



**Coimisiún na Scrúduithe Stáit**  
*State Examinations Commission*

# **JUNIOR CERTIFICATE EXAMINATION**

**2009**

**MARKING SCHEME**

**MATHEMATICS  
FOUNDATION LEVEL**

## GENERAL GUIDELINES FOR EXAMINERS

1. Penalties of three types are applied to candidates' work as follows:

- Blunders - mathematical errors/omissions (-3)
- Slips- numerical errors (-1)
- Misreadings (provided task is not oversimplified) (-1).

Frequently occurring errors to which these penalties must be applied are listed in the scheme. They are labelled: B1, B2, B3,..., S1, S2,..., M1, M2,...etc. These lists are not exhaustive.

2. When awarding attempt marks, e.g. Att(3), note that
- any *correct, relevant* step in a part of a question merits at least the attempt mark for that part
  - if deductions result in a mark which is lower than the attempt mark, then the attempt mark must be awarded
  - a mark between zero and the attempt mark is never awarded.
3. Worthless work is awarded zero marks. Some examples of such work are listed in the scheme and they are labelled as W1, W2,...etc.
4. The phrase “hit or miss” means that partial marks are not awarded – the candidate receives all of the relevant marks or none.
5. The phrase “and stops” means that no more work is shown by the candidate.
6. Special notes relating to the marking of a particular part of a question are indicated by an asterisk. These notes immediately follow the box containing the relevant solution.
7. The sample solutions for each question are not intended to be exhaustive lists – there may be other correct solutions.
8. Unless otherwise indicated in the scheme, accept the best of two or more attempts – even when attempts have been cancelled.
9. The *same* error in the *same* section of a question is penalised *once* only.
10. Particular cases, verifications and answers derived from diagrams (unless requested) qualify for attempt marks at most.
11. A serious blunder, omission or misreading results in the attempt mark at most.
12. Do not penalise the use of a comma for a decimal point, e.g. €5.50 may be written as €5,50.

## QUESTION 1

<b>Part (a)</b>	<b>10(5, 5) marks</b>	<b>Att(2,2)</b>
<b>Part (b)</b>	<b>20(5, 5, 5, 5) marks</b>	<b>Att (2,2,2,2)</b>
<b>Part (c)</b>	<b>20(5, 5, 10) marks</b>	<b>Att (2,2,3)</b>

**Part (a)** **10(5, 5) marks** **Att 2,2**

<b>(i)</b>	$59 + 23 =$
<b>(ii)</b>	$48 \times 51 =$

**(a) (i)** **5 marks** **Att 2**

<b>(i)</b>	82
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- \* Accept correct answer without work.
- \* Mark both parts (i) and (ii) independently.

*Blunders (-3)*

B1 Uses incorrect operator (with work).

*Slips (-1)*

S1 Arithmetic error in calculation (once only) – work shown

S2 Decimal Error

*Misreadings (-1)*

M1 Error in copying down a digit (once only)

*Attempts (2 marks)*

A1 Any attempt at addition [Evidence of operation – only one correct digit written down]

A2 Special cases: 36 (-), 1357 (x), 2·565 (÷), -36 (23-59), ·3898 (23 ÷59), 28, or similar (without work).

*Worthless (0)*

W1 Incorrect answer without work

**(a) (ii)** **5 marks** **Att 2**

<b>(ii)</b>	2448
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- \* Accept correct answer without work.
- \* Mark both parts (i) and (ii) independently.

*Blunders (-3)*

B1 Uses incorrect operator (with work).

*Slips (-1)*

S1 Arithmetic error in calculation (once only) – work shown

S2 Decimal error

*Misreadings (-1)*

M1 Error in copying down a digit (once only)

*Attempts (2 marks)*

A1 Any attempt at multiplication [Evidence of operation – only one correct digit written down]

A2 Special cases: 99 (+), -3 (-), ·941 (÷), 3 (51-48), 1·06 (51 ÷ 48) or similar (without work)

*Worthless (0)*

W1 Incorrect answer without work, but note A2.

**Part (b)**

**20(5, 5, 5, 5) marks**

**Att (2,2,2,2)**

(i)  $729 \div 9 =$

(ii)  $9 + 2(6 - 3) =$

(iii)  $(6 \cdot 5)^2 =$

(iv)  $\sqrt{46 \cdot 24} =$

**(b) (i)**

**5 marks**

**Att 2**

(i)	81
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\* Accept correct answer without work.

*Blunders (-3)*

B1 Uses incorrect operator (with work)

*Slips (-1)*

S1 Arithmetic error in calculation (once only) – work shown

S2 Decimal error

*Misreadings (-1)*

M1 Error in copying down a digit (once only)

*Attempts (2 marks)*

A1 Any attempt at division [Evidence of operation – at least one correct digit]

A2 Special cases: **738** (+), **720** (-), **6561**(x), **·0123** (9÷729), **-720** (9-729) with/without work.

*Worthless (0)*

W1 Incorrect answer without work, but note A2

**(b) (ii)**

**5 marks**

**Att 2**

(ii)	$9 + 2 (3)$	2m
	$= 9 + 6$	4m
	$= 15$	5m

\* Accept correct answer without work

*Blunders (-3)*

B1 Uses incorrect operator (with work)

B2 Incorrect order

B3 Ignores brackets

*Slips (-1)*

S1 Arithmetic error in calculation (once only) – work shown

S2 Fails to finish – stops at  $9 + 6$

*Misreadings(-1)*

M1 Error in copying down a digit (once only)

*Attempt (2 marks)*

A1 Any relevant work of merit

A2 Special cases: **33**  $(9+2)(6-3)$ , **18**  $(9+2.6-3)$ , **8**  $(9+2)-(6-3)$ , **14**  $(9+2)+(6-3)$  **54**  $(9 \times 2.3)$   
(with/without work).

A3  $9 + 26 - 3 = 32$

*Worthless (0)*

W1 Incorrect answer without work, but note A2

W2  $9 + 26 - 3$  and stops or 32 only (no work shown)

**(b) (iii)**

**5 marks**

**Att 2**

(iii)	$42.25$ or $\frac{169}{4}$ or $42\frac{1}{4}$
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\* Accept correct answer without work

\* Performs the following incorrect operations (with/without work):

*Blunders(-3)*

B1  $6.5 \times 2 = 13$

B2  $6.5 \div 2 = 3.25$

B3  $2^{6.5} = 90.51$

B4  $2 \div 6.5 = .3077$

B5  $\sqrt{6.5} = 2.5495$

B6  $6.5 - 2 = 4.5$  or  $6.5 + 2 = 8.5$

*Slips (-1)*

S1 Arithmetic error in calculation (once only)

S2 Decimal error

*Misreadings(-1)*

M1 Error in copying down digit (just once)

*Attempts (2 marks)*

A1  $6.5 \times 2$ , or any of the above operations (and stops)

A2  $6.5 \times 6.5$  or  $(6.5)(6.5)$  or  $6.5 \cdot 6.5$  and stops

A3  $2 - 6.5$

A4  $6^2 = 36$  or  $7^2 = 49$  (Rounds and finishes correctly)

*Worthless (0)*

W1 Incorrect answer without work (except 13, 3.25, 90.51, .3077, 2.5495, 4.5, 8.5, -4.5, 36, 49)

**(b) (iv)**

**5 marks**

**Att 2**

(iv)	6.8 or $\frac{34}{5}$ or $6\frac{4}{5}$
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\* Accept correct answer without work

\* Performs the following incorrect operations (with/without work):

*Blunders (-3)*

B1  $46.24^{\frac{1}{2}} = 23.12$

B2  $46.24 \times 2 = 92.48$

B3  $46.24^2 = 2138.1376$  (Fraction equivalents also acceptable)

