



# Coimisiún na Scrúduithe Stáit State Examinations Commission

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Marking Scheme  
**Maths**

Leaving Certificate Examination, 2007  
**Foundation Level**



**Coimisiún na Scrúduithe Stáit  
State Examinations Commission**

**LEAVING CERTIFICATE MATHS**

**FOUNDATION LEVEL**

**MARKING SCHEME**

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# MARKING SCHEME

## LEAVING CERTIFICATE EXAMINATION 2007

### MATHEMATICS – FOUNDATION LEVEL – PAPER 1

#### GENERAL GUIDELINES FOR EXAMINERS – PAPER 1

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. Any examiner unsure of the validity of the approach adopted by a particular candidate to a particular question should contact his/her advising examiner.
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.

## NOTES ON APPLYING THE SCHEME, A.T.B.L. MATHEMATICS PAPER 1.

### Question 1

- Computational decimal error: Blunder (–3).
- Misplacement of decimal point when a number is being transferred onwards in a question. [Transfer decimal error]: Slip (–1).
- Arithmetic slips (–1), if calculation by hand is shown, to a maximum of (–3) in each operation.
- Incorrect or omitted rounding off: Slip (–1).
- Misreading refers to a misreading of the question that does not oversimplify the problem. The misreading must be clear and obvious.
- Incorrect or omitted units (except monetary units): Slip (–1) per question.

### All Other Questions

- Computational decimal error: Slip (–1).
- Misplacement of decimal point when a number is being transferred onwards in a question. [Transfer decimal error]: Slip (–1)
- Arithmetic slips (–1), if calculation by hand is shown, to a maximum of (–3) in each operation.
- Incorrect or omitted rounding off: Slip (–1)
- Misreading refers to a misreading of the question that does not oversimplify the problem. The misreading must be clear and obvious.
- Incorrect or omitted units (except monetary units): Slip (–1) per question.
- If a worthless answer in one part of a question is used in another part of that question, then that part's mark is the attempt mark at most.

**Note: Specified instances cited within the scheme take precedence over the above notes: e.g. taking  $\sqrt[3]{64 \cdot 64}$  as  $\sqrt[3]{646 \cdot 4}$  is treated as a Blunder (–3), not as a misreading (–1), within the scheme.**

## QUESTION 1

**Each part** **10 marks** **Att 4**

**Part (i)** **10 marks** **Att 4**

(i) Find  $\sqrt[3]{64 \cdot 64}$ , correct to four decimal places.

**(i)** **10 marks** **Att 4**

(i)  $\sqrt[3]{64 \cdot 64} = 4.013289\dots = \mathbf{4.0133}$ .

\* Accept correct answer with no work.

### Blunders (-3)

B1  $\sqrt[3]{6464} = [18.62803\dots] = 18.6280$ .

B2  $\sqrt[3]{646 \cdot 4} = [8.64636\dots] = 8.6464$ .

B3  $\sqrt[3]{6 \cdot 464} = [1.86280\dots] = 1.8628$ .

B4  $\sqrt[3]{\cdot 6464} = [0.86463\dots] = 0.8646$ .

B5  $(\sqrt{64 \cdot 64})^3 = [519.69916\dots] = 519.6992$  or  $(\sqrt{64 \cdot 64}) \times 3 = [24.119701\dots] = 24.1197$ .

B6 Root other than cube root indicated and correctly worked.  $\sqrt{64 \cdot 64} = 8.0399$ .

### Misreadings (-1)

M1  $\sqrt[3]{64 \cdot 46} = [4.00956\dots] = 4.0096$ .

M2  $\sqrt[3]{46 \cdot 46} = [3.59495\dots] = 3.5950$ .

M3  $\sqrt[3]{46 \cdot 64} = [3.59958843\dots] = 3.5996$ .

### Slips (-1)

S1 Incorrect or omitted rounding-off.

### Attempts (4 marks)

A1  $(64 \cdot 64)^3 = 270087 \cdot 2253$ .

A2  $\frac{64 \cdot 64}{3} = 21.54666\dots = 21.5467$ .

A3  $(64 \cdot 64) \times 3 = 193.92$ .

A4 Work at estimating answer:  $\sqrt[3]{64 \cdot 64} = 4$ .

A5 Any effort at finding or estimating another root with work shown.

A6 An incorrect number correctly rounded off.

A7 Any other answers as B2, B3, B4, and B5 but with misplaced decimal point and no work shown.

### Worthless (0 marks)

W1 Incorrect answers with no work, other than those in scheme.

(ii) Find  $(19 \cdot 3)^3$ , correct to two significant figures.

(ii)

10 marks

Att 4

(ii)  $(19 \cdot 3)^3 = 7189 \cdot 057 = 7200$ .

\* Accept correct answer with no work.

*Blunders (-3)*

B1 Power ( $\in N$ ) greater than 1 (other than 3) indicated and correctly worked.

B2  $(193)^3 = 7189057 = 7200000$ .

B3  $(1 \cdot 93)^3 = 7 \cdot 189057 = 7 \cdot 2$ .

B4  $(\cdot 193)^3 = 0 \cdot 007189057 = 0 \cdot 01$ .

*Misreadings (-1)*

M1  $(91 \cdot 3)^3 = 761048 \cdot 497 = 760000$ .

*Slips (-1)*

S1 Significant figures incorrect or omitted.

*Attempts (4 marks)*

A1  $19 \cdot 3 \times 3 = 57 \cdot 9$  whether given correct to two significant figures or not.

A2  $\frac{19 \cdot 3}{3} = 6 \cdot 43333 \dots = 6 \cdot 4$  whether given correct to two significant figures or not.

A3  $\sqrt[3]{19 \cdot 3} = 2 \cdot 68237 \dots$  whether given correct to two significant figures or not.

A4  $19 \cdot 3 \times 10^3 = 19300$  whether given correct to two significant figures or not.

A5 Work at estimating answer: e.g.  $(20)^3 = 8000$ .

A6 Any other answers as B2, B3, B4, and B5 but with misplaced decimal point and no work shown.

A7 An incorrect number correctly rounded off to two significant figures.

*Worthless (0 marks)*

W1 Incorrect answers with no work, other than those in scheme.

(iii) Find  $\frac{1}{72.91}$ , correct to four decimal places.

(iii)

10 marks

Att 4

(iii)  $\frac{1}{72.91} = 0.0137155\dots = \mathbf{0.0137}$ .

\* Accept correct answer with no work.

*Blunders (-3)*

B1  $\frac{1}{7291} = 0.000137155 = 0.0001$ .

B2  $\frac{1}{729.1} = 0.0013715\dots = 0.0014$ .

B3  $\frac{1}{7.291} = 0.137155\dots = 0.1372$ .

B4  $\frac{1}{0.7291} = 1.37155\dots = 1.3716$ .

*Misreadings (-1)*

M1  $\frac{1}{72.19} = [0.013852\dots] = 0.0139$ .

M2  $\frac{1}{27.19} = [0.03677\dots] = 0.0368$ .

M3  $\frac{1}{27.91} = [0.03582\dots] = 0.0358$ .

*Slips (-1)*

S1 Incorrect or omitted rounding-off.

*Attempts (4 marks)*

A1 Work at estimating answer: e.g.  $\frac{1}{73}$  or  $\frac{1}{70}$ .

A2 Any other answers as B1, B2, B3, and B4 but with misplaced decimal point and no work shown.

A3 An incorrect number correctly rounded off.

*Worthless (0 marks)*

W1 Incorrect answers with no work, other than those in scheme.



Part (iv)

10 marks

Att 4

(iv)

Find the exact value of  $52.78 + 14.3 \times 0.4$ .

(iv)

10 marks

Att 4

(iv)

$$52.78 + 14.3 \times 0.4 = 52.78 + 5.72 = \mathbf{58.5}.$$

\* Accept correct answer with no work.

*Blunders (-3)*

B1 Error(s) in precedence:  $52.78 + 14.3 = 67.08 \times 0.4 = 26.832$ .

B2 A step omitted. [May also incur B1]

B3 The use of a wrong operator or operators is indicated. (Once only)

*Misreadings (-1)*

M1 A clear and obvious numerical misreading not involving the decimal point.

*Attempts (4 marks)*

A1 A different ordering of the numbers indicated and worked out correctly.

A2 Work at estimating answer: e.g.  $53 + 14 \times 0.5 = 60$ .

A3 Work towards some correct step: e.g. long multiplication begun.

*Worthless (0 marks)*

W1 Incorrect answers with no work, other than those in scheme.

(v) In a box of 90 oranges, 18 were bad. What percentage were good?

(v)

10 marks

Att 4

*Method 1*

$$(v) \quad 90 - 18 = 72 \Rightarrow \frac{72}{90} \times 100 = \mathbf{80\%}.$$

*Method 2*

$$\frac{18}{90} \times 100 = 20\% \Rightarrow 100\% - 20\% = \mathbf{80\%}.$$

\* Accept correct answer with no work.

*Blunders (-3)*

Method 1

B1 Incorrect or no subtraction.

B2 Error(s) in establishing  $\frac{72}{90} \times 100$ . [All three elements must be present otherwise attempt only].

B3 Incorrect or incomplete answer or no answer. [Use candidate's answer from above].

Method 2.

B1 Error(s) in establishing  $\frac{18}{90} \times 100$ . [All three elements must be present otherwise attempt only]

B2 Incorrect or incomplete answer or no answer. [Use candidate's answer from above].

B3 Incorrect or no subtraction. [Use candidate's answer from above].

*Attempts (4 marks)*

A1 Gives  $\frac{72}{90}$  or  $\frac{90}{72}$  only.

A2 Gives  $\frac{18}{90}$  or  $\frac{90}{18}$  only.

A3  $90 - 18 = 72$  and stops.

*Worthless (0 marks)*

W1 Incorrect answers with no work, other than those in scheme.

- (vi) A person took 4 hours and 30 minutes to travel 153 kilometres.  
What was the average speed for the journey?

(vi) Average Speed =  $\frac{\text{distance}}{\text{time}} = \frac{153}{4.5} = \mathbf{34 \text{ km/h.}}$  or  $\frac{153}{270} = \frac{17}{30} = \mathbf{0.57 \text{ km/min.}}$

\* Accept correct answer with no work.

*Blunders (-3)*

B1 Incorrect formula for average speed:

$$153 \times 4.5 = 688.5.$$

$$\frac{4.5}{153} = 0.0294\dots$$

$$153 \times 270 = 41310.$$

$$\frac{270}{153} = 1.7647\dots$$

B2 Incorrect conversion of hours and minutes: 4 hours 30 minutes taken as 4.3 hours.

*Slips (-1)*

S1 Incorrect or omitted units.

*Attempts (4 marks)*

A1 Some use of the given data: e.g.  $153 + 4.5$ .

A2 Converts 4 hours 30 minutes to 270 minutes and stops.

A3 Converts 4 hours 30 minutes to 4.5 hours and stops.

*Worthless (0 marks)*

W1 Incorrect answers with no work, other than those in scheme.

**Part (vii)**

**10 marks**

**Att 4**

**(vii)** Change 2650 Japanese yen to euro, at the exchange rate of 1 yen = 0.0091 euro.  
Give your answer correct to two decimal places.

**(vii)**

**10 marks**

**Att 4**

**(vii)**  $2650 \times 0.0091 = 24.115 = \mathbf{\text{€}24.12}$ .

\*Accept correct answer with no work.

*Blunders (-3)*

B1  $\frac{2650}{0.0091} = 291208.7912 = 291208.79$

B2  $2650 \times 0.91 = 2411.5$ , except if answer is given as 2411.5 cents.

*Slips (-1)*

S1 Incorrect or no rounding off.

S2 Answer given in cents.

*Attempts (4 marks)*

A1 Some use of the given data.

A2 An incorrect number correctly rounded off.

*Worthless (0 marks)*

W1 Incorrect answer with no work shown, other than those in scheme.

(viii) Express  $\frac{5}{7} + \frac{2}{3}$  as a decimal, correct to two decimal places.

(viii)

10 marks

Att 4

(viii)  $\frac{5}{7} + \frac{2}{3} = \frac{15+14}{21} = \frac{29}{21} = 1.38095\dots = \mathbf{1.38}$  or  $0.714285714 + 0.66666666 = \mathbf{1.3809523}$ .

