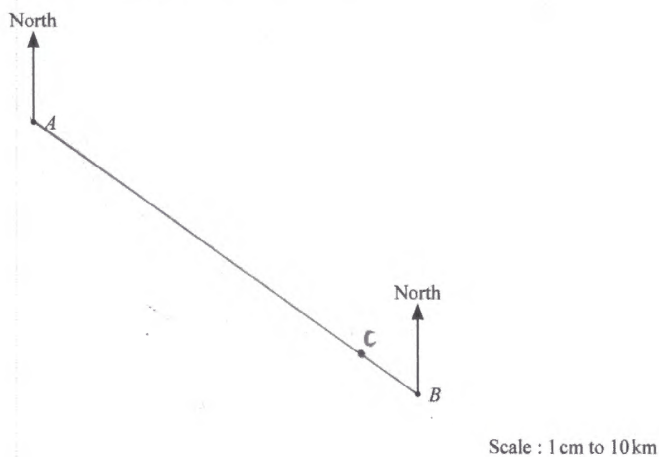
1 07 12 [1]

- (ii) The bus journey takes 41 minutes.

Work out the arrival time of the bus.

2 08 11 [1]

- (b) The scale drawing shows the positions of two towns, *A* and *B*.
The scale is 1 centimetre represents 10 kilometres.



- (i) Work out the actual distance between town *A* and town *B*.

9.5 cm

3

90.5 km [2]

- (ii) Town *C* is 85 km from town *A* on a bearing of 100° .

On the scale drawing, mark the position of town *C*.

4

[2]

1 The candidate gives the correct answer.

Mark for (a)(i) = 1 out of 1

2 The candidate gives an incorrect answer, and no mark is awarded.

Mark for (a)(ii) = 0 out of 1

3 The candidate correctly measures 9.5 cm as seen in the working space. This is then incorrectly converted to 90.5 km.
Mark for (b)(i) = 1 out of 2

4 The candidate marks point *C* on the scale drawing at an incorrect distance and on an incorrect bearing.

Mark for (b)(ii) = 0 out of 2

Total marks awarded = 2 out of 6

How the candidate could have improved their answer

- **(a)(ii)** The answer might have been improved by using a timeline such as 0735 + 25 minutes is 0800, 0800 + 16 minutes is 0816.
- **(b)(i)** The answer would be improved by writing 9.5×10 as this may have avoided the arithmetic error.
- **(b)(ii)** The main improvement would have been to draw the correct bearing.

Common mistakes candidates made in this question

- **(a)(i)** This part was generally very well answered although errors of 0758, 7, 12, and incorrect notation such as 7hrs 12 were seen.
- **(a)(ii)** This part was also generally very well answered although errors of 0654, 0753, 8, 16, and incorrect notation such as 8hrs 16 were seen.
- **(b)(i)** Common errors included leaving the distance as 9.5, an inaccurate measured distance of 10 cm and incorrect conversion to 950 or 9500 or 0.95.
- **(b)(ii)** A significant number plotted the location of the town at the correct distance but not at the correct bearing while fewer candidates plotted the correct bearing but at an incorrect distance. The incorrect bearings were often a result of reading the wrong scale (80°) on the protractor or aligning the protractor incorrectly.

Question 5

Example Candidate Response – high

Examiner comments

5 (a) Here are the weekly wages, in dollars, of the ten workers in an office.

280 200 175 1180 95 182 238 256 194 250
 95 175 182 194 266 238 250 256 280 1180

(i) Find the median.

$$\frac{200 + 238}{2} = 219$$

1

\$219..... [2]

(ii) Calculate the mean.

$$\frac{3050}{10} = 305$$

2

\$305..... [2]

(iii) For this office, explain why the mean is not a suitable average.

...Because...are no weekly wages from \$305 to..... [1]

3

(b) The stem-and-leaf diagram shows the ages of the workers in a factory.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 6 | 7 | 7 | 9 | | |
| 2 | 2 | 3 | 4 | 6 | 8 | |
| 3 | 0 | 2 | 3 | 6 | 9 | |
| 4 | 1 | 4 | 4 | 8 | | |
| 5 | 0 | 1 | 6 | 6 | 6 | 9 |
| 6 | 1 | 5 | 8 | | | |

Key : 2|3 represents 23

(i) Write down the mode.

4

.....56..... [1]

(ii) Work out the range.

5

.....52..... [1]

1 The candidate gives a correct answer supported by complete and clear working.

Mark for (a)(i) = 2 out of 2

2 The candidate gives a correct answer supported by complete and clear working.

Mark for (a)(ii) = 2 out of 2

3 This is an 'explain why' question and requires an understanding of the mean value and not just it's calculation. The comment the candidate gives is merely a statement relating to the given values and does not explain why the mean is an unsuitable average for this office. The effect of the extreme value of 1180 needed to be noticed and included in the explanation.

Mark for (a)(iii) = 0 out of 1

4 The candidate gives a correct answer.

Mark for (b)(i) = 1 out of 1

5 The candidate gives a correct answer, showing a good understanding of the given stem-and-leaf diagram.

Mark for (b)(ii) = 1 out of 1

Total mark awarded = 6 out of 7

How the candidate could have improved their answer

(a)(iii) The candidate needed to appreciate what is required in an 'explain why' question. In this question, the recognition that the extreme value of 1180 had a great effect on the mean was required.

Example Candidate Response – middle

Examiner comments

5 (a) Here are the weekly wages, in dollars, of the ten workers in an office.

280 200 175 1180 95 182 238 256 194 250

(i) Find the median.

95, 175, 182, 194, 200, 238, 250, 256, 280, 1180
 [2] 1

(ii) Calculate the mean.

$\frac{280+200+175+1180+95+182+238+256+194+250}{10}$
 $= \frac{3050}{10}$
 $= 305$ [2] 2

(iii) For this office, explain why the mean is not a suitable average.

It will calculate not ~~the~~ easiest. [1] 3

(b) The stem-and-leaf diagram shows the ages of the workers in a factory.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 6 | 7 | 7 | 9 | | |
| 2 | 2 | 3 | 4 | 6 | 8 | |
| 3 | 0 | 2 | 3 | 6 | 9 | |
| 4 | 1 | 4 | 4 | 8 | | |
| 5 | 0 | 1 | 6 | 6 | 6 | 9 |
| 6 | 1 | 5 | 8 | | | |

Key : 2|3 represents 23

(i) Write down the mode.

5 [1] 4

(ii) Work out the range.

$68 - 16 = 52$
 [1] 5

1 The candidate's working shows the correct re-ordering of the data with the two middle values of 200 and 238 identified. The answer is incorrect and may have come from using 238 and 250 rather than the 200 and 238.

Mark for (a)(i) = 1 out of 2

2 The candidate supplies the correct answer supported by complete and clear working.

Mark for (a)(ii) = 2 out of 2

3 The comment the candidate supplies is purely a statement about the calculation and does not explain why the mean is an unsuitable average for this office. The extreme value of 1180 needed to be noticed and included in the explanation.

Mark for (a)(iii) = 0 out of 1

4 The candidate gives an incorrect answer.

Mark for (b)(i) = 0 out of 1

5 The candidate gives a correct answer.

Mark for (b)(ii) = 1 out of 1

Total mark awarded = 4 out of 7

How the candidate could have improved their answer

(b) The candidate needed to consider the values represented in the stem-and-leaf diagram and to identify the mode as the value that occurs most frequently.

Example Candidate Response – low

Examiner comments

5 (a) Here are the weekly wages, in dollars, of the ten workers in an office.
 $\begin{matrix} 9 & 5 & 2 & 10 & 1 & 3 & 6 & 8 & 9 & 7 \\ 280 & 200 & 175 & 1180 & 95 & 182 & 238 & 256 & 194 & 250 \end{matrix}$

(i) Find the median.

