



Coimisiún na Scrúduithe Stáit  
State Examinations Commission

**LEAVING CERTIFICATE 2009**

**MARKING SCHEME**

**MATHEMATICS**

**FOUNDATION LEVEL**



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## 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.

## QUESTION 1

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

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

Find  $\sqrt{246 \cdot 8}$ , correct to two decimal places.

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

**(i)**  $\sqrt{246 \cdot 8} = 15.70986951\dots = \mathbf{15.71}$

\* Accept correct answer with no work.

### *Blunders (-3)*

B1  $\sqrt{2468} = [49.678969\dots] = 49.68.$

B2  $\sqrt{24 \cdot 68} = [4.967896\dots] = 4.97.$

B3  $\sqrt{2 \cdot 468} = [1.570986\dots] = 1.57.$

B4  $\sqrt{0 \cdot 2468} = [0.496789\dots] = 0.50.$

B5 Root other than square root indicated and correctly worked.  $\sqrt[3]{246 \cdot 8} = 6.27.$

B6 Incorrect or omitted rounding-off.

### *Misreadings (-1)*

M1  $\sqrt{248 \cdot 6} = [15.767054\dots] = 15.77.$

M2  $\sqrt{426 \cdot 8} = [20.659138\dots] = 20.66.$

### *Attempts (4 marks)*

A1  $(246 \cdot 8)^2 = 60910 \cdot 24$

A2  $246 \cdot 8 / 2 = 123 \cdot 4.$

A3  $246 \cdot 8 \times 2 = 493 \cdot 6.$

A4 Work at estimating answer:  $\sqrt{246 \cdot 8} = 16.$

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

A6 An incorrect figure correctly rounded off, to two decimal places.

A7 Any other answers as B1, B2, B3 and B4 but with misplaced decimal point and no work shown.

### *Worthless (0 marks)*

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

Find the exact value of  $\frac{1}{(0.4)^2} - (1.7)^2$ .

(ii)

10 marks

Att 4

$$(ii) \quad \frac{1}{0.16} - 2.89 = 6.25 - 2.89 = \mathbf{3.36} \text{ or } 3\frac{9}{25} \text{ or } \frac{84}{25}$$

\* Accept correct answer with no work.

*Blunders (-3)*

$$B1 \quad \frac{1}{(0.4)^2} - (17)^2 = 6.25 - 289 = -282.75.$$

$$B2 \quad \frac{1}{4^2} - (1.7)^2 = 0.0625 - 2.89 = -2.8275.$$

$$B3 \quad \frac{1}{(.04)^2} - (1.7)^2 = 625 - 2.89 = 622.11.$$

$$B4 \quad \frac{1}{(0.4)^2} - (0.17)^2 = 6.25 - 0.0289 = 6.2211.$$

B5 Only one Square evaluated. [-0.39 or 4.45 as answers]

B6 Reciprocal not found. [-2.73 as answer.]

B7 No subtraction.

B8 Error in precedence e.g.  $1 - (1.7)^2 \div (0.4)^2 = -17.0625$

$$B9 \quad \frac{1 - (1.7)^2}{(0.40)^2} = -11.8125$$

*Misreadings (-1)*

$$M1 \quad \frac{1}{(0.4)^2} - (7.1)^2 = 6.25 - 50.41 = -44.16.$$

M2 Subtraction reversed to give -3.36.

*Slips (-1)*

S1 Numerical errors to a max of -3.

*Attempts (4 marks)*

A1 Work at estimating answer: e.g. .16 or 4.

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

A3 No square evaluated.

*Worthless (0 marks)*

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

Part (iii)

10 marks

Att 4

Find  $(7.91)^3$ , correct to three decimal places.

Part (iii)

10 marks

Att 4

(iii)  $(7.91)^3 = 494.913671\dots = 494.914$

\* Accept correct answer with no work.

*Blunders (-3)*

B1 Incorrect or omitted rounding off.

B2 Power ( $\in N$ ) greater than 1 (other than 3) indicated and correctly worked.

B3  $(791)^3 = 494913671$

B4  $(79.1)^3 = 494913.671$

B5  $(0.791)^3 = 0.495$

*Misreadings (-1)*

M1  $(7.19)^3 = 371.695$

*Attempts (4 marks)*

A1  $7.91 \times 3 = 23.73$  whether given correct to three decimal places or not.

A2  $7.91/3 = 2.63666\dots$  whether given correct to three decimal places or not.

A3  $\sqrt[3]{7.91} = 1.99247\dots$  whether given correct to three decimal places or not.

A4  $7.91 \times 10^3 = 7910$ .

A5 Work at estimating answer: e.g.  $(8)^3 = 512$ .

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 three decimal places.

*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  $14 \cdot 2 - 2 \cdot 7 \div 0 \cdot 3$

(iv)

10 marks

Att 4

(iv)  $14 \cdot 2 - 2 \cdot 7 \div 0 \cdot 3 = 14 \cdot 2 - 9 = 5 \cdot 2$

\* Accept correct answer with no work.

*Blunders (-3)*

B1 Error in precedence:  $11 \cdot 5 \div 0 \cdot 3 = 38 \cdot 333333 \dots = 38 \frac{1}{3}$  [ $38 \cdot 3 \Rightarrow 7$  marks].

B2 Any step omitted.

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

B4 A different ordering of the numbers indicated and correctly worked out.

*Misreadings (-1)*

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

M2 Answer given as  $-5 \cdot 2$ .

*Attempts (4 marks)*

A1 Work at estimating answer: e.g.  $14 - 3 \div 0 \cdot 3 = 4$  or  $36 \cdot 6666$ .

A2 Work towards some correct step: e.g. division begun.

A3 38 only.

*Worthless (0 marks)*

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

(v) Find 21.5% of €300.

(v)

10 marks

Att 4

(v)  $\frac{300 \times 21.5}{100} = \mathbf{€64.5}$ .  $300 \times 0.215 = \mathbf{€64.5}$ .

- \* Accept correct answer with no work.
- \* An answer of 1395.35 is found from  $300 \div 21.5$  followed by use of the percentage key  $\Rightarrow$  7 marks.
- \* An answer of 13.95 is found from  $300 \div 21.5$  followed by use of the percentage key and then the “=” key  $\Rightarrow$  4 marks.
- \* 6450 (no units)  $\Rightarrow$  10 marks.

*Blunders (-3)*

B1  $300 \times 1.215 = 364.5$ .

B2  $300 \times 0.785 = 235.5$ .

B3  $\frac{300 \times 21.5}{100}$  or  $300 \times 0.215$  and stops.

B4 Errors in establishing  $\frac{300 \times 21.5}{100}$ . [All three elements must be present otherwise attempt only]

*Attempts (4 marks)*

A1 Gets 1% (= 3) and stops.

*Worthless (0 marks)*

W1  $300 \pm 21.5$ .

**Part (vi)**

**10 marks**

**Att 4**

Find the value in euro of \$240, given that €1 = \$1.47.  
Give your answer correct to the nearest cent.

**Part (vi)**

**10 marks**

**Att 4**

$$(vi) \quad \frac{240}{1.47} = 163.2653061\dots = \mathbf{\text{€}163.27}$$

$$\frac{240}{0.0147} = 16326.53061 = 16326.53c = \text{€}163.27.$$

\* Accept correct answer with no work.

\* 16327 c  $\Rightarrow$  9 marks.

*Blunders (-3)*

B1  $240 \times 1.47 = 352.8.$

B2  $\frac{1.47}{240} = 0.006125,.$

B3 Incorrect or no rounding off.

B4 Division not finished or finished incorrectly.

*Slips (-1)*

S1 Answer given in cents.

*Attempts (4 marks)*

A1 Some use of the given data.

*Worthless (0 marks)*

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

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

A train journey begins at 13:00 and finishes at 15:30.  
The average speed of the train for this journey is 60 km per hour.  
How far does the train travel?

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

**(vii)** JourneyTime = 2hrs 30 min = 2.5 hrs

$$s = d/t \Rightarrow d = s \times t \Rightarrow d = 60 \times 2.5 = \mathbf{150 \text{ km.}}$$

\* Accept correct answer with no work.

*Blunders (-3)*

- B1 Error in evaluation of journey time.
- B2 Treating 2hrs 30 min as 2.3 hrs  $\Rightarrow$  138 km as answer.
- B3 Misuse of  $s = d/t$ . e.g.  $60 \div 2.5 = 24$  km.
- B4  $60 \times 2.5$  and stops.

*Slips (-1)*

- S1 Numerical errors to a max of -3.
- S2 No units or incorrect units given.

*Attempts (4 marks)*

- A1 Evaluation of journey time and stops.
- A2 Some use of given data.
- A3  $s = d/t$  or  $d = s \times t$  written down and no more.

*Worthless (0 marks)*

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

Part (viii)

10 marks

Att 4

Harry spent  $\frac{1}{3}$  of his money. He then had €15.60

How much money did he start with?

Part (viii)

10 marks

Att 4

$$\text{(viii)} \quad \frac{2}{3} = 15.60 \Rightarrow \frac{1}{3} = 7.8 \Rightarrow \frac{3}{3} = \mathbf{€23.4} \text{ or } 7.8 + 15.6 = \mathbf{€23.4}.$$

\* Accept correct answer with no work

*Blunders (-3)*

B1  $\frac{1}{3} = 15.60 \Rightarrow \frac{3}{3} = €46.8.$

B2  $1 - \frac{1}{3}$  incorrect.

B3 7.8 and stops.

B4  $15.6 \div 2 = 5.2 + 15.6 = 20.8$  or  $15.6 \div 3 = 5.2 \times 4 = 20.8.$

*Slips (-1)*

S1 Numerical errors to a max – 3.

*Attempts (4 marks)*

A1  $15.6/3 = €5.2$  and stops.

A2 Some use of the given data.

*Worthless (0 marks)*

W1 Incorrect answer with no work.

Part (ix)

10 marks

Att 4

Find  $\frac{(4.5 \times 10^6) - (5.8 \times 10^5)}{2.4 \times 10^3}$  correct to two significant figures.

Part (ix)

10 marks

Att 4

(ix)  $\frac{3.92 \times 10^6}{2.4 \times 10^3} = 1.63333333... \times 10^3 = 1633 = \mathbf{1600}.$

$$\frac{4500000 - 580000}{2400} = \frac{3920000}{2400} = 1633.33333... = 1633 = \mathbf{1600}.$$

\* Accept correct answer with no work.

*Blunders (-3)*

- B1 Error in precedence.
- 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 0.000612244... 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).
- B7  $\frac{3920000}{2400}$  and stops. [ note B8]

*Slips (-1)*

- S1 Numerical slips (to a max of - 3).
- S2 Answer not correct to two significant figures.