\* Accept correct answer with no work.

*Blunders (-3)*

- B1 Error(s) in converting fraction to decimal. (Once only).  
 B2 No addition.  
 B3 Use of wrong operator indicated ( $\times$ ,  $\div$ ,  $-$ ) giving answers  
 (0.476/0.48, 1.071/1.07 and 0.047/0.05).

*Slips (-1)*

- S1 Incorrect or no rounding off.

*Attempts (4 marks)*

- A1 Effort at converting either of the given fractions to a decimal.  
 A2 Correctly converts a fraction (written) to a decimal and stops.  
 A3 A correct calculation.  
 A4  $1 < \text{Answer} < 2$  (in either decimal or fractional form) [See B4].  
 A5 An incorrect number correctly rounded off.

*Worthless (0 marks)*

- W1 Incorrect answer with no work shown, other than those in scheme.  
 W2 Adds or subtracts numerators and/ or denominators or similar.

(ix) Find $\frac{(2.05 \times 10^5) - (1.35 \times 10^3)}{3.67 \times 10^5}$ , correct to three decimal places.
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(ix) $\frac{2 \cdot 03650 \times 10^5}{3 \cdot 67 \times 10^5} = 5 \cdot 54904... \times 10^{-1} = \mathbf{5 \cdot 55 \times 10^{-1} = 0 \cdot 555}$ .
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or $\frac{205000 - 1350}{367000} = \frac{203650}{367000} = 0 \cdot 554904... = \mathbf{0 \cdot 555}$ .
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\* Accept correct answer with no work.

*Blunders (-3)*

- B1 Error(s) in precedence. (Once only).
- B2 Each omitted or incorrect step if slips not clear.
- B3 Misplaced decimal or wrong order of magnitude each time.
- B4 Inverts final fraction giving 1.80211... as answer.
- B5 Any incorrect rounding off within the working. (Once only).
- B6 The use of a wrong operator or operators is indicated. (Once only).

*Slips (-1)*

- S1 Incorrect or no rounding off of answer.
- S2 Any incorrect rounding off within the working. (Once only).

*Attempts (4 marks)*

- A1  $10^5$  treated as 50 and/or  $10^3$  treated as 30.
- A2 Some work towards estimation.
- A3  $10^5$  as  $10 \times 10 \times 10 \times 10 \times 10$  and/or  $10^3$  as  $10 \times 10 \times 10$  only.
- A4 An incorrect number correctly rounded off.

*Worthless (0 marks)*

- W1 Incorrect answer with no work shown, other than those in scheme.

(x) Find $\left(5 - \frac{13.87}{18.26}\right)(14.25 - 11.09)$ , correct to three decimal places
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(x) $(5 - 0.75958)(3.16) = (4.24042)(3.16) = 13.3997 = \mathbf{13.400}$
---

\*Accept correct answer with no work.

*Blunders (-3)*

B1 Error(s) in precedence. (Once only).

B2  $\frac{5 - 13.87}{18.26} = \frac{-8.87}{18.26} = -0.485761\dots = -0.4858$  and continues giving  $-1.535$ .

B3 Any incorrect rounding off within the working. (Once only).

B4 The use of a wrong operator or operators is indicated. (Once only).

*Slips (-1)*

S1 Numerical errors.

S2 Incorrect or no rounding off of answer.

S3 Any incorrect rounding off within the working. (Once only).

*Misreadings (-1)*

M1 Clear and obvious numerical misreading not involving the decimal point.

*Attempts (4 marks)*

A1 Any correct step:  $14.25 - 11.09 = 3.16$  and stops.

A2 An incorrect number correctly rounded off.

*Worthless (0 marks)*

W1 Incorrect answer with no work shown, other than those in scheme.

## QUESTION 2

<b>Part (a)</b>	<b>10 (5, 5) marks</b>	<b>Att (2, 2)</b>
<b>Part (b)</b>	<b>40 (10, 10, 10, 10) marks</b>	<b>Att (4, 4, 4, 4)</b>

<b>Part (a)</b>	<b>10 (5, 5) marks</b>	<b>Att (2, 2)</b>
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- (a) (i) Change 6.85 kilograms to grams.  
(ii) Change 462.5 grams to kilograms.

<b>(a)</b>	<b>10 (5, 5) marks</b>	<b>Att (2, 2)</b>
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- (a) (i)  $6.85 \text{ kg} = 6.85 \times 1000 = \mathbf{6850 \text{ g}}$ .  
(ii)  $462.5 \text{ g} = \frac{462.5}{1000} = \mathbf{0.4625 \text{ kg}}$ .

\* Accept correct answer with no work.

### *Blunders (-3)*

B1 Incorrect conversion factor. Do not penalise if the same incorrect conversion factor is again used in (ii).

B2 Misuse of conversion factor: e.g.  $\frac{6.85}{1000} = 0.00685$ .

B3 Misuse of conversion factor: e.g.  $462.5 \times 1000 = 462500$ .

### *Slips (-1)*

S1 Numerical errors.

### *Attempts (2 marks)*

A1  $6.85 \times 462.5 = 3168.125$ .

### *Worthless (0 marks)*

W1 Incorrect answer with no work shown, other than those in scheme.



**Part (b)****40 (10, 10, 10, 10) marks****Att (4, 4, 4, 4)**

- (b) A person worked for 42 hours in a particular week.  
 The rate of pay for the first 35 hours was €12.48 per hour.  
 The rate of pay for the remaining hours was €18.72 per hour.  
 Find
- (i) the gross wage for the week
  - (ii) the tax at 20%, given a tax credit of €64.40
  - (iii) the PRSI, to the nearest cent, at 4% of gross wages
  - (iv) the take-home pay.

**(b)(i)****10 marks****Att 4**

<b>(b)(i)</b> $€12.48 \times 35 = €436.8$ : $€18.72 \times 7 = €131.04 \Rightarrow$ Gross wage = <b>€567.84</b> .
---

\* Accept correct answer without work.

*Blunders (-3)*

- B1 Fails to add the two calculated part-wages.
- B2 Subtracts the two calculated part-wages.
- B3 No multiplier of €18.72 giving  $€436.8 + €18.72 = €455.52$ .

*Slips (-1)*

- S1 Decimal error.
- S2 Numerical errors.

*Attempts (4 marks)*

- A1 Any one of the multiplications and stops.
- A2  $€12.48 \times 42 = €524.16$  or  $€18.72 \times 42 = €786.24$ .
- A3 Any use of  $€12.48 + €18.72 = €31.2$ .

*Worthless (0 marks)*

- W1 Incorrect answer with no work shown, other than those in scheme.

**(b)(ii)****10 marks****Att 4**

<b>(b)(ii)</b> $€567.84 \times 0.2 = €113.57$ $€113.57 - €64.4 =$ <b>€49.17</b> .
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- \* Accept correct answer without work.
- \* Accept candidate's answer from (i).
- \* Marks lost by giving gross tax as answer to (ii) can be recouped in (iv) if (iv) is worked correctly.
- \* No need to round off in this part.

*Blunders (-3)*

- B1 Error in calculating % e.g.  $567.84 \times 1.20$ .
- B2 Adds tax credit to gross tax. (177.97).

*Slips (-1)*

- S1 Decimal error.

*Attempts (4 marks)*

- A1 Any mishandling or ignoring of the Tax Credit other than B2.
- A2 Some effort at getting %.

*Worthless (0 marks)*

- W1 Incorrect answer with no work shown, other than those in scheme.

**(b)(iii)**

**10 marks**

**Att 4**

<b>(b)(iii)</b>	$\text{€}567.84 \times 0.04 = \text{€}22.7136 = \text{€}22.71$ or $\frac{567.84}{100} \times 4 = \text{€}22.7136 = \text{€}22.71$ .
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\* Accept correct answer without work.

\* Accept candidate's answer from (i).

*Blunders (-3)*

B1 Error in calculating % e.g.  $\text{€}567.84 \times 0.4$ .

B2 Error(s) in establishing  $\frac{567.84}{100} \times 4$ . [All three elements must be present, otherwise attempt only]

B3 Calculates 4% of gross tax or tax payable or pay after tax.

*Slips (-1)*

S1 Incorrect or no rounding off of answer.

S2 Numerical errors.

*Attempts (4 marks)*

A1 Some use of 100.

*Worthless (0 marks)*

W1 Incorrect answer with no work shown, other than those in scheme.

**(b)(iv)**

**10 marks**

**Att 4**

<b>(b)(iv)</b>	$\text{€}567.84 - \text{€}49.17 - \text{€}22.71 = \text{€}495.96$ .
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\* Accept candidates figures from (i) and (ii) and (iii).

\* Accept correct answer without work.

\*  $\text{€}49.17$  will recoup marks if necessary for (ii).

\*  $\text{€}495.96$  without  $\text{€}49.17$  will recoup marks if necessary for (ii).

\*  $\text{€}495.96$  only given as the answer to all parts  $\Rightarrow$  31 marks.

\*  $\text{€}567.84 + \text{€}64.40 - \text{€}113.57 = \text{€}518.67$  given as the answer to all parts  $\Rightarrow$  30 marks.

\*  $\text{€}518.67$  only given as the answer to all parts  $\Rightarrow$  24 marks.

\* No need to round off in this part.

*Blunders (-3)*

B1 Uses wrong Gross wage.

B2 Uses a Tax other than that calculated in (b) (ii) above.

B3 Adds Tax.

B4 Uses a PRSI amount other than that calculated in (b)(iii) above.

B5 Adds the PRSI amount.

B6 Subtraction not completed.

*Slips*

S1 Numerical errors.

*Attempts (4 marks)*

A1 Some spurious number subtracted from Gross wage.

*Worthless (0 marks)*

W1 Incorrect answer with no work shown, other than those in scheme.

### QUESTION 3

<b>Part (a)</b>	<b>10 marks</b>	<b>Att 4</b>
<b>Part (b)</b>	<b>20 marks</b>	<b>Att 8</b>
<b>Part (c)</b>	<b>20 marks</b>	<b>Att 8</b>

**Part (a)** **10 marks** **Att 4**

- (a) A person was estimated to be 1.85 metres in height.  
The person's actual height was 1.82 metres.  
Find the percentage error, correct to one decimal place.

**(a)** **10 marks** **Att 4**

- (i) Error =  $1.85 - 1.82 = 0.03$  m.      Percentage error =  $\frac{0.03}{1.82} \times 100 = 1.6483\dots = \mathbf{1.6\%}$ .

\* Accept correct answer with no work.

#### *Blunders (-3)*

B1 Incorrect or no subtraction.

B2 Error(s) in establishing  $\frac{0.03}{1.82} \times 100$ . [All three elements must be present otherwise attempt only].

B3 Incorrect or incomplete answer or no answer. [Use candidate's answer from above].

#### *Attempts (4 marks)*

A1 Some use of the given data; e.g.  $1.85 \times 1.82$ .

#### *Worthless (0 marks)*

W1 Incorrect answer with no work shown, other than those in scheme.

**Part (b)****20 (10, 5, 5) marks****Att 8**

(b) €940 was borrowed for three years at 6.5% per annum compound interest.  
How much was owed after three years, correct to the nearest cent?

**(b)****20 (10 + 5 + 5) marks****Att (4, 2, 2)**

(b)  $A = 940 \left(1 + \frac{6.5}{100}\right)^3 = 940(1.065)^3 = 940(1.207949625) = 1135.472648 = \text{€}1135.47.$

**Formula Method**

\* Accept correct answer with no work.

\*  $A = 940 \left(1 + \frac{6.5}{100}\right)^3 \Rightarrow 10$  marks. \*  $A = 940(1.065)^3 \Rightarrow 15$  marks. \*  $A = \text{€}1135.47 \Rightarrow 20$  marks.

\*  $A = 940 \left(1 + \frac{6.5}{100}\right)^3 = \text{incorrect answer without work} \Rightarrow 14 (10 + 2 + 2)$  marks.

$A = 940 \left(1 + \frac{6.5}{100}\right)^3$

**10 marks****Att 4***Blunders (-3)*

B1 Error in formula as written by student or incorrect formula e.g. depreciation.

B2 Error in substituting into formula, once only.