1 \$ 200 [2]

(ii) Calculate the mean.

$$\frac{280 + 200 + 175 + 1180 + 95 + 182 + 238 + 256 + 194 + 250}{10}$$

2 2825 [2]

(iii) For this office, explain why the mean is not a suitable average.

3 because it over [1]

(b) The stem-and-leaf diagram shows the ages of the workers in a factory.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 6 | 7 | 7 | 9 | | |
| 2 | 2 | 3 | 4 | 6 | 8 | |
| 3 | 0 | 2 | 3 | 6 | 9 | |
| 4 | 1 | 4 | 4 | 8 | | |
| 5 | 0 | 1 | 6 | 6 | 6 | 9 |
| 6 | 1 | 5 | 8 | | | |

Key: 2|3 represents 23.

(i) Write down the mode.

4 5 [1]

(ii) Work out the range.

$$56 - 1$$

$$= 55$$

5 5 [1]

1 The candidate orders the values correctly from 1 to 10 (written above the values) and this is a valid first step in the calculation of the median. The 5th value of 200 is then incorrectly chosen. Mark for (a)(i) = 1 out of 2

2 The candidate provides correct and complete working. The answer of 2825 is incorrect, possibly due to incorrect use of the calculator. Mark for (a)(ii) = 1 out of 2

3 The candidate gives an incomplete and vague statement which does not answer this 'explain why' question. It may refer to their previous answer. The extreme value of 1180 needed to be noticed and included in the explanation. Mark for (a)(iii) = 0 out of 1

4 The candidate supplies an incorrect answer. Mark for (b)(i) = 0 out of 1

5 The answers to both (i) and (ii) of this question suggest that the terms mode and range are understood by the candidate, but not that the 27 values are represented by a stem and a leaf combined. The incorrect answer given here does not use the values of 68 and 16, instead it uses the two stems 1 and 6. Mark for (b)(ii) = 0 out of 1

Total mark awarded = 2 out of 7

How the candidate could have improved their answer

- **(a)(ii)** The answer would have been improved by doing the calculations in stages and writing down $\frac{3050}{10}$. The answer may also have been improved by considering the final answer with the data given.
- **(a)(iii)** The candidate needed to appreciate what is required in an ‘explain why’ question. In this question, the recognition that the extreme value of 1180 had a great effect on the mean was required.
- **(b)** The main issue is a lack of understanding on how to interpret and use a stem-and-leaf diagram.

Common mistakes candidates made in this question

- **(a)(i)** Using the unordered pair of 95 and 182 to get 138.5, leaving the ordered list without any further work, using 200 and 238 but obtaining answers of 438 and 319 (from $200 + 238 \div 2$ suggesting incorrect use of the calculator), with a small number finding the mean or range.
- **(a)(ii)** Leaving the answer as 3050, arithmetic errors in the addition, omission of one or more values in the addition, with a smaller number finding the median or range.
- **(a)(iii)** Common errors were very varied but were often based on the range being too big, the mean not being one of the given values, all the wages of the workers being different, or comments such as ‘it is unfair’.
- **(b)(i)** The most common error was an answer of 6, although it was usually unclear whether this came from ignoring the ‘stem’ of 50 or because there were more 6s in the ‘leaf’ section of the whole diagram. Another common answer was 5, although again, it was often unclear whether this was because there were more values in the row for the 50s than in any other row, or from $6 - 1 = 5$ using the stem.
- **(b)(ii)** Incorrect answers were very varied although a common error was to add all the numbers in each row and find the range of these, resulting in $29 - 14 = 15$. Other errors included using $6 - 1 = 5$ from the stems and the answer of 9 from subtracting the digits $9 - 0$.

Question 6

| Example Candidate Response – high | Examiner comments |
|---|--|
| <p>6 (a) Write 60025 in words.</p> <p><i>Sixty thousand and twenty five</i> Sixty hundred and twenty five thousand..... [1]</p> | <p>1 The candidate gives a correct answer. Mark for (a) = 1 out of 1</p> |
| <p>(b) Write 849.481 correct to 1 decimal place.</p> <p>..... 9 [1]</p> | <p>2 The candidate gives an incorrect answer. Mark for (b) = 0 out of 1</p> |
| <p>(c) Write down</p> <p>(i) all the factors of 21, <i>1, 21, 7, 3,</i></p> <p>(ii) a prime number between 40 and 50.</p> | <p>3 The candidate supplies a correct answer showing all 4 factors. Mark for (c)(i) = 2 out of 2</p> |
| <p>(d) Write $\frac{2}{5}$ as a decimal.</p> <p>..... 0.4 [1]</p> | <p>4 The candidate gives an incorrect answer, which is neither prime nor between 40 and 50. Mark for (c)(ii) = 0 out of 1</p> |
| <p>(e) Find the value of</p> <p>(i) $\sqrt[3]{2744}$,</p> <p>(ii) 7^0.</p> <p>..... 14 [1]</p> <p>..... 1 [1]</p> | <p>5 The candidate gives a correct answer. Mark for (d) = 1 out of 1</p> |
| <p>(f) Gino invests \$6000 for 5 years at a rate of 1.2% per year compound interest.</p> <p>Calculate the value of his investment at the end of the 5 years. Give your answer correct to the nearest dollar.</p> <p>$A = P\left(1 + \frac{R}{100}\right)^T$</p> <p>$A = 6000\left(1 + \frac{1.2}{100}\right)^5$</p> <p>$A = 6368.74$</p> <p>\$ 6368.74 [3]</p> | <p>6 The candidate gives a correct answer. Mark for (e)(i) = 1 out of 1</p> <p>7 The candidate gives a correct answer. Mark for (e)(ii) = 1 out of 1</p> <p>8 The working shows a correct formula, correct substitution and correct calculation. However, the candidate does not give the final answer to the nearest dollar and so loses the accuracy mark. Mark for (f) = 2 out of 3</p> |
| | <p>Total mark awarded = 8 out of 11</p> |

How the candidate could have improved their answer

(f) The candidate needed to read the question carefully and give the answer correct to the nearest dollar.

| Example Candidate Response – middle | Examiner comments |
|--|--|
| <p>6 (a) Write 60025 in words.</p> <p style="text-align: center;">..... <u>sixty thousand and twenty five</u> [1]</p> | <p>1 The candidate gives a correct answer. Mark for (a) = 1 out of 1</p> <p>2 The candidate rounds correctly. Mark for (b) = 1 out of 1</p> <p>3 The candidate gives a correct answer showing all 4 factors. Mark for (c)(i) = 2 out of 2</p> <p>4 The candidate supplies an incorrect answer as 42 is not prime. Mark for (c)(ii) = 0 out of 1</p> <p>5 The candidate gives a correct decimal. Mark for (d) = 1 out of 1</p> <p>6 The candidate gives the correct value. Mark for (e)(i) = 1 out of 1</p> <p>7 The candidate gives a correct answer. Mark for (e)(ii) = 1 out of 1</p> <p>8 The candidate's partial method is for simple interest and not for compound interest. Mark for (f) = 0 out of 3</p> <p>Total mark awarded = 7 out of 11</p> |
| <p>(b) Write 849.481 correct to 1 decimal place.</p> <p style="text-align: center;">..... <u>849.5</u> [1]</p> | |
| <p>(c) Write down</p> <p>(i) all the factors of 21,</p> <p style="text-align: center;">..... <u>1, 3, 7, 21</u> [2]</p> | |
| <p>(ii) a prime number between 40 and 50.</p> <p style="text-align: center;">..... <u>42</u> [1]</p> | |
| <p>(d) Write $\frac{2}{5}$ as a decimal.</p> <p style="text-align: center;">..... <u>0.4</u> [1]</p> | |
| <p>(e) Find the value of</p> <p>(i) $\sqrt[3]{2744}$,</p> <p style="text-align: center;">..... <u>14</u> [1]</p> | |
| <p>(ii) 7^0.</p> <p style="text-align: center;">..... <u>1</u> [1]</p> | |
| <p>(f) Gino invests \$6000 for 5 years at a rate of 1.2% per year compound interest. Calculate the value of his investment at the end of the 5 years. Give your answer correct to the nearest dollar.</p> <p style="margin-left: 40px;"> $\\$6000 \times 1.2\%$ $= \\$72$ $\\$72 \times 5$ $= \\$360$ </p> <p style="text-align: center;">..... <u>\$ 360</u> [3]</p> | |

How the candidate could have improved their answer

(f) The candidate needed to make a correct mathematical statement using the compound interest rate of 1.2%, \$6000 and 5 years.

