

# Coimisiún na Scrúduithe Stáit State Examinations Commission

## **LEAVING CERTIFICATE 2008**

## **MARKING SCHEME**

## **MATHEMATICS**

## FOUNDATION LEVEL



# **LEAVING CERTIFICATE 2008**

## **MARKING SCHEME**

## **MATHEMATICS**

## FOUNDATION LEVEL

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## **LEAVING CERTIFICATE 2008**

## **MARKING SCHEME**

## **MATHEMATICS – PAPER 1**

## **FOUNDATION LEVEL**

#### MARKING SCHEME

## **LEAVING CERTIFICATE EXAMINATION 2008**

#### MATHEMATICS – FOUNDATON 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: Blunder (-3).
- 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 therabove notes: e.g. taking  $\sqrt{87\cdot32}$  as  $\sqrt{873\cdot2}$  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  $\sqrt{87 \cdot 32}$ , correct to two decimal places.

(i) 10 marks Att 4

(i) 
$$\sqrt{87 \cdot 32} = 9.34451... = 9.34$$

\* Accept correct answer with no work.

Blunders (-3)

B1 
$$\sqrt{8732} = [93.44517...] = 93.45.$$

B2 
$$\sqrt{873 \cdot 2} = [29 \cdot 54995...] = 29 \cdot 55.$$

B3 
$$\sqrt{8.732} = [2.954995...] = 2.95.$$

B4 
$$\sqrt{0.8732} = [0.934451...] = 0.93.$$

B5 Root other than square root indicated and correctly worked.  $\sqrt[3]{87 \cdot 32} = 4 \cdot 44$ .

B6 Incorrect or omitted rounding-off.

Misreadings (-1)

M1 
$$\sqrt{87 \cdot 23} = [9 \cdot 33970...] = 9 \cdot 34$$
.

M2 
$$\sqrt{78 \cdot 23} = [8 \cdot 84477...] = 8 \cdot 84.$$

M3 
$$\sqrt{78 \cdot 32} = [8 \cdot 84985...] = 8 \cdot 85.$$

Attempts (4 marks)

A1 
$$(87 \cdot 32)^2 = 7624 \cdot 78(24)$$
.

A2 
$$\frac{87 \cdot 32}{2} = 43 \cdot 66$$
.

A3 
$$(87 \cdot 32) \times 2 = 174 \cdot 64$$
.

A4 Work at estimating answer:  $\sqrt{87 \cdot 32} = 9$ .

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)

(ii) Find the exact value of  $(4 \cdot 2)^2 - (3 \cdot 6)^2$ .

(ii) 10 marks Att 4

(ii) 
$$(4 \cdot 2)^2 - (3 \cdot 6)^2 = 17 \cdot 64 - 12 \cdot 96 = 4 \cdot 68.$$
  
 $(4 \cdot 2 + 3 \cdot 6)(4 \cdot 2 - 3 \cdot 6) = (7 \cdot 8)(0 \cdot 6) = 4 \cdot 68.$ 

\* Accept correct answer with no work.

Blunders (-3)

B1 
$$\sqrt{4 \cdot 2} - \sqrt{3 \cdot 6} = 2 \cdot 04939... - 1 \cdot 897366... = 0 \cdot 152023...$$

B2 
$$(42)^2 - (36)^2 = 1764 - 1296 = 468$$
.

B3 
$$(0.42)^2 - (0.36)^2 = 0.1764 - 0.1296 = 0.0468$$
.

- B4 Blunder in precedence giving  $(0 \cdot 6)^2 = 0 \cdot 36$ ..
- B5 Square not found, each time.

B6 
$$(4 \cdot 2 \times 10^2) - (3 \cdot 6 \times 10^2) = 420 - 360 = 60.$$

- B7 Any incorrect rounding off within the working. (Once only).
- B8 Subtraction omitted.
- B9  $17 \cdot 64 + 12 \cdot 96 = 30 \cdot 6$

Misreadings (-1)

M1 
$$(2 \cdot 4)^2 - (3 \cdot 6)^2 = 5 \cdot 76 - 12 \cdot 96 = -7 \cdot 2$$
.

M2 
$$(4 \cdot 2)^2 - (6 \cdot 3)^2 = 17 \cdot 64 - 39 \cdot 69 = -22 \cdot 05$$
.

M3 
$$(2 \cdot 4)^2 - (6 \cdot 3)^2 = 5 \cdot 76 - 39 \cdot 69 = -33 \cdot 93$$
.

Slips(-1)

S1 Numerical Errors.

Attempts (4 marks)

A1 
$$(4 \cdot 2 \times 2) - (3 \cdot 6 \times 2) = 8 \cdot 4 - 7 \cdot 2 = 1 \cdot 2$$
.

A2 
$$\frac{4 \cdot 2}{2} - \frac{3 \cdot 6}{2} = 2 \cdot 1 - 1 \cdot 8 = 0 \cdot 3.$$

- A3 Work at estimating answer: e.g. 16 9 = 7.
- A4 Any other answers as B1, B2, B3 and B4, B6 but with misplaced decimal point and no work shown

Worthless (0 marks)

Part (iii) 10 marks Att 4

(iii) Find  $(3 \cdot 1)^2 - \frac{1}{(3 \cdot 1)}$ , correct to one decimal place.

(iii) 10 marks Att 4

(iii) 
$$(3 \cdot 1)^2 - \frac{1}{(3 \cdot 1)} = 9 \cdot 61 - 0 \cdot 322580... = 9 \cdot 28741.... = 9.3$$

\* Accept correct answer with no work.

Blunders (-3)

B1 
$$\sqrt{3\cdot 1} - \frac{1}{3\cdot 1} = 1\cdot 7606... - 0\cdot 32258... = 1\cdot 43802... = 1\cdot 4$$
.

B2 
$$(31)^2 - \frac{1}{3 \cdot 1} = 961 - 0 \cdot 32258... = 960 \cdot 67742 = 960 \cdot 7.$$

B3 
$$(3 \cdot 1)^2 - \frac{1}{31} = 9 \cdot 61 - 0 \cdot 032258... = 9 \cdot 5777 = 9 \cdot 6$$
.

B4 
$$(31)^2 - \frac{1}{31} = 961 - 0.032258... = 960.967... = 961.$$

B5 
$$(0.31)^2 - \frac{1}{3.1} = 0.0961 - 0.32258... = -0.22648... = -0.2.$$

B6 
$$(0.31)^2 - \frac{1}{0.31} = 0.0961 - 3.2258... = -3.1297 = -3.1.$$

- B7 Square not found.
- B8 Reciprocal not found.
- B9 No subtraction.
- B10 Error in precedence e.g.  $[(3 \cdot 1)^2 1] \div 3 \cdot 1 = 2 \cdot 7774... = 2 \cdot 8$ .
- B11 Incorrect or omitted rounding-off.

Misreadings (-1)

M1 
$$(1 \cdot 3)^2 - \frac{1}{3 \cdot 1} = 1 \cdot 69 - 0 \cdot 32258... = 1 \cdot 367... = 1 \cdot 4.$$

M2 
$$(3 \cdot 1)^2 - \frac{1}{1 \cdot 3} = 9 \cdot 61 - 0 \cdot 7692... = 8 \cdot 8408 = 8 \cdot 8.$$

M3 
$$0.322580 - 9.61 = -9.28741 = -9.3$$
.