*Attempts (4 marks)*

A1  $\frac{940}{6.5}$  or  $\frac{940}{6.5} = 144.615\dots$

A2  $940 \times 6.5$  or  $940 \times 6.5 = 6110.$

A3  $\frac{940}{0.065} = 14461.54.$

$A = 940(1.065)^3$

**5 marks****Att 2**

B1  $A = 940 \left(1 + \frac{6.5}{100}\right)^3 \neq 940(1.065)^3.$

$A = \text{€}1135.47$

**5 marks****Att 2**

\* Use candidate's answer to simplification of  $A = 940 \left(1 + \frac{6.5}{100}\right)^3.$

B1  $(1.065)^3 = (1.065) \times 3 = 3.195$  or  $(1.065)^3 = (1.065) \div 3 = 0.355.$

B2  $\frac{940}{(1.065)^3} = 778.18$  or  $\frac{940}{(0.935)^3} = 1149.99.$

B3  $940 \times (0.935)^3 = 768.36.$

*Slips (-1)*

S1 Incorrect or omitted rounding off.

S2 Numerical error

*Misreadings (-1)*M1  $(1.065)^n$ ,  $n = 2$  or  $n \geq 4$  used in formula*Worthless (0 marks)*

W1 Incorrect answer with no work shown, other than those in scheme.

(b)

20 (10 + 5 + 5) marks

Att (4, 2, 2)

(b) Amount at end of year 1:  $940 \times 1.065 = 1001.1$   
Amount at end of year 2:  $1001.1 \times 1.065 = 1066.1715$   
Amount at end of year 3:  $1066.1715 \times 1.065 = 1135.472648 = \text{€}1135.47$ .

or Compound Interest Year 1:  $\frac{940 \times 6.5}{100} = 61.1 \Rightarrow \text{Principal 2} = 1001.1$

Compound Interest Year 2:  $\frac{1001.1 \times 6.5}{100} = 65.0715 \Rightarrow \text{Principal 3} = 1066.1715$

Compound Interest Year 3:  $\frac{1066.1715 \times 6.5}{100} = 69.301 \Rightarrow \text{Amount} = \text{€}1135.47(25)$

**Year by year method**

\* Accept correct answer with no work.

\* Amount year 1 = 1001.1  $\Rightarrow$  10 marks \* Amount year 2 = 1066.17(15)  $\Rightarrow$  15 marks.

\* Amount year 3 = 1135.47(2648)  $\Rightarrow$  20 marks .

\* Using Simple Interest only to give 183.3 or 1123  $\Rightarrow$  8 (4 + 2 + 2) marks, with or without work.

**Amount at end of year 1**

**10 marks**

**Att 4**

*Blunders (-3)*

B1  $940 \times 1.65 = 1551$ .

B2 Error(s) in establishing  $\frac{940 \times 6.5}{100}$  [All three elements must be present otherwise attempt only].

B3 Stops at interest and fails to find amount.

B4 Subtracts interest to find amount.

*Slips (-1)*

S1 Numerical errors.

*Attempts (4 marks)*

A1 Some use of 100 in attempt to find percentage.

*Worthless (0 marks)*

W1 Incorrect answer with no work shown, other than those in scheme.

**Amount at end of year 2**

**5 marks**

**Att 2**

\* Use candidate's answer for amount at end of year 1.

*Blunders (-3)*

B1 Error(s) in calculating percentage.

B2 Uses a principal other than calculated above.

B3 Stops at interest and fails to find amount.

B4 Subtracts interest to find amount. Do not penalise if B4 above in Year 1.

*Slips (-1)*

S1 Numerical errors.

*Worthless (0 marks)*

W1 No effort at compounding.

W2 Incorrect answer with no work shown, other than those in scheme.

**Amount at end of year 3****5 marks**

- \* Use candidate's answer for amount at end of year 2.

*Blunders (-3)*

- B1 Error(s) in calculating percentage.  
B2 Uses a principal other than calculated above.  
B3 Stops at interest and fails to find amount.  
B4 Subtracts interest to find amount. Do not penalise if B4 above in Year 1 or Year 2.

*Slips (-1)*

- S1 Numerical errors.  
S2 Total compound interest only given. [195·47]

*Worthless (0 marks)*

- W1 No effort at compounding.  
W2 Incorrect answer with no work shown, other than those in scheme.

**Part (c)****20(10, 5, 5) marks****Att 8**

- (c) A machine was bought for €25 000.  
It depreciated at the rate of 15% per annum.  
What was its value after three years, correct to the nearest euro?

**(c)****20(10 + 5 + 5) marks****Att (4, 2, 2)**

(c)  $A = 25000\left(1 - \frac{15}{100}\right)^3 = 25000(0.85)^3 = 25000(0.614125) = 15353.125 = \text{€}15353.$

**Formula Method** \* Accept correct answer with no work.

\*  $A = 25000\left(1 - \frac{15}{100}\right)^3 \Rightarrow 10 \text{ mks.}$  \*  $A = 25000(0.85)^3 \Rightarrow 15 \text{ marks.}$  \*  $A = \text{€}15353 \Rightarrow 20 \text{ mks.}$

\*  $25000\left(1 - \frac{15}{100}\right)^3 = \text{incorrect answer without work} \Rightarrow 14(10 + 2 + 2) \text{ marks.}$

$A = 25000\left(1 - \frac{15}{100}\right)^3$

**10 marks****Att 4***Blunders (-3)*

B1 Error in formula as written by student or incorrect formula e.g. Compound Interest.

B2 Error in substituting into formula, once only.

*Attempts (4 marks)*

A1  $\frac{25000}{15}$  or  $\frac{25000}{15} = 1666.666\dots$

A2  $25000 \times 15$  or  $25000 \times 15 = 375000$  or  $\frac{25000}{0.15} = 166666.6667.$

$A = 25000(0.85)^3$

**5 marks****Att 2***Blunders (-3)*

B1  $A = 25000\left(1 - \frac{15}{100}\right)^3 \neq 25000(0.85)^3.$

$A = \text{€}15353.$

**5 marks****Att 2**

\* Use candidate's answer to simplification of  $A = 25000\left(1 - \frac{15}{100}\right)^3.$

B1  $(0.85)^3 = (0.85) \times 3 = 2.55$  or  $(0.85)^3 = (0.85) \div 3 = 0.28333\dots$

B2  $\frac{25000}{(0.85)^3} = 40708.32$  or  $\frac{25000}{(1.15)^3} = 16437.905\dots$

B3  $25000 \times (1.15)^3 = 38021.875.$

*Slips (-1)*

S1 Incorrect or omitted rounding off.

S2 Numerical errors.

*Misreadings (-1)*

M1  $(0.85)^n, n = 2$  or  $n \geq 4$  used in formula.

*Worthless (0 marks)*

W1 Incorrect answer with no work shown, other than those in scheme.

(c)

20(10 + 5 + 5) marks

Att (4, 2, 2)

(c)	Value at the end of year 1: $25000 \times 0.85 = 21250$
	Value at the end of year 2: $21250 \times 0.85 = 18062.5$
	Value at the end of year 3: $18062.5 \times 0.85 = 15353.125 = \text{€}15353.$
or	Depreciation at end of year 1: $\frac{25000 \times 15}{100} = 3750 \Rightarrow \text{Value 2} = 21250.$
	Depreciation at end of year 2: $\frac{21250 \times 15}{100} = 3187.5 \Rightarrow \text{Value 3} = 18062.5$
	Depreciation at end of year 3: $\frac{18062.5 \times 15}{100} = 2709.375 \Rightarrow \text{final value} = \text{€}15353.$

**Year by year method** \* Accept correct answer with no work.

\* Value year 1 = 21250  $\Rightarrow$  10 marks \* Value year 2 = 18062.5  $\Rightarrow$  15 marks.

\* Value year 3 = 15353  $\Rightarrow$  20 marks.

\* Using Simple Interest only to give 11250 or 13750  $\Rightarrow$  8 (4 + 2 + 2) mks. with or without work.

**Value at end of year 1**

**10 marks**

**Att 4**

*Blunders (-3)*

B1  $25000 \times 0.085 = 2125.$

B2 Error(s) in establishing  $\frac{25000 \times 15}{100}$  [All three elements must be present otherwise attempt only].

B3 Stops at depreciation and fails to find value.

B4 Adds depreciation to find value.

*Slips (-1)*

S1 Numerical errors.

*Attempts (4 marks)*

A1 Some use of 100 in attempt to find percentage.

*Worthless (0 marks)*

W1 Incorrect answer with no work shown, other than those in scheme.

**Value at end of year 2**

**5 marks**

**Att 2**

\* Use candidate's answer for Value at end of year 1.

*Blunders (-3)*

B1 Error(s) in calculating percentage.

B2 Uses a value other than calculated above.

B3 Stops at depreciation and fails to find value.

B4 Adds depreciation to find value. Do not penalise if B4 above in Year 1.

*Slips (-1)*

S1 Numerical errors.

*Worthless (0 marks)*

W1 No effort at compounding.

W2 Incorrect answer with no work shown, other than those in scheme.



**Value at end of year 3**

**5 marks**

**Att 2**

- \* Use candidate's answer for value at end of year 2.

*Blunders (-3)*

- B1 Error(s) in calculating percentage.
- B2 Uses a value other than calculated above.
- B3 Stops at depreciation and fails to find value.
- B4 Adds depreciation to find value. Do not penalise if B4 above in Year 1 or Year 2.

*Slips (-1)*

- S1 Incorrect or omitted rounding off.
- S2 Numerical errors.
- S3 Total depreciation only given. [9646.875].

*Worthless (0 marks)*

- W1 No effort at compounding.
- W2 Incorrect answer with no work shown, other than those in scheme.

## QUESTION 4

<b>Part (a)</b>	<b>10 marks</b>	<b>Att 4</b>
<b>Part (b)</b>	<b>20 (15, 5)marks</b>	<b>Att (6, 2)</b>
<b>Part (c)</b>	<b>20 (10, 10) marks</b>	<b>Att (4, 4)</b>

**Part (a)** **10 marks** **Att 4**

(a) Solve for  $x$   
$$10x - 13 - 3x = 15$$

(a) **10 marks** **Att 4**

(a) 
$$10x - 13 - 3x = 15 \Rightarrow 7x - 13 = 15 \Rightarrow 7x = 28 \Rightarrow x = 4.$$

\* Award full marks for a correct answer by T + E with verification.

### *Blunders (-3)*

- B1 Blunders in grouping terms e.g.  $10x - 13 = -3x$ . (Each time).
- B2 Transposition error(s). (Once only).
- B3 Each step omitted.
- B4  $x = 4$  without work.

### *Slips(-1)*

- S1  $10x - 3x$  becomes  $10x + 3x = 13x$ .

### *Attempts (4 marks)*

- A1 Some correct work.
- A2 Effort at T+E by substitution.

### *Worthless (0 marks)*

- W1 Incorrect answer without work.

(b) Solve the simultaneous equations

$$3x - 2y = 15$$

$$2x + y = 3.$$

First variable found

15 marks

Att 6

Second variable

5 marks

Att 2

(b)	$3x - 2y = 15$	
	$4x + 2y = 6$	$6 + y = 3$
	$7x = 21$	$y = -3$
	$x = 3$	

\* Random  $x$  picked,  $y$  calculated (or vice-versa) – award 5 marks.

\* Substitution of correct values in both equations and verification shown – Award 20 marks.

*Blunders(-3)*

B1 Error(s) in establishing the first equation in terms of  $x$  only [ $7x = 21$ ] or the first equation terms of  $y$  only [ $-7y = 21$ ].

B2 Blunder in substitution e.g.  $y$  value for  $x$ .

B3 Transposition error(s). (Once only).

*Attempts -First variable- (6 marks).*

A1 Effort at equalising coefficients of  $x$ 's or  $y$ 's.

A2 Effort at cancelling one variable or combining variables.

A3 Effort at writing  $x$  in terms of  $y$  (or vice-versa).

*Attempts- Second variable- (2 marks).*

A4 Effort at substituting first variable.

A5 Effort at cancelling second variable or second effort at combining variables.

*Attempts (8 marks).*

A6 Attempt at finding a solution by T + E.

A7 Correct answers with no work shown.

A8 Any correct work, even in the context of an approach of no merit (Att 6 or Att 6 + Att 2).

*Worthless (0 marks)*

W1 Incorrect answer(s), no work shown.