*Attempts (4 marks)*

- A1  $10^6$  treated as 60,  $10^5$  treated as 50 and/or  $10^3$  treated as 30.
- A2 Some work towards estimation.
- A3  $10^6$  as  $10 \times 10 \times 10 \times 10 \times 10 \times 10$ , and/or likewise with  $10^5$  and  $10^3$ .
- A4 An incorrect number correctly rounded off to two significant figures.

*Worthless (0 marks)*

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

Part (x)

10 marks

Att 4

Find  $\frac{(38 \cdot 7)(15 \cdot 9)}{10 \cdot 2 - 4 \cdot 7}$ , correct to the nearest integer

Part (x)

10 marks

Att 4

$$(x) \quad \frac{615 \cdot 33}{5 \cdot 5} = 111 \cdot 8781818... = \mathbf{112}$$

\*Accept correct answer with no work.

$$* \frac{(38 \cdot 7)(15 \cdot 9)}{10 \cdot 2} - 4 \cdot 7 = 55 \cdot 626 = 56 \Rightarrow 7 \text{ marks.}$$

*Blunders (-3)*

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

$$B2 \quad \frac{5 \cdot 5}{615 \cdot 33} = 0.008938293 = 0.$$

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

B4 Any step omitted e.g.  $615 \cdot 33 / 5 \cdot 5$  and stops. [ Note B6]

B5 Any incorrect rounding off within the working. (Once only)

*Slips (-1)*

S1 Numerical errors to a max of -3.

S2 Incorrect or no rounding off.

*Misreadings (-1)*

M1 Clear and obvious misreading not involving the decimal point.

*Attempts (4 marks)*

A1 Work at estimating answer.

A2 An incorrect number correctly rounded off to nearest integer.

*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>20 (10, 5, 5) marks</b>	<b>Att (4, 2, 2)</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)** Change to metres

**(i)** 1.56 km

**(ii)** 4900 mm

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

**(a) (i)**  $1.56 \times 1000 = 1560 = \mathbf{1560 \text{ metres.}}$

**(ii)**  $\frac{4900}{1000} = 4.9 = \mathbf{4.9 \text{ metres.}}$

\* Accept correct answer with no work.

\* Accept answers given without units.

### *Blunders (-3)*

B1 Incorrect conversion factor.

B2 Misuse of conversion factor: e.g.  $1.56 \div 1000 = 0.0015$ .

B3 Misuse of conversion factor: e.g.  $4900 \times 1000 = 4900000$ .

### *Slips (-1)*

S1 Numerical errors.

S2 Answer given as 4 m 90 cm.

### *Attempts (2 marks)*

A1 Use of given data [Covers both parts].

### *Worthless (0 marks)*

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

**Part (b)****20(10, 5, 5) marks****Att (4, 2, 2)****(b)** The following information was used to calculate the cost of gas used by a family:

Previous meter reading	125689
Present meter reading	127312
First 700 units charged at	4.5 cent per unit
Remaining units charged at	3.6 cent per unit.

- (i)** Calculate the number of units used between these two meter readings.  
**(ii)** Calculate the cost of the first 700 units used.  
**(iii)** Calculate the cost of all the units used between these two readings, correct to the nearest cent.

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

<b>(b)(i)</b>	$127312 - 125689 = 1623$
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\* Accept correct answer without work.

*Blunders (-3)*

B1  $127312 + 125689 = 253001$

*Slips (-1)*

S1  $125689 - 127312 = -1623.$

S2 Decimal error.

S3 Numerical errors to a max of  $-3$ .*Attempts (4 marks)*

A1 Some use of the given data.

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

<b>(b)(ii)</b>	$700 \times 4.5 = 3150 \text{ cent or } \text{€}31.50.$
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\* Accept correct answer without work.

*Blunders (-3)*

B1 Incorrect multiplier.

*Slips (-1)*

S1 Decimal error.

S2 Numerical errors to a max of  $-3$ .*Attempts (2 marks)*

A1 Some use of the given data.

**(b)(iii)**

**5 marks**

**Att 2**

**(b)(iii)**      Units @ 3·6 cent:  $1623 - 700 = 923$  units.  
Cost of 700 units @ 4·5 cent per unit = 3150 cent.  
Cost of 923 units @ 3·6 cent per unit = 3322·8 cent.  
Total Cost =  $3150 + 3322·8 = 6472·8 = \mathbf{6473 \text{ cent}}$  or **€64·73**

- \* Accept correct answer without work.
- \* Accept candidate's answers from **parts (i) and (ii)**.

*Blunders (-3)*

- B1  $700 \times 4·5 + 923 \times 3·6$  and stops.
- B2 Any error(s) in calculation of  $700 \times 4·5 + 923 \times 3·6$ . (to a max -3)
- B3 Incorrect break up of 1623 units.
- B4 Incorrect multiplier e.g. 8·1.

*Slips(-1)*

- S1 Decimal error.
- S2 Numerical errors to a max of -3.

*Attempts (2 marks)*

- A1 1623 units not broken into 700 and additional units.
- A2  $700 \times 4·5 = 3150$  and stops.
- A3  $923 \times 3·6 = 33322·8$  and stops.
- A4  $1623 = 700 + 923$  and stops.
- A5 Some use of the given data.

**Part (c)****20(10, 5, 5) marks****Att (4, 2, 2)****(c)** Tom earns €650 per week and has tax credits of €78 per week.

- (i)** The rate of tax is 20%. How much tax does Tom pay per week?
- (ii)** Find his weekly take home pay.
- (iii)** What percentage of his total pay is paid in tax?

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

**(c)(i)** Gross tax:  $650 \times 0.2 = 130$   
 Tax payable:  $130 - 78 = \mathbf{€52}$

\* Accept correct answer without work.

\* **Part (ii)** must be shown separately to earn marks for that section.*Blunders (-3)*B1 Error in calculating % e.g.  $650 \times 1.20$ .

B2 Adds tax credit to gross tax. (208).

B3 €598 given as tax payable.

B4  $650 - 130 = 520 + 78 = 598 \Rightarrow 7$  marks for **part (i)***Slips (-1)*

S1 Decimal error.

S2 Numerical errors to a max of -3.

*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.

**(c)(ii)****5 marks****Att 2****(c)(ii)** Take-home pay:  $650 - 52 = \mathbf{€598}$ 

\* Accept correct answer without work

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

*Blunders (-3)*B1  $650 + 52 = 702$ 

B2 Uses wrong Gross wage.

B3 Uses a Tax other than that calculated in **(b) (i)** above.

B4 Subtraction not completed.

*Slips (-1)*

S1 Numerical errors to a max of -3.

*Attempts (2 marks)*

A1 Some spurious number subtracted from Gross wage

*Worthless (0 marks)*

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

**(c)(iii)**

**5 marks**

**Att 2**

<b>(c)(iii)</b>	$\frac{52}{650} \times 100 = 8\%$
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- \* Accept correct answer without work.
- \* Accept candidate's answer from part **(i)**.

*Blunders (-3)*

- B1 Errors in establishing  $\frac{52}{650} \times 100$  [ All three elements must be present otherwise att only]
- B2 Uses wrong Gross wage.
- B3 Uses a Tax other than that calculated in **(b) (i)** above.

*Slips (-1)*

- S1 Numerical errors to a max of -3.

*Attempts (2 marks)*

- A1 Some use of 100.

*Worthless (0 marks)*

- W1 Incorrect answer with no work shown.

### QUESTION 3

<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)** A teacher estimates that a particular exam will take the students 1 hour to complete. The students actually finish the exam in 50 minutes.

- (i)** Find the error in the estimate given by the teacher.
- (ii)** Find the percentage error.

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

**(i)** **10 minutes**

\* Accept correct answer with no work.

*Blunders (-3)*

B1 60 – 50 and stops.

B2 50 – 1 = 49.

*Slips (-1)*

S1 Numerical errors to a max of –3.

*Attempts (2 marks)*

A1 Some use of the given data.

*Worthless (0 marks)*

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

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

**(ii)** Percentage error =  $\frac{10}{50} \times 100 = 20\%$

\* Accept correct answer with no work.

*Blunders (-3)*

B1 Error(s) in establishing  $\frac{10}{50} \times 100$  [All three elements must be present; otherwise attempt only].

B2 Incorrect or incomplete answer or no answer. [Use candidate's answer from Part **(a) (i)**].

*Worthless (0 marks)*

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

(b) €5200 is invested for four years at 2.5% per annum compound interest.  
What was the total value of the investment at the end of the four years, correct to the nearest cent.

(b) **Substitute into formula** **10 marks** **Att 4**  
**Simplify bracket** **5 marks** **Att 2**  
**Finish** **5 marks** **Att 2**

(b)  $A = 5200 \left(1 + \frac{2.5}{100}\right)^4 = 5200(1.025)^4 = 5200(1.103812891) = 5739.827033111 = \text{€}5739.83.$

\* Accept correct answer with no work.

\*  $A = 5200 \left(1 + \frac{2.5}{100}\right)^4 \Rightarrow 10$  marks.

\*  $A = 5200(1.025)^4 \Rightarrow 15$  marks.

\*  $A = \text{€}5739.83 \Rightarrow 20$  marks

\*  $A = 5200 \left(1 + \frac{2.5}{100}\right)^4 = \text{incorrect ans., no further work} \Rightarrow 14$  marks. (10 + 2 + 2)

**Substitute into formula** **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  $5200 / 2.5 = 2080$

A2  $(5200)(2.5) = 13000.$

A3  $5200 / 0.025 = 208000.$

**Simplify bracket** **5 marks** **Att 2**

B1  $A = 5200 \left(1 + \frac{2.5}{100}\right)^4 \neq 5200(1.025)^4.$

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

\* Use candidate's answer to simplification of  $A = 5200 \left(1 + \frac{2.5}{100}\right)^4$

B1  $(1.025)^4 = (1.025) \times 4 = 4.1$  or  $(1.025)^4 = (1.025) / 4 = 0.25625$

B2  $\frac{5200}{(1.025)^4} = 4828.716937\dots$  or  $\frac{5200}{(0.975)^4} = 5610.344072\dots$

B3  $5200 \times (0.975)^4 = 4699.177031.$

*Slips (-1)*

S1 Incorrect or omitted rounding off to nearest cent.