*Slips* (-1)

S1 Numerical errors.

Attempts (4 marks)

- A1 Work at estimating answer: e.g. 9 or 0 · 3333.
- A2 Any other answers as B2, B3, B4, and B5 but with misplaced decimal point and no work shown.

Worthless (0 marks)

Part (iv) 10 marks Att 4

(iv) Find the exact value of  $17 \cdot 2 - 6.4 \times 2 \cdot 81$ 

(iv) 10 marks Att 4

(iv) 
$$17 \cdot 2 - 6 \cdot 4 \times 2 \cdot 81 = 17 \cdot 2 - 17 \cdot 984 = -0 \cdot 784$$

\* Accept correct answer with no work.

#### Blunders (-3)

- B1 Error in precedence:  $10 \cdot 8 \times 2 \cdot 81 = 30 \cdot 348$ .
- B2 Any step omitted.
- 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.
- M2 Answer given as +0.784

#### Attempts (4 marks)

- A1 A different ordering of the numbers indicated and correctly worked out.
- A2 Work at estimating answer: e.g.  $17-6\times3=-1$  or 33.
- A3 Work towards some correct step: e.g. long multiplication begun.

## Worthless (0 marks)

Part (v)

10 marks

Att 4

**(v)** A cinema has 500 seats. One night 200 seats were empty. What percentage of seats were occupied?

**(v)** Att 4

Method 1

(v) 
$$500 - 200 = 300 \Rightarrow \frac{300}{500} \times 100 = 60\%$$

Method 1 Method 2  

$$500 - 200 = 300 \Rightarrow \frac{300}{500} \times 100 = 60\%$$
 :  $\frac{200}{500} \times 100 = 40\% \Rightarrow 100\% - 40\% = 60\%$ .

Accept correct answer with no work.

Blunders (-3)

Method 1

Incorrect or no subtraction. B1

- Error(s) in establishing  $\frac{300}{500} \times 100$ . [All three elements must be present otherwise attempt B2 only].
- **B**3 Incorrect or incomplete answer or no answer. [Use candidate's answer from above].

Method 2.

$$\frac{200}{100} \times 100$$

- Error(s) in establishing  $\frac{200}{500} \times 100$ .[All three elements must be present otherwise attempt only] **B**1
- B2 Incorrect or incomplete answer or no answer. [Use candidate's answer from above].
- Incorrect or no subtraction. [Use candidate's answer from above]. B3

Attempts (4 marks)

A1 Gives 
$$\frac{300}{500}$$
 or  $\frac{500}{300}$  only.

A2 Gives 
$$\frac{200}{500}$$
 or  $\frac{500}{200}$  only.

A3 
$$500 - 200 = 300$$
 and stops.

Worthless (0 marks)

Part (vi) 10 marks Att 4

(vi) Given an exchange rate of  $\in 1 = 9.272$  Swedish Kronor, find the value in euro of 700 Swedish Kronor.

(vi) 10 marks Att 4

(vi) 
$$\frac{700}{9 \cdot 272} = 75 \cdot 49611734 = [\text{7.5.5}]$$

- \* Accept correct answer with no work.
- \* Accept candidate's degree of rounding.

Blunders (-3)

B1  $700 \times 9 \cdot 272 = 6490 \cdot 4$ 

B2  $\frac{700}{0.09272}$  = 7549.611734, except if answer is given as 7549.611734 cents.

*Slips* (-1)

S1 Answer given in cents.

Attempts (4 marks)

A1 Some use of the given data.

Worthless (0 marks)

(vii) A prize of €300 is divided between 1<sup>st</sup> and 2<sup>nd</sup> place in the ratio of 3:2. How much does each person get?

(vii) 10 marks Att 4

Att 4

(***)	10 marks	ALLT
(vii)	or	or
3:2	3+2=5	3x:2x
$\Rightarrow \frac{300}{5} = 60$	$\frac{1}{5} = 60$	$\Rightarrow 5x = 300$
$\rightarrow {5} = 60$	3	$\Rightarrow x = 60$
$1^{st} = 60 \times 3 = \text{\textsterling}180$	$\frac{3}{5} = \text{£}180(1^{st})$	$\Rightarrow 3x = \text{£}180(1^{st})$
$2^{nd} = 60 \times 2 = \text{\textsterling}120$	$\Rightarrow 300 - 180 = \text{\textsterling}120(2^{nd}).$	$\Rightarrow 2x = \text{£}120(2^{nd}).$

<sup>\*</sup>Accept correct answer with no work.

#### Blunders (-3)

- B1 Divisor  $\neq$  5 only and continues.
- B2 Incorrect multiplier or fails to multiply. (Each time).
- B3 Error in transposition.
- B4 Fails to find second amount.
- B5 Addition instead of subtraction e.g. 300 + 180 = 480.

## Attempts (4 marks)

A1 Divisor 
$$\neq 5$$
 e.g.  $\frac{300}{3}$  and /or  $\frac{300}{2}$  and stops.

A2 Indicates 5 parts or 3 parts or 2 parts or 
$$\frac{3}{5}$$
 or  $\frac{2}{5}$  or  $3+2=5$  and stops.

A3 Indicates multiplication of 300 by 3 and/or 2 and stops.

#### Worthless (0 marks)

Part (viii)

Att 4

(viii) Find the exact value of  $\frac{167 \cdot 3}{\sqrt{12 \cdot 25}}$ .

(viii) 10 marks Att 4

10 marks

(viii) 
$$\frac{167 \cdot 3}{\sqrt{12 \cdot 25}} = \frac{167 \cdot 3}{3 \cdot 5} = 47 \cdot 8 = 47 \cdot 8$$

\* Accept correct answer with no work.

Blunders (-3)

B1 
$$\frac{167 \cdot 3}{\sqrt{12 \cdot 25}} = \frac{167 \cdot 3}{(12 \cdot 25)^2} = \frac{167 \cdot 3}{150 \cdot 0625} = 1 \cdot 114868...$$

- B2  $167.3 \times 3.5 = 585.55$ .
- B3  $167 \cdot 3/3 \cdot 5$  and stops.

Misreadings (-1)

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

Attempts (4 marks)

A1 
$$\sqrt{12 \cdot 25} = 12 \cdot 25 \times 2 = 24 \cdot 5..$$

Worthless (0 marks)

Part (ix) 10 marks Att 4

(ix) Find 
$$\frac{(5 \cdot 78 \times 10^9) - (3 \cdot 46 \times 10^5)}{4 \cdot 32 \times 10^4}$$
, correct to three significant figures..

(ix) 10 marks Att 4

(ix) 
$$\frac{5 \cdot 779654 \times 10^9}{4 \cdot 32 \times 10^4} = 1 \cdot 33788287 \times 10^5 = 133788 \cdot 287 = 134 \ 000$$

Or 
$$\frac{5780000000 - 346000}{43200} = \frac{5779654000}{43200} = 133788 \cdot 287 = 134 000$$

\* 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 0.000007474... 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  $\frac{5779654000}{43200}$  and stops.
- B8 Answer not correct to three significant figures.