- (c) Seán and Siobhán are brother and sister. Seán is five years older than Siobhán. Their grandfather's age is seven times Seán's age added to three times Siobhán's age. Let  $x$  be Seán's age.
- (i) Write the grandfather's age as an expression in  $x$ .
- (ii) If the grandfather is 75 years old, find Seán's age.

(c) (i)

10 marks

Att 4

- (c) (i) Seán's age =  $x$   
 $\Rightarrow$  Siobhán's age =  $x - 5$ .
- Grandfather's age =  $7x + 3(x - 5)$ .

\* May use Siobhán's age =  $x$ .

*Blunders (-3)*

B1 An incorrect expression in  $x$  involving the use of 7 and 3 operating on an expression in  $x$ .

*Slips (-1)*

S1 Siobhán's age =  $5x$  or =  $x + 5$ . (Stated or implied.)

S2 Grandfather's age =  $7[x + 3(x - 5)]$ .

*Attempts (4 marks)*

A1 Assigns a numerical value to  $x$  that is then used to find a numerical value for Siobhán's age.

A2 Some use of the given data.

*Worthless (0 marks)*

W1  $\frac{x}{5}, \frac{5}{x}, 5 - x$ .

(c) (ii)

10 marks

Att 4

- (c) (ii)  $7x + 3x - 15 = 75$   
 $10x = 90 \Rightarrow x = 9$

\* Accept candidate's answer from (i).

\* Award full marks for a correct answer by T + E with verification.

*Blunders (-3)*

B1 candidate's answer  $\neq 75$ .

B2 Blunders in grouping terms e.g.  $3x - 15 = -12x$ . (Each time).

B3 Transposition error(s). (Once only).

B4 Each step omitted.

B5  $x = 9$  without work.

*Attempts (4 marks)*

A1 Some correct work.

A2 Effort at T+E by substitution.

A3 Forms equation and stops.

*Worthless (0 marks)*

W1 Incorrect answer without work.

$$\begin{aligned} \text{Siobhán's age} &= x \\ \text{Seán's age} &= x + 5 \\ \text{Grandfather's age} &= 3x + 7(x + 5) \\ 3x + 7(x + 5) &= 75 \\ \Rightarrow x &= 4 \\ \Rightarrow \text{Seán's age} &= 9. \end{aligned}$$

## QUESTION 5

<b>Part (a)</b>	<b>10 (5, 5) marks</b>	<b>Att (2, 2)</b>
<b>Part (b)</b>	<b>20 marks</b>	<b>Att (8)</b>
<b>Part (c)</b>	<b>20 (10, 5, 5) marks</b>	<b>Att (4, 2, 2)</b>

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

- (a) (i) List the prime numbers from 2 to 11, including 2 and 11.
- (ii) Which of the numbers you have listed are factors of 55?

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

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

(i) 2, 3, 5, 7, 11.

(ii) 5, 11.

*Slips (-1)*

S1 Each omitted or incorrect entry, provided at least one is correct. (to a max of -3)

*Attempts (2 marks)*

A1 At least one correct entry, each part.

**Part (b)** **20 marks** **Att 8**

(b) Solve for  $x$

$$5x^2 - 9x - 2 = 0.$$

**(b) Factor method** **20 marks** **Att 8**

$$5x^2 - 9x - 2 = 0 \Rightarrow (5x + 1)(x - 2) = 0 \Rightarrow x = -\frac{1}{5} \text{ and } x = 2.$$

*Blunders(-3)*

- B1 Sign error(s) in factors (Once only).  
B2 Sign error(s) in solution (Once only).  
B3 Incorrect factors and continues.  
B4 Each  $x$  value not found.

*Attempts(8 marks)*

- A1 Effort at finding factors.  
A2 Attempt at T + E.

**\* without work**

- 2 correct answers, both verified: full marks  
2 correct answer and one verified: 1 × B (-3)  
2 correct answers, neither verified: Att 8 marks  
1 correct answer, and verified: Att 8 marks  
1 correct answer but not verified: 0 marks

**(b) Formula Method****20 marks****Att 8**

$$\text{or } x = \frac{-(-9) \pm \sqrt{(-9)^2 - 4(5)(-2)}}{2(5)} = \frac{9 \pm \sqrt{81 + 40}}{10} = \frac{9 \pm \sqrt{121}}{10} *$$

$$x = \frac{9 \pm 11}{10} \Rightarrow x = \frac{-2}{10} = \frac{-1}{5} \text{ and } x = \frac{20}{10} = 2.$$

\* Maximum deductions beyond this point is 6 marks.

*Blunders (-3)*

- B1 Incorrect choice of constants ( $a$ ,  $b$ ,  $c$ ) applied once (consistent error).
- B2 Incorrect substitution into formula, subject to S2 below.
- B3 Blunder in application of formula.
- B4 Omits  $\pm$  in formula. Only + or - in place of  $\pm$ .
- B5 Each  $x$  value not found.
- B6 Error in formula as written by student or incorrect quadratic formula.

*Slips(-1)*

- S1 Slips in signs on substitution into formula.
- S2 Sign of coefficient incorrectly extracted, prior to substitution. (Applied each time).
- S3  $81 + 40 = 41$ .
- S4 Incorrect or omitted rounding off, each time.

*Attempts (8 marks)*

- A1 Effort at substitution into formula.
- A2 Attempt at finding factors e.g.  $(5x \quad)(x \quad)$  or guide number given.
- A3 No quadratic: e.g.  $5x - 9x - 2 = 0$  and continues with some correct work.
- A4 Appearance of the variable in the answer.

**Part (c)****20 (10, 5, 5) marks****Att (4, 2, 2)**

- (c) (i) Solve  $7x + 4 < 25$ ,  $x \in \mathbb{N}$ .
- (ii) Solve  $31 - 4x \geq 19$ ,  $x \in \mathbb{N}$ .
- (iii) What values of  $x$  satisfy both of the inequalities in (i) and (ii)?

**(c)(i)****10 marks****Att 4**

(i)  $7x + 4 < 25 \Rightarrow 7x < 21 \Rightarrow x < 3.$

\* Listing of 0, 1, 2 not required.

*Blunders (-3)*

- B1 Blunders in grouping terms e.g.  $7x + 4 = 11x$ . (Each time).
- B2 Transposition error(s). (Once only).
- B3 Each step omitted.
- B4  $x < 3$  without work.
- B5 Replaces inequality sign with equality sign.

*Attempts (4 marks)*

- A1 Some correct work.
- A2 Effort at T+E by substitution.

*Worthless (0 marks)*

- W1 Incorrect answer without work.

**(c)(ii)**

**5 marks**

**Att 2**

<b>(ii)</b> $31 - 4x \geq 19 \Rightarrow -4x \geq 19 - 31 \Rightarrow -4x \geq -12 \Rightarrow 4x \leq 12 \Rightarrow x \leq 3$ .
---

\* Listing of 0, 1, 2, 3 not required.

*Blunders (-3)*

B1 Blunders in grouping terms e.g.  $31 - 4x = 27x$ . (Each time).

B2 Transposition error(s). (Once only).

Bf Blunder in direction of inequality when multiplying by “minus”.

B3 Each step omitted.

B4  $x \leq 3$  without work.

B5 Replaces  $\geq$  with equality sign. Do not penalise if B5 is incurred in **(i)**.

*Misreadings (-1)*

M1 Uses  $>$  for  $\geq$ .

*Attempts (2 marks)*

A1 Some correct work.

A2 Effort at T+E by substitution.

A3  $31 + 4x \geq 19$ .

*Worthless (0 marks)*

W1 Incorrect answer without work.

**(c)(iii)**

**5 marks**

**Att 2**

<b>(iii)</b> <b>0, 1, 2.</b>
------------------------------

\* Accept candidates answers from **(i)** and **(ii)**.

\* If Equality used in **(i)** and **(ii)** then attempt mark at most.

*Slips(-1)*

S1 Each omitted or incorrect entry, provided at least one is correct. (to a max of -3)

*Attempts(2 Marks)*

A1 At least one correct entry.

## QUESTION 6

<b>Part (i)</b>	<b>20 marks</b>	<b>Att 8</b>
<b>Part (ii)</b>	<b>10 marks</b>	<b>Att 4</b>
<b>Part (iii)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (iv)</b>	<b>10 marks</b>	<b>Att 4</b>
<b>Part (v)</b>	<b>5 marks</b>	<b>Att 2</b>

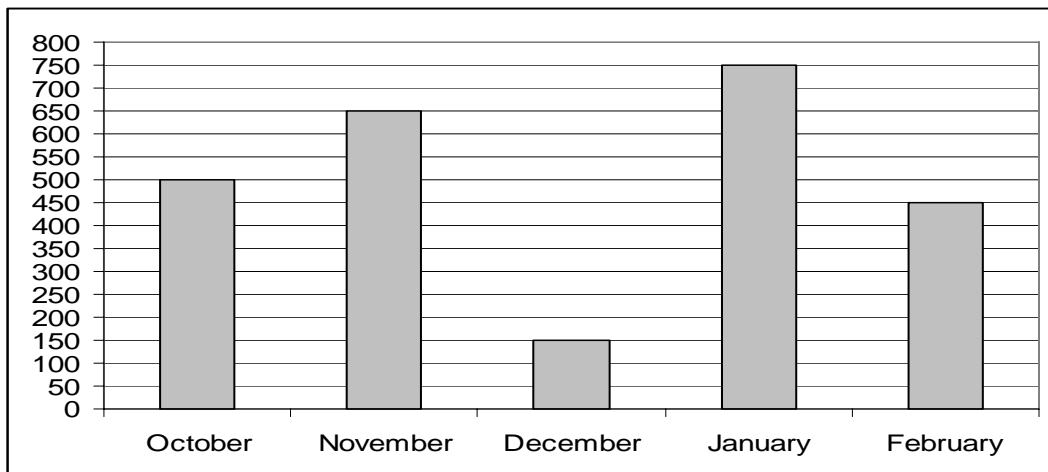
6. The number of litres of oil used to heat a building for five months is shown.

October	500
November	650
December	150
January	750
February	450

- (i) Draw a bar-chart to illustrate the information.
- (ii) Calculate the average amount of oil used per month.
- (iii) Draw a line across the bar-chart to show this average.
- (iv) Which month shows the greatest difference between the oil used and the average?
- (v) What is the average cost of heating the building per month, if oil costs €0.65 per litre?

**(i) 20 marks Att 8**

(i)



*Blunders (-3)*

- B1 Widths of bars inconsistent.
- B2 Months not in chronological order.

*Slips (-1)*

- S1 Omits a bar (to a max of 3 bars).
- S2 Incorrect height of bar (each time).
- S3 A trend graph (then subject to slips and blunders, e.g. points not joined  $\Rightarrow$  -3marks).
- S4 Vertical axis not graduated uniformly.

*Attempts (8 marks)*

- A1 One bar only.
- A2 Axes only.



(ii)

10 marks

Att 4

$$(ii) \quad \frac{500 + 650 + 150 + 750 + 450}{5} = \frac{2500}{5} = 500 \text{ litres.}$$

\* Accept correct answer without work.

*Blunders (-3)*

B1 Each value omitted in the evaluation of  $\sum x$ .

B2 Incorrect denominator.

B3  $\frac{5}{2500}$  or  $2500 \times 5$  and continues.

B4  $\frac{2500}{5}$  and stops.

*Slips (-1)*

S1 Numerical errors within the evaluation of  $\sum x$ .

*Attempts (4 marks)*

A1 5 and no more.

A2 Some use of the given data.

A3 Incorrect  $\sum x$  without work.

A4 2500 and stops.