B4 Answer given as 6 or 7

*Slips (-1)*

S1 Arithmetic error in calculation

S2 Decimal error

*Misreadings (-1)*

M1 Error in copying down digit

*Attempts (2 marks)*

A1  $46.24 \div$  and stops

A2  $46.24 \times 2$  or  $46.24 \div 2$  and stops

A3 Incorrect use of mathematical tables

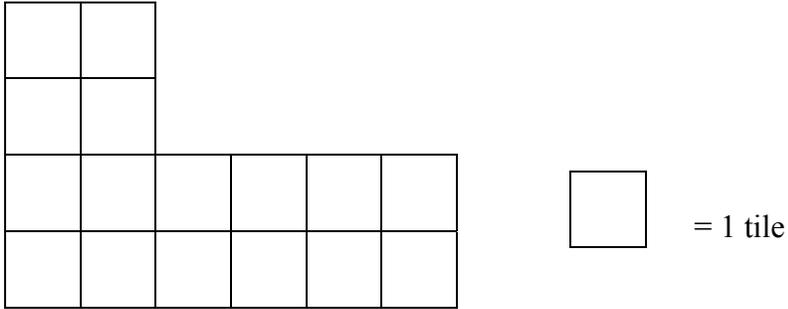
*Worthless (0)*

W1 Incorrect answer without work, but note blunders

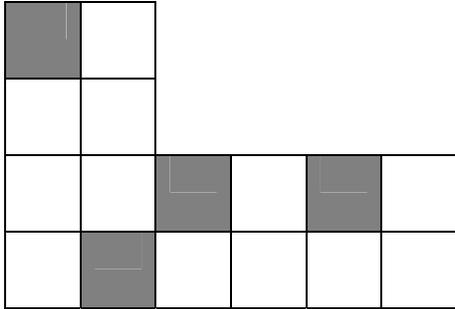
Part (c)

20 (5, 5, 10) marks

Att (2, 2, 3)



(i) Count the number of tiles in the diagram above.



(ii) How many of these tiles are now shaded?  
(iii) Express the number of shaded tiles as a percentage of the total number of tiles.

(c) (i)

5 marks

Att 2

Number of tiles = 16

\* Accept correct answer without work

*Blunders (-3)*

B1 Completes shape (shown or not) to get 24 tiles

*Slips (-1)*

S1 Writes  $8+8$  or similar and stops

S2  $\pm 2$  of correct answer with no work (14, 15, 17 or 18)

S3 Arithmetic error

*Attempts (2 marks)*

A1 Any indication of counting the tiles

(c) (ii)

5 marks

Att 2

Number of shaded tiles = 4

\* Accept the correct answer without work.

\* Accept  $\frac{1}{4}$  shaded for 5 marks

*Blunders (-3)*

B1 Correct answer  $\pm 1$

*Misreadings (-1)*

M1 States the number of tiles which are not shaded (*i.e.* 12, or candidate's answer in (i) less 4)

*Attempts (2 marks)*

A1 An indication of counting the shaded boxes

*Worthless (0)*

W1 Incorrect answer with no work

(c) (iii)

10 marks

Att 3



$\frac{4}{16} \times 100$	7m	16 tiles = 100%	3m
$\frac{1}{4} \times 100$	7m	1 tile = $\frac{100}{16}$ %	4m
100/4	9m	4 tiles = $\frac{100}{16} \times 4$ %	7m
25%	10m	400/16 (or 100/4)	9m
		25%	10m

\* Accept candidate's answers from (c) (i) and (ii).

\* % symbol not required

\* Accept  $\frac{2}{8} \times 100 = 25\%$

\*  $\frac{4}{16}$  or  $\cdot 25$  or similar and stops is worth 4 marks

\*  $\frac{16}{4}$  or similar and stops is worth 3 marks

*Blunders (-3)*

B1 Correct answer without work

B2 Inverts fraction – uses  $\frac{16}{4}$  to get 400%

B3 Incorrect numerator, but note B2

B4 Incorrect denominator, but note B2

B5 Divides by 100

*Slips (-1)*

S1 Arithmetic error in calculation

S2 Decimal error, but note B5

*Attempts (3 marks)*

A1 Any use of 100

A2 Some effort at %

A3 4, 12 or 16 written, or similar - note \*1

*Worthless (0)*

W1 Incorrect answer without work

## QUESTION 2

<b>Part (a)</b>	<b>10(5, 5) marks</b>	<b>Att (2, 2)</b>
<b>Part (b)</b>	<b>20(5, 10, 5) marks</b>	<b>Att (2, 3, 2)</b>
<b>Part (c)</b>	<b>20(10, 10) marks</b>	<b>Att (3, 3)</b>
<b>Part (a)</b>	<b>10(5,5) marks</b>	<b>Att (2,2)</b>

(i)  $A = \{ \quad , \quad , \quad \}$

(ii)  $A \cup B = \{ \quad , \quad , \quad , \quad , \quad \}$

**(a) (i)** **5 marks** **Att 2**

**(i)  $A = \{1, 2, 5, 6\}$**

\* Accept appropriate shading, but answers must be distinguishable.

*Blunders (-3)*

B1 Shades  $A \cup B$

B2 Shades  $A \cap B$

*Slips (-1)*

S1 Each additional or incorrect element or omitted element listed (to max -3, provided one is correct)

*Attempts (2 marks)*

A1 One correct element

*Worthless (0)*

W1 Any number not in A

W2 Adds numbers or similar (e.g. 24)

**(a) (ii)** **5 marks** **Att 2**

**(ii)  $A \cup B = \{1, 2, 3, 5, 6, 7\}$**

\* Accept appropriate shading

*Blunders (-3)*

B1 Shades or lists intersection  $\{6\}$

*Slips (-1)*

S1 Each additional or incorrect or omitted element (to max -3, provided one is correct)

*Attempts (2 marks)*

A1 Mentions union, unite, together or similar words.

A2 One correct element

*Worthless(0)*

W1 Any number not in  $A \cup B$ .

**Part (b)**

**20(5, 10, 5) marks**

**Att (2,3,2)**

A car left Galway at 07:30 and arrived in Dublin at 10:30.

- (i) How many hours did the car take to travel from Galway to Dublin?
- (ii) The car travelled from Galway to Dublin at an average speed of 70 km/h.  
What distance did the car travel?
- (iii) A bus took 4 hours to travel the same distance.  
What was the average speed of the bus in km/h?

**(b) (i)**

**5 marks**

**Att 2**

3 hours

- \* Accept correct answer without work.
- \* Accept 180 minutes or 180
- \* No penalty for omission of units
- \* 3 hours with some number of minutes is 2 marks

*Blunders (-3)*

- B1 Adds (Answer = 18 or 17:60)
- B2 Fails to finish (10:30-7:30)
- B3 1 hour = 100 minutes and continues correctly

*Slips (-1)*

- S1 Arithmetic error in calculation

*Misreadings (-1)*

- M1 Error in copying down a digit

*Attempts (2 marks)*

- A1 10-7 or 30-30
- A2 7:30 written as half past 7 or similar
- A3 1 hour = 60 minutes

*Worthless (0)*

- W1 Incorrect answer without work
- W2 Multiplication / division
- W3 1 Hour = 100 minutes and stops.

(b) (ii)

10 marks

Att 3

	Distance = Speed $\times$ Time	4m
	$D = 70 \times 3$	7m
	$D = 210 \text{ km}$	10m

\* No penalty for omission of units

\* Candidate may convert to minutes in effort to get answer

*Blunders (-3)*

B1 Correct answer without work

B2 Wrong operator

B3 Fails to finish

*Slips (-1)*

S1 Arithmetic error in calculation

S2 Decimal error (e.g. uses 300 instead of 3)

S3 Uses 180 instead of 3

*Misreadings (-1)*

M1 Error in copying down a digit

*Attempts (3 marks)*

A1 D/S/T in triangle or mentioned

A2 Special cases: answers **73 (+)**, **67** or **-67 (-)**, **12600** ( $70 \times 180$ ), **23.333** ( $70 \div 3$ ) **0.4285** ( $3 \div 70$ ) or similar without work

A3  $70+3$  or  $70-3$  or  $70 \times 180$  or  $70 \div 3$  or 180 and stops

A4 Attempt to use candidate's answer from (b)(i) in this section

*Worthless (0)*

W1 Incorrect answer without work

W2 Triangle only

(b) (iii)

5 marks

Att 2



$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} \quad \therefore S = \frac{210}{4} = 52.5 \text{ km/hr}$$

- \* No penalty for omission of units.
- \* Accept candidate's answer from (ii)

*Blunders (-3)*

- B1 Correct answer without work
- B2 Error in S, D, T e.g. 4/210 (-01905) or  $210 \times 4 = 840$  (once, with work)
- B3 Use of additional incorrect component
- B4 Incorrect operator

*Slips (-1)*

- S1 Arithmetic error in calculation
- S2 Decimal error
- S3 Fails to finish (i.e stops at 210/4)

*Misreadings (-1)*

- M1 Error in copying down a digit

*Attempts (2 marks)*

- A1 Any mention of S, D, T
- A2 Km  $\rightarrow$  m or hr  $\rightarrow$  min
- A3 Special cases: ·01905 or 840 or 214 or 206 or similar without work.
- A4 Some relevant step, correct numerator or correct denominator, must be fraction

*Worthless (0)*

- W1 Incorrect answer without work
- W2 4/70 or 4 x 70

Part (c)

20 (10, 10) marks

Att 3, 3

(c) I invest €1250 in a bank for two years at 4% per annum compound interest.