*Slips (-1)* 

S1 Numerical slips

Attempts (4 marks)

- A1 10<sup>9</sup> treated as 90, 10<sup>5</sup> treated as 50 and/or 10<sup>4</sup> treated as 40.
- A2 Some work towards estimation.
- A4 An incorrect number correctly rounded off to three significant figures

Worthless (0 marks)

(x) Find 
$$\frac{47 \cdot 3 - 8 \cdot 9}{3 \cdot 25 \times 1 \cdot 47}$$
, correct to two decimal places.

(x) 10 marks Att 4

(x) 
$$\frac{47 \cdot 3 - 8 \cdot 9}{3 \cdot 25 \times 1 \cdot 47} = \frac{38 \cdot 4}{4 \cdot 7775} = 8 \cdot 037676609 = 8.04.$$

Blunders (-3)

- B1 Error(s) in precedence. (Once only)
- B2  $\frac{4 \cdot 7775}{38 \cdot 4} = 0.124414062$
- B3 The use of a wrong operator or operators is indicated. (Once only)
- B4 Any step omitted e.g.38·4/4·7775 and stops.
- B5 Any incorrect rounding off within the working. (Once only)
- B6 Incorrect or no rounding off.

*Slips* (-1)

S1 Numerical errors.

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 two decimal places.

Worthless (0 marks)

<sup>\*</sup>Accept correct answer with no work.

## **QUESTION 2**

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

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

- (a) (i) Change 750 cm to metres.
  - (ii) Change 2.56 kg to grams.

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

- (a) (i)  $750 \text{ cm} = \frac{750}{100} = 7.5 = 7.5 \text{ metres.}$ 
  - (ii)  $2.56 \text{ kg} = 2.56 \times 1000 = 2560 = 2560 \text{ grams.}$
- \* Accept correct answer with no work.

Blunders (-3)

- B1 Incorrect conversion factor
- B2 Misuse of conversion factor: e.g.  $750 \times 100 = 75000$
- B3 Misuse of conversion factor: e.g.  $\frac{2.56}{1000} = 0.00256..$

*Slips* (-1)

- S1 Incorrect units, e.g. 7.5 cm.
- S2 Numerical errors.
- S3 Answer given as 7m 50 cm. .

Attempts (2 marks)

A1  $750 \times 2 \cdot 56 = 1920$ 

Worthless (0 marks)

Part (b)

20 (10, 5, 5) marks

Att (4, 2, 2)

**(b)** The charges for Helen's bill-pay phone per month are as follows:

Fixed charge: €10

Call charges:

First 40 minutes: 25 cent per minute Additional minutes: 15 cent per minute

Text messages: 12 cent each

During March, Helen used 60 minutes call time and sent 30 text messages.

- (i) Calculate the total charge for all her phone calls.
- (ii) Calculate the charge for her text messages.
- (iii) Calculate Helen's bill, after VAT at 21% is added to all the above charges. Give your answer correct to the nearest cent.

(b)(i) 10 marks Att 4

**(b)(i)**  $60 = 40 + 20 \Rightarrow 40 \times 25 + 20 \times 15 = 1000 + 300 = 1300 \text{ cent} =$ **43** 

Blunders (-3)

- B1  $40 \times 25 + 20 \times 15$  and stops.
- B2 Any error(s) in calculation of  $40 \times 25 + 20 \times 15$ . (to a max -3)
- B3 Incorrect break up of 60 minutes. e.g. 60 = 40 + 30

Slips(-1)

- S1 Decimal error.
- S2 Numerical errors.
- S3 Adds fixed charge.

Attempts (4 marks)

- A1 60 minutes call time not broken into 40 minutes and additional minutes.
- A2  $40 \times 25 = 1000$  and stops.
- A3  $20 \times 15 = 300$  and stops.
- A4 60 = 40 + 20 and stops.
- A5 Some use of the given data.

(b)(ii) 5 marks Att 2

Blunders (-3)

B1 Incorrect multiplier.

*Slips* (-1)

- S1 Decimal error.
- S2 Numerical errors.
- S3 Adds fixed charge, except if penalised S3 in part (i).

Attempts (2 marks)

A1 Some use of the given data.

<sup>\*</sup> Accept correct answer without work.

<sup>\*</sup> Accept correct answer without work.

(b)(iii) 5 marks Att 2

(b)(iii) 
$$10 + 13 + 3.60 = 26.6$$
: VAT =  $\frac{26.6}{100} \times 21 = 5.586 \Rightarrow \text{Bill} = 26.6 + 5.586 = €32.186 = €32.19$ 

or Bill with VAT =  $\frac{26.6}{100} \times 121 = 32.186 = €32.19$ 

- Accept correct answer without work.
- Use Candidate's answers from previous parts.

Blunders (-3)

- Error(s) in establishing  $\frac{26 \cdot 6}{100} \times 21$  [All three elements must be present otherwise att only]
- Error(s) in establishing  $\frac{26 \cdot 6}{100} \times 121$  [All three elements must be present otherwise att only] B2
- B3 Element of bill omitted.
- Calculates VAT as 21% but fails to add to find total bill. **B4**

*Slips (-1)* 

- Numerical errors. **S**1
- Incorrect or no rounding off to nearest cent.

Attempts (2 marks)

10 + 13 + 3.60 = 26.6 only.

- (c) John earns €11 per hour and works a 40 hour week. His rate of tax is 20% and he has tax credits of €50 per week.
  - (i) Calculate the tax payable by John.
  - (ii) John also pays PRSI at the rate of 4% of his gross weekly wage. Calculate John's weekly take-home pay.

(c)(i) 10 marks Att 4

(c)(i) Gross weekly wage =  $11 \times 40 = \text{€}440$ .  $\text{€}440 \times 0 \cdot 2 = 88 \Rightarrow \text{Tax payable} = 88 - 50 = \text{€}38$ 

- Accept correct answer without work.
- \* Accept candidate's answer for gross wage when calculating tax.

#### Blunders (-3)

- B1 Error in calculating % e.g.  $440 \times 1 \cdot 20$ .
- B2 Adds tax credit to gross tax. (138).
- B3 €402 given as tax payable or take home (net) pay.

## *Slips* (-1)

- S1 Decimal error.
- S2 Numerical errors.

#### Attempts (4 marks)

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

## Worthless (0 marks)

## (c)(ii) PRSI: $440 \times 0.04 = 17.6$ : Take-home pay: 440 - 38 - 17.6 = 384.4

- \* Accept correct answer without work
- \* Accept candidate's answer from part (i).

#### Blunders (-3)

B1 Error in calculating % e.g.  $\in$ 440 × 0·4.

- B2 Error(s) in establishing  $\frac{440}{100} \times 4$  [All three elements must be present, otherwise attempt only]
- B3 Calculates 4% of gross tax or tax payable or pay after tax.
- B4 Uses wrong Gross wage.
- B5 Uses a Tax other than that calculated in (c) (i) above.
- B6 Adds Tax.
- B7 Uses a PRSI amount other than that calculated.
- B8 Adds the PRSI amount.
- B9 Subtraction not completed.

#### *Slips (-1)*

- S1 Incorrect rounding off of answer.
- S2 Numerical errors.

## Attempts (4 marks)

- A1 Some use of 100.
- A2 Some spurious number subtracted from Gross wage

## Worthless (0 marks)

**QUESTION 3** 

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

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

(a) The estimated building cost of a community hall was €600 000. The actual cost was €750 000.