*Worthless (0 marks)*

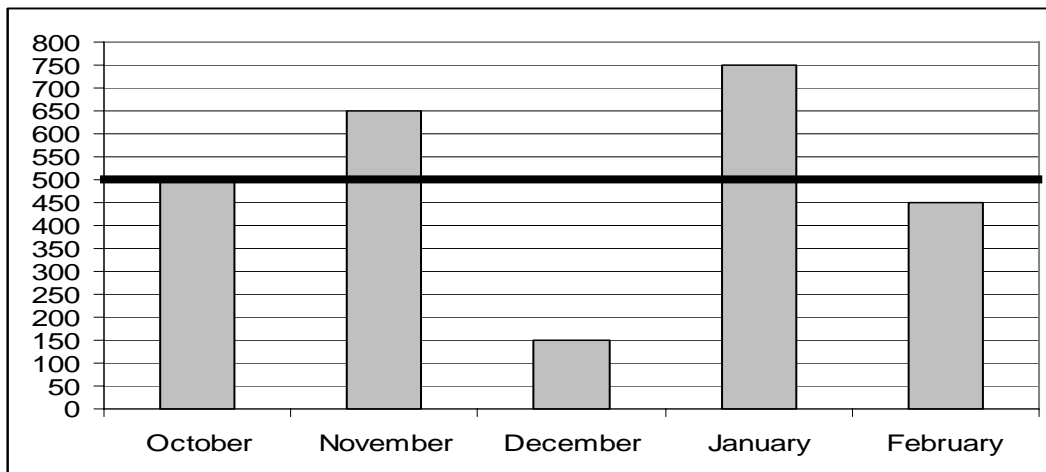
W1 Incorrect answers with no work, other than those in scheme.

(iii)

5 marks

Att 2

(iii) (The line indicating the average)



\* Accept candidate's answer from (ii).

*Attempts (2 marks)*

A1 500 indicated on y-axis but line not drawn as above.

(iv)

10 marks

Att 4

(iv)

December

\* Accept candidate's answer from (ii).

*Misreadings (-1)*

M1 January as answer, (i.e. finds the greatest difference above 500).

(v)

5 marks

Att 2

$$\begin{aligned} \text{(v)} \quad & \frac{2500 \times 0.65}{5} = \frac{1625}{5} = \text{€}325 \text{ or } 500 \times 0.65 = \text{€}325 \\ \text{or} \quad & 500 \times 0.65 + 650 \times 0.65 + 150 \times 0.65 + 750 \times 0.65 + 450 \times 0.65 \\ & = 325 + 422.5 + 97.5 + 487.5 + 292.5 = 1625 \\ & \frac{1625}{5} = 325. \end{aligned}$$

\* Accept correct answer without work.

\* Accept candidate's figure from (ii).

\* Accept 32500 for full marks.

*Blunders (-3)*

B1 Error(s) in establishing  $\frac{2500 \times 0.65}{5}$  [All three elements must be present otherwise attempt only].

B2 Incorrect or incomplete answer or no answer.

B4 Each multiplication omitted in  $500 \times 0.65 + 650 \times 0.65 + 150 \times 0.65 + 750 \times 0.65 + 450 \times 0.65$ .

*Slips (-1)*

S1 Numerical errors.

*Attempts (4 marks)*

A1  $\frac{2500}{5}$  or  $\frac{2500}{5} = 500$  only.

A2 1625 and stops.

*Worthless (0 marks)*

W1 Incorrect answers with no work, other than those in scheme.

## QUESTION 7

<b>Graph</b>	<b>35 (20, 15) marks</b>	<b>Att (8, 6)</b>
<b>Values</b>	<b>15 (5, 5, 5) marks</b>	<b>Att (2, 2, 2)</b>

<b>Table / evaluation</b>	<b>20 marks</b>	<b>Att 8</b>
<b>Graph</b>	<b>15 marks</b>	<b>Att 6</b>

Draw the graph of the function

$$f(x) = x^2 - 4, \quad \text{for } -3 \leq x \leq 3, \quad x \in \mathbf{R}.$$

<b>Table method</b>	<b>20 marks</b>	<b>Att 8</b>
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<b><math>x</math></b>	<b>-3</b>	<b>-2</b>	<b>-1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b><math>x^2</math></b>	<b>9</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>9</b>
<b>-4</b>	<b>-4</b>	<b>-4</b>	<b>-4</b>	<b>-4</b>	<b>-4</b>	<b>-4</b>	<b>-4</b>
<b><math>f(x)</math></b>	<b>5</b>	<b>0</b>	<b>-3</b>	<b>-4</b>	<b>-3</b>	<b>0</b>	<b>5</b>

\* Accept correct  $f(x)$  values without work.

*Blunders (-3)*

B1  $x$ -values added on when calculating  $f(x)$  values.

B2 Consistent errors across full line.

Otherwise slips applied.

*Misreadings (-1)*

M1  $-4$  treated as 4 across the line.

*Slips (-1)*

S1 Each incorrect or omitted value in body of table.

S2 Each incorrect or omitted  $y / f(x)$  value, calculated from candidate's work.

*Attempt (8 marks)*

A1 Any four correct calculated values in the table.

A2 Function treated as linear e.g.  $x^2 = 2x$  or  $x$ .

**OR**

<b>Function evaluation method</b>	<b>20 marks</b>	<b>Att 8</b>
-----------------------------------	-----------------	--------------

$$f(-3) = (-3)^2 - 4 = 9 - 4 = 5$$

$$f(-2) = (-2)^2 - 4 = 4 - 4 = 0$$

$$f(-1) = (-1)^2 - 4 = 1 - 4 = -3$$

$$f(0) = (0)^2 - 4 = 0 - 4 = -4$$

$$f(1) = (1)^2 - 4 = 1 - 4 = -3$$

$$f(2) = (2)^2 - 4 = 4 - 4 = 0$$

$$f(3) = (3)^2 - 4 = 9 - 4 = 5$$

*Blunders (-3)*

- B1 Consistent errors in the evaluation of  $x^2$ .
- B2  $-4$  omitted from the evaluation.
- B3 Each incorrect  $f(x)$  value when no work is shown to a max of 3(-3) provided that at least one  $f(x)$  value is correct. All  $f(x)$  values incorrect without work  $\Rightarrow$  0 marks. Otherwise slips applied when work is shown.

*Misreadings (-1)*

- M1  $-4$  consistently treated as 4 in the evaluation.

*Slips (-1)*

- S1 Each incorrect or omitted value from the evaluation after substitution.
- S2 Each incorrect or omitted  $f(x)$  value, calculated from candidate's work.

*Attempt (8 marks)*

- A1 Any four correct calculated values in the function evaluation.
- A2 Function treated as linear e.g.  $x^2 = 2x$  or  $x$ .

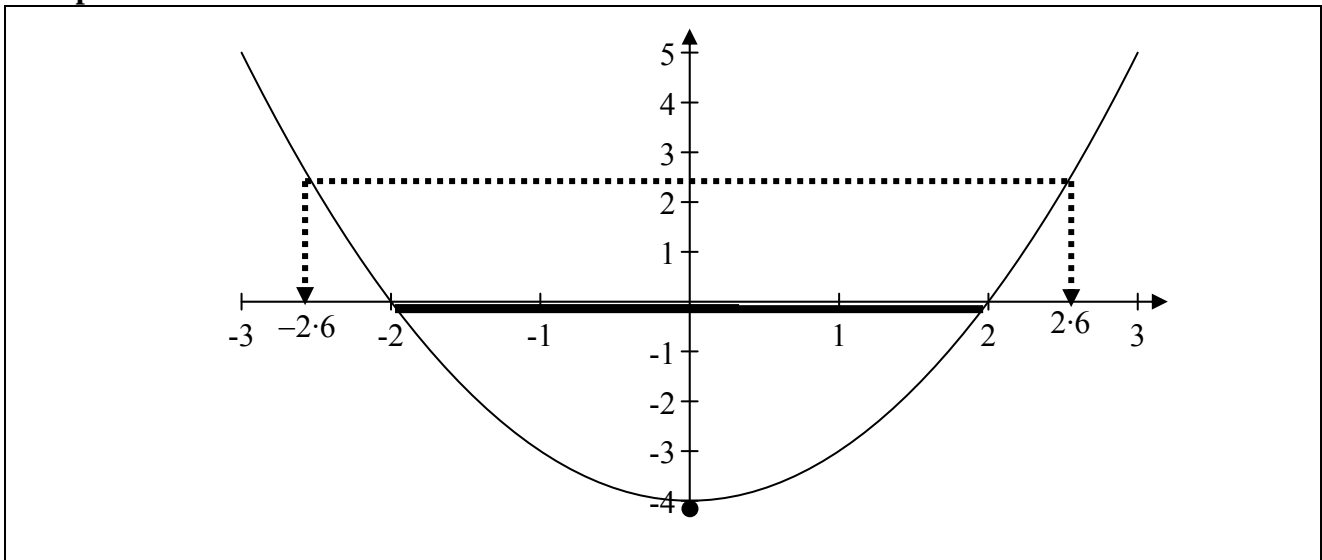
*Worthless (0 marks)*

- W1 Incorrect answers with no work, other than those in scheme.

**Graph**

**15 marks**

**Att 6**



- \* Accept values from candidate's table.
- \* Fully correct graph drawn with no work shown: Award 35 marks.

*Blunders (-3)*

- B1 Points joined in incorrect order.
- B2 Blunders in scales on axis or axes. (Once only.)

*Slips (-1)*

- S1 Each point, from table, plotted incorrectly.
- S2 Each pair of successive points not joined, to maximum  $-3$ .
- S3 Not a smooth curve.
- S4 The graph of the function is not in the conventional position or orientation.

*Attempts (6 marks)*

- A1 At least two of candidate's points plotted.
- A2 Any  $\cup$ -shaped graph.
- A3 Axes Drawn.

Use your graph to answer the following:

- (i) For what range of values of  $x$  is  $f(x)$  less than zero?
- (ii) Write down the minimum value of  $f(x)$ .
- (iii) For what values of  $x$  is  $f(x) = 2.5$ ?

<b>Part (i)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (ii)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (iii)</b>	<b>5 marks</b>	<b>Att 2</b>

- |       |                          |
|-------|--------------------------|
| (i)   | $-2 < x < 2$             |
| (ii)  | $-4$                     |
| (iii) | $x = -2.6$ and $x = 2.6$ |

\* Accept candidate's values from graph.

\* Allow tolerance  $\pm 0.2$  units on  $x$ -axis,  $\pm 0.5$  units on  $y$ -axis.

#### Blunders (-3)

B1 Each value outside tolerance.

B2 Value omitted, or extra value. Applies in part (iii).

#### Misreading (-1)

M1 Gives the value of  $x$  corresponding to the minimum of  $f(x)$  in part (ii).

#### Slips(-1)

S1 Answers indicated correctly on axes, but not specified.

#### Attempt(2 marks)

A1 Effort at reading value(s) from graph.

A2 Correctly solving equation algebraically: part (iii).

A3 Calculating  $f(2.5)$  : part (iii).

# MARKING SCHEME

## LEAVING CERTIFICATE EXAMINATION 2007

### MATHEMATICS – FOUNDATION LEVEL – PAPER 2

#### GENERAL GUIDELINES FOR EXAMINERS – PAPER 2

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. Any examiner unsure of the validity of the approach adopted by a particular candidate to a particular question should contact his/her advising examiner.
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

**Part (a)**

**10 marks**

**Att 4**

**Part (b)**

**40 (35, 5) marks**

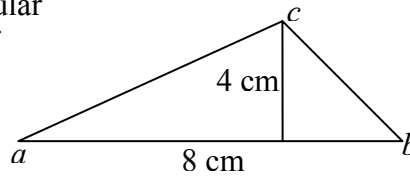
**Att 14, 2**

**Part (a)**

**10 marks**

**Att 4**

- (a) In the given triangle  $|ab| = 8$  cm and the perpendicular height of the triangle is 4 cm. Calculate the area of the triangle. Give the answer in  $\text{cm}^2$ .



**(a)**

**10 marks**

**Att 4**

$$\text{Area} = \frac{ah}{2} = \frac{8 \times 4}{2} = 16\text{cm}^2$$

*Blunders (-3)*

B1 Incorrect substitution.

B2 Omits the 2 or uses 2 incorrectly.

*Slips (-1)*

S1 Numerical errors to a max of 3.