(i) Calculate the interest earned at the end of the first year.

(ii) Calculate the total interest earned at the end of the two years.

(c) (i)

10 marks

Att 3



<u>Method 1</u>	<u>Method 2</u>	<u>Method 3</u>
100% = €1250	€1250 × 0.04 or $1250 \times \frac{4}{100}$	€1250 × 1.04
1% = €12.50	= €50	= €1300
4% = €50		€1300 - €1250
		= €50

\* No penalty for omission of € symbol.

\* 5000 with no work shown is 4 marks

*Blunders (-3)*

- B1 Correct answer without work
- B2 Inverts, once e.g.  $1250 \times \frac{100}{4}$  (= €31,250)
- B3  $4\% \neq 0.04$
- B4 Fails to finish
- B5 Does not subtract 1250 (Method 3)
- B6 Incorrect substitution (e.g.  $1250 \times 0.02$ )
- B7 No use of 100

*Slips (-1)*

- S1 Arithmetic error in calculation
- S2 Decimal error, but note blunders above

*Misreadings (-1)*

- M1 Error in copying down a component or digit

*Attempts (3 marks)*

- A1  $I = \frac{P \times R \times T}{100}$  or identifies any of P, R, T correctly
- A2 Any relevant step e.g. mentions 100 and stops
- A3 Any mention of 0.04 or  $\frac{4}{100}$  or 1.04
- A4 Any division or multiplication

*Worthless (0)*

- W1  $1250 \pm 4$

(c) (ii)

10 marks

Att 3

 Principal at start of year 2 = €1250 + €50 = €1300		
<b><u>Method 1</u></b>	<b><u>Method 2</u></b>	<b><u>Method 3</u></b>
100% = €1300	€1300 × 0.04	€1300 × 1.04
1% = €13	= €52	= €1352
4% = €52		€1352 - €1300
		= €52
Total Interest = €52 + €50 = €102		

- \* Accept candidate's answers from part (i).
- \* No penalty for omission of € symbol.

*Blunders (-3)*

- B1 Correct answer without work
- B2 Treats as Simple Interest for each year
- B3 Incorrect or omitted substitution. (Principal for year 2)
- B4 Inverts, once
- B5 Incorrect use of 4
- B6 Fails to add interest from year 1 to interest from year 2
- B7 Adds to Principal
- B8 Does not use amount for year 2
- B9 No use of 100

*Slips (-1)*

- S1 Arithmetic error in calculation
- S2 Misplaced decimal, but note B9

*Misreadings (-1)*

- M1 Error in copying down a component or digit

*Attempts (3 marks)*

- A1 Some effort at % calculation
- A2 Multiplies answer (i) by 2. Applies with/without work
- A3 Any relevant step

*Worthless (0)*

- W1 Incorrect answer no work, but note A2

### QUESTION 3

<b>Part (a)</b>	<b>10 marks</b>	<b>Att 3</b>
<b>Part (b)</b>	<b>15(10, 5) marks</b>	<b>Att (3,2)</b>
<b>Part (c)</b>	<b>25(10, 10, 5) marks</b>	<b>Att (3,3,2)</b>

**Part (a)** **10 marks** **Att 3**

Find the mean of the following numbers:

18, 10, 16, 12, 9

**(a)** **10 marks** **Att 3**



$$\begin{aligned} \text{Mean} &= \frac{18+10+16+12+9}{5} && 6\text{m} \\ &= \frac{65}{5} && 9\text{m} \\ &= 13 && 10\text{m} \end{aligned}$$

*Blunders (-3)*

- B1 Correct answer without work
- B2 Omits 5 or multiplies by 5 ( $65 \times 5 = 325$ )
- B3 Addition not complete

*Slips(-1)*

- S1 Arithmetic error in calculation
- S2 Each incorrect, omitted or additional numbers (max 3)
- S3 Count of numbers not equal to 5
- S4 Fails to finish

*Misreadings (-1)*

- M1 Error in copying down a digit

*Attempts (3marks)*

- A1 Finds median (= 12)
- A2 Numbers arranged in ascending or descending order
- A3 Mention of 5 or 65 without work

*Worthless (0)*

- W1 Incorrect operator
- W2 Incorrect answer without work

**Part (b)**

**15(10, 5) marks**

**Att (3, 2)**

**(b)** The marks scored in a test by twenty students are shown below:

50 10 30 10 30  
40 50 10 30 50  
40 30 10 20 30  
50 30 50 20 20

- (i)** Complete the table below:  
**(ii)** Draw a bar chart to represent the scores.  
Use the grid below to draw your bar chart.

**(b) (i)**

**10 marks**

**Att 3**

	Marks scored	10	20	30	40	50
	Number of students	<b>4</b>	[3]	<b>6</b>	<b>2</b>	<b>5</b>

\* Ignore any change in [3] above

<b>1 correct</b>	<b>3 marks</b>
<b>2 correct</b>	<b>4 marks</b>
<b>3 correct</b>	<b>7 marks</b>
<b>4 correct</b>	<b>10 marks</b>

*Blunders (-3)*

B1 Each incorrect or omitted entry

*Attempts (3 marks)*

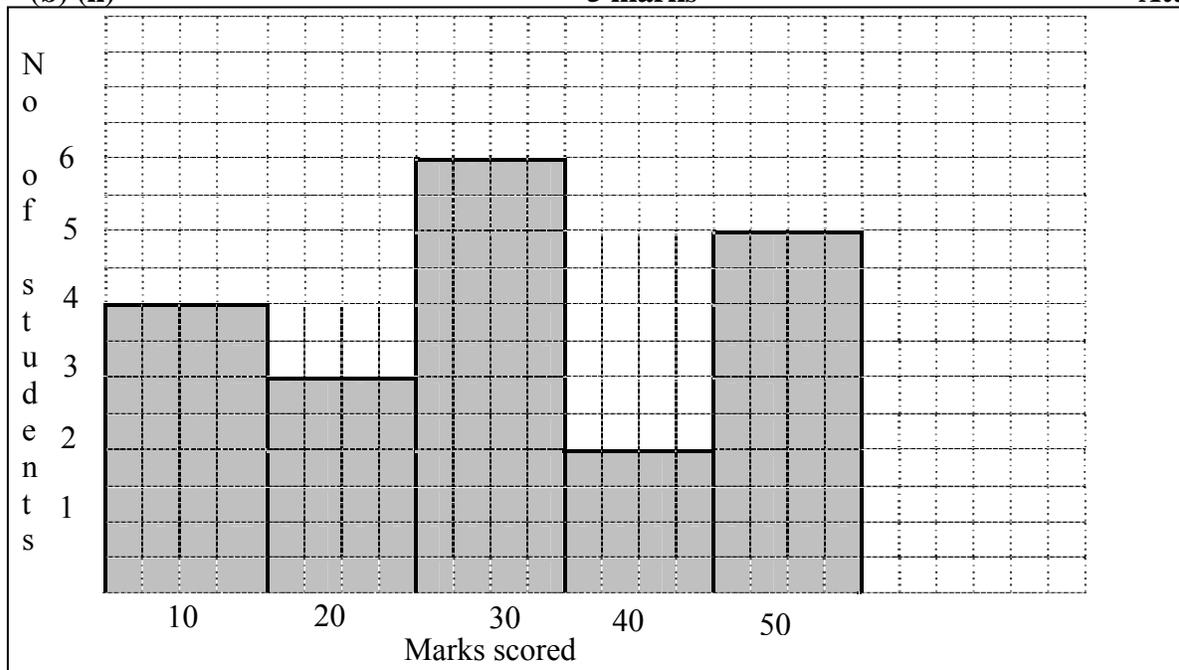
A1 Any effort at counting from array

A2 If all numbers are incorrect but sum to 20

(b) (ii)

5 marks

Att 2



- \* Vertical or horizontal bars accepted
- \* Accept candidate's data
- \* Tolerance  $< \pm 1$  box on grid (to the eye)

*Blunders (-3)*

B1 Scale error on vertical axis

*Attempts (2 marks)*

A1 Trend graph drawn

A2 Any attempt at drawing a bar chart, includes any attempt at drawing or labelling axes.