- (i) Find the error in the estimate.
- (ii) Find the percentage error.

(a) 5 marks Att 2

(i) Error =  $750\ 000 - 600\ 000 = 450,000$ 

\* Accept correct answer with no work.

Blunders (-3)

B1  $750\,000 - 600\,000$  and stops.

*Slips (-1)* 

S1 Numerical errors.

Attempts (2 marks)

A1 Some use of the given data; e.g.  $600\ 000 \times 750\ 000$ .

Worthless (0 marks)

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

(a) 5 marks Att 2

(ii) Percentage error = 
$$\frac{150\ 000}{750\ 000} \times 100 = 20 = 20\%$$

Blunders (-3)

B1 Error(s) in establishing  $\frac{150\ 000}{750\ 000} \times 100$  [All three elements must be present; else attempt only].

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

Worthless (0 marks)

<sup>\*</sup> Accept correct answer with no work.

- (b) €4000 is invested for three years at 2.5% per annum compound interest. Find the value of the investment at the end of the three years, correct to the nearest cent.
- (b) Substitute into formula10 marksAtt 4Simplify bracket5 marksAtt 2Finish5 marksAtt 2

**(b)** 
$$A = 4000 \left(1 + \frac{2 \cdot 5}{100}\right)^3 = 4000 (1 \cdot 025)^3 = 4000 (1 \cdot 076890625) = 4307 \cdot 5625 =$$
**4307 · 56**

- \* Accept correct answer with no work.
- \*  $A = 4000 \left(1 + \frac{2 \cdot 5}{100}\right)^3 \Rightarrow 10 \text{ marks.}$
- \*  $A = 4000(1.025)^3 \Rightarrow 15 \text{ marks}.$
- \*  $A = 4000 \left(1 + \frac{2 \cdot 5}{100}\right)^3$  = incorrect answer, without 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 4000 / 2.5 or 4000 / 2.5 = 1600

A2 (4000)(2.5) or (4000)(2.5) = 10000.

A3 4000 / 0.025 = 160000.

#### Simplify bracket

5 marks

Att 2

B1 
$$A = 4000 \left(1 + \frac{2 \cdot 5}{100}\right)^3 \neq 4000 (1.025)^3$$
.

Finish 5 marks Att 2

 $A = 4000 \left( 1 + \frac{2 \cdot 5}{100} \right)^3$ 

\* Use candidate's answer to simplification of

B1  $(1.025)^3 = (1.025) \times 3 = 3.075 \text{ or } (1.025)^3 = (1.025)/3 = 0.341666...$ 

B2 
$$\frac{4000}{(1.025)^3} = 3714.399... \text{ or } \frac{4000}{(0.975)^3} = 4315.651...$$

B3 
$$4000 \times (0.975)^3 = 3707.4375$$

*Slips (-1)* 

S1 Incorrect or omitted rounding off to nearest cent.

S2 Numerical error

Misreadings (-1)

M1  $(1.025)^n$ , n = 2 or  $n \ge 4$  used in formula

Worthless (0 marks)

#### OR

(b) Amount year 1 10 marks Att 4
Amount year 2 5 marks Att 2
Amount year 3 5 marks Att 2

**(b)** Amount at end of year 1:  $4000 \times 1.025 = 4100$ 

Amount at end of year 2:  $4100 \times 1.025 = 4202.5$ 

Amount at end of year  $3:4202.5 \times 1.025 = 4307.5625 = €4307.56$ .

#### OR

Compound Interest Year 1:  $4000 \times \frac{2.5}{100} = 100 \Rightarrow \text{Principal Yr 2} = 4100$ 

Compound Interest Year 2:4100  $\times \frac{2.5}{100} = 102.5 \Rightarrow \text{Principal Yr } 3 = 4202.5$ 

Compound Interest Year 3:  $4202.5 \times \frac{2.5}{100} = 105.0625 \Rightarrow \text{Principal Yr 4} = 4307.56(25)$ 

 $\Rightarrow$  Amount = 4307·56(25)

- \* Accept correct answer with no work.
- \* Amount year  $1 = 4100 \Rightarrow 10 \text{ marks}$
- \* Amount year  $2 = 4202.5 \Rightarrow 15$  marks
- \* Amount year  $3 = 4307.56(25) \Rightarrow 20$  marks
- \* Using Simple Interest only to give  $300 \Rightarrow 8$  marks (4 + 2 + 2), with or without work.

#### Amount at end of year 1

## 10 marks

Att 4

Blunders (-3)

B1  $4000 \times 1 \cdot 25 = 5000$ .

- B2 Error(s) in establishing  $4000 \times \frac{2.5}{100}$  [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.

Attempts (4 marks)

A1 Some use of 100 in attempt to find percentage

Worthless (0 marks)

## 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.
- 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 above in Year 1 or Year 2.

#### *Slips* (-1)

- S1 Numerical errors.
- S2 Total compound interest only given.[307.56]
- S3 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) The value of a computer depreciates at the rate of 20% per year. At the end of the first year a computer is worth €656.
  - (i) Find the value of the computer when it was new.
  - **(ii)** What will the computer be worth at the end of the third year? Give your answer to the nearest euro.

(c)(i) 10 marks Att 4

(c)(i)
$$P = \frac{656}{\left(1 - \frac{20}{100}\right)} = \frac{656}{0 \cdot 8} = 6820 \text{ or } 656 = P\left(1 - \frac{20}{100}\right) \Rightarrow 656 = P(0 \cdot 8) \Rightarrow P = 6820$$

or 
$$\frac{4}{5} = 656 \Rightarrow \frac{1}{5} = 164 \Rightarrow \frac{5}{5} = \text{€820}$$
 or  $80\% = \text{€656}$   
 $\Rightarrow 1\% = \text{€8.20}$   
 $\Rightarrow 100\% = \text{€820}$ 

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.
- B3 Error in transposition.

B4 
$$P = \frac{656}{\left(1 - \frac{20}{100}\right)} \neq \frac{656}{0.8}$$

*Slips* (-1)

S1 Numerical errors

Attempts (4 marks)

A1 656/20 or 656/20=32·8

A2 (656)(20) or (656)(20) = 13120 or 656/0.2 = 3280.

A3  $656 \times \frac{20}{100} = 131.20$  giving a total of €787.20

A4 €787·20 without work or 524·80 without work.

Worthless (0 marks)

<sup>\*</sup> Accept correct answer with no work.

## (c)(ii) (formula method)

#### 10 marks

Att 4

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

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.
- B3 Incorrect number of years for candidate's chosen starting amount.

B4 A = 
$$820\left(1 - \frac{20}{100}\right)^3 \neq 820(0.8)^3$$
.

B5 
$$(820)(1\cdot2)^3 = 1416\cdot96$$

B6 
$$\frac{820}{(0.8)^3} = 1601.5625 \text{ or } \frac{820}{(1.2)^3} = 474.537$$

B7 Above blunders apply to 656 when taken as starting amount.

Attempts (4 marks)

A1 
$$\frac{820}{20}$$
 or  $\frac{820}{20} = 41$ 

A2 (820)(20) or (820)(20) = 16400 or 
$$\frac{820}{0.2}$$
 = 4100.

A3 Above attempts apply to 656 taken as starting amount.