S2 Numerical error

*Misreadings (-1)*

M1  $(1.025)^n$ ,  $n = 2$  or  $3$  or  $n \geq 5$  used in formula

*Worthless (0 marks)*

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

**OR**

<b>(b) Amount year 1</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Amount year 2</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Amount year 3</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Amount year 4</b>	<b>5 marks</b>	<b>Att 2</b>

- (b) Amount at end of year 1:  $5200 \times 1.025 = 5330$   
Amount at end of year 2:  $5330 \times 1.025 = 5463.25$   
Amount at end of year 3:  $5463.25 \times 1.025 = 5599.83125$ .  
Amount at end of year 4:  $5599.83125 \times 1.025 = 5739.827031 = \mathbf{\text{€}5739.83}$

**or**

Compound Interest Year 1:  $5200 \times \frac{2.5}{100} = 130 \Rightarrow \text{Principal Yr 2} = 5330$

Compound Interest Year 2:  $5300 \times \frac{2.5}{100} = 133.5 \Rightarrow \text{Principal Yr 3} = 5463.25$

Compound Interest Year 3:  $5463.25 \times \frac{2.5}{100} = 136.58125 \Rightarrow \text{Principal Yr 4} = 5599.83125$

Compound Interest Year 4:  $5599.83125 \times \frac{2.5}{100} = 139.995733$

$\Rightarrow \text{Amount} = 5739.827031 = \mathbf{\text{€}5739.83}$

- \* Accept correct answer with no work.
- \* Amount year 1 = 5330  $\Rightarrow$  5 marks
- \* Amount year 2 = 5463.25  $\Rightarrow$  10 marks
- \* Amount year 3 = 5599.83125  $\Rightarrow$  15 marks
- \* Amount year 4 = **€5739.83**  $\Rightarrow$  20 marks
- \* No effort at compounding  $\Rightarrow$  0 marks

<b>Amount at end of year 1</b>	<b>5 marks</b>	<b>Att 2</b>
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*Blunders (-3)*

B1  $5200 \times 1.25 = 6500$ .

B2 Error(s) in establishing  $\frac{5200 \times 2.5}{100}$  [All three elements must be present; else attempt only]

B3 Stops at interest and fails to find amount.

B4 Subtracts interest to find amount.

*Slips (-1)*

S1 Numerical errors. (to a max of -3.)

*Attempts (2 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. (to a max of -3.)

S2 Incorrect or omitted rounding off.

*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****Att 2**

\* 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 in Year 1 or Year 2

*Slips (-1)*

S1 Numerical errors. (to a max of -3.)

S2 Incorrect or omitted rounding off.

*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 4****5 marks****Att 2**

\* Use candidate's answer for amount at end of year 3.

*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 in Year 1 or Year 2

*Slips (-1)*

S1 Numerical errors. (to a max of -3.)

S2 Incorrect or omitted rounding off.

*Worthless (0 marks)*

W1 No effort at compounding.

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

(c) Susan is 10 years old and Jane is 14 years old. A sum of money is divided between them in the ratio of their ages. Susan gets €50.

(i) How much money will Jane get?

(ii) How much money is divided between them?

In one year's time the sum of money to be divided will be increased by €114.  
This sum of money will be divided between them in the ratio of their ages at that time.

(iii) How much will each person get next year?

## Part(c)(i)

10 marks

Att 4

<p>(c)(i) 10:14</p> $\Rightarrow \frac{10}{24} = 50$ $\Rightarrow \frac{1}{24} = 5$ $\Rightarrow \frac{14}{24} = 70 \text{ (Jane's Share)}$	$\frac{1}{24} = 5$ $\Rightarrow \frac{24}{24} = 120$ $120 - 50 = 70$	$10x : 14x \Rightarrow 10x = 50$ $\Rightarrow x = 5$ $\Rightarrow 14x = 70$ $\Rightarrow \text{Jane's Share} = 70$
---	--	--

\*Accept correct answer with no work.

\*  $10 : 24 = 5 : 12$

\*  $120 \Rightarrow 7$  marks but **part (ii)** must be shown separately to earn marks for that section.

*Blunders (-3)*

B1 Divisor  $\neq$  10 or 5 only and continues.

B2 Incorrect multiplier or fails to multiply. (Each time).

B3 Error in transposition.

B5 Addition instead of subtraction e.g.  $120 + 50 = 170$ .

*Attempts (4 marks)*

A1 Divisor  $\neq$  10 or 5 e.g.  $50/24$  and stops.

A2 Indicates 24 parts or 10 parts or 14 parts or  $\frac{10}{24}$  or  $\frac{14}{24}$  or  $10 + 14 = 24$  and stops.

A3 Indicates multiplication of 50 by 10 and or 14 and stops.

*Worthless (0 marks)*

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

**(c)(ii)**

**5 marks**

**Att 2**

<b>(c)(ii)</b> $50 + 70 = 120$	$\frac{1}{24} = 5 \Rightarrow \frac{24}{24} = 120$
--------------------------------	--

- \* Accept correct answer with no work.
- \* Accept candidate's answer from part **(i)**.

*Blunders (-3)*

- B1 Divisor  $\neq$  10 or 5 only and continues.
- B2 Incorrect multiplier or fails to multiply.
- B3 Error in transposition. [Note  $x$ -method above]
- B5 subtraction instead of addition e.g.  $70 - 50 = 20$ .

*Attempts (4 marks)*

- A1 Divisor  $\neq$  10 or 5 e.g.  $50/24$  and stops.
- A2 Indicates 24 parts or 10 parts or 14 parts or  $\frac{10}{24}$  or  $\frac{14}{24}$  or  $10 + 14 = 24$  and stops.
- A3 Indicates multiplication of 50 by 10 and or 14 and stops.

*Worthless (0 marks)*

- W1 Incorrect answer with no work shown.

**(c)(iii)**

**5 marks**

**Att 2**

<b>(c)(iii)</b> New sum of money = $120 + 114 = 234$ New Ratio: 11 : 15
$\frac{234}{26} = 9 \Rightarrow$ Susan's Share = <b>99</b> and Jane's Share = <b>135</b>

- \* Accept correct answer with no work.
- \* Accept candidate's answer from part **(i)** and part **(ii)**

*Blunders (-3)*

- B1 subtraction instead of addition e.g.  $120 - 114 = 6$  i.e. incorrect new sum of money
- B2 Incorrect new ratio.
- B3 Divisor  $\neq$  26 only and continues.
- B4 Incorrect multiplier or fails to multiply.
- B5 Error in transposition. [Note  $x$ -method above part **c(i)**].

*Slips (-1)*

- S1 Numerical errors to a max of -3.

*Attempts (2 marks)*

- A1 Divisor  $\neq$  26 e.g.  $234/24$  and stops.
- A2 Indicates 26 parts or 11 parts or 15 parts or  $\frac{11}{26}$  or  $\frac{15}{26}$  or  $11 + 15 = 26$  and stops.
- A3 Indicates multiplication of 114 by 11 and or 15 and stops.

*Worthless (0 marks)*

- W1 Incorrect answer with no work shown.

## 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, 5, 5) marks</b>	<b>Att (4, 2, 2)</b>

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

(a) Solve for  $x$   
$$2x + 7 = 5x - 5$$

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

(a)  $2x + 7 - 5x = -5 \Rightarrow -3x + 7 = -5 \Rightarrow -3x = -5 - 7 \Rightarrow -3x = -12$  [7 marks]  $\Rightarrow x = 4.$   
 $7 + 5 = 5x - 2x \Rightarrow 12 = 3x$  [7 marks]  $\Rightarrow 4 = x.$

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

### *Blunders (-3)*

- B1 Blunders in grouping terms e.g.  $2x + 7 = 9x$ . (Each time).
- B2 Transposition error(s). (Once only).
- B3  $-3x = -12 \Rightarrow x \neq 4$  or  $12 = 3x \Rightarrow x \neq 4$
- B4 Each step omitted e.g.  $-3x = -12$  and stops
- B5  $x = 4$  without work.

### *Slips(-1)*

- S1 Numerical errors.

### *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

$$7x - y = 11$$

$$4x + 3y = 17.$$

First variable found

15 marks

Att 6

Second variable

5 marks

Att 2

(b)

$$7x - y = 11$$

$$4x + 3y = 17$$

$$21x - 3y = 33$$

$$4x + 3y = 17$$

$$25x = 50$$

$$x = 2$$

$$14 - y = 11$$

$$3 = y$$

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

\* Substitution of correct values in both equations and verification shown – Award 15 + 5 marks.

#### Blunders(-3)

B1 Error(s) in establishing the first equation in terms of  $x$  only [ $25x = 50$ ] or the first equation terms of  $y$  only [ $-25y = -75$ ].

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

B3  $25x = 50 \Rightarrow x \neq 2$ .

#### Attempts -First variable – (6 marks)

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

A2 Effort at cancelling one variable .

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.

#### Attempts (6+2 marks)

A6 Attempt at finding a solution by T + E.

A7 Correct answers with no work shown.

#### Worthless (0 marks)

W1 Incorrect answer(s), no work shown.

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

- (c) John cycles to school in  $x$  minutes.  
 Mark gets the bus to school and takes 10 minutes longer.  
 Brendan walks to school and takes twice as long as Mark.



- (i) Express the time taken by Brendan to get to school in terms of  $x$ .

When the times taken by the three boys to get to school are added, the total is 90 minutes.

- (ii) Write this information as an equation in terms of  $x$ .

- (iii) Find how long it took John to get to school.

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

**(c) (i)** John =  $x$  min.  $\Rightarrow$  Mark =  $x + 10$  min  $\Rightarrow$  Brendan =  $2(x + 10)$  [10 marks] =  $2x + 20$

\* Arithmetic Work only i.e. Trial and Error

Correct answers  $\Rightarrow$  14 marks.

Incorrect answers  $\Rightarrow$  8 marks at most.

B1 Not adding 10 to John's Time. e.g.  $(x - 10)$ ,  $(10 - x)$

B2 Not multiplying Mark's time by 2.

B3  $(x + 10)^2$ .

*Attempts (4 marks)*

A1 Some use of the given data e.g.  $\frac{x}{10}$ ,  $\frac{10}{x}$ ,  $10x - 2$ .

*Worthless (0 marks)*

W1 No use of  $x$  or 10.

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

**(c) (ii)**  $x + x + 10 + 2x + 20 = 90$  or  $4x + 30 = 90$

\* Accept candidate's answers from part (i).

*Blunders (-3)*

B1 Each time omitted.

B2  $4x + 30$  only.

*Attempts (2 marks)*

A1 A spurious equation in  $x$ .

(c) (iii)

5 marks

Att 2

(c) (iii) $x + x + 10 + 2x + 20 = 90 \Rightarrow 4x + 30 = 90 \Rightarrow 4x = 60 \Rightarrow x = 15.$
--

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

\*  $4x + 30$  or  $4x + 30 = 90$  as starting work can earn marks for parts (i) and (ii).

*Blunders (-3)*

B1 Incorrectly formed equation.

B2 Blunders in grouping terms e.g.  $4x + 30 = 34x$ . (Each time).

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

B4  $4x = 60 \Rightarrow x \neq 15$ .

B4 Each step omitted.

*Slips(-1)*

S1 Numerical errors.

*Attempts (2 marks)*

A1 Some correct work.

A2 Effort at T+E by substitution.

*Worthless (0 marks)*

W1 Incorrect answer without work.