Example Candidate Response – low

Examiner comments

- 6 (a) Write 60025 in words. 1
 Six hundred thousand and twenty five. [1]
- (b) Write 849.481 correct to 1 decimal place. 2
 849.490 [1]
- (c) Write down
- (i) all the factors of 21, 3
 3×7 3×7 [2]
 3 and 7
- (ii) a prime number between 40 and 50. 4
 $41, 42, 43, 44, 45, 46, 47, 48, 49$ [1]
 43
- (d) Write $\frac{2}{5}$ as a decimal. 5
 0.4 [1]
- (e) Find the value of
- (i) $\sqrt[3]{2744}$, 6
 14 [1]
- (ii) 7^0 . 7
 1 [1]
- (f) Gino invests \$6000 for 5 years at a rate of 1.2% per year compound interest.
 Calculate the value of his investment at the end of the 5 years.
 Give your answer correct to the nearest dollar.
- $PV = 6000 (1 + 1.2)^5$
 $= 309217.92$ 8
- \$ 309 [3]

- 1 The candidate supplies an incorrect answer that shows some confusion with the place value of the digit 6. Mark for (a) = 0 out of 1
- 2 The candidate gives another incorrect answer. Mark for (b) = 0 out of 1
- 3 The candidate gives an incomplete answer showing only 2 of the 4 factors of 21. Mark for (c)(i) = 0 out of 2
- 4 The candidate supplies a correct response. Mark for (c)(ii) = 1 out of 1
- 5 The candidate supplies a correct response. Mark for (d) = 1 out of 1
- 6 The candidate supplies a correct response. Mark for (e)(i) = 1 out of 1
- 7 The candidate supplies a correct response. Mark for (e)(ii) = 1 out of 1
- 8 The working shows incorrect use of 1.2 rather than 0.12. The answer of 309217.92 was then incorrectly rounded to 309. Mark for (f) = 0 out of 3

Total mark awarded = 4 out of 11

How the candidate could have improved their answer

- The issues in the first 3 parts required the candidate to deal correctly with the numeracy skills of place value, decimal places and factors.
- **(f)** The candidate needed to make a correct mathematical statement using the compound interest rate of 1.2%, \$6000 and 5 years.

Common mistakes candidates made in this question

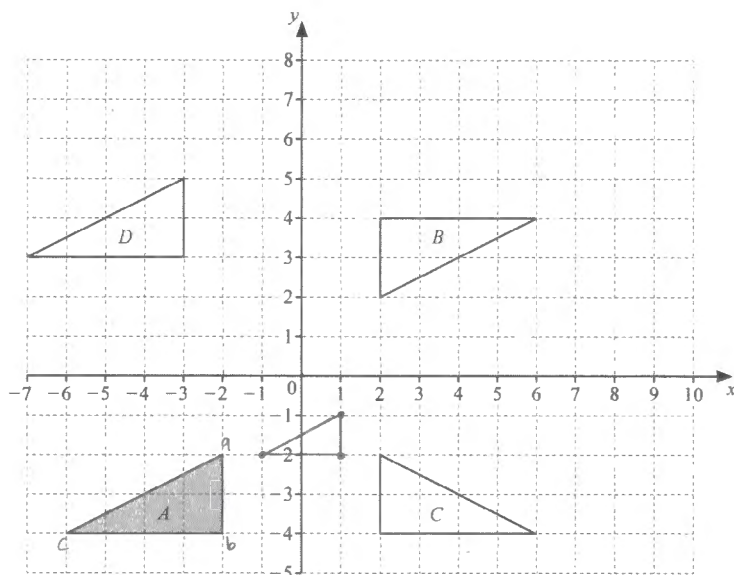
- **(a)** This part was generally answered very well with just a few common errors of six hundred thousand and twenty five and sixty hundred thousand and twenty five.
- **(b)** This part was generally answered very well although common errors of 849.500, 84.95, 849.4, 849 and 849.0 were seen.
- **(c)(i)** It was common to see just the two factors of 3 and 7 stated, sometimes given as a multiplication. Other common errors included 1, 3, 7, 1×21 and 3×7 , $1 \times 3 \times 7 \times 21$.
- **(c)(ii)** Common errors included, 45 and 49, either alone or alongside the correct answers, whilst a very small number had not read the question carefully and gave a number outside of the given range.
- **(d)** This part was very well answered with the rare error of 0.25 or 2.5.
- **(e)(i)** This part was very well answered, although the most common errors were to find the square root or to find the square root and multiply this by 3.
- **(e)(ii)** This part was generally answered very well although the usual common errors of 0 and 7 were seen.
- **(f)** Subtracting the initial investment to give just the interest, using simple interest, and using an incorrect compound interest formula, and not following the instruction 'Give your answer correct to the nearest dollar'.

Question 7

Example Candidate Response – high

Examiner comments

7



(a) Describe fully the **single** transformation that maps

(i) triangle *A* onto triangle *B*,

rotation ^{180°} centre (0,0)

1

[3]

(ii) triangle *A* onto triangle *C*,

reflection mirror line ~~is~~ $y = 0$

2

[2]

(iii) triangle *A* onto triangle *D*.

translation vector $\begin{pmatrix} 7 \\ -1 \end{pmatrix}$

3

[2]

(b) On the grid, enlarge triangle *A* by scale factor 0.5, centre (4, 0).

[2]

$$a'a = \begin{pmatrix} -6 \\ -2 \end{pmatrix} \times 0.5 \quad a'c = \begin{pmatrix} -10 \\ -4 \end{pmatrix} \times 0.5 \quad a' = \begin{pmatrix} -3 \\ -1 \end{pmatrix} \quad c' = \begin{pmatrix} -5 \\ -2 \end{pmatrix}$$

$$o'b = \begin{pmatrix} -6 \\ -4 \end{pmatrix} \times 0.5$$

$$b' = \begin{pmatrix} -3 \\ -2 \end{pmatrix}$$

4

1 The candidate supplies a correct answer.

Mark for (a)(i) = 3 out of 3

2 The transformation is correctly identified by the candidate as a reflection, but the wrong line of reflection is given.

Mark for (a)(ii) = 1 out of 2

3 The transformation is correctly identified by the candidate as a translation, but the wrong translation vector is given.

Mark for (a)(iii) = 1 out of 2

4 The candidate produces a correct enlargement on the grid. A valid but seldom seen method to find the coordinates is shown in the working space.