Slips (-1)

- S1 Incorrect or omitted rounding off to the nearest euro.
- S2 Numerical errors.

Misreadings (-1)

M1 
$$(0.8)^n$$
,  $n \ge 4$  used in formula.

Worthless (0 marks)

#### (c)(ii) (year-by-year method)

#### 10 marks

Att 4

(c) Value at the end of year 1:  $820 \times 0.8 = 656$ 

Value at the end of year 2:  $656 \times 0.8 = 524.8$ 

Value at the end of year 3:  $524.8 \times 0.8 = 419.84 = €420$ 

or Depreciation at end of year 2:  $656 \times \frac{20}{100} = 131 \cdot 20 \Rightarrow \text{Value } 2 = 524 \cdot 8$ 

Depreciation at end of year 3:  $524.8 \times \frac{20}{100} = 104.96 \Rightarrow \text{Value } 3 = 419.84$ 

⇒ final value = €420.

- \* Accept correct answer with no work.
- \* Using Simple Interest only to give  $492 \Rightarrow 4$  marks, with or without work.

## Blunders (-3)

- B1 (820)(0.08) = 65.6
- B2 Error(s) in establishing (820)(20)/100 [All three elements must be present; else attempt only].
- B3 Stops at depreciation and fails to find value. (Each time)
- B4 Adds depreciation to find value. (Once only)
- B5 Error(s) in calculating percentage.
- B6 Uses a value other than calculated above.
- B7 Each step omitted for the candidate's chosen starting amount.

## *Slips* (-1)

- S1 Numerical errors.
- S2 Incorrect or no rounding off to nearest euro.

#### Attempts (4 marks)

A1 Some use of 100 in attempt to find percentage.

#### Worthless (0 marks)

**QUESTION 4** 

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

Part (a) 10 marks Att 4

(a) Solve for x5x - 2 = 3x + 14

(a) 10 marks Att 4

(a) 
$$5x-2-3x=14 \Rightarrow 2x-2=14 \Rightarrow 2x=14+2 \Rightarrow 2x=16 \Rightarrow x=8$$
.

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

## Blunders (-3)

- B1 Blunders in grouping terms e.g. 5x 2 = 3x. (Each time).
- B2 Transposition error(s). (Once only).
- B3 Each step omitted e.g. 2x = 16 and stops
- B4 x = 8 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

$$3x - 4y = 8$$
$$x + 2y = 16.$$

# First variable found Second variable

## 15 marks 5 marks

Att 6 Att 2

**(b)** 
$$3x - 4y = 8$$

$$x+2y = 16$$

$$3x-4y = 8$$

$$2x+4y = 32$$

$$5x = 40$$

x = 8

$$8 + 2y = 16$$
$$2y = 8$$

$$y=4$$

- \* 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 [5x = 40] or the first equation terms of y only [-10 y = -40].
- 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 (6+2 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) Alan, Barry and Colm each bought a ticket for a concert. Barry paid  $\in$ 5 more than Alan for his ticket. Colm paid twice as much as Barry. Alan's ticket cost  $\in$  x.
  - (i) Write an expression in x for the price that Barry paid.
  - (ii) Write an expression in x for the price that Colm paid
  - (iii) Given that the total paid out by the three friends was €95, how much did Alan pay?

(c) (i) 10 marks Att 4

(c) (i)

x+5

Blunders (-3)

B1 x-5.

B2 5*x*.

Attempts (4 marks)

A1 Assigns a numerical value to x that is then used to find a numerical value for Barry's cost.

A2 Some use of the given data e.g.  $\frac{x}{5}$ ,  $\frac{5}{x}$ , 5-x

Worthless (0 marks)

W1 No use of x or 5.

W2 x = 5 and stops.

(c) (ii) 5 marks Att 2

(c) (ii) 2(x+5) or 2x+10

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

Blunders (-3)

B1 x + 10

B2 2x + 5

Attempts (2 marks)

A1 2x - 5

A2 x - 10

A3  $x^2$ 

Worthless (0 marks)

W1 No use of 2 and/or 10

(c) (iii) 
$$x + (x+5) + (2x+10) = 95 \implies 4x+15 = 95 \implies 4x = 80 \implies x = 20$$
.

- \* Accept candidate's answer from part (i) and part (ii).
- \* 4x + 15 or 4x + 15 = 95 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+15 = 19x. (Each time).
- B3 Transposition error(s). (Once only).
- B4 Each step omitted.
- B5 x = 20 without work.

#### *Slips(-1)*

S1 Numerical errors.

#### Attempts (2 marks)

- A1 Some correct work.
- A2 Effort at T+E by substitution.
- A3 No equation formed.

## Worthless (0 marks)

W1 Incorrect answer without work.

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

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

- (a) (i) List the first five multiples of 3 and list the first five multiples of 4.
  - (ii) Hence, or otherwise, write down the lowest common multiple of 3 and 4.

(a)(i)5 marks<br/>5 marksAtt 2<br/>Hit/Miss

(a)	<b>(i)</b>	3, 6, 9, 12, 15.
		4, 8, 12, 16, 20.
	(ii)	12

### Part (a)(i)

*Slips (-1)* 

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

Attempts (2 marks)

A1 At least one correct entry, in either list.

### Part(a)(ii)

Lowest common multiple – hit or miss. Accept 12 or  $3 \times 4$ .

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

- **(b) (i)** Solve the quadratic equation  $x^2 + 4x + 3 = 0$ .
  - (ii) Solve the quadratic equation  $2x^2 9x + 6 = 0$ , correct to two decimal places.

(b) (i) 10 marks Att 4

**(b) (i)**  $x^2 + 4x + 3 = 0 \Rightarrow (x+3)(x+1) = 0 \Rightarrow x = -3, x = -1$ 

Blunders(-3)

B1 Last step 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).

\* without work

2 correct answers, both verified: full marks
2 correct answer and one verified: 1×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

Attempts(4 marks)

A1 Effort at finding factors.

A2 Attempt at T + E.

Worthless (0 marks)

W1 Quadratic reduced to linear.

(b) (ii) 10 marks Att 4

(ii) 
$$2x^2 - 9x + 6 = 0 \Rightarrow x = \frac{9 \pm \sqrt{(-9)^2 - 4(2)(6)}}{2(2)} \Rightarrow \frac{9 \pm \sqrt{81 - 48}}{4} \Rightarrow \frac{9 \pm \sqrt{33}}{4} \quad [\dagger]$$

$$\Rightarrow x = \frac{9 \pm 5.744..}{4} = 3.686... \text{ or } 0.813... \Rightarrow x = 3.69 \text{ or } x = 0.81.$$

- \* Maximum deductions beyond point [†] is 3 marks.
- \*  $\frac{9 \pm \sqrt{neg \ no.}}{4}$  implies 6 marks.

Blunders (-3)

- B1 Blunder in application of formula.
- B2 Omits  $\pm$  in formula.

Slips(-1)

- S1 Slips in substitution into the formula (to a max of -5)
- S2 81 48 = 129.
- 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. (2x)(x) or guide no. = 12.
- 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  $3x 2 \le 17, x \in \mathbb{N}$ .
  - **(ii)** Solve  $5 2x \le 1, x \in \mathbb{N}$ .
  - (iii) Write down the values of x which satisfy both of the above inequalities?