*Worthless (0)*

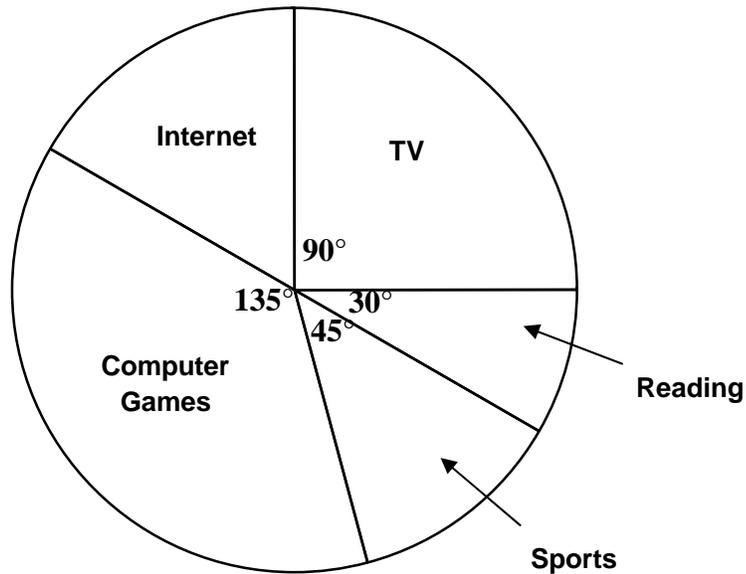
W1 Rewrites the table

W2 Pie chart

Part (c)

25(10, 10, 5) marks

Att (3, 3, 2)



- (i) Calculate the size of the angle that represents 'Internet'.
- (ii) Which hobby is the most popular?  
24 students said that watching TV was their favourite hobby.
- (iii) How many students were surveyed altogether?

(c) (i)

10 marks

Att 3



$90+30+45+135$	4m
$90 + 30 + 45 + 135 = 300^\circ$	7m
$\text{Internet} = 360^\circ - 300^\circ$	9m
$\text{Internet} = 60^\circ$	10m

\* No penalty for omission of units

*Blunders (-3)*

- B1 Correct answer, no work shown
- B2 Omission of  $90^\circ$ ,  $30^\circ$ ,  $45^\circ$ ,  $135^\circ$ , each time
- B3 300 from any number except 360  
(or 120 from any number except 180)  
(or 30 from any number except 90)
- B4 Performs appropriate addition and stops

*Slips (-1)*

- S1 Arithmetic error in calculations
- S2 Fails to finish (*e.g.* 360 – 300 and stops)

*Misreadings (-1)*

- M1 Error in copying down a number

*Attempts (3 marks)*

- A1 Mention of 360 or 180 or 90
- A2 Adds or shows indication to add any two of the following numbers 90, 30, 45, 135.
- A3 Measures angle with a protractor from diagram. ( $60 \pm 5^\circ$ ), but note B1

*Worthless (0)*

- W1 Copies diagram

**(c) (ii)**

**10 marks**

**Att 3**

Computer Games
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- \* Accept the correct answer clearly indicated on diagram
- \* Accept “c. g.” or similar for full marks
- \* Accept  $135^\circ$  for full marks

*Blunder (-3)*

- B1 Computer games and one other listed (or equivalent angles)

*Attempts (3 marks)*

- A1 Computer games and *more* than one other listed (or equivalent angles)

*Worthless (0)*

- W1 Copies diagram only

(c) (iii)

5 marks

Att 2

	24 students = $90^\circ$	2m	
	$\frac{90}{360} = \frac{1}{4}$	2m	$24/90 = 1^\circ$
	$\frac{1}{4}$ of students watch TV	2m	$\cdot 26' = 1^\circ$
	Total number of students = $24 \times 4$	4m	$\cdot 26' \times 360$
	= 96 students.	5m	96 students

*Blunders (-3)*

- B1 Correct answer without work
- B2 Divides by 4 ( $24/4 = 6$  students)
- B3 Incorrect operator
- B4 Finds number of students in **one** portion of pie chart: 8 (Reading) *or* 12 (Sports) *or* 36 (Computer games) *or* 16 (Internet) only, with work

*Slips (-1)*

- S1 Error in calculation
- S2 Fails to finish (Stops at  $24 \times 4$  or 8, 12, 36, 16, 24 or  $\cdot 26 \times 360$ )
- S3 Decimal error
- S4 Each missing portion, if relevant: 8, 12, 36, 16 (max 3)

*Misreadings (-1)*

- M1 Error in copying down a digit

*Attempts (2 marks)*

- A1 Mentions  $\frac{1}{4}$  or 4 or similar
- A2 Reference to  $360^\circ$  or  $90^\circ$  (degree symbol not required)
- A3 States 8 or 12 or 36 or 16 with/without work
- A4 Mentions  $\cdot 26'$  and stops

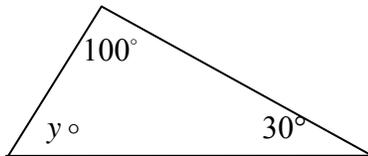
*Worthless (0)*

- W1 Copies diagram
- W2 Incorrect answer, no work shown

## QUESTION 4

<b>Part (a)</b>	<b>10 marks</b>	<b>Att 3</b>
<b>Part (b)</b>	<b>20(15, 5) marks</b>	<b>Att (5,2)</b>
<b>Part (c)</b>	<b>20(10, 10) marks</b>	<b>Att (3,3)</b>
<b>Part (a)</b>	<b>10 marks</b>	<b>Att 3</b>

Find the measure of the angle  $y$  in the diagram below.



**(a)** **10 marks** **Att 3**



$100^\circ + 30^\circ$		4m
$100^\circ + 30^\circ = 130^\circ$		7m
$180^\circ - 130^\circ$		9m
$180^\circ - 130^\circ = 50^\circ$		10m
$y = 50^\circ$		

- \* No penalty for omission of degree symbol
- \*  $130^\circ$  without work is worth 4 marks

*Blunders (-3)*

- B1 Correct answer without work
- B2 Performs addition ( $100 + 30 = 130$ ) and stops
- B3 Subtracts 130 from any number except 180

*Slips (-1)*

- S1 Arithmetic error in calculation
- S2 Decimal error
- S3 Writes  $180 - 130$  and stops

*Misreadings (-1)*

- M1 Error in copying down a component/digit

*Attempts (3 marks)*

- A1 Measures angle from diagram with tolerance of  $\pm 5^\circ$  (i.e.  $58^\circ \pm 5^\circ$ )
- A2 Any mention of  $180^\circ$ ,  $90^\circ$  or  $360^\circ$
- A3 Treats as an isosceles triangle (answer =  $100^\circ$  or  $30^\circ$ )
- A4  $100 - 30$  or 70

*Worthless (0)*

- W1 Copies diagram and stops
- W2 Wrong answer, no work shown (but note attempts)