Mark for (b) = 2 out of 2

Total mark awarded = 7 out of 9

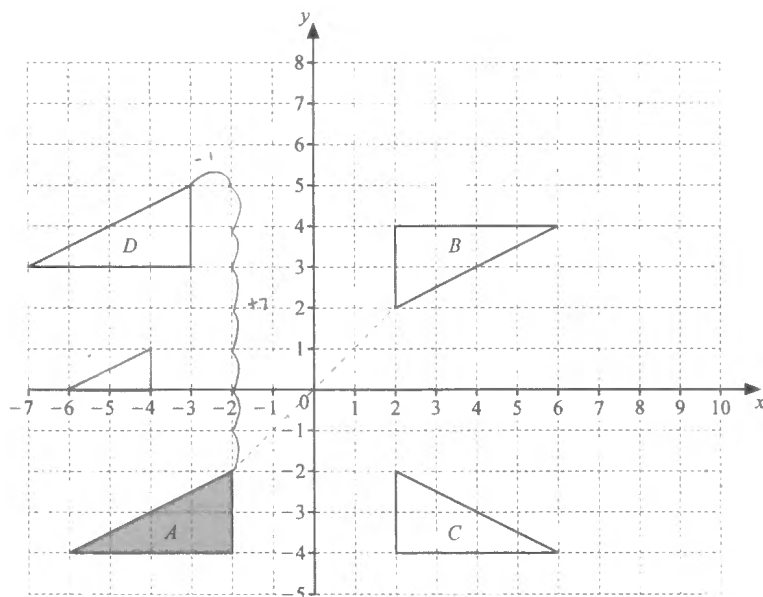
How the candidate could have improved their answer

The candidate could have checked a few points on the line to ensure that the equation of the reflection line was correct.

Example Candidate Response – middle

Examiner comments

7



(a) Describe fully the **single** transformation that maps

(i) triangle *A* onto triangle *B*,

rotation, clockwise, centre (0,0)

1

[3]

(ii) triangle *A* onto triangle *C*,

reflection, centre 2, 4

2

[2]

(iii) triangle *A* onto triangle *D*.

transformation by vector $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$

3

[2]

(b) On the grid, enlarge triangle *A* by scale factor 0.5, centre (4, 0).

4

[2]

1 The transformation is correctly identified by the candidate as a rotation, and the correct centre of rotation is stated, but an incomplete angle of rotation is given. Mark for (a)(i) = 2 out of 3

2 The candidate correctly identifies the transformation as a reflection but attempts to give a centre rather than the line of reflection, $x = 0$. Mark for (a)(ii) = 1 out of 2

3 The transformation is incorrectly identified by the candidate and the translation vector is incorrectly given as coordinates. Mark for (a)(iii) = 0 out of 2

4 The candidate draws an enlargement of the correct scale factor on the grid, but the incorrect centre of $(-6, 4)$ is used. Mark for (b) = 1 out of 2

Total mark awarded = 4 out of 9

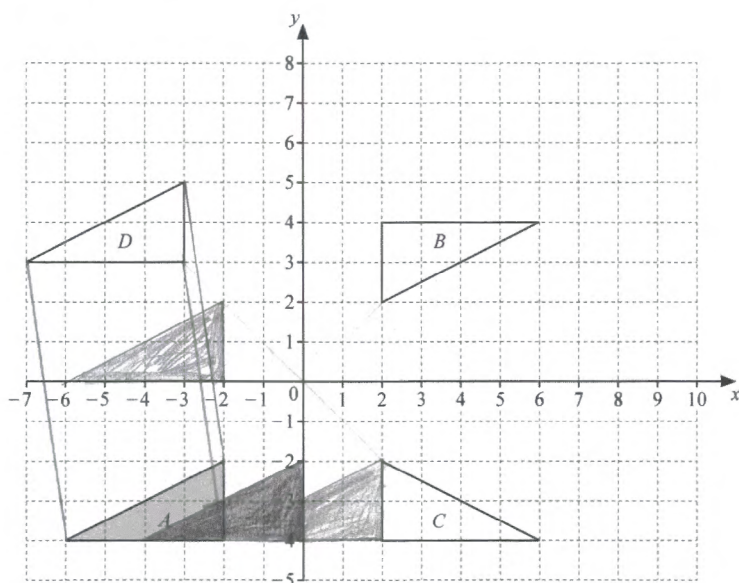
How the candidate could have improved their answer

The candidate needed to state correct descriptions when describing a rotation and a reflection, use correct vector notation when describing a translation and use the given centre for drawing an enlargement.

Example Candidate Response – low

Examiner comments

7



(a) Describe fully the **single** transformation that maps

(i) triangle *A* onto triangle *B*,

~~Rotation~~ centre (0;0) 1

[3]

(ii) triangle *A* onto triangle *C*,

Rotation 180° 2

[2]

(iii) triangle *A* onto triangle *D*.

Transition 3

[2]

(b) On the grid, enlarge triangle *A* by scale factor 0.5, centre (4, 0). 4

[2]

1 The candidate correctly identifies the transformation as a rotation. Although it has been deleted, it is accepted as it has not been replaced. The correct centre of rotation is stated, but no angle of rotation is given.

Mark for (a)(i) = 2 out of 3

2 The candidate supplies an incorrect answer.

Mark for (a)(ii) = 0 out of 2

3 The candidate supplies an incorrect answer.

Mark for (a)(iii) = 0 out of 2

4 No enlargement of the correct size is given by the candidate.

Mark for (b) = 0 out of 2

**Total mark awarded =
2 out of 9**

How the candidate could have improved their answer

The candidate needed to provide full correct statements when describing a rotation, recognise the given transformations as a reflection and as a translation, and use the given centre for drawing an enlargement.

Common mistakes candidates made in this question

- (a) Throughout this part, the majority of candidates were able to identify the given transformation but not all were able to correctly state the required components for the full description.
- (a)(i) Angles of 90 anticlockwise and clockwise, centres of $(-2, -4)$ and $(2, 2)$.
- (a)(ii) Common errors included $y = 0$, x axis, $x = 2$ and giving a vector or coordinates in place of a line of reflection.
- (a)(iii) The identification of the translation vector proved difficult with the common errors being reversed or inverted vectors, incorrect signs, and the use of coordinates.
- (b) A triangle with the correct scale factor but incorrect centre [often $(0, 0)$ or $(-2, -2)$], a triangle with the correct centre but incorrect scale factor (often 2 or 1 or -0.5), with a significant number unable to attempt this part.

Question 8

Example Candidate Response – high

Examiner comments

8 (a)

COMMONWEALTH

Lindon picks a letter at random from this word.

Explain why the probability that he picks a letter M is not $\frac{1}{10}$.

There are 2 M's then the 12 letters in the word not P [1]

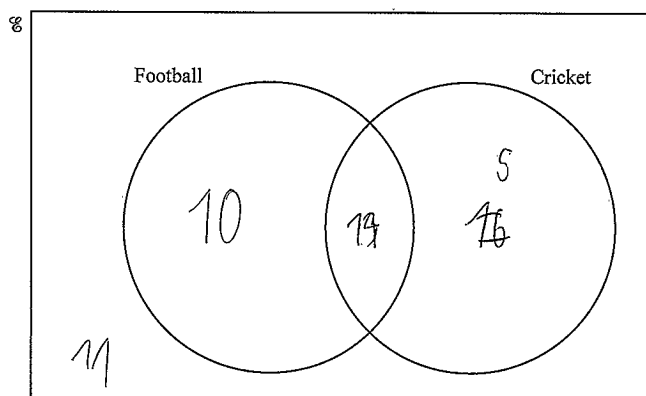
- (b) Tickets for athletics or swimming or hockey or diving are placed in a box. A ticket is picked at random from the box.

| Sport | Athletics | Swimming | Hockey | Diving |
|-------------|-----------|----------|--------|--------|
| Probability | 0.12 | 0.75 | 0.09 | 0.4 |

Complete the table.

- (c) In a group of 40 students,

- 24 students like football
- 19 students like cricket
- 10 students like football but not cricket.



Complete the Venn diagram.

1 The candidate gives a correct explanation.

Mark for (a) = 1 out of 1

2 The candidate's answer is incorrect, and there is no evidence of working or the method used. No marks are awarded. It is possible that this error comes from $12 + 9 + 4 = 25$.