## QUESTION 5

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

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

- (a) (i) Write down all the prime numbers between 1 and 10.  
(ii) How many of these prime numbers are factors of 21?

(a)(i) **5 marks** **Att 2**  
(ii) **5 marks** **Hit or miss**

- (a) (i) 2, 3, 5, 7.  
(ii) 2 [3, 7]

**Part (a)(i)**

*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.

**Part(a)(ii)**

Hit or miss. Accept “2” or “3 and 7”.

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

- (b) (i) Solve the quadratic equation  $x^2 - 5x - 36 = 0$ .  
(ii) Solve the quadratic equation  $x^2 - 7x + 8 = 0$ .  
Give your answers correct to one decimal place.

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

(b) (i)  $x^2 - 5x - 36 = 0 \Rightarrow (x - 9)(x + 4) = 0$  [ 7 marks]  $\Rightarrow x = 9, x = -4$

*Blunders(-3)*

- B1 Last step(s) omitted.
- B2 Sign error(s) in factors (Once only).
- B3 Sign error(s) in solution (Once only).
- B4 Incorrect relevant factors and continues.
- B5 Errors in using formula as in (ii).

*Attempts(4 marks)*

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

*Worthless (0 marks)*

W1 Quadratic reduced to linear.

**\* without work:**

- 2 correct answers, both verified: full marks
- 2 correct answer and one verified:  $1 \times B (-3)$
- 2 correct answers, neither verified: Att 4 marks
- 1 correct answer, and verified: Att 4 marks
- 1 correct answer but not verified: 0 marks

**(b) (ii)**

**10 marks**

**Att 4**

$$(ii) \quad x^2 - 7x + 8 = 0 \Rightarrow x = \frac{7 \pm \sqrt{(-7)^2 - 4(1)(8)}}{2} = \frac{7 \pm \sqrt{49 - 32}}{2} = \frac{7 \pm \sqrt{17}}{2} *$$

$$x = \frac{7 \pm 4.123}{2} = 5.5615 \text{ or } 1.4385 \Rightarrow x = \mathbf{5.6} \text{ or } x = \mathbf{1.4}$$

\* Maximum deductions beyond point \* is 3 marks.

\*  $\frac{7 \pm \sqrt{\text{negative no.}}}{2}$  cannot earn final 3 marks.

*Blunders (-3)*

B1 Blunder in application of formula.

*Slips(-1)*

S1 Slips in substitution into the formula (to a max of -5).

S2  $49 + 32 = 81$ .

S3 Incorrect or omitted rounding off, each time.

*Attempts(4 marks)*

A1 Effort at substitution into formula.

A2 Incorrect formula with substitution.

A3 Attempt at finding factors e.g.  $(x \quad)(x \quad)$ .

A4 Appearance of the variable in the answer.

*Worthless (0 marks)*

W1 Quadratic reduced to linear.

**Part (c)**

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

**Att (4, 2, 2)**

(c) (i) Solve  $3x - 4 < 8, x \in \mathbf{Z}$ .

(ii) Solve  $12 - 2x \leq 16, x \in \mathbf{Z}$ .

(iii) Write down the values of  $x$  which satisfy both of the above inequalities?

**(c)(i)**

**10 marks**

**Att 4**

(i)  $3x - 4 < 8 \Rightarrow 3x < 12 \Rightarrow x < 4$

\* Listing not required.

*Blunders (-3)*

B1 Blunders in grouping terms e.g.  $3x - 4 = -x$ . (Each time).

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

B3 Each step omitted.

B4  $x < 4$  without work.

B5 Replaces inequality sign with equality sign.

*Misreadings (-1)*

M1 Uses  $\leq$  for  $<$ .

*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**

**(ii)**  $12 - 2x \leq 16 \Rightarrow -4 \leq 2x \Rightarrow -2 \leq x$

\* *Listing not required.*

*Blunders (-3)*

B1 Blunders in grouping terms e.g.  $12 - 2x = 10x$ . (Each time).

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

B3 Blunder in direction of inequality when multiplying by “minus”.

B4 Each step omitted.

B5  $x \geq -2$  without work.

B6 Replaces  $\leq$  with equality sign. Do not penalise if B5 is incurred in **(i)**.

*Misreadings (-1)*

M1 Uses  $<$  for  $\leq$ .

*Attempts (2 marks)*

A1 Some correct work.

A2 Effort at T+E by substitution.

A3  $12 + 2x \leq 16$ .

*Worthless (0 marks)*

W1 Incorrect answer without work.

**(c)(iii)**

**5 marks**

**Att 2**

**(iii)**  $-2 -1, 0 1, 2, 3$

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

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

*Slips(-1)*

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

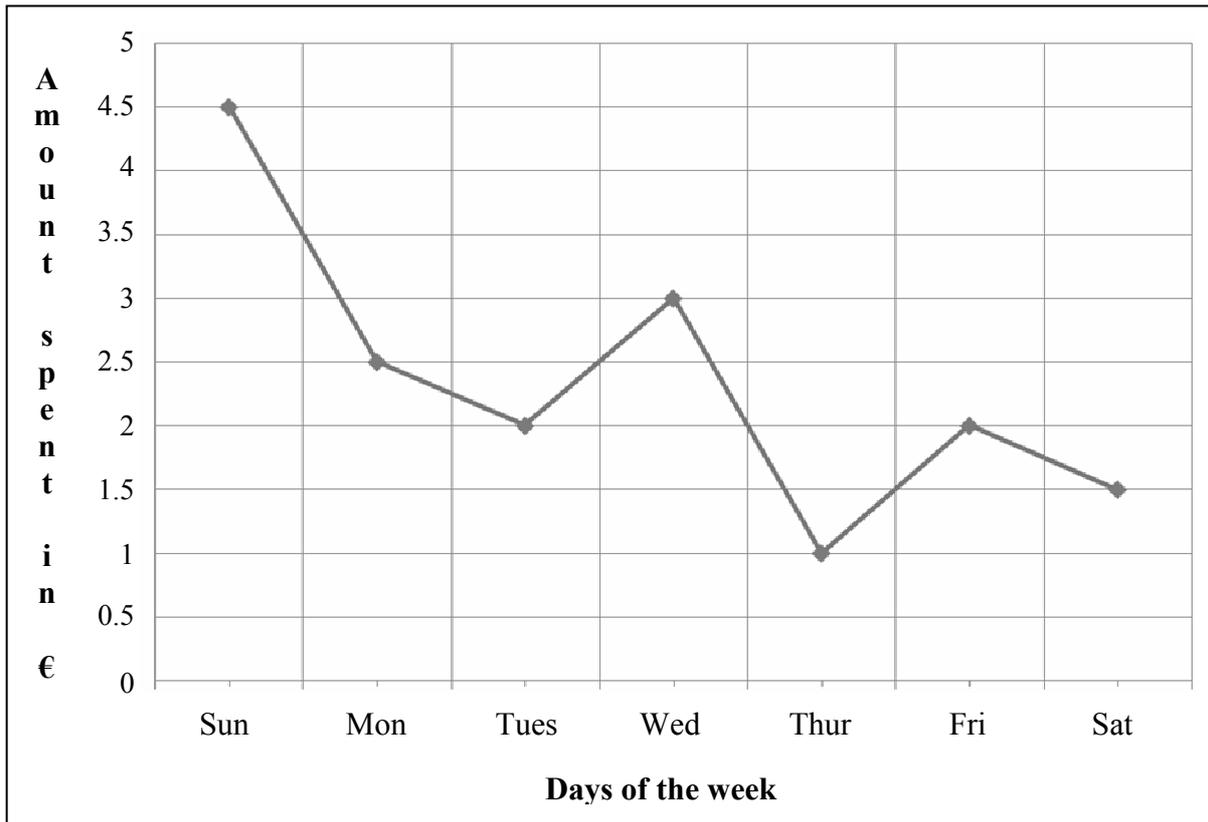
*Attempts (2 marks)*

A1 At least one correct entry.

## QUESTION 6

Part (i)	10 marks	Att 4
Part (ii)	10 marks	Att 4
Part (iii)	10 marks	Att 4
Part (iv)	10 marks	Att 4
Part (v)	10 marks	Att 4

The graph shows a record of the amount of money spent by a student on fruit on each day of the week. For example on Wednesday the amount spent was €3.



- How much did the student spend on Saturday?
- On which two days was the same amount spent?
- What was the difference between the amounts spent on Wednesday and on Friday?
- What was the average amount spent per day during this week, correct to the nearest cent?
- Express the amount spent on Wednesday as a percentage of the total spent on Monday, Tuesday and Saturday.

(i)	10 mark	Att 4
(i)	1.5	

*Blunders (-3)*

B1 0.75.

B2 3 as answer as a result of scalar misreading.

*Worthless (0 marks)*

W1 Incorrect answer without work, other than those in the scheme.

**(ii)**

**10 marks**

**Att 4**

**(ii)**

Tuesday and Friday

*Blunders (-3)*

B1 Only one of the correct days given

*Worthless (0 marks)*

W1 Incorrect answers with no work.

**(iii)**

**10 marks**

**Att 4**

**(iii)**

$3 - 2 = 1$

\* Accept correct answer without work.

*Blunders (-3)*

B1 Each incorrect amount. [do not penalise scalar misreading if the same as error in part (i).]

B2  $1.5 - 1 = 0.5$ . [See S1]

B3  $3 + 2 = 5$ .

B4  $6 - 4 = 2$  [do not penalise scalar misreading if the same as error in part (i).]

*Worthless (0 marks)*

W1 Incorrect answers with no work, other than those in

*Attempts(2 Marks)*

A1 Only one value.

(iv)

10 marks

Att 4

(iv) $4 \cdot 5 + 2 \cdot 5 + 2 + 3 + 1 + 2 + 1 \cdot 5 = 16 \cdot 5 \Rightarrow 16 \cdot 5 / 7 = 2 \cdot 36.$
--

\* Accept correct answer without work.

*Blunders (-3)*

B1 Calculating the sum of half the values. [do not penalise scalar misreading if the same as error in a previous part ]

B2 Stops at  $16 \cdot 5 / 7$ .

B3 2, the mode given as average.

B4 Scalar Error [do not penalise scalar misreading if the same as error in a previous part] i.e.  $\frac{33}{7}$ .

*Slips (-1)*

S1 Each omitted amount, or incorrect amount, provided at least one is correct.

S2 Uses a divisor other than 7.

S3 Numerical errors. (to a max of -3)

*Attempts (4 Marks)*

A1 Stops at  $16 \cdot 5$ . or candidates answer.

*Worthless (0 marks)*

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

(v)

10 marks

Att 4

(v) $\frac{3}{2 \cdot 5 + 2 + 1 \cdot 5} \times 100 = \frac{3}{6} \times 100 = 50\%$
--

\* Accept correct answer without work.