**Part (b)**

**20(10+5, 5) marks**

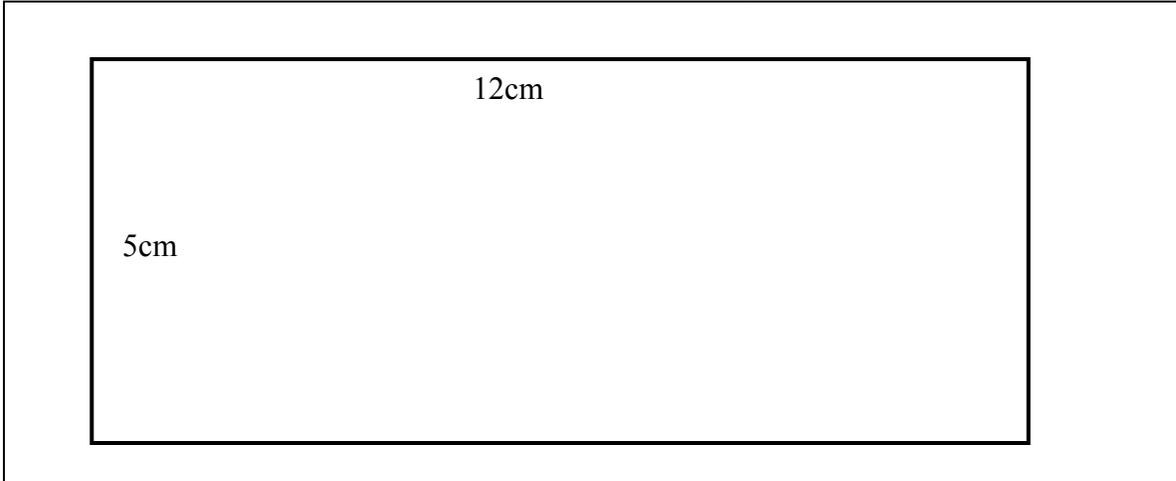
**Att (3+2,2)**

- (b) (i) Construct a rectangle 12 cm long and 5 cm wide.  
(ii) Measure, in centimetres, the length of a diagonal of the rectangle you have drawn.

**(b)(i)**

**15 marks (10 +5)**

**Att (3,2)**



- \* Tolerance  $\pm 0.5\text{cm}$
- \* Tolerance  $\pm 5^\circ$
- \* The marking of this construction is divided into two sections:  
Sides 10m, Att3 and Angles 5m, Att 2
- \* It will be necessary to measure candidates' work with ruler and protractor

**SIDES**

Any line drawn, incorrect length	3marks
One correct length	4marks
Two or three correct lengths	7marks
Four correct lengths	10marks

**ANGLES**

Lines not joined or one line only, i.e. no angle	0marks
Any angle	2 marks
Four correct right angles, within tolerance	5 marks

**SPECIAL CASE**

Right angled triangle with one side 12cm and one side 5cm is worth 12 marks

**(b) (ii)**

**5 marks**

**Att 2**

The length of the diagonal is: 13 cm
--------------------------------------

- \* Use candidate's diagram
- \* Tolerance  $\pm 0.5$  cm, otherwise blunder applies
- \* No penalty for omission of units
- \* Accept correct Pythagoras' calculation
- \* Candidate must have quadrilateral or triangle in b) (i) to qualify for the full 5 marks in this section
- \* Measures original side is attempt, measures diagonal correctly is worth full marks

*Blunders (-3)*

- B1 Incorrect hypotenuse if using Pythagoras' calculation
- B2 Outside tolerance

*Slips(-1)*

- S1 Arithmetic error in calculation if using Pythagoras' calculation

*Misreading (-1)*

- M1 Answer given as 130mm or 130

*Attempts (2 marks)*

- A1 Any relevant work e.g. indicates a diagonal
- A2 Mentions or attempts to use Pythagoras' Theorem or similar
- A3 Correct measurement of one of candidate's drawn lines from (b) (i)  
(Candidate might put down total of some or all drawn lines)

*Worthless (0)*

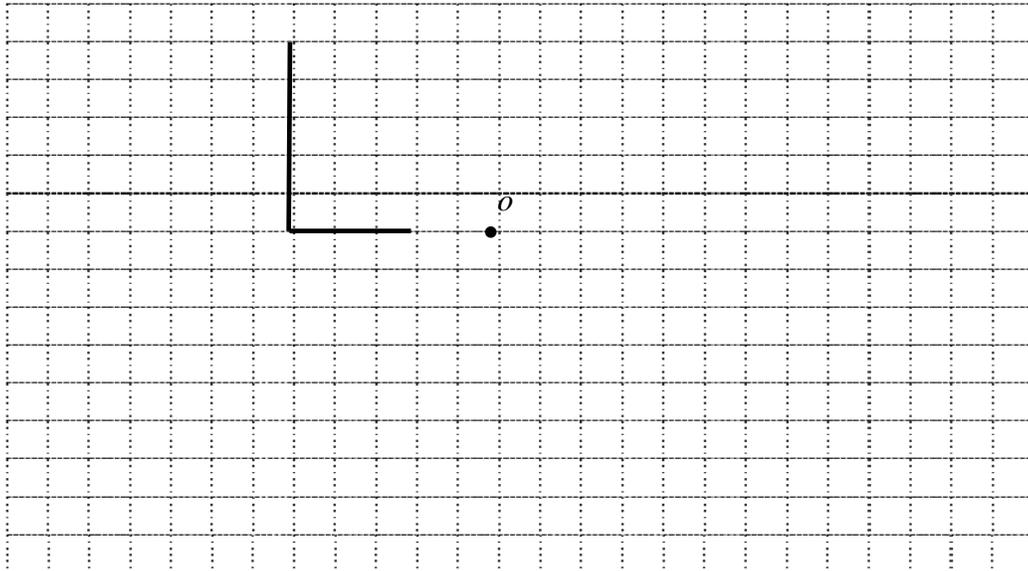
- W1 Incorrect answer without work

Part (c)

20(10, 10) marks

Att (3, 3)

- (c) (i) Construct the image of the letter L in the diagram under central symmetry in the point  $o$ .



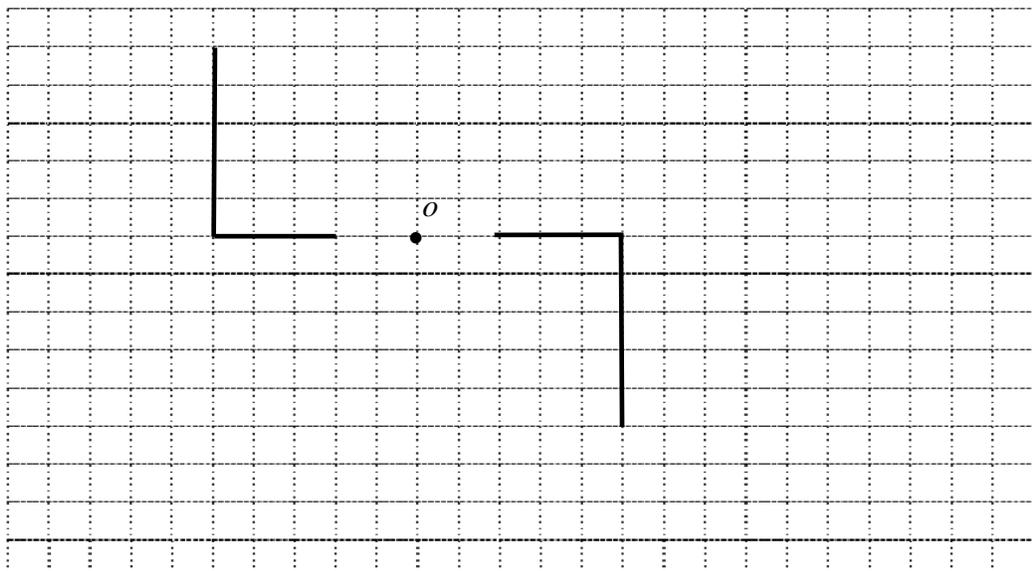
- (ii) Construct a triangle  $abc$  with

$$|ab| = 8 \text{ cm}, \quad |ac| = 5 \text{ cm} \quad \text{and} \quad |bc| = 7 \text{ cm}.$$

(c) (i)