Mark for (b) = 0 out of 2

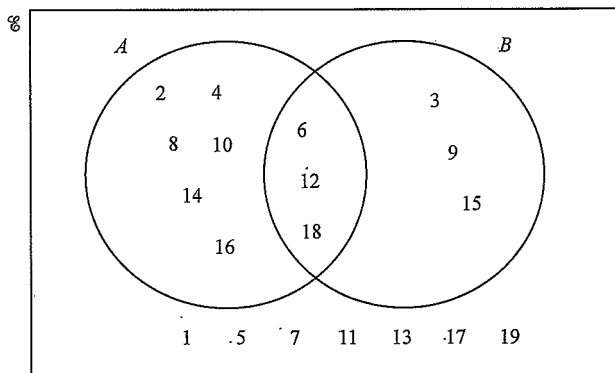
3 The candidate gives a completely correct answer.

Mark for (c) = 3 out of 3

Example Candidate Response – high, continued

Examiner comments

- (d) $\mathcal{U} = \{x : x \text{ is a positive integer less than } 20\}$
 $A = \{x : x \text{ is an even number}\}$
 $B = \{x : x \text{ is a multiple of } 3\}$



- (i) Write down $n(A)$.

4 9 [1]

- (ii) List the elements of set B .

5 $B = \{3, 6, 9, 12, 15, 18\}$ [2]

- (iii) One of these 19 numbers is picked at random.

Work out the probability that this number is

- (a) not in set A and not in set B ,

6 $\frac{7}{19}$ [1]

- (b) in $A \cup B$.

7 $\frac{12}{19}$ [1]

- (iv) Complete the statement.

$A \cap B = \{x : x \text{ is an even number that is also a multiple of } 3\}$ 8 [1]

4 The candidate gives a correct answer.
 Mark for (d)(i) = 1 out of 1

5 The candidate gives a correct answer.
 Mark for (d)(ii) = 2 out of 2

6 The candidate gives a correct answer.
 Mark for (d)(iii)(a) = 1 out of 1

7 The candidate gives a correct answer.
 Mark for (d)(iii)(b) = 1 out of 1

8 The candidate gives a correct statement.
 Mark for (d)(iv) = 1 out of 1

Total mark awarded = 10 out of 12

How the candidate could have improved their answer

(b) The answer could have been improved by showing the working of $1 - (0.12 + 0.09 + 0.4)$ or its equivalent completed in stages.

Example Candidate Response – middle

Examiner comments

8 (a)

COMMONWEALTH

Lindon picks a letter at random from this word.

Explain why the probability that he picks a letter M is not $\frac{1}{10}$.

First because there are 12 letters and 2 letter m. So is $\frac{2}{12}$ [1]

(b) Tickets for athletics or swimming or hockey or diving are placed in a box. A ticket is picked at random from the box.

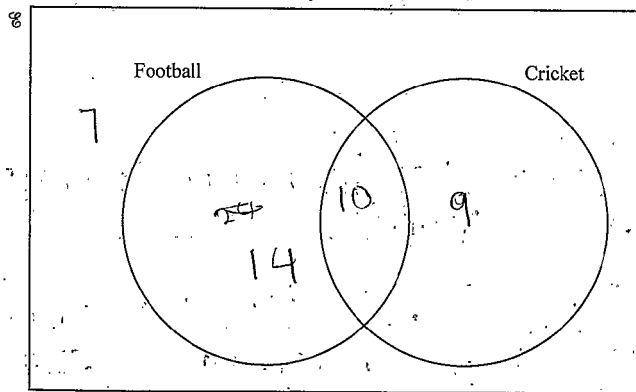
| Sport | Athletics | Swimming | Hockey | Diving |
|-------------|-----------|----------|--------|--------|
| Probability | 0.12 | 0.39 | 0.09 | 0.4 |

Complete the table.

12 2 9 40

(c) In a group of 40 students,

- 24 students like football
- 19 students like cricket
- 10 students like football but not cricket.



Complete the Venn diagram.

3

1 The candidate gives a correct explanation. The value of $\frac{2}{12}$ is correct but on its own would not be sufficient for a question requiring a candidate to 'explain why'. Mark for (a) = 1 out of 1

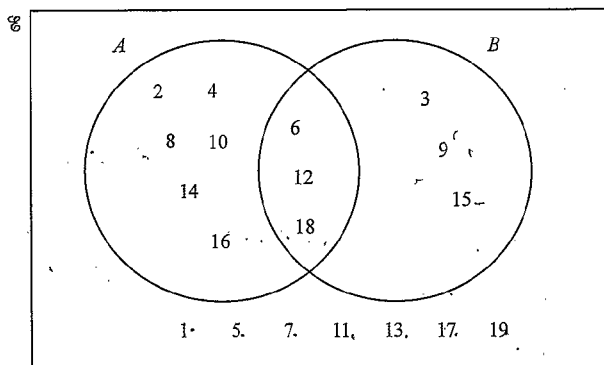
2 The candidate gives a correct answer. Mark for (b) = 2 out of 2

3 The candidate places the value 10 in the wrong part of the Venn diagram. The rest of the values are then correctly placed on a follow through basis i.e. $14 + 10 = 24$, $10 + 9 = 19$ and $40 - (14 + 10 + 9) = 7$. Mark for (c) = 2 out of 3

Example Candidate Response – middle, continued

Examiner comments

- (d) $\mathcal{U} = \{x : x \text{ is a positive integer less than } 20\}$
 $A = \{x : x \text{ is an even number}\}$
 $B = \{x : x \text{ is a multiple of } 3\}$



- (i) Write down $n(A)$.

4 {2, 4, 8, 10, 14, 16, 12, 18} [1]

- (ii) List the elements of set B .

5 $B = \{3, 6, 9, 12, 15, 18\}$ [2]

- (iii) One of these 19 numbers is picked at random.

Work out the probability that this number is

- (a) not in set A and not in set B ,

6 $\frac{7}{19}$ [1]

- (b) in $A \cup B$.

7 $\frac{3}{19}$ [1]

- (iv) Complete the statement.

$A \cap B = \{x : x \text{ is } 2, 3, 4, 6, 8, 9, 10, 12, 14, 15, 16, 18\}$ 8 [1]

4 The candidate makes the common error of listing the elements rather than the number of elements.
 Mark for (d)(i) = 0 out of 1

5 The candidate gives a correct answer.
 Mark for (d)(ii) = 2 out of 2

6 The candidate gives a correct answer.
 Mark for (d)(iii)(a) = 1 out of 1

7 The candidate gives an incorrect answer which suggests the intersection rather than the union was probably used.
 Mark for (d)(iii)(b) = 0 out of 1

8 The candidate gives an incorrect answer which suggests that the union rather than the intersection was probably used.
 Mark for (d)(iv) = 0 out of 1

Total mark awarded = 8 out of 12

How the candidate could have improved their answer

- (c) The candidate needed to translate the given information into a correct Venn diagram.
- (d) The candidate needed a better knowledge of set notation.

Example Candidate Response – low

Examiner comments

8 (a)

COMMONWEALTH

Lindon picks a letter at random from this word.

Explain why the probability that he picks a letter M is not $\frac{1}{10}$.

~~COMMON~~ $\frac{1}{10}$ $\frac{1}{10} = \frac{1}{10} = M$.