(c)(i) 10 marks Att 4

(i) 
$$3x-2 \le 17 \Rightarrow 3x \le 19 \Rightarrow x \le 6.33 \Rightarrow \{1, 2, 3, 4, 5, 6\} \text{ OR } \{0, 1, 2, 3, 4, 5, 6\}$$

\* Listing not required.

Blunders (-3)

- B1 Blunders in grouping terms e.g. 3x 2 = x. (Each time).
- B2 Transposition error(s). (Once only).
- B3 Each step omitted.
- B4  $x \le 6.33$  or 19/3 without work.
- B5 Replaces inequality sign with equality sign.

Misreadings (-1)

M1 Uses < for  $\le$ .

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)  $5-2x \le 1 \Rightarrow 4 \le 2x \Rightarrow 2 \le x \Rightarrow \{2, 3, 4, ...\}$ 

\* *Listing of {2, 3, 4, ...} not required.* 

Blunders (-3)

- B1 Blunders in grouping terms e.g. 5- 2x = 3x. (Each time).
- B2 Transposition error(s). (Once only).
- B3 Blunder in direction of inequality when multiplying by "minus".
- B4 Each step omitted.
- B5  $x \ge 2$  without work.
- B6 Replaces  $\leq$  with equality sign. Do not penalise if B5 is incurred in (i).

Misreadings (-1)

M1 Uses < for  $\le$ .

Attempts (2 marks)

- A1 Some correct work.
- A2 Effort at T+E by substitution.
- A3  $5 + 2x \le 1$ .

Worthless (0 marks)

W1 Incorrect answer without work.

(c)(iii) 5 marks Att 2

(iii)

 $\{2, 3, 4, 5, 6\}$ 

- \* 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)

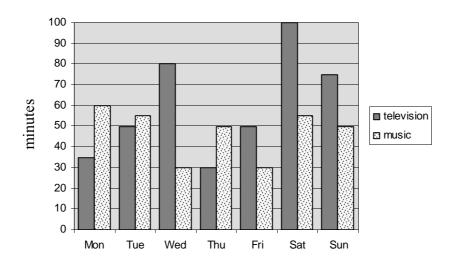
Attempts(2 Marks)

A1 At least one correct entry.

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

**6.** A student spends her free time at home watching television and listening to music. The following chart shows the amount of time spent in minutes by this student doing these activities in one particular week.

For example, on Friday, she spent 50 minutes watching television and 30 minutes listening to music.



- (i) On what day did she spend the least amount of time watching television?
- (ii) Which day shows the greatest difference between time spent watching television and time spent listening to music?
- (iii) On which days did she spend more than two hours in total watching television and listening to music?
- (iv) What is the average time per day she spent watching television during that week?
- (v) During that week, how much more of her free time did she spend watching television than listening to music?

(i) 10 marks Att 4

(i) Thursday

Blunders (-3)

- B1 Music instead of television ⇒ Wednesday and Friday
- B2 Saturday, the greatest, given as the least.

Attempts (4 marks)

A1 Wednesday only or Friday only given.

Worthless (0 marks)

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

(ii) 10 marks Att 4

# (ii) Wednesday

Blunders (-3)

B1 Tuesday, the least difference, given as greatest.

Attempts(4 Marks)

A1 Saturday given as the answer.

Worthless (0 marks)

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

(iii) 10 marks Att 4

## (iii) Saturday & Sunday

Blunders (-3)

B1 Each omitted or incorrect day.

B2 Gives Monday, Tuesday, Wednesday, Thursday and Friday as greater than two hours.

Worthless (0 marks)

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

(iv) 10 marks Att 4

(iv)  $35 + 50 + 80 + 30 + 50 + 100 + 75 = 420 \Rightarrow 420/7 = 60$  minutes.

- \* Accept correct answer without work.
- \* For TV time on Monday, accept 35 or  $35 \pm 2$  minutes. Likewise for Sunday.

Blunders (-3)

- B1 Calculating average time listening to music.
- B2 Stops at 420/7.
- B3 50, the mode given as average.
- B4 750/7 = 107.14

*Slips* (-1)

- S1 Each omitted time, or incorrect time, provided at least one is correct.
- S2 Uses a divisor other than 7.
- S3 Numerical errors.

Attempts(4 Marks)

A1 Stops at 420. or candidates answer.

Worthless (0 marks)

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

(v) 
$$420 - (60 + 55 + 30 + 50 + 30 + 55 + 50) \Rightarrow 420 - 330 = 90$$
.

- \* Accept correct answer without work.
- \* For Music time on Tuesday, accept 55 or  $55 \pm 2$  minutes. Likewise for Saturday.

### Blunders (-3)

B1 Fails to subtract 420–330 or adds 420 + 330.

### *Slips* (−1)

- S1 Numerical errors.
- S2 Each omitted time, or incorrect time, provided at least one is correct. ( to a max 3)
- S3 Interchanges television and music giving –90 as answer.

## Attempts (4 marks)

A1 Some effort at finding totals.

### Worthless (0 marks)

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

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

Table / evaluation20 marksAtt 8Graph10 marksAtt 4

Draw the graph of the function

$$f: x \to 2x^2 - 3x - 5$$
, for  $-2 \le x \le 3$ ,  $x \in \mathbb{R}$ .

Use your graph to estimate

Table method 20 marks Att 8

x	-2	-1	0	1	2	3
$2x^2$	8	2	0	2	8	18
-3x	6	3	0	-3	-6	-9
-5	-5	-5	-5	-5	-5	-5
f(x)	9	0	-5	-6	-3	4

<sup>\*</sup> 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 - 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.

### **Function evaluation method**

## 20 marks

Att 8

$$f(-2) = 2(-2)^{2} - 3(-2) - 5 = 9$$

$$f(-1) = 2(-1)^{2} - 3(-1) - 5 = 0$$

$$f(0) = 2(0)^{2} - 3(0) - 5 = -5$$

$$f(1) = 2(1)^{2} - 3(1) - 5 = -6$$

$$f(2) = 2(2)^{2} - 3(2) - 5 = -3$$

$$f(3) = 2(3)^{2} - 3(3) - 5 = 4$$

### 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)*

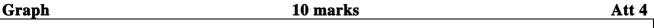
- S1 Each incorrect or omitted value from the evaluation after substitution.
- S2 Each incorrect or omitted f(x) value, calculated from candidate's work.

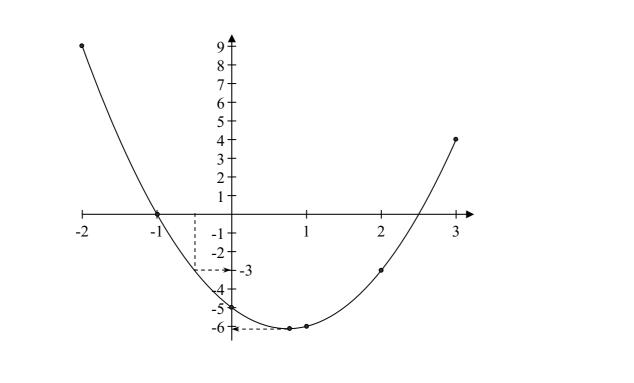
### Attempt (8 marks)

- A1 Any four correct calculated values in the function evaluation.
- A2 Function treated as linear e.g.  $x^2 = 2x$  or  $x = 2x^2 = 4x$  or x = 2x

### Worthless (0 marks)

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





- \* 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 ∪-shaped graph.
- A3 Axes Drawn.