10 marks

Att 3



\* Tolerance  $< \pm 0.5$  cm to the eye, *i.e.* less than one box

One correct image point	4marks
2 or 3 correct points	7 marks
3 correct points joined	10 marks

*Blunders (-3)*

- B1 Points located but not joined
- B2 Incorrect transformation
- B3 Outside tolerance (once only)

*Slips (-1)*

- S1 Extra line in image

*Attempts (3 marks)*

- A1 Any effort at locating an image point
- A2 Any L drawn (completely out of scale)

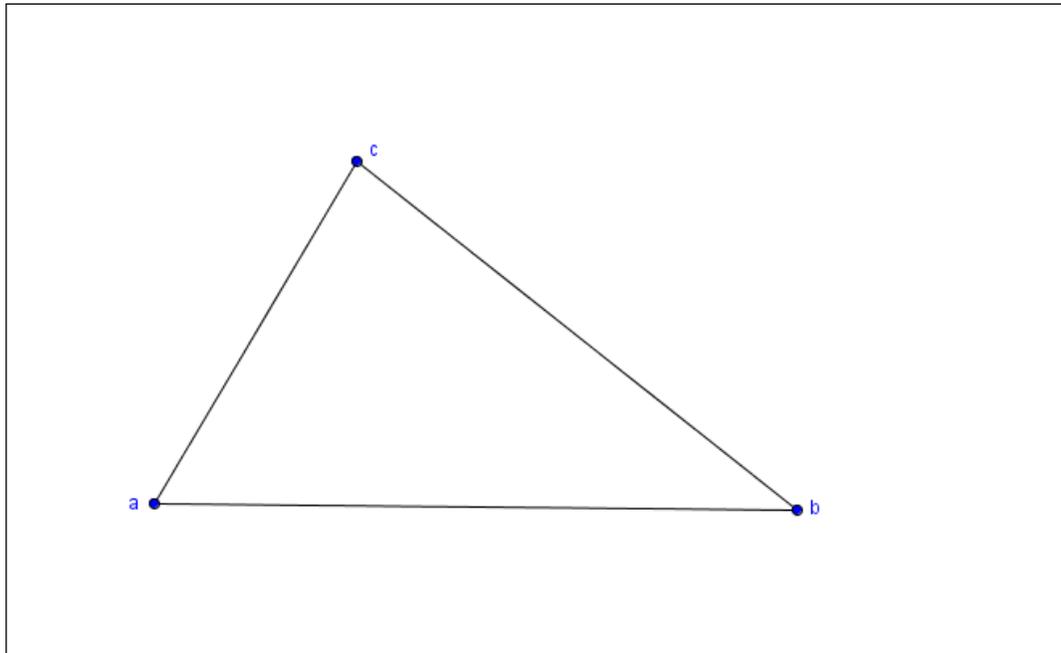
*Worthless (0)*

- W1 Any other random figure drawn (completely out of scale)

(c) (ii)

10 marks

Att 3



- \* Tolerance =  $\pm 0.5$  cm
- \* Does not have to name point c

Correct vertex c, not joined 7marks

Incorrect vertex c, joined or not, 4marks

Vertex c collinear is Attempt 3 marks

*Blunders (-3)*

B1 Incorrect side

B2 Vertices not joined

*Misreadings (-1)*

M1  $|bc| = 5, |ac| = 7$

*Attempts (3 marks)*

A1 Pilot diagram (not using  $|ab|$  as given)

A2 Draws one or more disjoint sides

A3 Any reasonable addition to given line

## QUESTION 5

<b>Part (a)</b>	<b>10 marks</b>	<b>Att 3</b>
<b>Part (b)</b>	<b>20(10, 10) marks</b>	<b>Att (3,3)</b>
<b>Part (c)</b>	<b>20(10, 10) marks</b>	<b>Att (3,3)</b>

**Part (a)** **10 marks** **Att 3**

Change 1250 g to kilograms

**(a)** **10 marks** **Att 3**

$1250 \div 1000$     7m  
 $= 1.25$  kg    10m

- \* No penalty for missing units
- \* Accept correct answer without work
- \* Accept 1kg 250g or 1  $\frac{1}{4}$  kg,
- \* Multiplies by any multiple of 10, (except 1000) is worth 4 marks

*Blunders (-3)*

- B1 1kg not equal to 1000grams
- B2 Wrong operator (*e.g.* 250g subtracted or 1,250,000 multiplied)
- B3 Fails to finish

*Slips(-1)*

- S1 Arithmetic error in calculation
- S2 Decimal error (but note B1)

*Misreadings (-1)*

- M1 Error in copying down a digit

*Attempts (3 marks)*

- A1 Any mention of 1000

*Worthless(0)*

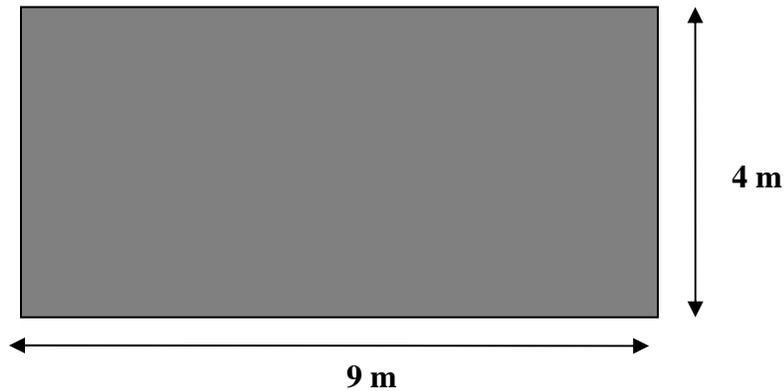
- W1 Incorrect answer without work, other than decimal error
- W2 1250 without work or with irrelevant work

Part (b)

20 (10, 10) marks

Att (3, 3)

A rectangular garden wall measures 9 m × 4 m.  
Mary is going to paint this wall.



- (i) Find the area of the wall in  $\text{m}^2$ .
- (ii) One tin of paint covers  $12 \text{ m}^2$  of the wall.  
How many tins of paint does Mary need?

(b) (i)

10 marks

Att 3



Area = length × breadth

Area =  $9 \times 4$

Area =  $36 \text{ m}^2$

- \* No penalty for omission of units or inclusion of incorrect units
- \* Accept  $\text{base} \times \text{perpendicular height} = 36 \text{ m}^2$

*Blunders (-3)*

- B1 Correct answer without work
- B2 Each incorrect or omitted substitution
- B3 Mathematical error e.g. incorrect operator (with work shown):  
 $13(+)$ ,  $5(-)$ ,  $2.25 (9 \div 4)$ ,  $.444 (4 \div 9)$ ,  $1296 (9^2 \times 4^2)$  or similar
- B4 Incorrect formula used e.g. perimeter = 26m or  $\frac{1}{2} \text{ base} \times \text{height} = 18 \text{ m}^2$

*Slips (-1)*

- S1 Arithmetic error in calculation
- S2 Decimal error (e.g. 3.6, 360,000, .36 etc)
- S3 Fails to finish

*Misreadings(-1)*

- M1 Error in copying down a digit

*Attempts (3 marks)*

- A1 Mentions length, width, breadth, base or height
- A2 Copies diagram with indication of further knowledge (e.g. internal shading or subdivides diagram)
- A3 Mentions 9 and/or 4
- A4 26, 18, 13, 5, 2·25, ·44 (without work)

*Worthless(0)*

- W1 Copies diagram as is
- W2 Incorrect answer without work, but note A4
- W3 Incorrect formula with  $\pi$ , and stops

**(b) (ii)**

**10 marks**

**Att 3**

	
Number of tins = $\frac{36}{12}$  = 3 tins	1 tin = 12 m <sup>2</sup>  2 tins = 24 m <sup>2</sup>  3 tins = 36 m <sup>2</sup>

\* Accept candidate's answer from (b) (i) – If answer (b) (i) was 26, 2 tins with work is 9 marks, 2·1, 2·16 or 3 tins with work is 10 marks

\* Unit (i.e. tins) not necessary for full marks

*Blunders (-3)*

- B1 Correct answer without work
- B2 Incorrect operator
- B3 Inversion ( $12 \div 36 = \frac{1}{3}$ )
- B4 Incorrect numerator, but note B3
- B5 Incorrect denominator, but note B3

*Slips (-1)*

- S1 Arithmetic error in calculation
- S2 Fails to finish

*Misreading (-1)*

- M1 Error in copying down a number

*Attempts (3 marks)*

- A1 Mentions 9, 4 or answer from (b)(i)
- A2 12 used with another number
- A3 Attempt at division

*Worthless (0)*

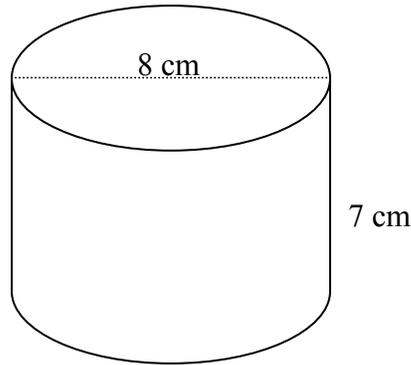
- W1 Incorrect answer without work

Part (c)

20 (10, 10) marks

Att (3, 3)

The diameter of a solid cylinder is 8 cm. Its height is 7 cm.