1

[1]

- (b) Tickets for athletics or swimming or hockey or diving are placed in a box. A ticket is picked at random from the box.

| Sport | Athletics | Swimming | Hockey | Diving |
|-------------|-----------|----------|--------|--------|
| Probability | 0.12 | 0.39 | 0.09 | 0.4 |

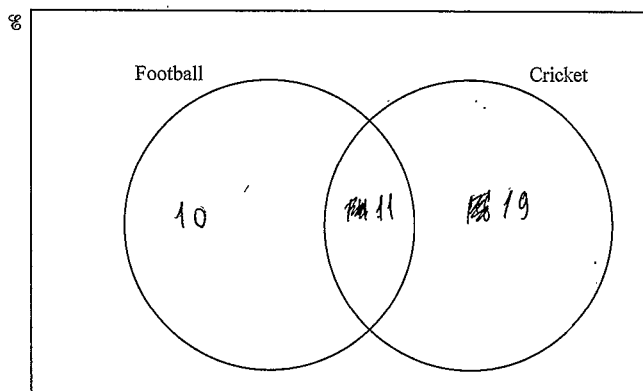
Complete the table.

2

[2]

- (c) In a group of 40 students,

- 24 students like football
- 19 students like cricket
- 10 students like football but not cricket.



Complete the Venn diagram.

3

[3]

1 The candidate's calculation of the probability is insufficient. This is an 'explain why' question and requires reasoning.

Mark for (a) = 0 out of 1

2 The candidate supplies the correct answer. The answer would be improved by showing the working of $1 - (0.12 + 0.09 + 0.4)$ or the equivalent done in stages, although this is not essential.

Mark for (b) = 2 out of 2

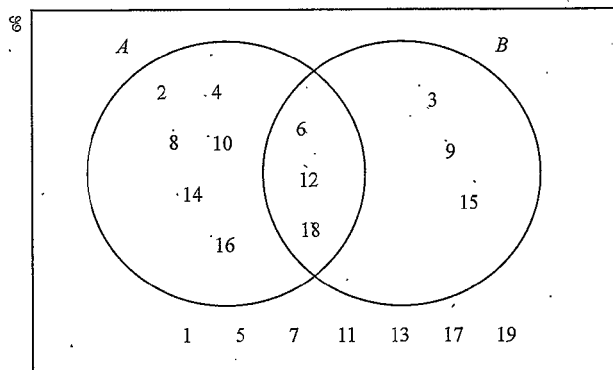
3 In the initial stage, the candidate places the value of 10 in the correct part of the Venn diagram. The rest of the values are then incorrectly placed.

Mark for (c) = 1 out of 3

Example Candidate Response – low, continued

Examiner comments

- (d) $\mathcal{U} = \{x : x \text{ is a positive integer less than } 20\}$
 $A = \{x : x \text{ is an even number}\}$
 $B = \{x : x \text{ is a multiple of } 3\}$



- (i) Write down $n(A)$.

4 $2, 4, 8, 10, 14, 16, 18$ [1]

- (ii) List the elements of set B .

5 $B = \{3, 6, 9, 12, 15, 18\}$ [2]

- (iii) One of these 19 numbers is picked at random.

Work out the probability that this number is

- (a) not in set A and not in set B ,

6 $\frac{7}{19}$ [1]

- (b) in $A \cup B$.

7 $\frac{12}{19}$ [1]

- (iv) Complete the statement.

$A \cap B = \{x : x \text{ is } 6, 12, 18\}$ 8 [1]

4 The candidate gives an incorrect answer. Mark for (d)(i) = 0 out of 1

5 The candidate gives a correct answer. Mark for (d)(ii) = 2 out of 2

6 The candidate gives a correct answer. Mark for (d)(iii)(a) = 1 out of 1

7 The candidate gives a correct answer. Mark for (d)(iii)(b) = 1 out of 1

8 Although the correct elements are identified, the candidate's statement has not been completed correctly with a relevant description of the elements. Mark for (d)(iv) = 0 out of 1

Example Candidate Response – low, continued

Examiner comments

95 175. 182 194 200 $2 \overline{) 250}$ 256 280 1130.

parallelogram.
parallelogram.
parallely

$$4 - 8 - 3$$

$$-4 - 4$$

a cylinder

$$D = 16 - 4 \cdot 1 \cdot (-3)$$

$$\frac{4 \pm 5}{8 - 6}$$

$$4 + 8 - 3$$

$$D = 8^2 - 4ac$$

$$D = 16 - 4 \cdot 1 \cdot (-3)$$

$$8^2 = 85$$

$$= 26$$

$$L + 3 +$$

$$L = w + 3$$

$$2(w + 3 + w) = 26 \text{ cm.}$$

$$2 \cdot w + 6 + 2w = 26 \text{ cm.}$$

$$4w = 20$$

$$w = 5.$$

$$5 + 5 = 6 + 8.$$

Total mark awarded =
7 out of 12

How the candidate could have improved their answer

- **(a)** The candidate needed to appreciate what is required in an ‘explain why’ question. In this question, the error made in the given statement needed to be identified and not just the correct answer given.
- **(c)** The candidate should have translated the given information into a correct Venn diagram.
- **(d)** The candidate needed a better knowledge of set notation.

Common mistakes candidates made in this question

- **(a)** Sometimes, a correct statement was spoilt by stating the incorrect probability of $\frac{2}{10}$ or $\frac{1}{12}$. A number of answers only involved stating the correct probability and not giving an explanation referring to numbers of Ms or numbers of letters.
- **(b)** Common errors included 0.61, 0.15 and 0.25.
- **(c)** The most common error was starting with the figure of 24 (like football) but incorrectly positioning it, usually in the (like football but not cricket) section, often followed by the figure of 19 (like cricket) positioned incorrectly in the (like cricket but not football) section. A small yet significant number placed all the numbers from 1 to 40 onto the diagram.
- **(d)(i)** The most common errors involved listing the numbers either in A or $A \cap B'$ or $A \cap B$. Other errors included: all the values added to give answers of 54 or 90, incorrect notation such as $9(A)$ and the answer of 2.
- **(d)(ii)** A list of 3, 9 and 15, seen less often a list of 6, 12 and 18, the omission of one element and the answer of 6.
- **(d)(iii)(a)** An answer of 7 or a list of the elements rather than a probability, incorrect denominators of 18, 20 and 12, and/or incorrect numerators of 3, 13 and 16.
- **(d)(iii)(b)** An answer of 12 or a list of the elements rather than a probability, incorrect denominators of 18, 20 and 12, and/or incorrect numerators of 3, 13 and 16, with $\frac{3}{19}$ often seen possibly due to confusion with the union and intersection notation.
- **(d)(iv)** A very common error was the list 6, 12 and 18. Other common errors included other lists such as 2, 4, 6, 8, 10, 12, 14, 16, 18 or 3, 9, 15 or 1, 5, 7, 11, 13, 17, 19, and incorrect statements such as ‘odd numbers’, ‘prime numbers’, ‘integers less than 20’, ‘even number’ or ‘multiples of 3’.

Question 9

Example Candidate Response – high

Examiner comments

9 (a) Simplify.

$$4x + 3y + 2x - 8y$$

$$4x + 2x + 3y - 8y$$

$$= 6x - 5y$$

1 $6x - 5y$ [2]

(b) A pen costs 60 cents and a ruler costs 29 cents.

Write down an expression for the total cost, in cents, of x pens and y rulers.

$$\begin{array}{r} 0.60 \\ + 0.29 \\ \hline 0.89 \end{array}$$

2 89 cents [2]

(c) Solve.

$$\frac{5(2x+4)}{5} = \frac{85}{5}$$

$$\frac{2x+4}{-4} = \frac{17}{-4} \quad x = 6.5$$

$$\frac{2x}{2} = \frac{13}{2}$$

3 $x = 6.5$ [3]

(d) (i) $2^8 \times 2^m = 2^6$

Work out the value of m .

4 $m = 2$ [1]

(ii) $5^n \div 5^4 = 5^6$

Work out the value of n .