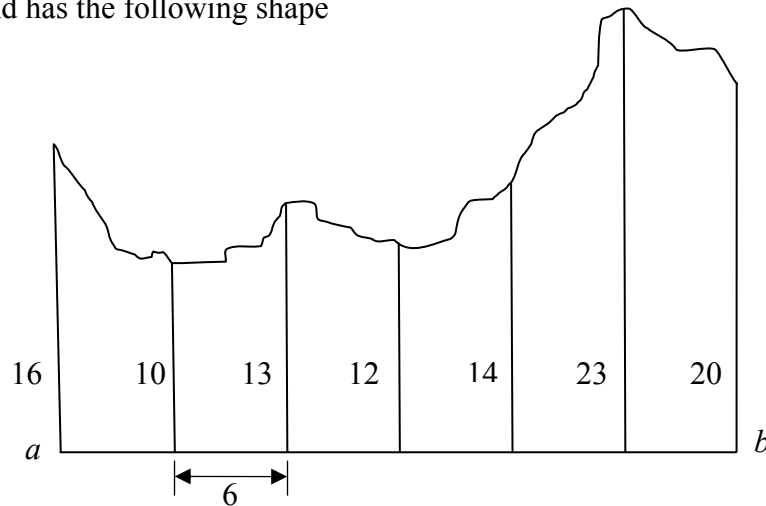
*Attempts (4)*

A1 Correct formula without substitution.

A2 Calculates perimeter.

A3 Copies diagram.

(a) A plot of land has the following shape



Offsets of lengths 16, 10, 13, 12, 14, 23 and 20 metres are measured at intervals of 6 metres along [ab] as shown.

- (i) Use Simpson's rule to calculate the area of the plot in m<sup>2</sup>.  
 (ii) The owner agrees to sell 108 m<sup>2</sup> of the plot to a neighbour. What percentage of the plot remains?

(i)

35 marks

Att 14

(ii)

5 marks

Att 2

$$\text{Area} = \frac{h}{3} [\text{First} + \text{last} + 2(\text{odd}) + 4(\text{even})]$$

$$\begin{aligned} \text{(i)} \quad &= \frac{6}{3} [16 + 20 + 2(13 + 14) + 4(10 + 12 + 23)] \\ &= 2[36 + 2(27) + 4(45)] = 2[36 + 54 + 180] = 2(270) = 540 \text{ m}^2 \end{aligned}$$

$$\text{(ii)} \quad \text{Remaining Plot} = (540 - 108) \text{ m}^2 = 432 \text{ m}^2$$

$$\text{Percentage} = \frac{432}{540} \times \frac{100}{1} = 80\%$$

### Blunders (-3)

- B1 Uses four odd and twice even e.g.  $2(45) + 4(27) = 90 + 108$ .  
 B2 Omits 2 or 4 in the formula or both.  
 B3 Omits  $h$  or uses an incorrect  $h$  or does not divide  $h$  by 3.  
 B4 Incorrect fraction.  
 B5 Omits the 100 or divides by 100.

### Slips (-1)

- S1 Each incorrect or omitted altitude.  
 S2 Numerical errors to a max of 3.  
 S3 Calculates % sold

### Attempts (14, 2)

- A1 Gives Simpson's Formula only.  
 A2 Copies diagram

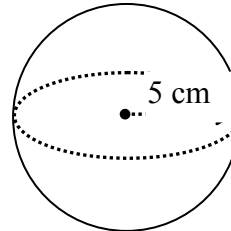


## QUESTION 2

<b>Part (a)</b>	<b>20 marks</b>	<b>Att 8</b>
<b>Part (b)</b>	<b>15 marks</b>	<b>Att 6</b>
<b>Part (c)</b>	<b>15 marks</b>	<b>Att 6</b>

**Part (a)** **20 marks** **Att 8**

2. (a) A sphere has a radius of 5 cm.  
Calculate the volume of the sphere,  
correct to the nearest  $\text{cm}^3$ .



**(a)** **20 marks** **Att 8**

$$(a) \text{ Volume} = \frac{4\pi r^3}{3} = \frac{4 \times \pi \times 5^3}{3} = \frac{500\pi}{3} \text{ or } 523.33\text{cm}^3 \approx 523\text{cm}^3$$

Note  $\pi = \text{calc } \pi$  gives 523.59 and  $\pi = \frac{22}{7}$  gives 523.8

*Blunders (-3)*

B1 Incorrect substitution.

*Slips (-1)*

S1 Numerical errors to a max of 3.

S2 Error in rounding or leaves in terms of  $\pi$ .

*Attempts (8)*

A1 Correct formula without substitution.

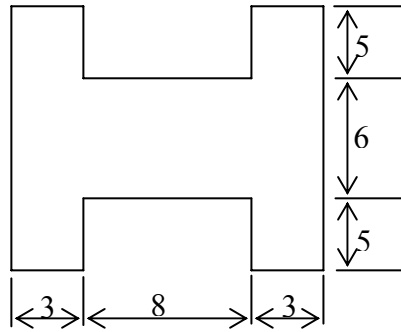
A2 Copies diagram.

**Part (b)****15 marks****Att 6**

The diagram shows a garden.  
The dimensions are given in metres.

Calculate the area of the garden.

Note: See formula sheet.

**(b)****15 marks****Att 6**

$$\begin{aligned}
 P &= a + 2r = 8 + 2(3) = 14\text{m} \\
 \text{Area} &= pq - 2ab \\
 &= 14 \times 16 - 2(8 \times 5) \quad \text{or} \\
 &= 224 - 80 = 144\text{m}^2
 \end{aligned}$$

$$\begin{aligned}
 q &= 2b + t = 2(5) + 6 = 16\text{m} \\
 \text{Area} &= at + 2qr \\
 &= 8 \times 6 + 2 \times 16 \times 3 \\
 &= 48 + 96 = 144\text{m}^2
 \end{aligned}$$

*Blunders (-3)*

- B1 Incorrect substitution.
- B2 Incorrect combination of areas.

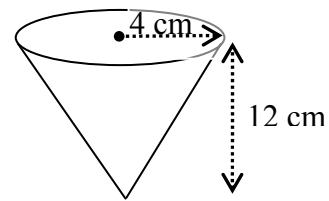
*Slips (-1)*

- S1 Numerical errors to a max of 3.

*Attempts (6)*

- A1 Correct formula without substitution.
- A2 Calculates perimeter.
- A3 Copies diagram.

(c) A solid metal cone has a radius of 4 cm and a vertical height of 12 cm.



- (i) Calculate the volume of the cone in terms of  $\pi$ .
- (ii) The cone is melted down and recast as a cylinder of radius 2.5 cm. Calculate the height of this cylinder.

(i)

10 marks

Att 4

$$(i) \text{ Volume} = \frac{\pi r^2 h}{3} = \frac{\pi \times 4^2 \times 12}{3} = 64\pi \text{ cm}^3$$

*Blunders (-3)*

B1 Incorrect substitution.

*Slips (-1)*

S1 Numerical errors to a max of 3.

S2 Omits  $\pi$  or gives answer as 201.06 or 200.96 or 201.14.*Attempts (4)*

A1 Correct formula without substitution.

A2 Copies diagram.

(ii)

5 marks

Att 2

$$\begin{aligned} \pi r^2 h &= 64\pi \\ (ii) \quad \pi(2.5)^2 h &= 64\pi \\ h &= \frac{64}{(2.5)^2} = 10.24 \text{ cm} \end{aligned}$$

*Blunders (-3)*

B1 Incorrect volume of cylinder.

B2 Error in balancing equation.

*Slips (-1)*

S2 Numerical errors to a max of 3.

*Attempts (2)*

A1 Correct formula without substitution.

A2 Correct volume of cylinder and stops.

### QUESTION 3

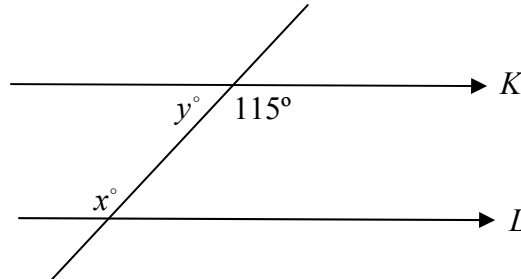
<b>Part (a)</b>	<b>15 marks</b>	<b>Att 6</b>
<b>Part (b)</b>	<b>20 marks</b>	<b>Att 8</b>
<b>Part (c)</b>	<b>15 marks</b>	<b>Att 6</b>

<b>Part (a)</b>	<b>15 (10, 5) marks</b>	<b>Att 4, 2</b>
-----------------	-------------------------	-----------------

3. (a) The lines  $K$  and  $L$  are parallel.

(i) Find the value of  $x$ .

(ii) Find the value of  $y$ .



<b>(i)</b>	<b>10 marks</b>	<b>Att 4</b>
<b>(ii)</b>	<b>5 marks</b>	<b>Att 2</b>

- |   |
|---|
| (i) $x^\circ = 115^\circ$ Alternate                 |
| (ii) $y^\circ = (180^\circ - 115^\circ) = 65^\circ$ |

*Blunders (-3)*

B1 Geometrical error.

*Slips (-1)*

S1 Numerical errors to a max of 3.

*Attempts (4, 2)*

A1 Incorrect answer of some merit.

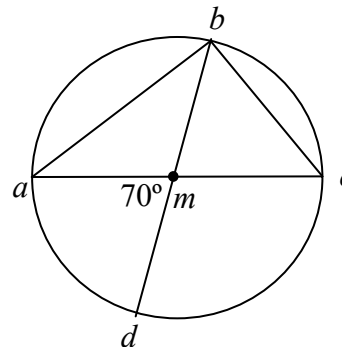
<b>Part (b)</b>	<b>20 (5, 5, 5, 5) marks</b>	<b>Att 2, 2, 2, 2</b>
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(b) The diagram shows a circle with centre  $m$ .

$a, b, c$  and  $d$  are points on the circle.

$[ac]$  and  $[bd]$  are diameters.

- (i) Write down the measure of the angle  $\angle abc$ .
- (ii) Name an isosceles triangle in the diagram
- (iii) Write down the measure of the angle  $\angle bmc$
- (iv) Write down the measure of the angle  $\angle mbc$



<b>Each part</b>	<b>5 marks</b>	<b>Att 2</b>
------------------	----------------	--------------

- |   |  |
|---|--|
| (i) $\angle abc = 90^\circ$ Angle in a semicircle | (ii) $\triangle abm$ or $\triangle bcm$ or similar               |
| (iii) $\angle bmc = 70^\circ$ vertically opposite | (iv) $\angle mbc = \frac{1}{2}(180^\circ - 70^\circ) = 55^\circ$ |

*Blunders (-3)*

B1 Geometrical error.

*Slips (-1)*

S1 Numerical errors to a max of 3.

*Attempts (2, 2, 2, 2)*

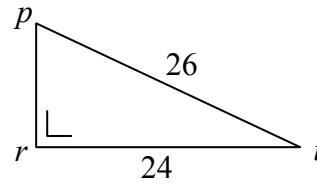
A1 Incorrect answer of some merit.

**Part (c)**

**15 marks**

**Att 6**

- (c) The diagram shows a right-angled triangle with  $|pt| = 26$  and  $|rt| = 24$ .  
Use the theorem of Pythagoras to find  $|pr|$



**(c)**

**15 marks**

**Att 6**

$$\begin{array}{l} (c) \quad |pr|^2 + 24^2 = 26^2 \qquad \text{or} \quad |pr|^2 + 576 = 676 \\ \qquad \qquad |pr|^2 = 26^2 - 24^2 \qquad \text{or} \quad |pr|^2 = 676 - 576 \\ \qquad \qquad \qquad |pr|^2 = 100 \\ \qquad \qquad \qquad |pr| = 10 \end{array}$$

*Blunders (-3)*

- B1 Any error in Pythagoras.
- B2 Mathematical error.
- B3 Error in balancing equation.

*Slips (-1)*

- S1 Numerical errors to a max of 3.

*Attempts (6)*

- A1 Incorrect answer of some merit.

## QUESTION 4

<b>Part (a)</b>	<b>10 marks</b>	<b>Att 4</b>
<b>Part (b)</b>	<b>20 marks</b>	<b>Att 8</b>
<b>Part (c)</b>	<b>20 marks</b>	<b>Att 8</b>

**Part (a)** **10 marks** **Att 4**

4. (a)  $p(0, 5)$  and  $q(4, -3)$  are two points.  
Find the slope of  $pq$

**(a)** **10 marks** **Att 4**

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - 5}{4 - 0} = \frac{-8}{4} \quad \text{or} \quad -2$$

*Blunders (-3)*

B1 Incorrect substitution once only.

*Slips (-1)*

S1 Numerical errors to a max of 3

*Attempts (4)*

A1 Draws axes.

(b)  $a$  is the point  $(-4, 2)$  and  $b$  is the point  $(2, 5)$ .