*Blunders (-3)*

B1 Errors in establishing  $\frac{3}{2 \cdot 5 + 2 + 1 \cdot 5} \times 100$  [all three elements must be present; else att only]

*Slips (-1)*

S1 Numerical errors.

S2 Each omitted amount, or incorrect amount, provided at least one is correct. (to a max -3)

*Attempts (4 marks)*

A1 Some effort at finding totals.

*Worthless (0 marks)*

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

## QUESTION 7

<b>Graph Values</b>	<b>30 (20, 10) marks</b> <b>20 (5, 5, 5,5) marks</b>	<b>Att (8, 4)</b> <b>Att (2, 2, 2, 2)</b>
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<b>Table / evaluation</b>	<b>20 marks</b>	<b>Att 8</b>
<b>Graph</b>	<b>10 marks</b>	<b>Att 4</b>

7. Draw the graph of the function

$$f(x) = 2x^2 - 4x - 5, \quad \text{for } -2 \leq x \leq 4, \quad x \in \mathbf{R}.$$

<b>Table method</b>	<b>20 marks</b>	<b>Att 8</b>
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$x$	-2	-1	0	1	2	3	4
$2x^2$	8	2	0	2	8	18	32
$-4x$	8	4	0	-4	-8	-12	-16
$-5$	-5	-5	-5	-5	-5	-5	-5
$f(x)$	<b>11</b>	<b>1</b>	<b>-5</b>	<b>-7</b>	<b>-5</b>	<b>1</b>	<b>11</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.
- B3  $f(x)$  not evaluated for an  $x$ -value in domain or some  $x$  value omitted.

*Misreadings (-1)*

- M1 -5 treated as 5 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  $2x^2 = 4x$  or  $x$ .

**OR**

$$\begin{aligned}f(-2) &= 2(-2)^2 - 4(-2) - 5 = 11 \\f(-1) &= 2(-1)^2 - 4(-1) - 5 = 1 \\f(0) &= 2(0)^2 - 4(0) - 5 = -5 \\f(1) &= 2(1)^2 - 4(1) - 5 = -7 \\f(2) &= 2(2)^2 - 4(2) - 5 = -5 \\f(3) &= 2(3)^2 - 4(3) - 5 = 1 \\f(4) &= 2(4)^2 - 4(4) - 5 = 11\end{aligned}$$

*Blunders (-3)*

B1 Consistent errors in the evaluation of  $2x^2$ .

B2  $-5$  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.

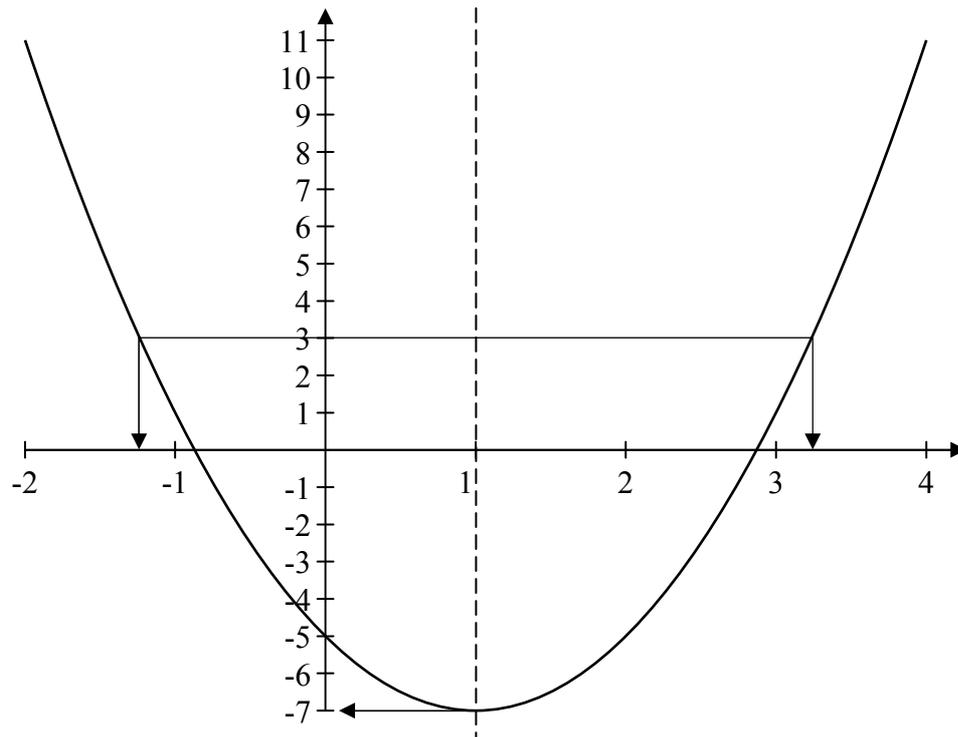
*Misreadings (-1)*

M1  $-5$  consistently treated as 5 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.



\* Accept values from candidate's table.

\* Fully correct graph drawn with no work shown: Award 30 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 (4 marks)*

A1 At least two of candidate's points plotted.

A2 Any  $\cup$ -shaped graph.

A3 Axes Drawn.

Use your graph to estimate

- (i) Write down the minimum value of  $f(x)$
- (ii) What are the values of  $x$  for which  $f(x) = 3$ ?
- (iii) For what range of values of  $x$  is  $f(x)$  increasing?
- (iv) Draw the axis of symmetry of the graph.

<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>
<b>Part (iv)</b>	<b>5 marks</b>	<b>Att 2</b>

- |       |                             |  |
|-------|-----------------------------|--|
| (i)   | -7                          |  |
| (ii)  | 3.2 and -1.2                |  |
| (iii) | $1 < x \leq 4$ or $x > 1$ . |  |
| (iv)  | On graph                    |  |

- \* Accept candidate's values from graph.
- \* Allow tolerance  $\pm 0.3$  units on  $x$ -axis,  $\pm 0.5$  units on  $y$ -axis.
- \* Accept (1, -7) in part (i) for 5 marks.

#### Blunders (-3)

- B1 Value omitted, or extra value. Applies in part (ii).
- B2  $f(x) = 3$  treated as  $f(3)$

#### Misreading (-1)

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

#### Slips(-1)

- S1 Answers indicated correctly on axes, but not specified.
- S2 Increasing part of graph indicated but no  $x$  values written down.

#### Attempt (2 marks)

- A1 Effort at reading value(s) from graph.
- A2 Correctly solving equation algebraically: part (ii).
- A3 Any vertical line on graph, applies to axis of symmetry.





Coimisiún na Scrúduithe Stáit  
State Examinations Commission

**LEAVING CERTIFICATE 2009**

**MARKING SCHEME**

**MATHEMATICS - PAPER 2**

**FOUNDATION LEVEL**

## 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.

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)

15 (10, 5) marks

Att (4, 2)

Part (b)

35 (30, 5) marks

Att (12, 2)

Part (a)

15 (10, 5) marks

Att (4, 2)

1. (a) The perimeter of a rectangular field is 280 m.

The length of the longer side is 100 m.



Find

(i) the length of the shorter side,

(ii) the area of the field.

(a) (i)

10 marks

Att 4

(a) (ii)

5 marks

Att.2

(i) 
$$b = \frac{(\text{Length} - 2a)}{2} = \frac{280 - 200}{2} = \frac{80}{2} = 40m$$

(ii) 
$$\text{Area} = ab = 100 \times 40 = 4000m^2$$

*Blunders (-3)*

B1 Incorrect substitution

B2 Failure to divide by 2

*Slips (-1)*

S1 Numerical errors to a max of 3

*Attempts (4, 2)*

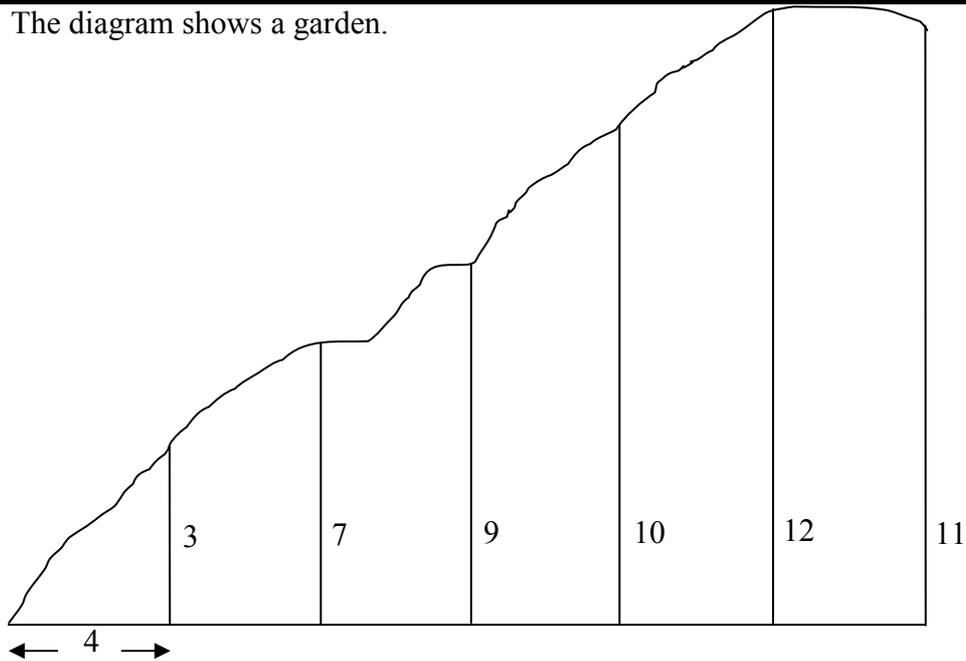
A1 Defines length or area

Part (b)(i)  
(ii)

30 marks  
5 marks

Att 12  
Att 2

(b) The diagram shows a garden.



Offsets of lengths 3, 7, 9, 10, 12 and 11 metres are measured at intervals of 4 m as shown.

- (i) Use Simpson's rule to estimate the area of the garden.
- (ii) A flower bed takes up 25% of the area of the garden. Calculate the area of this flower bed.