5 $n = 2$ [1]

(e) A plant costs p dollars and a bush costs b dollars.
Ana buys 2 plants and 4 bushes for \$42.
Paola buys 7 plants and 9 bushes for \$107.

Write down a pair of simultaneous equations and solve them to find the value of p and the value of b .

You must show all your working.

$$(i) 2p + 4b = 42 \times 9$$

$$(ii) 7p + 9b = 107 \times 4$$

$$\begin{array}{r} 18p + 36b = 378 \\ - 28p + 36b = 428 \\ \hline -10p = -50 \\ \hline p = 5 \end{array}$$

$$p = 5$$

$$(i) 2(5) + 4b = 42$$

$$10 + 4b = 42$$

$$4b = 32$$

$$b = 8$$

6 $p = 5$
 $b = 8$ [6]

1 The candidate gives a correct answer.

Mark for (a) = 2 out of 2

2 The algebra content of this question is not recognised by the candidate who supplies an incorrect answer.

Mark for (b) = 0 out of 2

3 The candidate gives a correct answer supported by full and correct working.

Mark for (c) = 3 out of 3

4 The candidate gives an incorrect answer with no working shown.

Mark for (d)(i) = 0 out of 1

5 The candidate gives an incorrect answer with no working shown.

Mark for (d)(ii) = 0 out of 1

6 The candidate provides a model answer including correct use of the elimination method.

Mark for (e) = 6 out of 6

Total mark awarded = 11 out of 15

How the candidate could have improved their answer

- **(b)** The candidate should have translated the given information into a correct algebraic expression.
- **(d)** The candidate needed a better understanding of how to use and interpret positive and negative indices. It may have helped starting in **(i)**, with $8 + m = 6$ and in **(ii)**, $n - 4 = 6$.

Example Candidate Response – middle

Examiner comments

9 (a) Simplify. $4x + 3y + 2x - 8y$

$$4x + 2x + 3y - 8y = 6x - 5y$$

..... [2]

1 The candidate gives a correct answer.
Mark for (a) = 2 out of 2

(b) A pen costs 60 cents and a ruler costs 29 cents.
Write down an expression for the total cost, in cents, of x pens and y rulers.

..... cents [2]

2 The candidate does not appreciate the algebra requirement of this question.
Mark for (b) = 0 out of 2

(c) Solve. $5(2x + 4) = 85$

..... [3]

3 The candidate supplies the correct answer with no wrong working.
Mark for (c) = 3 out of 3

(d) (i) $2^8 \times 2^m = 2^6$
Work out the value of m .

..... [1]

4 The candidate gives the correct answer.
Mark for (d)(i) = 1 out of 1

(ii) $5^n \div 5^4 = 5^6$
Work out the value of n .

..... [1]

5 The candidate gives an incorrect answer.
Mark for (d)(ii) = 0 out of 1

(e) A plant costs p dollars and a bush costs b dollars.
Ana buys 2 plants and 4 bushes for \$42.
Paola buys 7 plants and 9 bushes for \$107.
Write down a pair of simultaneous equations and solve them to find the value of p and the value of b .
You must show all your working.

$$\begin{aligned} \textcircled{1} \quad 2p + 4b &= 42 \\ \textcircled{2} \quad 7p + 9b &= 107 \\ -4p - 8b &= -84 \\ \hline 7p + 9b &= 107 \\ -4p - 8b &= -84 \\ \hline 3p &= 23 \\ p &= 7.7 \end{aligned}$$

$$\begin{aligned} 2 \times 7.7 + 4b &= 42 \\ 15.4 + 4b &= 42 \\ -15.4 & \quad -15.4 \\ \hline 4b &= 42 - 15.4 \\ 4b &= 26.6 \\ \hline b &= 6.65 \end{aligned}$$

..... [6]

6 The candidate gives two correct simultaneous equations. The elimination method is clearly attempted but the method used does not equate one set of coefficients. The 2 values stated do satisfy the equation $2p + 4b = 42$.
Mark for (e) = 3 out of 6

Total mark awarded = 9 out of 15

How the candidate could have improved their answer

- **(b)** The candidate should have translated the given information into a correct algebraic expression.
- **(d)(ii)** This could have been improved by writing down the initial stage of the working, i.e. $n - 4 = 6$.
- **(e)** The candidate needed a more developed understanding of the methodology for solving simultaneous equations.

Example Candidate Response – low

Examiner comments

9 (a) Simplify.

$$4x + 3y + 2x - 8y$$

$$4x + 2x + 3y - 8y$$

$$6x + -5y$$

1 $6x + -5y$ [2]

(b) A pen costs 60 cents and a ruler costs 29 cents.

Write down an expression for the total cost, in cents, of x pens and y rulers.

$$60 + 29 = 89$$

$$\frac{60}{60} \times 59$$

$$\frac{29}{60} \times 59$$

2 43 cents [2]

(c) Solve.

$$5(2x + 4) = 85$$

$$10x + 20 = 85 - 20$$

$$10x = 65$$

$$x = 65 \div 10$$

$$x = 6.5$$

3 $x = \dots 6.5$ [3]

(d) (i)

$$2^8 \times 2^m = 2^6$$

Work out the value of m .

$$2^8 \times 2^m = 2^6$$

4 $m = \dots -2$ [1]

(ii)

$$5^n \div 5^4 = 5^6$$

Work out the value of n .

5 $n = \dots -2$ [1]

(e) A plant costs p dollars and a bush costs b dollars.
Ana buys 2 plants and 4 bushes for \$42.
Paola buys 7 plants and 9 bushes for \$107.

Write down a pair of simultaneous equations and solve them to find the value of p and the value of b .
You must show all your working.

Ana

$$2 \text{ plants} = 42$$

$$4 \text{ bushes}$$

$$44 + 63 = 107$$

$$2p + 4b = 42 \times 9$$

$$7p + 9b = 107 \times 4$$

Exp

$$4p - 12b = 144$$

$$18p + 36b = 378$$

$$28p + 84b = 428$$

$$18 \quad 28 \quad 18$$

$$\underline{18} \quad \underline{28} \quad \underline{18}$$

$$= 10$$

$$428 \div 378$$

$$\frac{10}{28} = \frac{5}{14}$$

$$\frac{50}{428} = \frac{16 + 50}{428} = \frac{60}{428} = \frac{15}{107}$$

Paola

$$7 \text{ plants} = 107$$

$$9 \text{ bushes}$$

$$7(5) + 9b = 107 = 7$$

$$35 + 9b = 107$$

$$107 - 35 = 72$$

$$90 \div 9 = 10$$

6 $p = \dots 5$

$$b = \dots 7$$

..... [6]

1 The answer given by the candidate is not completely processed.

Mark for (a) = 1 out of 2

2 The candidate gives an incorrect answer.

Mark for (b) = 0 out of 2

3 The candidate expands the bracket correctly and also isolates the 'x' term correctly to reach $10x = 65$. The final step is incorrect.

Mark for (c) = 2 out of 3

4 The candidate gives the correct answer.

Mark for (d)(i) = 1 out of 1

5 The candidate gives an incorrect answer.

Mark for (d)(ii) = 0 out of 1

6 The candidate does not write down the initial pair of simultaneous equations clearly and the working supplied is not very clear but there is sufficient evidence to show that a correct method to eliminate one variable has been used, and that the correct answer of $p = 5$ has been reached.

Mark for (e) = 3 out of 6

Total mark awarded = 7 out of 15

How the candidate could have improved their answer

- **(b)** The candidate should have translated the given information into a correct algebraic expression.
- **(d)(ii)** This could have been improved by writing down the initial stage of the working, i.e. $n - 4 = 6$.
- **(e)** The candidate needed to demonstrate a more developed understanding of the methodology for solving simultaneous equations, stating the two initial equations as required in the question, to show the method and the working clearly.