- (i) Plot the points  $a$  and  $b$  on graph paper  
 (ii) Find the co-ordinates of the midpoint of  $[ab]$   
 (iii) Find the length of  $[ab]$

(i)

10 marks

Att 4

(ii)

5 marks

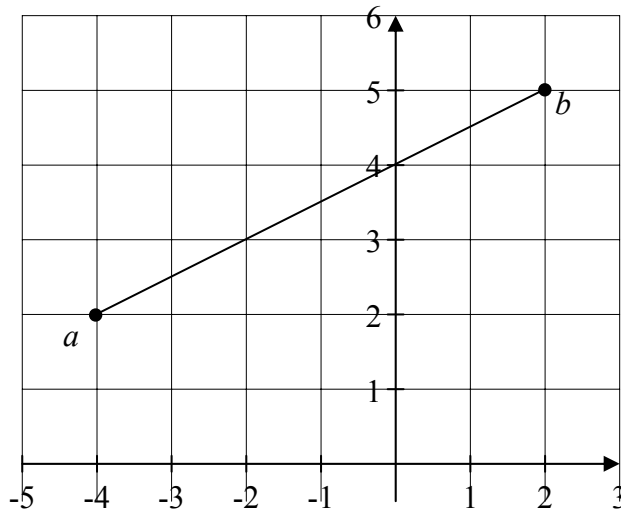
Att 2

(iii)

5 marks

Att 2

(i)



(ii) Midpoint =  $\left(\frac{-4+2}{2}, \frac{2+5}{2}\right) = \left(\frac{-2}{2}, \frac{7}{2}\right)$  or  $\left(-1, \frac{7}{2}\right)$

(iii)

$$\begin{aligned} \text{Length } [ab] &= \sqrt{(2 - (-4))^2 + (5 - 2)^2} \\ &= \sqrt{6^2 + 3^2} = \sqrt{36 + 9} = \sqrt{45} \end{aligned}$$

*Blunders (-3)*

- B1 Error in scales.  
 B2 Omits 2 in midpoint formula.  
 B3 Incorrect substitution once only.  
 B4 No square root.

*Slips (-1)*

- S1 Numerical errors to a max of 3.  
 S2 Each incorrectly plotted point.

*Attempts(4, 2, 2)*

- A1 Draws axes.

**Part (c)****20 (5, 5, 5, 5) marks****Att 2, 2, 2, 2**

- (c) The line  $K$  has equation  $y = 3x + 2$ .  
 The line  $L$  has equation  $2y = 6x - 1$ .  
 The point  $c$  has co-ordinates  $(1, 5)$ .
- (i) Show that the point  $c$  lies on the line  $K$ .  
 (ii) Write down the slope of  $K$ .  
 (iii) Write down the slope of  $L$ .  
 (iii) Are the lines  $K$  and  $L$  parallel? Explain your answer.

**Each part****5 marks****Att 2**

- (i)  $y = 3x + 2$   
 $5 = 3(1) + 2$  or  $5$
- (ii)  $y = 3x + 2$       Slope = 3
- (iii)  $2y = 6x - 1$   
 $y = 3x - \frac{1}{2}$   
 Slope = 3.
- (iv) Slope  $L =$  Slope  $K$        $\therefore$  parallel

*Blunders (-3)*

- B1 Incorrect substitution once only.  
 B2 In (ii) gives slope  $-3, \pm 1, \pm \frac{1}{3}$ .  
 B3 Error in balancing equation.  
 B4 In (iii) gives slope  $-3, \pm \frac{2}{6}, \pm 2, \pm 6$ .  
 B5 No reason or incorrect reason given.

*Slips (-1)*

- S1 Numerical errors to a max of 3.

*Attempts(2, 2, 2, 2)*

- A1 Draws axes.



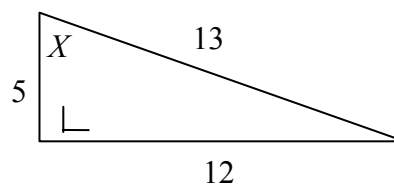
## QUESTION 5

<b>Part (a)</b>	<b>20 marks</b>	<b>Att 8</b>
<b>Part (b)</b>	<b>15 marks</b>	<b>Att 6</b>
<b>Part (c)</b>	<b>15 marks</b>	<b>Att 6</b>

**Part (a)** **20 (10, 10) marks** **Att 4, 4**

5. (a) The diagram shows a right-angled triangle with sides of length 5, 12 and 13 and an angle  $X$

- (i) Write down the length of the hypotenuse.  
(ii) Write down  $\cos X$  as a fraction.



**Each part** **10 marks** **Att 4**

- (i) Length of hypotenuse = 13  
(ii)  $\cos X = \frac{5}{13}$

*Blunders (-3)*

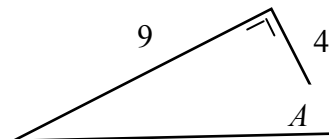
- B1 Gives answer 5 or 12.  
B2 Uses incorrect numerator or denominator.

*Slips (-1)*

- S1 Calculates the angle approx  $67^\circ$   
S2 Answer not in fraction form.

*Attempts(4, 4)*

- A1 Defines *cos*.

**Part (b)****15 (10, 5) marks****Att 4, 2****(b)** In the diagram, find**(i)**  $\tan A$ .**(ii)** the measure of the angle  $A$ ,  
correct to the nearest degree.**(i)****10 marks****Att 4****(ii)****5 marks****Att 2**

**(i)**  $\tan A = \frac{9}{4}$  or 2.25

**(ii)**  $A = \tan^{-1} 2.25 = 66.037^\circ \approx 66^\circ$

*Blunders (-3)*

B1 Uses incorrect numerator or denominator.

B2 Error in balancing equation.

*Slips (-1)*

S1 Fails to round off

S2 Numerical errors to a max of 3

S3 Wrong mode.

Wrong mode

Rad:  $A = 1.152 \approx 1$ Grad:  $A = 73.37 \approx 73$ *Attempts (4, 2)*A1 Defines  $\tan$ .

Part (c)

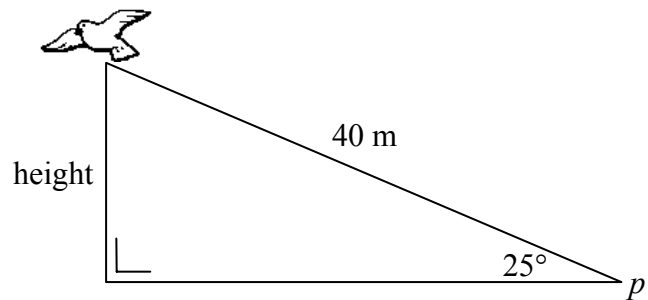
15 marks

Att 6

- (c) A bird takes flight from a point  $p$  on the ground. The bird rises at an angle of  $25^\circ$  to the ground.

After flying 40 metres, what is the bird's height above the ground?

Give your answer to the nearest metre.



(c)

15 marks

Att 6

(c)

$$\begin{aligned}\frac{\text{Height}}{40} &= \sin 25^\circ \\ \text{Height} &= 40 \sin 25^\circ \\ &= 40(0.4226) \\ &= 16.904 \text{ m} \\ &\approx 17\text{m}\end{aligned}$$

*Blunders (-3)*

- B1 Incorrect trig ratio.  
B2 Error in balancing equation.

*Slips (-1)*

- S1 Fails to round off.  
S2 Wrong mode.

Wrong mode  
Rad:  $h = -5.294 \approx -5$   
Grad:  $h = 15.307 \approx 15$

*Attempts (6)*

- A1 Measures from diagram.  
A2 Evaluates  $\sin 25^\circ$ ,  $\cos 25^\circ$  or  $\tan 25^\circ$  and stops.

## QUESTION 6

<b>Part (a)</b>	<b>10 marks</b>	<b>Att 4</b>
<b>Part (b)</b>	<b>20 marks</b>	<b>Att 8</b>
<b>Part (c)</b>	<b>20 marks</b>	<b>Att 8</b>

**Part (a)** **10 marks** **Att 4**

- (a) A restaurant makes six varieties of pizza. Each of these is available in three different sizes.  
How many different pizzas can be made?

(a) **10 marks** **Att 4**

Ans:  $6 \times 3$  or 18

*Blunders (-3)*

B1  $6 + 3 = 9$  or 9 written down.

B2  $6! \times 3!$

*Slips (-1)*

S1 Numerical errors to a max of 3.

*Attempts(4)*

A1 Incorrect answer of some merit.

**Part (b)** **20 (5, 5, 5, 5)** **Att 2, 2, 2, 2**

- (b) Noreen bought a packet of flavoured sweets. There were 11 sweets in the packet: 4 apple sweets, 2 cherry sweets, 2 raspberry sweets and 3 pineapple sweets. Noreen takes one sweet at random from the packet.
- Find the probability that it is apple flavoured.
  - Find the probability that it is cherry or pineapple flavoured.
  - Find the probability that it is **not** raspberry flavoured.
  - Which two flavours have the same probability of being picked?

**Each part** **5 marks** **Att 2**

Ans : (i)  $\frac{4}{11}$  (ii)  $\frac{5}{11}$  (iii)  $\frac{9}{11}$  (iv) *Cherry, Raspberry*

*Blunders(-3)*

B1 Incorrect n(S) apply once only.

B2 Incorrect n(E).

B3 Inverted fraction.

B4 No division.

*Slips (-1)*

S1 Numerical errors to a max of 3.

*Attempts (2, 2, 2, 2)*

A1 Incorrect answer of some merit.

Answers:(i) 4 (ii) 5 (iii) 9 merits 12 marks

or

Answers:(i)  $\frac{1}{4}$  (ii)  $\frac{1}{5}$  (iii)  $\frac{1}{9}$  merits 12 marks

**Part (c)****20 (5, 5, 5, 5)****Att 2, 2, 2, 2**

(c) Among a group of students, 50 are planning to travel abroad during the summer. The table shows where they plan to go.

	Spain	Greece	England
Boys	7	6	10
Girls	17	8	2

One of the fifty is chosen at random.

Find the probability that the student chosen is

- (i) a boy planning to visit England
- (ii) a person planning to visit Spain
- (iii) a girl
- (iv) a person who is not planning to visit Greece.

**Each part****5 marks****Att 2**

$$\text{Ans : (i) } \frac{10}{50} \quad \text{(ii) } \frac{24}{50} \quad \text{(iii) } \frac{27}{50} \quad \text{(iv) } \frac{36}{50}$$

*Blunders (-1)*

- B1 Incorrect n(S) apply once only.
- B2 Incorrect n(E).
- B3 Inverted fraction.
- B4 No division.

*Slips (-1)*

- S1 Numerical errors to a max of 3.

*Attempts (2, 2, 2, 2)*

- A1 Incorrect answer of some merit.

Answers: (i) 10 (ii) 24 (iii) 27  
(iv) 36 merits 17 marks

Answers: (i)  $\frac{1}{10}$  (ii)  $\frac{1}{24}$   
(iii)  $\frac{1}{27}$  (iv)  $\frac{1}{36}$  merits 17 marks

## QUESTION 7

<b>Part (a)</b>	<b>10 marks</b>	<b>Att 4</b>
<b>Part (b)</b>	<b>25 marks</b>	<b>Att 10</b>
<b>Part (c)</b>	<b>15 marks</b>	<b>Att 6</b>

**Part (a)** **10 marks** **Att 4**

(a) Find the mean of the five numbers 12, 13, 17, 18, 20.

(a) **10 marks** **Att 4**

(a)  $Mean = \frac{12+13+17+18+20}{5} = \frac{80}{5} \text{ or } 16$

*Slips (-1)*

S1 Numerical errors to a max of 3.

*Attempts (4)*

A1 Any addition.

A2 Writes median = 17.

**Part (b)** **25 (5, 10, 5, 5) marks** **Att 2, 4, 2, 2**

(b) The following table is a record of the number of visits each of 80 students made to the cinema last year:

Number of visits to the cinema	0 - 10	11 - 20	21 - 30	31 - 40	41 - 50
Number of students	6	22	35	12	5

Copy and complete the cumulative frequency table below.

Number of visits to the cinema	≤ 10	≤ 20	≤ 30	≤ 40	≤ 50
Number of students					

Draw the cumulative frequency curve with the number of students on the vertical axis. Use your curve to estimate

- (i) the median number of visits that the students made to the cinema.
- (ii) the number of students who went to the cinema more than 35 times in the year.