(b) (i)  
(b) (ii)

30 marks  
5 marks

Att 12  
Att 2

$$Area = \frac{1}{3} \text{ width} [First + last + 2(\text{odd}) + 4(\text{even})]$$

(i)  $Area = \frac{4}{3} [0 + 11 + 2(7 + 10) + 4(3 + 9 + 12)] = \frac{4}{3} [11 + 34 + 96] = \frac{4}{3} (141) = 188m^2$

(ii)  $Area = 188 \times \frac{25}{100} = 47m^2$

*Blunders (-3)*

- B1 Uses four odd and twice even e.g.  $2(24) + 4(17)$   
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 Error in percentage calculation

*Slips (-1)*

- S1 Numerical errors to a max of 3  
S2 Each incorrect or omitted altitude

*Attempts (12, 2)*

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

## QUESTION 2

Part (a)

20 marks

Att 8

Part (b)

30 (15, 5, 10) marks

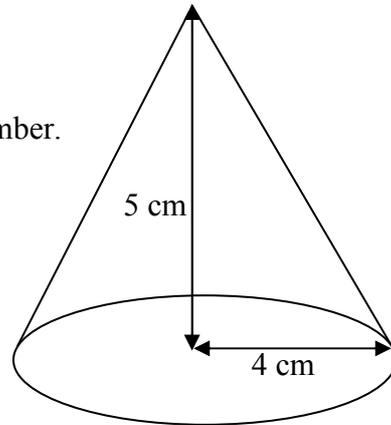
Att (6, 2, 4)

Part (a)

20 marks

Att 8

2. (a) The diagram shows a cone with a height of 5 cm and of base radius 4 cm. Calculate the volume of this cone. Give your answer correct to the nearest whole number.



(a)

20 marks

Att 8

$$\text{Volume} = \frac{\pi r^2 h}{3} = \frac{\pi \times 4^2 \times 5}{3} = 83.77 \approx 84 \text{ cm}^3$$

*Blunders (-3)*

B1 Incorrect substitution

*Slips (-1)*

S1 Numerical errors to a max of 3

S2 Error in rounding or gives answer in terms of  $\pi$

*Attempts (8)*

A1 Correct formula without substitution

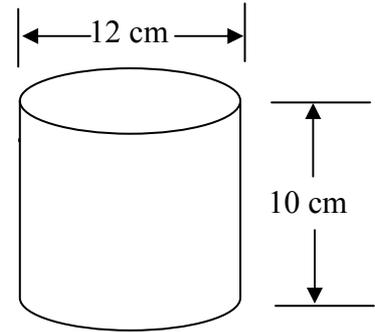
A2 Copies diagram

(b)

30 (15, 5, 10) marks

Att (6, 2, 4)

The length of the diameter of the empty cylinder in the diagram is 12 cm and the height is 10 cm.



(i) Calculate the volume of the cylinder in terms of  $\pi$ .

A volume of  $288\pi\text{ cm}^3$  of liquid is poured into this cylinder.

(ii) Calculate the height of the liquid in the cylinder.

(iii) What percentage of the total volume of the cylinder has no liquid in it?

(b)(i)

15 marks

Att 6

(ii)

5 marks

Att 2

(iii)

10 marks

Att 4

$$(i) \text{ Volume} = \pi r^2 h = \pi(6)^2(10) = 360\pi\text{ cm}^3$$

$$(ii) \pi \times 6^2 \times h = 288\pi \Rightarrow h = \frac{288\pi}{36\pi} = 8\text{ cm}$$

$$(iii) \text{ No liquid volume} = 360\pi - 288\pi = 72\pi \Rightarrow \% = \frac{72\pi}{360\pi} \times 100 = 20\%$$

*Blunders (-3)*

B1 Incorrect substitution

B2 Error in balancing equation

B3 Error in percentage calculation

*Slips (-1)*

S1 Numerical errors to a max of 3

S2 Omits  $\pi$  or gives answer as 1130.97 or 1130.4 or similar

S3 Answer 80%

*Attempts (6, 2, 4)*

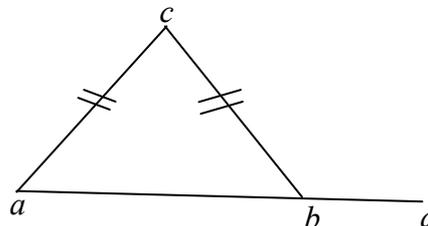
A1 Correct formula without substitution

### QUESTION 3

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

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

In the triangle  $abc$ ,  $|ac| = |bc|$  and  $|\angle acb| = 70^\circ$   
 Calculate  $|\angle cbd|$ .



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

Ans:  $125^\circ$

*Blunders (-3)*

B1 Geometrical error

*Slips (-1)*

S1 Numerical errors to a max of 3

*Attempts (4)*

A1 Incorrect answer of some merit

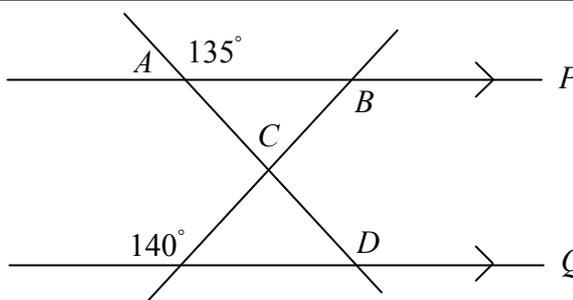
A2 Oversimplifies

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

$P$  and  $Q$  are parallel lines

Find

- (i) the measure of the angle  $A$
- (ii) the measure of the angle  $B$
- (iii) the measure of the angle  $C$
- (iv) the measure of the angle  $D$ .



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

Ans (i)  $45^\circ$  (ii)  $140^\circ$  (iii)  $95^\circ$  (iv)  $135^\circ$

*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)**

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

**Att(4, 2, 2)**

The diagram shows a circle with centre at  $o$ .

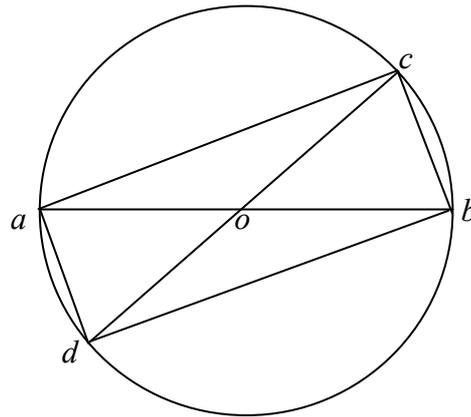
$[dc]$  and  $[ab]$  are diameters.

$|\angle dob| = 100^\circ$  and  $|ob| = 6$  cm.

(i) Write down  $|\angle acb|$ .

(ii) Calculate  $|\angle oad|$ .

(iii) Find  $|dc|$ .



**Part (c)**

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

**Att(4, 2, 2)**

(i)  $90^\circ$

(ii)  $50^\circ$

(iii) 12 cm

*Blunders (-3)*

B1 Geometrical error

*Slips (-1)*

S1 Numerical errors to a max of 3

S2 Omits units

*Attempts (4, 2, 2)*

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>30 (15, 10, 5) marks</b>	<b>Att (6, 4, 2)</b>
<b>Part (c)</b>	<b>10 marks</b>	<b>Att 4</b>

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

$p(6, 3)$  and  $q(-2, 4)$  are two points.  
Find the length of  $[pq]$

(i)  $Length = \sqrt{(-2-6)^2 + (4-3)^2} = \sqrt{(-8)^2 + (1)^2} = \sqrt{65}$

*Blunders (-3)*

- B1 No square root
- B2 Incorrect substitution once only
- B3 Mathematical error

*Slips (-1)*

- S1 Numerical errors to a max of 3

*Attempts (4)*

- A1 Draws axes.

**Part (b)** **30 (15, 10, 5) marks** **Att (6, 4, 2)**

$a$  is the point  $(4, -3)$  and  $b$  is the point  $(-5, 1)$ .

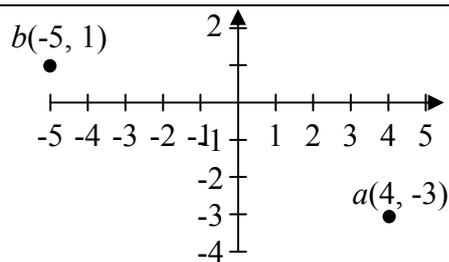
- (i) Plot the points  $a$  and  $b$  on graph paper.
- (ii) Find the slope of  $ab$ .
- (iii) Find the equation of the line  $ab$ .

<b>(i)</b>	<b>15 marks</b>	<b>Att 6</b>
<b>(ii)</b>	<b>10 marks</b>	<b>Att 4</b>
<b>(iii)</b>	<b>5 marks</b>	<b>Att 2</b>

(i) Plot

(ii)  $Slope = \frac{1+3}{-5-4} = \frac{-4}{9}$

(iii)  $y+3 = \frac{-4}{9}(x-4)$  or  $4x+9y+11=0$



*Blunders (-3)*

- B1 Error in scales
- B2 Each point omitted
- B3 Incorrect substitution once only
- B4 Mathematical error

*Slips (-1)*

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

*Attempts(6, 4, 2)*

- A1 Draws axes.

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

The line  $K$  has equation  $y = 4x + 2$ .

The point  $c$  has co-ordinates  $(1, h)$ .

- (i) If  $c$  lies on the line  $K$ , find the value of  $h$ .
- (ii) Find the slope of  $K$ .
- (iii) Find the equation of the line  $M$ , which passes through the point  $(3, -2)$  and is perpendicular to  $K$ .

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

- (i)  $y = 4x + 2 \Rightarrow h = 4(1) + 2 \Rightarrow h = 6$
- (ii)  $slope = 4$
- (iii)  $y + 2 = \frac{-1}{4}(x - 3)$  or  $x + 4y + 5 = 0$

*\* Penalise to a maximum of 1 blunder in each section*

**Blunders (-3)**

- B1 Incorrect substitution once only
- B2 Error in balancing equation
- B3 Incorrect slope of  $K$
- B4 Incorrect slope of  $M$

**Slips (-1)**

- S1 Numerical errors to a max of 3

**Attempts (4)**

- A1 Draws axes.

## QUESTION 5

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

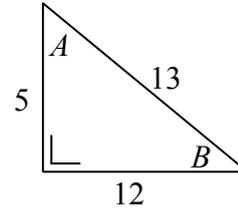
**Part (a)** **20 (10, 10) marks** **Att (4, 4)**

The diagram shows a right angled triangle with sides of length 5, 12 and 13 cm and angles named  $A$  and  $B$ .

Write as a fraction

(i)  $\sin A$ .

(ii)  $\tan B$ .



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

(i)  $\sin A = \frac{12}{13}$

(ii)  $\tan B = \frac{5}{12}$

*Blunders (-3)*

B1 Uses incorrect numerator or denominator each time

*Slips (-1)*

S1 Calculates the angle approx  $A = 67^\circ$  or  $B = 23^\circ$

S2 Answer not in fraction form.

*Attempts(4, 4)*

A1 Defines *sin* or *tan* and stops

Part (b)

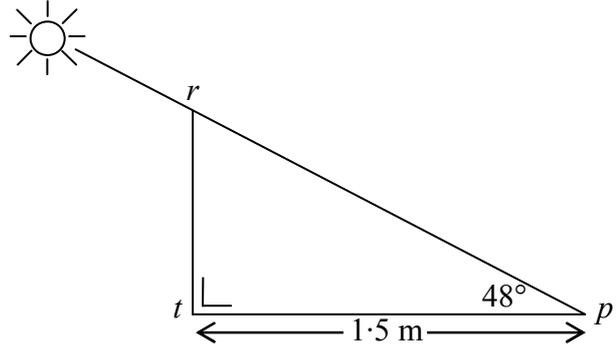
15 marks

Att 6

A vertical pole  $[tr]$  stands on level ground, as shown.