Common mistakes candidates made in this question

- **(a)** Final answers with $2x$ and/or $5y$, $-3y$, $11y$ or $-11y$, $30xy$ or $1xy$.
- **(b)** Common errors included $60x + 29y = 89$, $89xy$ and simply 89.
- **(c)** Incorrect first steps of $10x + 4 = 85$, $2x + 4 = 80$, $5 \times 6x = 85$ and incorrect second steps of $10x = 105$, $30x = 85$, $2x = 21$, $6x = 17$.
- **(d)(i)** The most common incorrect answer was 2 rather than -2 and workings were sometimes shown as $8 - 6$ beside the question. The other common mistake was to add the powers, giving an answer of 14.
- **(d)(ii)** The most common incorrect answers were 2, from $6 - 4$ and 24, from 6×4 .
- **(e)** The most common and most successful method was to equate one of the coefficients and then subtract one equation from the other, and the majority of candidates showed full and clear working for this. It was less common to see a rearrangement and substitution method which is where more algebraic mistakes occur. Common errors included the addition of two suitable equations, incorrect solution of the resulting linear equation, incorrect substitution, and use of an incorrect method in the first step.

Question 10

Example Candidate Response – high

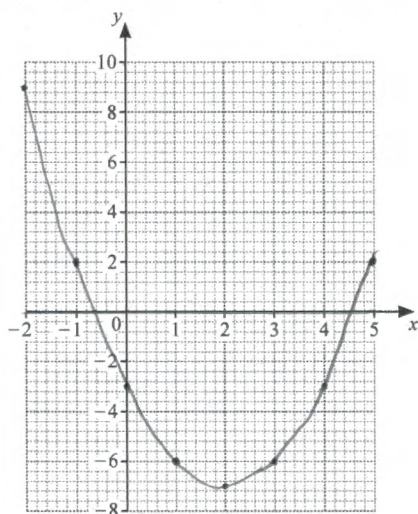
Examiner comments

10 (a) Complete the table of values for $y = x^2 - 4x - 3$.

| | | | | | | | | |
|---|----|----|----|----|----|----|----|---|
| x | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
| y | 9 | 2 | -3 | -6 | -7 | -6 | -3 | 2 |

1 [2]

(b) On the grid, draw the graph of $y = x^2 - 4x - 3$ for $-2 \leq x \leq 5$.



2

1 The candidate completes the table with correct values. Mark for (a) = 2 out of 2

2 The candidate produces an acceptable graph. Mark for (b) = 4 out of 4

(c) Use your graph to solve the equation $x^2 - 4x - 3 = 0$.

x = 0.6 or x = 4.6 [2]

[4]

3 The candidate uses the graph correctly to solve the given equation. Only one value is correct. The incorrect value of 0.6, from incorrectly interpreting the negative axis, is a common error. Mark for (c) = 1 out of 2

Total mark awarded = 7 out of 8

How the candidate could have improved their answer

The only improvement was for the candidate to correctly identify the point on the negative x -axis.

Example Candidate Response – middle

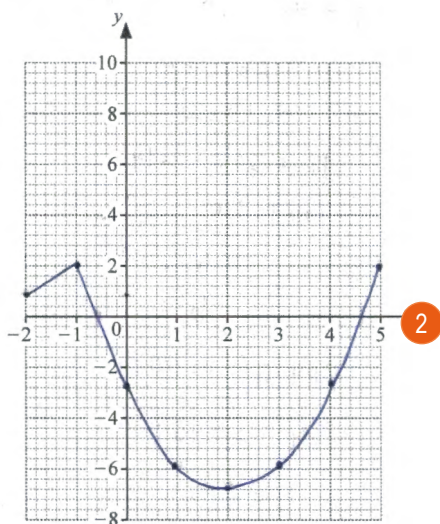
Examiner comments

10 (a) Complete the table of values for $y = x^2 - 4x - 3$.

| | | | | | | | | |
|---|----|----|----|----|----|----|----|---|
| x | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
| y | 1 | 2 | -3 | -6 | -7 | -6 | -3 | 2 |

[2]

(b) On the grid, draw the graph of $y = x^2 - 4x - 3$ for $-2 \leq x \leq 5$.



[4]

(c) Use your graph to solve the equation $x^2 - 4x - 3 = 0$.

$$x = \dots 0.5 \dots \text{ or } x = \dots 4.6 \dots$$

[2]

1 The candidate supplies one correct value.

Mark for (a) = 1 out of 2

2 The candidate does not give a fully correct quadratic curve, but all 8 points from their table have been plotted correctly on a follow through basis.

Mark for (b) = 3 out of 4

3 The candidate uses the graph correctly to solve the given equation. Only one value is correct. The incorrect value of 0.5, from incorrectly interpreting the negative axis, is a common error.

Mark for (c) = 1 out of 2

Total mark awarded = 5 out of 8

How the candidate could have improved their answer

- (a) Care was needed when dealing with negative values, the answer could have been improved by showing the working, e.g. $y = (-2) (-2) - 4 (-2) - 3 = 4 + 8 - 3 = 9$.
- (b) The answer may have been improved by knowledge of the basic shape of a quadratic graph.
- (c) The main improvement would have been to correctly identify the point on the negative x -axis.

Example Candidate Response – low

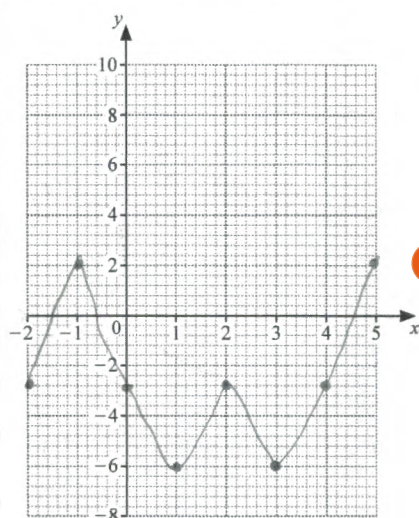
Examiner comments

10 (a) Complete the table of values for $y = x^2 - 4x - 3$.

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

1 [2]

(b) On the grid, draw the graph of $y = x^2 - 4x - 3$ for $-2 \leq x \leq 5$.



2

[4]

(c) Use your graph to solve the equation $x^2 - 4x - 3 = 0$.

3 $x = \dots 2 \dots$ or $x = 4 \dots$ [2]

1 The candidate supplies one correct value.
Mark for (a) = 1 out of 2

2 The candidate does not give a fully correct quadratic curve, but all 8 points from their table have been plotted correctly on a follow through basis.
Mark for (b) = 3 out of 4

3 The candidate uses the graph correctly to solve the given equation. Only one value is correct. The incorrect value of 0.5, from incorrectly interpreting the negative axis, is a common error.
Mark for (c) = 1 out of 2

Total mark awarded = 5 out of 8

How the candidate could have improved their answer

- (a) Issues involved dealing correctly with the substitution of the given values of x into the given equation. The answer could have been improved by showing the working, e.g. $y = (-2)^2 - 4(-2) - 3 = 4 + 8 - 3 = 9$ and $y = (-2)^2 - 4(2) - 3 = 4 - 8 - 3 = -7$.
- (b) The answer may have been improved by knowledge of the basic shape of a quadratic graph.
- (c) The candidate should improve knowledge on how to use graphs to solve equations.

Common mistakes candidates made in this question

- (a) The common error was the point at $x = -2$, dealing with the negative sign incorrectly within the x^2 term and giving $y = 1$ or $y = 7$.
- (b) Common errors included one or more points being plotted out of tolerance, or for just plotting the points without drawing the curve through them, or for joining the points with ruled lines.
- (c) Common errors included: misreading of the scale, omission of the negative sign, and incorrect values of ± 4 and ± 3 .

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