**Cumulative Table** **5 marks** **Att 2**

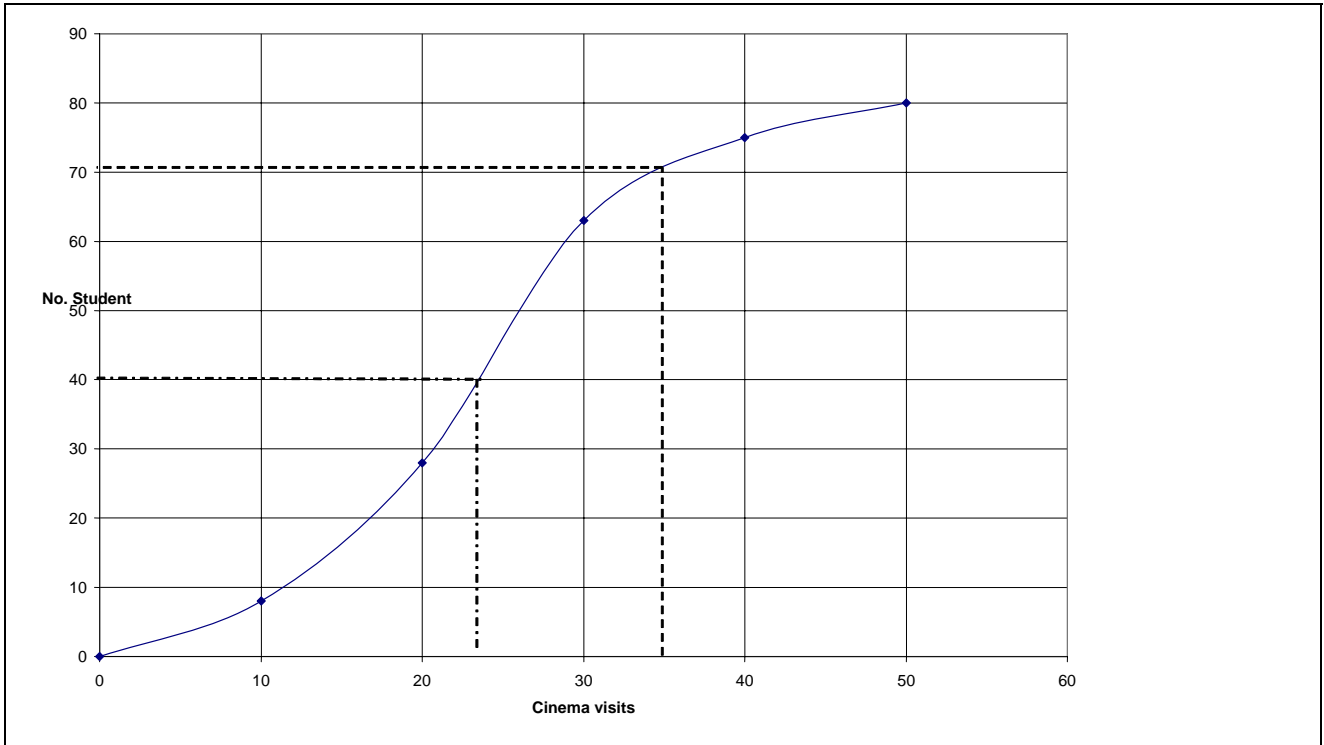
Number of visits to the cinema	≤10	≤20	≤30	≤40	≤50
Number of students	6	28	63	75	80

*Slips (-1)*

S1 Each incorrect or omitted value in the table

*Attempts (2)*

A1 Copies table

*Blunders (-3)*

- B1 Plots on the midpoints
- B2 Error in scales, one blunder
- B3 Points not joined
- B4 Uses wrong axis for median.

Tolerance  $\pm 2$ *Slips (-1)*

- S1 Each incorrectly plotted point
- S2 Reverses axes
- S3 Joins points with straight lines.

## Attempts (4)

- A1 Draws axes only

**Each part****5 marks****Att 2**

- (i) Median = 24                      (ii) More than 35 visits =  $80 - 71 = 9$

*Blunders (-3)*

- B1 Uses wrong axis for median.

*Slips (-1)*

- S1 Median not specified
- S2 Fails to subtract reading in (ii)

(c) Find the standard deviation of the numbers 4, 7, 8, 9 correct to one decimal place.

**Standard Deviation**

15 marks

Att 6

$$\text{Mean} = \frac{4+7+8+9}{4} = 7$$

Standard Deviation

$$\sigma = \sqrt{\frac{(4-7)^2 + (7-7)^2 + (8-7)^2 + (9-7)^2}{4}}$$

$$= \sqrt{\frac{9+0+1+4}{4}}$$

$$= \sqrt{\frac{14}{4}}$$

$$= \sqrt{3.5} = 1.870$$

$$= 1.9$$

*Blunders (-3)*

B1 Incorrect mean.

B2 Incorrect substitution.

*Slips (-1)*

S1 Numerical errors to a max of 3

*Attempts (6)*

A1 Any addition

A2 Work on SD or defines SD.



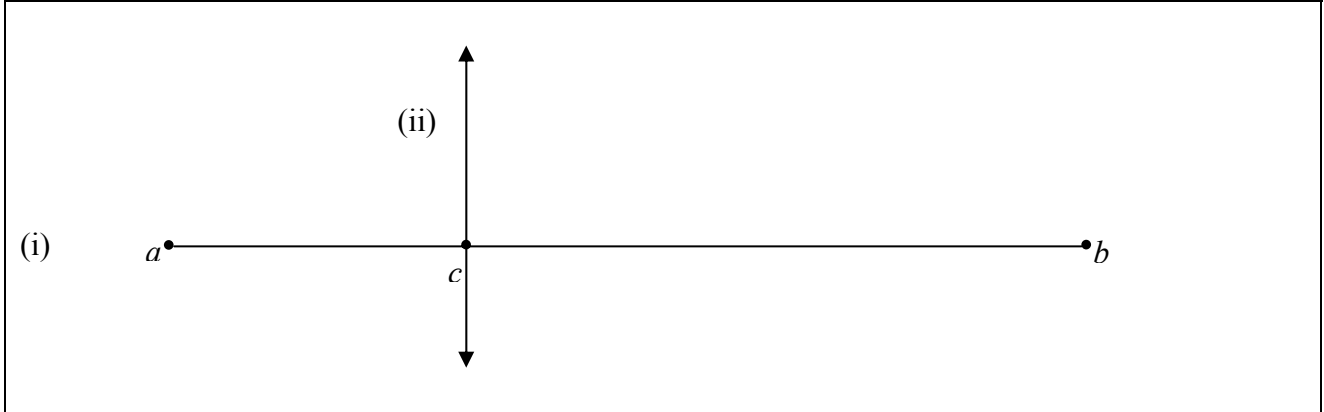
## QUESTION 8

<b>Part (a)</b>	<b>15 marks</b>	<b>Att 6</b>
<b>Part (b)</b>	<b>20 marks</b>	<b>Att 8</b>
<b>Part (c)</b>	<b>15 marks</b>	<b>Att 6</b>

**Part (a)** **15 (5, 10) marks** **Att 2, 4**

- (a) (i) Construct a line segment  $[ab]$  of length 12cm  
(ii) Mark any point  $c$  on the line segment. Construct a line through  $c$  perpendicular to  $[ab]$

(i) **5 marks** **Att 2**  
(ii) **10 marks** **Att 4**



*Blunders(-3)*

B1  $c \notin [ab]$

B2 Line not perpendicular.

Tolerance  $\pm 0.5$  cm

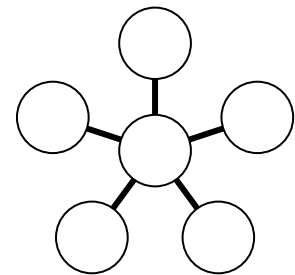
*Slips (-1)*

S1 Diagram not labelled.

S2 Length outside tolerance.

**Part (b)** **20 (10, 10) marks** **Att 4, 4**

- (b) The diagram on the right shows the pattern for a logo.



- (i) How many axial symmetries does the logo have?  
(ii) What is the smallest angle of rotation about the centre that will map the logo onto itself?

**Each part** **10 marks** **Att 4**

(b) (i) 5                      (ii)  $\frac{360^\circ}{5} = 72^\circ$

*Blunders(-3)*

B1 Answer greater than 5

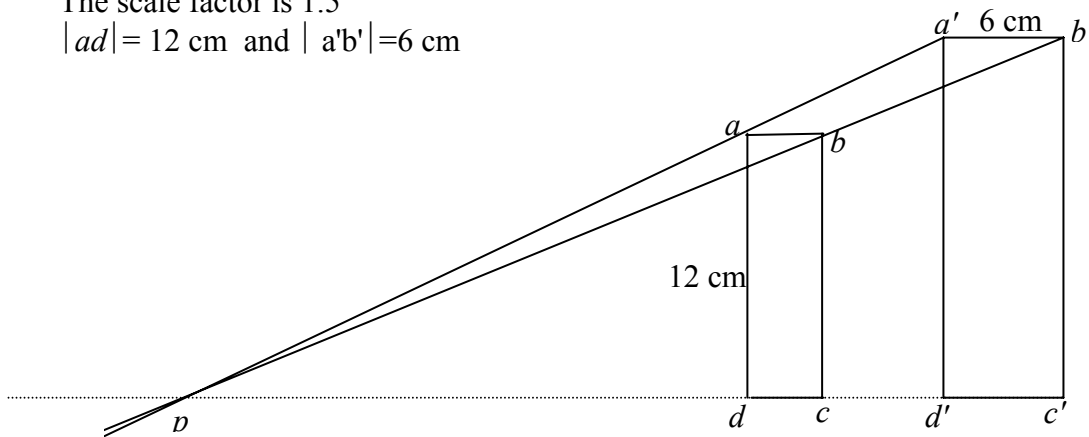
*Slips (-1)*

S1 Each symmetry omitted.

- (c) The rectangle  $a'b'c'd'$  is the image of the rectangle  $abcd$  under an enlargement with centre  $p$ .

The scale factor is 1.5

$$|ad| = 12 \text{ cm and } |a'b'| = 6 \text{ cm}$$



- (i) Find the length of  $[a'd']$   
 (ii) Find the length of  $[ab]$   
 (iii) Write as a fraction in its simplest form  

$$\frac{\text{area rectangle } a'b'c'd'}{\text{area rectangle } abcd}$$

Each part

5 marks

Att 2

(i)  $|a'd'| = 12 \times 1.5 = 18 \text{ cm}$

(ii)  $|ab| = \frac{6}{1.5} = 4 \text{ cm}$

(iii)  $(1.5)^2 = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$       or       $\frac{18 \times 6}{12 \times 4} = \frac{108}{48} = \frac{9}{4}$

*Blunders (-3)*

- B1 Uses incorrect scale factor  
 B2 Does not square scale factor  
 B3 Error in area formula.

*Slips (-1)*

- S1 Numerical errors to a max of 3  
 S2 Multiplication for division or vice versa.  
 S3 Not in simplest form.

*Attempts (2, 2, 2)*

- A1 Incorrect answer of some merit.

## MARCANNA BREISE AS UCHT FREAGAIRT TRÍ GHAELGE

### (Bonus marks for answering through Irish)

Ba chóir marcanna de réir an ghnáthráta a bhronnadh ar iarrthóirí nach ngnóthaíonn thar 75% d'iomlán na marcanna don pháipéar. Ba chóir freisin an marc bónais sin a shlánú **síos**.

Déantar an cinneadh agus an ríomhaireacht faoin marc bónais i gcás gach páipéar ar leithligh.

Is é 5% an gnáthráta agus is é 300 iomlán na marcanna don pháipéar. Mar sin, bain úsáid as an ngnáthráta 5% i gcás marcanna suas go 225. (e.g.  $198 \text{ marks} \times 5\% = 9.9 \Rightarrow \text{bónas} = 9 \text{ marc.}$ )

Thar 225, is féidir an bónas a ríomh de réir na foirmle seo:  $[300 - \text{bunmharc}] \times 15\%$ , (agus an marc sin a shlánú **síos**). In ionad an ríomhaireacht sin a dhéanamh, is féidir úsáid a bhaint as an tábla thíos.

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