When the angle of elevation of the sun from  $p$  is  $48^\circ$ , the pole casts a shadow of length 1.5 m.

Calculate the height of the pole.  
Give your answer correct to one place of decimals.



(b)

15 marks

Att 6

$$\frac{h}{1.5} = \tan 48^\circ \Rightarrow h = 1.5 \tan 48^\circ \Rightarrow h = 1.66 \approx 1.7m$$

*Blunders (-3)*

- B1 Incorrect trig ratio
- 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:  $h = 1.8$   
Grad:  $h = 1.408 \approx 1.4$

*Attempts (6)*

- A1 Measures from diagram
- A2 Evaluates  $\sin 48^\circ$ ,  $\cos 48^\circ$ , or  $\tan 48^\circ$  and stops

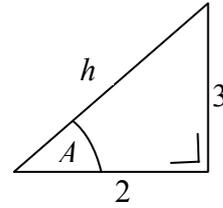
Part (c)

15 (10, 5) marks

Att (4, 2)

(i) Find the length of the side  $h$  in the diagram.

(ii) Find the measure of the angle  $A$ .  
Give your answer to the nearest degree.



(i)

10 marks

Att 4

(ii)

5 marks

Att 2

(i)  $h^2 = 3^2 + 2^2 = 13 \Rightarrow h = \sqrt{13}$  or 3.6

(ii)  $\tan A = \frac{3}{2} \Rightarrow A = \tan^{-1}\left(\frac{3}{2}\right) \Rightarrow A = 56.309^\circ \approx 56^\circ$

*Blunders (-3)*

B1 Any error in Pythagoras

B2 Incorrect trig ratio

B3 Error in balancing equation

*Slips (-1)*

S1 Fails to round off

S2 Wrong mode

Wrong mode

Rad:  $A = 0.9827 \approx 0$

Grad:  $A = 62.56 \approx 63$

*Attempts (4, 2)*

A1 Measures from diagram.

## QUESTION 6

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

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

Photographs can be developed in large, medium or small sizes. They can be in black and white or in colour and they can have a glossy finish or a matt finish.  
In how many different ways can photographs be developed?

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

Ans:  $3 \times 2 \times 2$  or 12

*Blunders (-3)*

B1  $3 + 2 + 2 = 7$  or 7 written down

B2 3! Etc

*Misreadings (-1)*

M1 Answer  $3 \times 3 \times 2 = 18$  or 18

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

A bag contains 3 red, 2 green and 6 blue marbles.  
A marble is selected at random from the bag.

What is the probability that the marble is

- (i) red
- (ii) green
- (iii) blue or green
- (iv) not blue ?

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

Ans: (i)  $\frac{3}{11}$  (ii)  $\frac{2}{11}$  (iii)  $\frac{8}{11}$  (iv)  $\frac{5}{11}$

*Blunders(-1)*

B1 Incorrect #(S) apply once only

B2 Incorrect #(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) 3 (ii) 2 (iii) 8 (iv) 5 merits 17 marks

or

Answers:(i)  $\frac{1}{3}$  (ii)  $\frac{1}{2}$  (iii)  $\frac{1}{8}$  (iv)  $\frac{1}{5}$  merits 17 marks

Part (c)

20(5, 5, 5, 5) marks

Att (2, 2, 2, 2)

80 students were asked what their favourite sport was. The results are given in the following table.

	Basketball	Football	Gymnastics
Boys	10	21	8
Girls	16	12	13

A student is selected at random. Find the probability that the student is

- (i) a boy
- (ii) a girl who likes basketball
- (iii) a student who likes football
- (iv) a student who likes basketball or gymnastics.

Each part

5 marks

Att 2

Ans: (i)  $\frac{39}{80}$  (ii)  $\frac{16}{80}$  (iii)  $\frac{33}{80}$  (iv)  $\frac{47}{80}$

*Blunders (-1)*

- B1 Incorrect #(S) apply once only.
- B2 Incorrect #(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) 39 (ii) 16 (iii) 33 (iv) 47  
merits 17 marks

Answers: (i)  $\frac{1}{39}$  (ii)  $\frac{1}{16}$  (iii)  $\frac{1}{33}$  (iv)  $\frac{1}{47}$   
merits 17 marks

## QUESTION 7

<b>Part (a)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (b)</b>	<b>25 (15, 5, 5) marks</b>	<b>Att (6, 2, 2)</b>
<b>Part (c)</b>	<b>20 (15, 5) marks</b>	<b>Att (6, 2)</b>

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

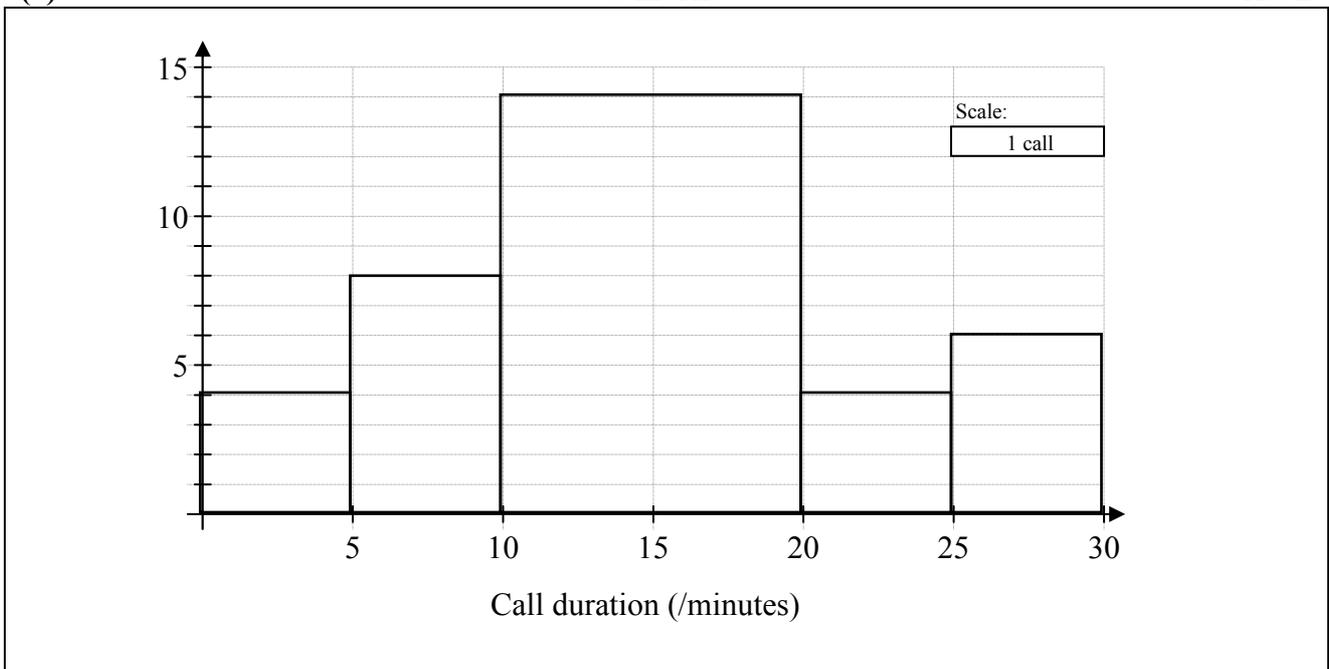
(a) The table below is a record of the duration, in minutes, of 50 telephone calls

Duration in minutes	0 – 5	5 – 10	10 – 20	20 – 25	25 – 30
Number of calls	4	8	28	4	6

[Note: 5 – 10 means 5 minutes or more but less than 10 minutes, etc.]

Illustrate this data on a histogram. Put the duration in minutes on the horizontal axis.

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



*Blunders (-3)*

- B1 Error in scales, one blunder
- B2 Draws trend graph
- B3 Ignores proportion of 10 – 20 interval

*Slips (-1)*

- S1 Each incorrect height
- S2 Reverses axes

*Attempts (2)*

- A1 Draws axes only

**Part (b)**

**25 (15, 5, 5) marks**

**Att (6, 2, 2)**

A shopkeeper recorded the amount of money spent by 40 students during lunch time on a certain day. The cumulative frequency table below shows the results.

Amount spent in €	≤2	≤4	≤6	≤8	≤10
Number of students	10	18	28	35	40

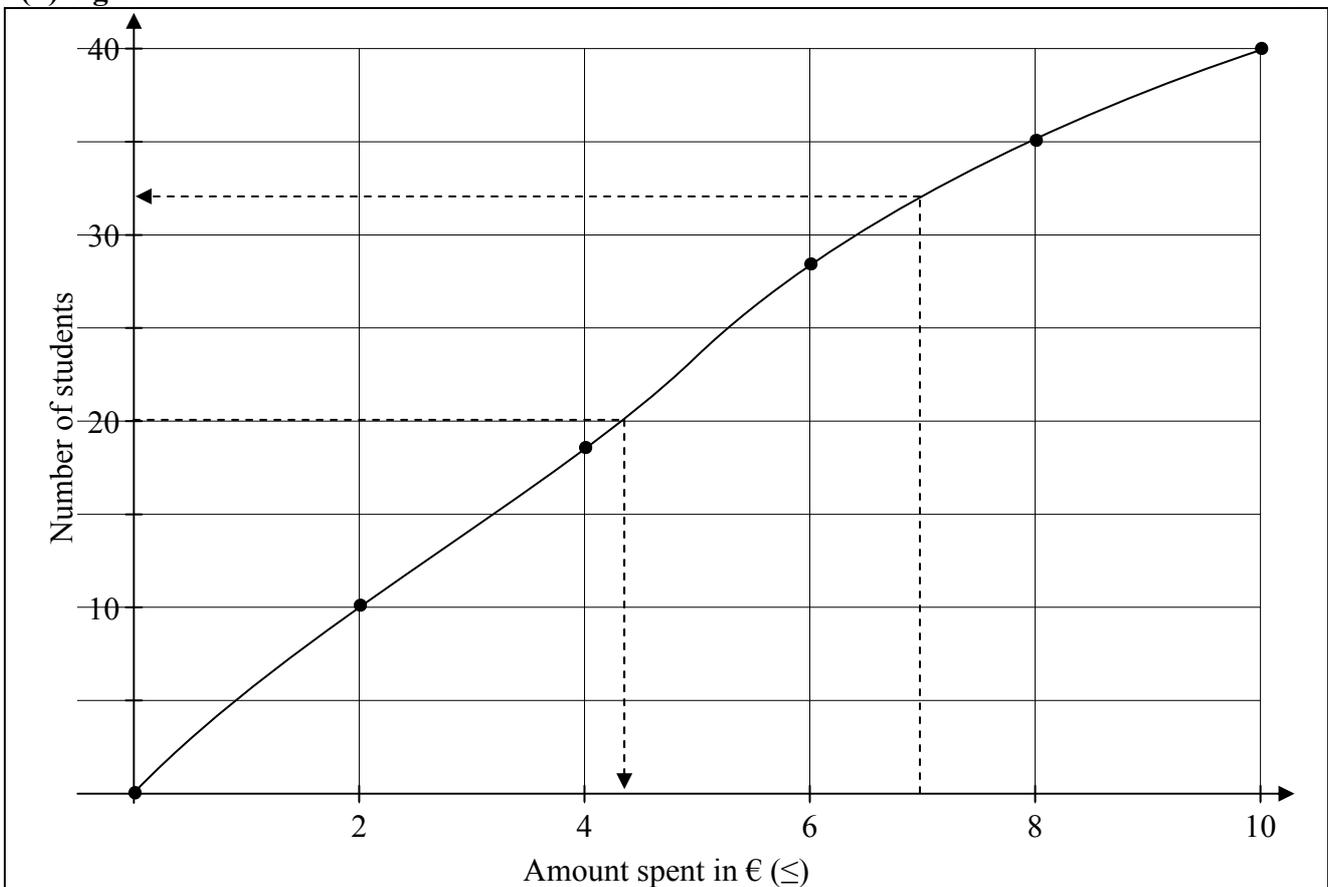
Draw the cumulative frequency curve.  
Put the number of students on the vertical axis.