- (i) Write down the length of the radius.
- (ii) Find the volume of the cylinder, taking  $\pi = 3.142$ .

(c) (i)

10 marks

Att 3

Radius	$8 \div 2$	7m
	= 4 cm	10m

- \* No penalty for omission of units or inclusion of incorrect units
- \* Accept correct answer without work
- \* Answer may appear on diagram

*Blunders (-3)*

B1 Incorrect operator [e.g. **16** ( $\times 2$ ), **64** ( $8^2$ ), **6** ( $-2$ ), **10** ( $+2$ ), **2.828** ( $\sqrt{8}$ )], with/without work

*Slips (-1)*

S1 Arithmetic error in calculation

*Misreadings (-1)*

M1 Error in copying down a digit

*Attempts (3 marks)*

- A1 Effort to get circumference or area, with or without substitution
- A2 Indicates diameter or radius on a sketch/diagram
- A3 A phrase which attempts a definition of diameter or radius
- A4 8 used (allow  $8 \times 7$ ,  $8 + 7$ , 56, 28 or 15 with/without work for attempt)
- A5 Any effort at division involving 2

*Worthless (0)*

W1 Incorrect answer without work, but note B1

(c) (ii)

10 marks

Att 3



$$\begin{aligned}\text{Volume} &= \pi r^2 h \\ &= 3.142 \times 4^2 \times 7 \\ &= 3.142 \times 16 \times 7 \\ &= 50.272 \times 7 \\ &= 351.904 \text{ cm}^3\end{aligned}$$

- \* No penalty for omission of units or inclusion of incorrect units
- \* No penalty for using  $\pi$  from calculator, answer = 351.858
- \* If other variations of  $\pi$  used, S (-1) applies to the following answers:
  - $\pi = \frac{22}{7}$  Volume = 352
  - $\pi = 3.14$  Volume = 351.68
  - $\pi = 3.1$  Volume = 347.2
  - $\pi = 3$  Volume = 336
  - $\pi = \pi$  Volume =  $112\pi$
- \* Accept candidate's radius from (i) above - figures will therefore vary.

*Blunders (-3)*

- B1 Correct answer without work
- B2 Each incorrect or omitted substitution (max 2)
- B3 Mathematical error e.g.  $4^2 = 8$
- B4 Value of  $\pi$  not used in calculation ( $4^2 \times 7 = 112$ )

*Slips (-1)*

- S1 Arithmetic error in calculation, to max 3
- S2 Decimal error
- S3 Fails to finish from  $3.142 \times 16 \times 7$

*Misreadings (-1)*

- M1 Error in copying down a digit

*Attempts (3 marks)*

- A1 Mentions radius = 4, or corresponding value from (i)
- A2 Correct formula
- A3 Some correct substitution

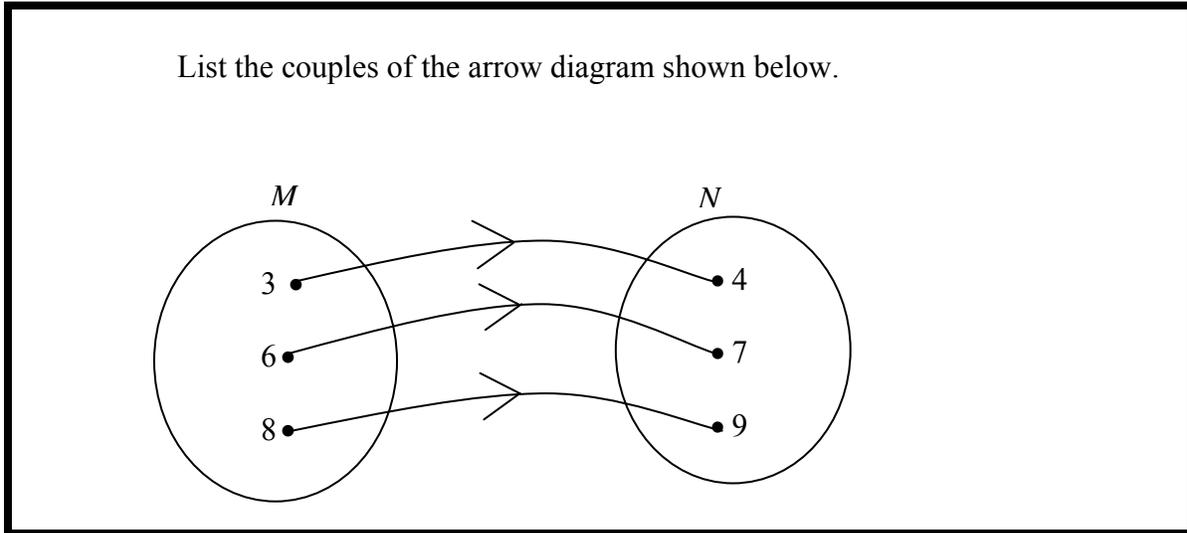
*Worthless (0)*

- W1 Incorrect formula with  $\pi$ , and stops
- W2 Incorrect answer without work

## QUESTION 6

<b>Part (a)</b>	<b>10 marks</b>	<b>Att 3</b>
<b>Part (b)</b>	<b>20(5, 10, 5) marks</b>	<b>Att (2,3,2)</b>
<b>Part (c)</b>	<b>20(10, 10) marks</b>	<b>Att (3,3)</b>

**Part (a)** **10 marks** **Att 3**



**(a)** **10 marks** **Att 3**

Couples:      ( 3, 4 )      ( 6, 7 )      ( 8, 9 )

\* One couple correct = 4 marks, two correct = 7 marks, three correct = 10 marks

\* {3, 6, 8} and {4, 7, 9} = 7 marks, but {3,6,8} or {4,7,9} = 4 marks

*Blunders (-3)*

B1 Couples reversed, apply once

*Slips (-1)*

S1 No brackets, provided groupings are distinguishable

S2 Excess couples, max 3

*Misreading (-1)*

M1 Error in copying a digit

*Attempt (3 marks)*

A1 Lists any of the following numbers: 3, 6, 8, 4, 7, 9, 13, 17, 20

A2 Copies diagram and indicates some knowledge of a correct pair

A3 Draws one circle with arrows linking numbers correctly or incorrectly

*Worthless (0)*

W1 Copies diagram as is.

**Part (b)****20(5, 10, 5) marks****Att 2, 3, 2**

- (i) Given that  $y = 2x + 4$ , complete the table below.  
Show all your work in the box provided.
- (ii) Using your answers from (i), draw the graph of  $y = 2x + 4$  from  $x = 1$  to  $x = 5$ .
- (iii) Use your graph to find the value of  $y$  when  $x = 1.5$ .