Use your graph to estimate

- (i) the minimum value of f(x)
- (ii) the value of f(-0.5)
- (iii) the roots of f(x)=0
- (iv) the range of values of x for which f(x) is decreasing.

Part (i)		5 marks	Att 2
Part (ii)		5 marks	Att 2
Part (iii)		5 marks	Att 2
Part (iv)		5 marks	Att 2
(i)	-6·125		
(ii)	-3		
(iii)	-1, 2.5		
(iv)	$-2 \le x < 0.75$		

<sup>\*</sup> Accept candidate's values from graph.

### Blunders (-3)

B1 Value omitted, or extra value. Applies in part (iii) and (iv).

B2 f(-0.5) treated as f(x) = -0.5

## 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.

# Attempt (2 marks)

A1 Effort at reading value(s) from graph.

A2 Correctly solving equation algebraically: part (iii).

<sup>\*</sup> Allow tolerance  $\pm 0.3$  units on x-axis,  $\pm 0.5$  units on y-axis.



# **LEAVING CERTIFICATE 2008**

# **MARKING SCHEME**

# **MATHEMATICS – PAPER 2**

# **FOUNDATION LEVEL**

### MARKING SCHEME

### LEAVING CERTIFICAT EXAMINATION 2008

#### MATHEMATICS – FOUNDATON 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.

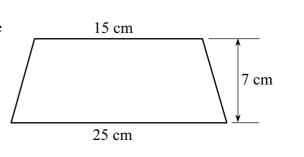
 Part (a)
 10 marks
 Att 4

 Part (b)
 40 (35, 5) marks
 Att (14, 2)

Part(a) 10 marks Att 4

(a)

The parallel sides of a trapezium measure 15 cm and 25 cm. The height is 7 cm. Calculate the area of the trapezium.



(a) 10marks Att4

$$Area = \frac{h(a+b)}{2} = \frac{7(25+15)}{2} = 140cm^2$$

Blunders (-3)

B1 Incorrect substitution

B2 Failure to divide by 2

B3 Multiplication for addition

*Slips (-1)* 

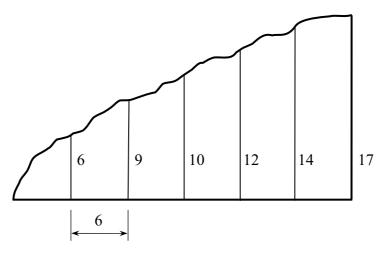
S1 Numerical errors to a max of 3

S2 Omits units

Attempts (4)

A1 Defines length or area

**(b)** The diagram below shows a corner of a lawn that needs to be replanted with grass seed.



Offsets of lengths 6, 9, 10, 12, 14 and 17 metres are measured at intervals of 6 metres as shown.

- (i) Use Simpson's rule to calculate an estimate of the area of this corner of the lawn.
- (ii) One box of lawn seed is needed for every 40 m<sup>2</sup> of the lawn. How many boxes of seed will be needed?

(b)(i) 35 marks Att 14 (ii) 5 marks Att 2

$$Area = \frac{1}{3} width [First + last + 2(odd) + 4(even)]$$
(i) 
$$Area = \frac{6}{3} [0 + 17 + 2(9 + 12) + 4(6 + 10 + 14)]$$

$$Area = 2[17 + 2(21) + 4(30)] = 2[17 + 42 + 120] = 2(179)$$

$$Area = 358m^{2}$$

(ii) Number of boxes = 
$$\frac{358}{40}$$
 = 8.95 or 9

Blunders (-3)

- B1 Uses four odd and twice even e.g. 2(30) + 4(21)
- 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 Multiplies by 40

*Slips* (-1)

- S1 Numerical errors to a max of 3
- S2 Omits units
- S3 Each incorrect or omitted altitude

Attempts (14, 2)

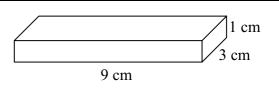
- A1 Gives Simpson's Formula only.
- A2 Copies diagram

Part (a)	10 marks	Att 4
Part (b)	15 marks	Att 6
Part (c)	25(15, 10) marks	Att (6, 4)

Part(a) 10 marks Att 4

**2.** (a) A rectangular chocolate bar is 9 cm long, 3 cm wide and 1 cm thick.

Calculate the volume of chocolate in the bar.



(a) 10 marks Att 4

$$Volume = l \times b \times h = 9 \times 3 \times 1 = 27 cm^3$$

Blunders (-3)

B1 Incorrect substitution

B2 Addition for multiplication

*Slips* (-1)

S1 Numerical errors to a max of 3

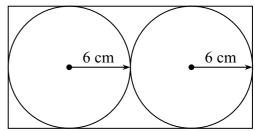
S2 Omits units

Attempts (4)

A1 Correct formula without substitution

Part(b) 15 marks Att 6

The diagram shows two circles inscribed in a rectangle.
The radius of each circle is 6 cm
Find the area of the rectangle



(b) 15 marks Att 6

Length = 
$$4 \times 6 = 24$$
cm Width =  $2 \times 6 = 12$ cm  
Area =  $24 \times 12 = 288$ cm<sup>2</sup>

Blunders (-3)

B1 Each incorrect dimension

*Slips* (-1)

S1 Numerical errors to a max of 3

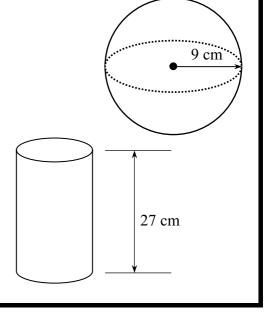
S2 Omits units

Attempts (6)

A1 Defines length or area

A2 Finds area of circle

- (c) A sphere and a cylinder have the same volume. The sphere has a radius of 9 cm.
  - (i) Calculate the volume of the sphere in terms of  $\pi$ .
  - (ii) The height of the cylinder is 27 cm. Calculate the radius of the cylinder.



(i) 15 marks Att 6

Volume = 
$$\frac{4\pi r^3}{3} = \frac{4 \times \pi \times 9^3}{3} = 972\pi cm^3$$

Blunders (-3)

B1 Incorrect substitution

*Slips* (-1)

- S1 Numerical errors to a max of 3
- S2 Omits units
- S3 Omits  $\pi$  or gives answer as 3053.6 or 3052.08 or similar

Attempts (6)

A1 Correct formula without substitution

(ii) 10 marks Att 4

$$\pi \times r^2 \times 27 = 972\pi$$

$$\Rightarrow r^2 = \frac{972\pi}{27\pi} = 36 \qquad \Rightarrow r = 6cm$$

Blunders (-3)

- B1 Incorrect substitution
- B2 Error in balancing equation

*Slips* (-1)

- S1 Numerical errors to a max of 3
- S2 Omits units

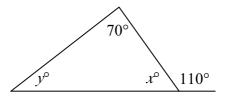
Attempts (4)

- A1 Correct formula without substitution
- A2 Correct volume of cylinder and stops