Use your cumulative frequency curve to estimate  
**(i)** the median amount of money spent by the students.  
**(ii)** the number of students who spent more than €7.

**(b) Ogive**

**15 marks**

**Att 6**



Tolerance ± 2

*Blunders (-3)*

- B1 Error in scales, one blunder
- B2 Points not joined

*Slips (-1)*

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

*Attempts (6)*

- A1 Draws axes only

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

Ans:	(i) €4.40	(ii) $40 - 33 = 7$
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*Blunders (-3)*

B1 Uses wrong axis for median.

*Slips (-1)*

S1 Median not specified

S2 Fails to subtract reading in (ii)

<b>Part (c)</b>	<b>20 (15, 5) marks</b>	<b>Att (6, 2)</b>
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<b>(i)</b>	Find the mean of the numbers 2, 4, 7, 8, 9.
<b>(ii)</b>	Find the standard deviation of the numbers 2, 4, 7, 8, 9, correct to two decimal places.

<b>(i)</b>	<b>15 marks</b>	<b>Att 6</b>
<b>(ii)</b>	<b>5 marks</b>	<b>Att 2</b>

(i)	Mean = $\frac{\sum x}{n} = \frac{2+4+7+8+9}{5} = \frac{30}{5}$ or 6
(ii)	Standard Deviation = $\sqrt{\frac{\sum d^2}{n}}$ = $\sqrt{\frac{(2-6)^2 + (4-6)^2 + (7-6)^2 + (8-6)^2 + (9-6)^2}{5}}$ = $\sqrt{\frac{16+4+1+4+9}{5}}$ = $\sqrt{\frac{34}{5}}$ = 2.607 ≈ 2.61

*Blunders (-3)*

B1 Incorrect substitution

*Slips (-1)*

S1 Numerical errors to a max of 3

*Attempts (6, 2)*

A1 Any addition

A2 Work on SD or defines SD

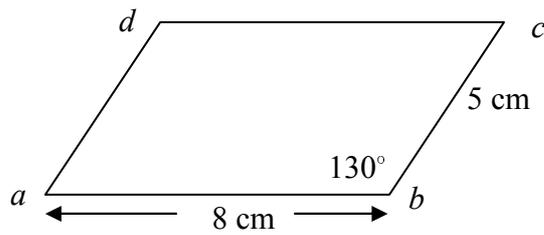
## QUESTION 8

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

Part (a) 10 marks Att 4

- (a) Construct a parallelogram  $abcd$  where  
 $|ab| = 8$  cm,  $|\angle abc| = 130^\circ$  and  $|bc| = 5$  cm.

Part (a) 10 marks Att 4



*Blunders (-3)*

- B1 Each omitted side.
- B2 Incorrect angle  $\pm 5^\circ$

*Slips (-1)*

- S1 Each side outside tolerance of  $\pm 1$  cm

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

(b) The triangle  $ors$  is the image of the triangle  $otu$  under an enlargement, centre  $o$ .

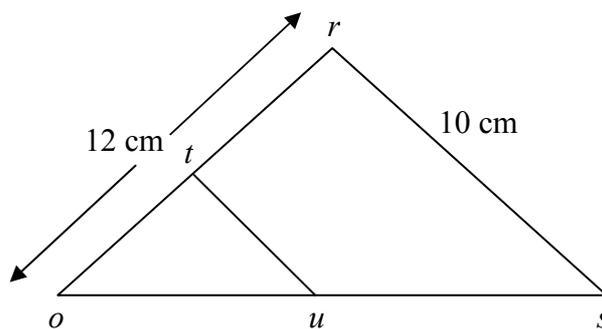
$$|rs| = 10 \text{ cm and } |tu| = 5 \text{ cm.}$$

(i) Find the scale factor of the enlargement.

(ii)  $|or| = 12 \text{ cm}$ , find  $|ot|$ .

(iii) The area of the triangle  $ors$  is  $60 \text{ cm}^2$ , find the area of the triangle  $otu$ .

(iv) Write down the area of the region  $rsut$ .

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

$$(i) \text{ Scale factor} = \frac{10}{5} \text{ or } 2$$

$$(ii) |ot| = \frac{12}{2} = 6 \text{ cm}$$

$$(iii) \text{ Area} = \frac{60}{2^2} = 15 \text{ cm}^2 \text{ or } \text{Area} = 3 \times 5 = 15 \text{ cm}^2$$

$$(iv) \text{ Area } rsut = 60 - 15 = 45 \text{ cm}^2$$

*Blunders (-3)*

B1 Incorrect scale factor

B2 Error in area formula

B3 Does not square scale factor

*Misreadings (-1)*

M1 Treats out as image triangle

*Slips (-1)*

S1 Numerical errors to a max of 3

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

A1 Incorrect answer of some merit

Part (c)

20 (10, 10) marks

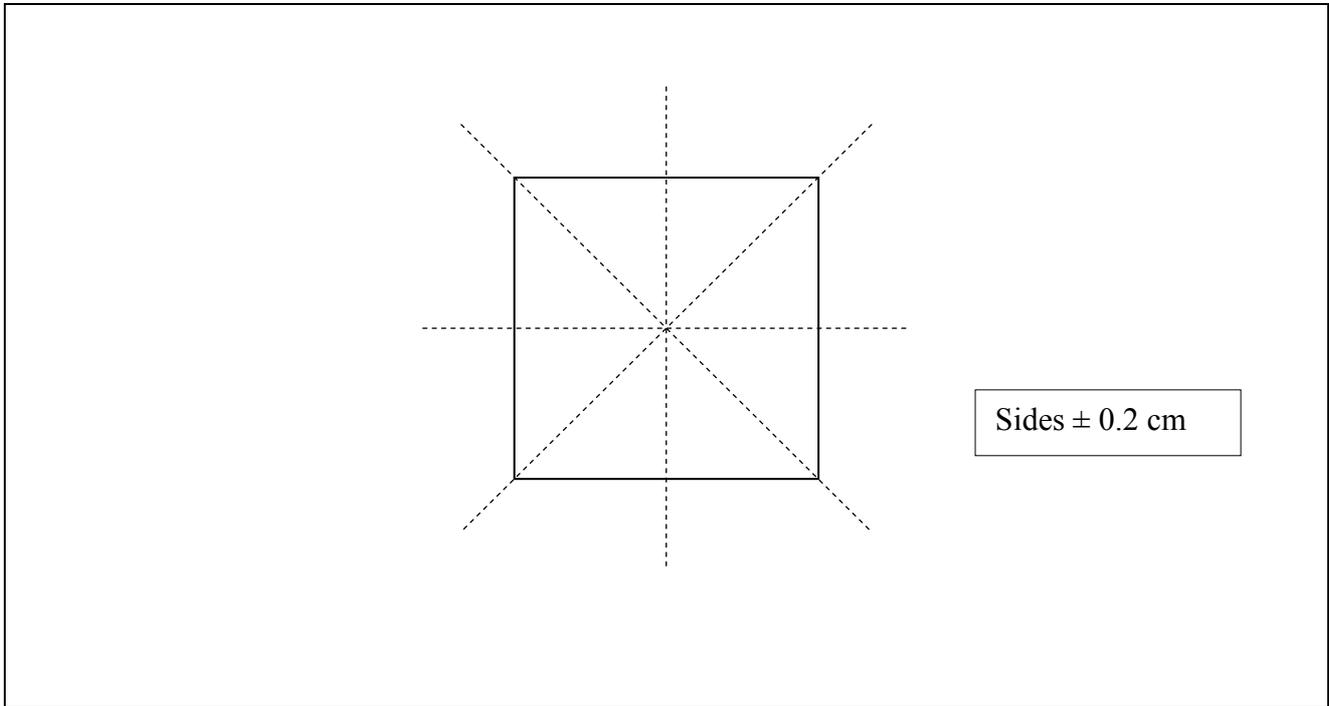
Att (4, 4)

(c) Construct any square in your answer book. Draw all the axes of symmetry of this square.

(c) Square  
Axes

10 marks  
10 marks

Att 4  
Att 4



*Blunders (-3)*

- B1 Each omitted side.
- B2 Axes greater than 4
- B3 Incorrect angle
- B4 Four sides not equal

*Slips (-1)*

- S1 Each symmetry omitted.

*Attempts (4, 4)*

- A1 No axes of symmetry drawn

## MARCANNA BREISE AS UCHT FREAGAIRT TRÍ GHAELGE

### (Bonus marks for answering through Irish)

Ba chóir marcanna de réir an ghnáthrata a bhronnadh ar iarrthóirí nach ngnóthaíonn níos mó ná 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 páipéir ar leithligh.

Is é 5% an gnáthrata agus is é 300 iomlán na marcanna don pháipéar. Mar sin, bain úsáid as an ngnáthrata 5% i gcás iarrthóirí a ghnóthaíonn 225 marc nó níos lú, e.g.  $198 \text{ marc} \times 5\% = 9.9 \Rightarrow$  bónas = 9 marc.

Má ghnóthaíonn an t-iarrthóir níos mó ná 225 marc, ríomhtar an bónas de réir na foirmle  $[300 - \text{bunmharc}] \times 15\%$ , agus an marc bónais 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