**(b) (i)****5 marks****Att**
  $y = 2x + 4$ 

$x$	1	2	3	4	5
$y$	<b>6</b>	<b>8</b>	[10]	<b>12</b>	<b>14</b>

$x$	$2x + 4$	$y$
1	$2(1) + 4$	6
2	$2(2) + 4$	8
3	$2(3) + 4$	10
4	$2(4) + 4$	12
5	$2(5) + 4$	14

- \* Answers need not be written in table
- \* Correct answers without work merit full marks
- \* If graph is fully correct, 5 marks here in b) (i)

*Blunders (-3)*

- B1 Each entry omitted or incorrect
- B2 Error e.g.  $y = 2x$ ,  $y = x + 4$  or  $y = 2(x + 4)$  with/without work

*Slips (-1)*

- S1 Adds in top line of table (watch for consistency) (7, 10, 13, 16, 19)
- S2 Arithmetic error in calculation (max 3)

*Misreadings (-1)*

- M1 Error in copying down digit or equation, if task is not oversimplified

*Attempts (2 marks)*

- A1 Any one correct entry with/without work
- A2  $x = 3$ ,  $y = 10$  - only point worked out and done so correctly
- A3 Some relevant step

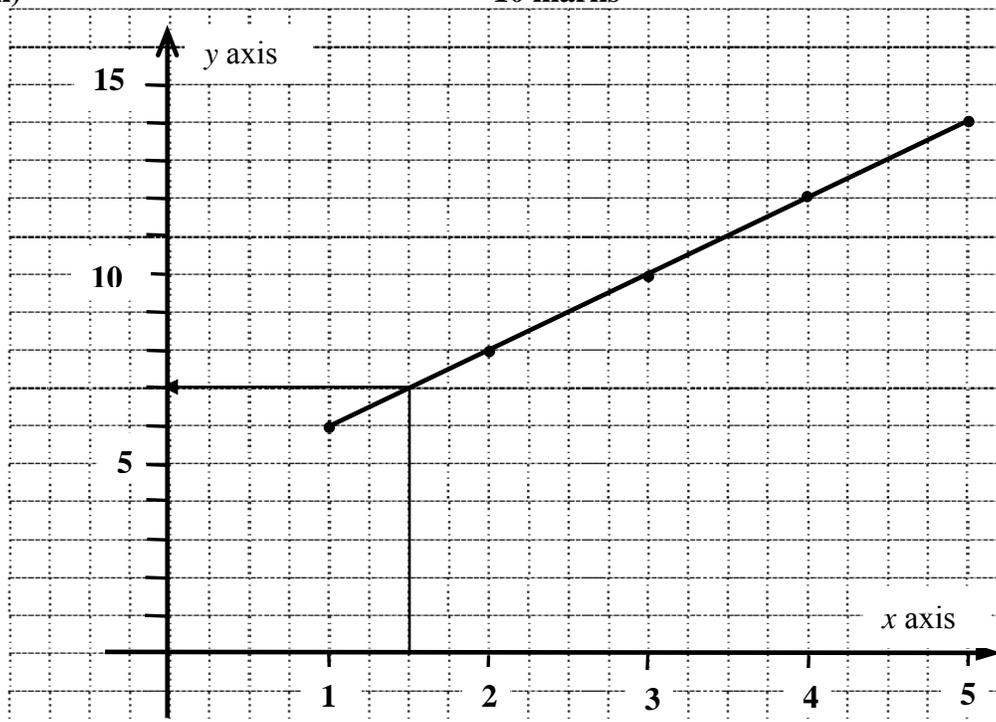
*Worthless (0)*

- W1 Table completed with spurious numbers
- W2 Copies down table with no additional work

(b) (ii)

10 marks

Att 3



\* Tolerance  $< \pm 0.5$  ( $\pm 1$  box on grid)

\* Allow work from b) (i)

\* Ignore join to origin

*Blunders (-3)*

B1 Scale error, apply once

B2 Incorrect point (apply once) if no work in b) (i)

*Slips (-1)*

S1 Each incorrectly plotted or omitted point

S2 All points not joined

S3 (y, x) consistently drawn

*Attempts (3 marks)*

A1 Random straight line

A2 One correct point

*Worthless (0)*

W1 Copies diagram, with no additional work

(b) (iii)

5 marks

Att 2

$$y = 7$$

\* Tolerance  $\pm 0.5$  cm (one box)

\* Answer dependent on candidate's graph in (b) (ii)

*Slips (-1)*

S1 Correct answer got by subbing into equation  $y = 2x + 4$

*Attempts (2 marks)*

A1 Locates 1.5

A2 Any effort at drawing a line from x or y axis on graph

Part (c)

20 (10, 10) marks

Att (3, 3)

- |      |   |                 |
|------|---|-----------------|
| (i)  | Solve for $x$ :                                 | $3(2x - 5) = 9$ |
| (ii) | Find the value of $x^2 + 4x + 5$ when $x = 3$ . |                 |

(c) (i)

10 marks

Att 3



$3(2x - 5) = 9$	
$6x - 15 = 9$	4m
$6x = 9 + 15$ or $6x = 24$	7m
$x = 24/6$	9m
$x = 4$	10m

\* Accept correct trial and error with work *e.g.*  $3\{2(4) - 5\} = 9$

\*  $6x - 15 = 9$  or  $2x = 3 + 5$  and stops is worth 4 marks

*Blunders (-3)*

- B1 Correct answer without work
- B2 Transposition error (once)
- B3 Mathematical error *e.g.*  $6x - 15$  as  $\pm 9x$
- B4 Ignores 3 and continues ( $2x - 5 = 9$ ,  $2x = 14$ ,  $x = 7$ )
- B5 Distribution error (apply once)  $6x - 5 = 9$

*Slips (-1)*

- S1 Arithmetic error in calculation
- S2 Stops at  $24/6$

*Misreadings (-1)*

- M1 Error in copying down equation, if task is not oversimplified

*Attempts (3 marks)*

- A1 Unsuccessful trial and error
- A2 Attempt to divide by 3 and stops *e.g.*  $3(2x - 5) = 3$  or  $2x - 5 = 9$  or  $2x - 5 = 3$
- A3 Any relevant step

*Worthless (0)*

- W1 Incorrect answer without work
- W2  $x = 9$

(c) (ii)

10 marks

Att 3



$$\begin{array}{l} x^2 + 4x + 5 \text{ when } x = 3 \\ (3)^2 + 4(3) + 5 \quad 4\text{m} \\ 9 + 12 + 5 \quad 7\text{m} \\ = 26 \quad 10\text{m} \end{array}$$

\* Answer given as  $3^2 + 4(3) + 5$  is worth 4 marks

*Blunders (-3)*

B1 Correct answer without work shown

B2 Association error (e.g.  $3^2 + 4(3) + 5 = 9 + 4(3+5) = 9 + 4(8) = 9 + 32 = 41$ )

B3 Mathematical error e.g.  $3^2 + 4(3) + 5 = 9 + 43 + 5$  and continues

B4  $3^2 = 6$  or similar and continues ( $6 + 12 + 5 = 25$ )

*Slips (-1)*

S1 Arithmetic error in calculation, max 3

S2 Fails to finish, no addition (stops at  $9 + 12 + 5$ )

*Misreadings (-1)*

M1 Error in copying down a component, provided it doesn't oversimplify question

*Attempts (3 marks)*

A1  $x^2 + 4x + 5 = 3$  and continues

A2 Any correct step e.g.  $4(3)$  or  $4.3$  or  $4 \times 3$  or  $3^2$  or  $9$  and stops

*Worthless (0)*

W1 Incorrect answer without work

W2 Any division

W3  $43$  and stops

## **BONUS MARKS FOR ANSWERING THROUGH IRISH**

Bonus marks are applied separately to each paper as follows:

If the mark achieved is 225 or less, the bonus is 5% of the mark obtained, rounded *down*.  
(e.g. 198 marks  $\times$  5% = 9.9  $\Rightarrow$  bonus = 9 marks.)

If the mark awarded is above 225, the following table applies:

Bunmharc (Marks obtained)	Marc Bónais (Bonus Mark)	Bunmharc (Marks obtained)	Marc Bónais (Bonus Mark)
226	11	261 – 266	5
227 – 233	10	267 – 273	4
234 – 240	9	274 – 280	3
241 – 246	8	281 – 286	2
247 – 253	7	287 – 293	1
254 – 260	6	294 – 300	0