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

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

**3.** (a) Find the value of x and the value of y.



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

Ans: 
$$x = 70^{\circ}, y = 40^{\circ}$$

Blunders (-3)

B1 Geometrical error

*Slips* (-1)

S1 Numerical errors to a max of 3

Attempts (2, 2)

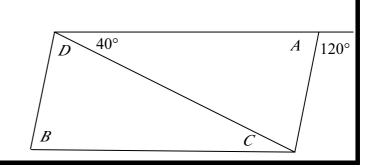
A1 Incorrect answer of some merit

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

**(b)** The diagram shows a parallelogram.

Find the measure of

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



Each part 5 marks Att 2

Ans: (i) 
$$A = 60^{\circ}$$
 (ii)  $B = 60^{\circ}$  (iii)  $C = 40^{\circ}$  (iv)  $D = 80^{\circ}$ 

Blunders (-3)

B1 Geometrical error

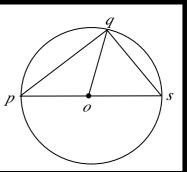
Slips(-1)

S1 Numerical errors to a max of 3

Attempts (2, 2, 2, 2)

A2 Incorrect answer of some merit

- (c) The diagram shows a circle with centre o and radius 6.5 cm.
  - (i) Write down the measure of the angle  $\angle pqs$ .
  - (ii) Write down the length of [oq].
  - (iii) Write down the length of the diameter of the circle.
  - (iv) If |qs| = 5 cm, find the length of [pq].



Each part 5 marks Att 2

Ans: **(i)**  $|\angle pqs| = 90^{\circ}$ 

**(ii)**|oq| = 6.5cm

**(iii)** d = 13cm

**(iv)** |pq| = 12cm

Blunders (-3)

B1 Geometrical error

B2 Any error in Pythagoras

*Slips* (-1)

S1 Numerical errors to a max of 3

S2 Omits units

Attempts (2, 2, 2, 2)

A1 Incorrect answer of some merit

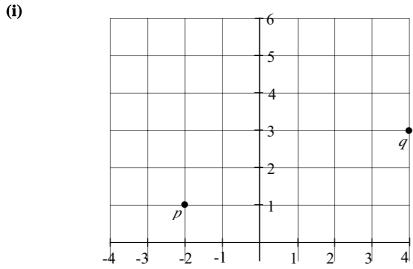
(iv) 
$$|pq|^2 + 25 = 169$$
  
 $|pq|^2 = 169 - 25$   
 $|pq|^2 = 144$   
 $|pq| = 12 \text{ cm}$ 

Part (a)	15 (10, 5) marks	Att (4, 2)
Part (b)	15(5, 5, 5) marks	Att (2, 2, 2)
Part (c)	20 (5, 5, 10) marks	Att (2, 2, 4)

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

- (a) p(-2, 1) and q(4, 3) are two points.
  - (i) Plot the points p and q on graph paper.
  - (ii) Find the midpoint of [pq].

(i)10 marksAtt 4(ii)5 marksAtt 2



(ii) Midpoint = 
$$\left(\frac{-2+4}{2}, \frac{1+3}{2}\right) = \left(\frac{2}{2}, \frac{4}{2}\right)$$
 or  $(1, 2)$ 

Blunders (-3)

- B1 Error in scales
- B2 Omits 2 in midpoint formula
- B3 Incorrect substitution once only
- B4 Each point ommitted

*Slips* (-1)

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

Attempts(4, 2)

A1 Draws axes.

- **(b)** a(-6, 6) and b(-3, 4) are two points
  - (i) Find the length of [ab].
  - (ii) Find the slope of *ab*.
  - (iii) Find the equation of the line ab.

Each part 5 marks Att 2

(i) Length = 
$$\sqrt{(-3-(-6))^2+(4-6)^2} = \sqrt{(3)^2+(-2)^2} = \sqrt{13}$$

(ii) Slope = 
$$\frac{4-6}{-3-(-6)} = \frac{-2}{3}$$

(iii) 
$$y-6 = \frac{-2}{3}(x+6)$$
 or  $2x+3y-6=0$ 

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 (2, 2, 2)

A1 Draws axes.

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

(c) The line L has equation 2y = 5x + 2.

The point r has co-ordinates (0, 1).

- (i) Show that the point r lies on the line L.
- (ii) Find the slope of L.
- (iii) Find the equation of the line K, which is perpendicular to L and contains the point r.

(i) 
$$2y = 5x + 2 \Rightarrow 2(1) = 5(0) + 2 \Rightarrow 2 = 2$$

**(ii)** 
$$slope = \frac{5}{2}$$

(iii) 
$$y-1 = \frac{-2}{5}(x-0)$$
 or  $2x+5y-5=0$ 

Blunders (-3)

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

*Slips (-1)* 

S1 Numerical errors to a max of 3

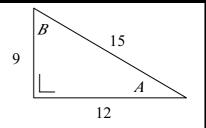
Attempts (2, 2, 4)

A1 Draws axes.

Part (a)	20 (10, 10) marks	Att (4, 4)
Part (b)	15 marks	Att 6
Part (c)	15 marks	Att 6

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

- **5. (a)** The diagram shows a right-angled triangle with sides of length 9, 12 and 15 and angles named *A* and *B*.
  - (i) Write down  $\cos A$  as a fraction.
  - (ii) Write down tan B as a fraction.



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

$$\cos A = \frac{12}{15} \qquad \tan B = \frac{12}{9}$$

Blunders (-3)

B1 Uses incorrect numerator or denominator each time

*Slips* (-1)

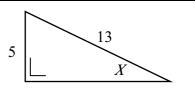
- S1 Calculates the angle approx  $A = 37^{\circ}$  or  $B = 53^{\circ}$
- S2 Answer not in fraction form.

Attempts (4, 4)

A1 Defines cos or tan

Part (b) 15 marks Att 6

**(b)** Find the measure of the angle *X* in the diagram, correct to the nearest degree.



(b) 15 marks Att 6

$$\sin X = \frac{5}{13}$$
  $\Rightarrow$   $X = \sin^{-1} \left(\frac{5}{13}\right)$   $\Rightarrow$   $X = 22.619^{\circ} \approx 23^{\circ}$ 

Blunders (-3)

- B1 Incorrect trig ratio
- B2 Error in balancing equation

*Slips (-1)* 

- S1 Fails to round off
- S2 Wrong mode

Attempts (6)

A1 Measures from diagram.

Wrong mode

Rad:  $x = 0.3947 \approx 0$ Grad:  $x = 25.133 \approx 25$  Part (c)

### 15 marks

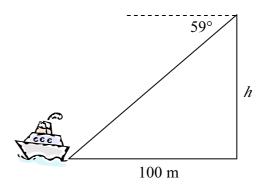
Att 6

(c) A boat that is anchored out at sea can be seen from the top of a vertical cliff.

The angle of depression from the top of the cliff to the boat is 59°, as shown in the diagram.

The boat is 100m from the foot of the cliff.

Find *h*, the height of the cliff, correct to the nearest metre.



(c)

Att 6

$$\frac{h}{100} = \tan 59^{\circ} \quad \Rightarrow \quad h = 100 \tan 59^{\circ} \quad \Rightarrow \quad h = 166.42 \approx 166 m$$

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 = -82.577Grad:  $h = 133.1 \approx 133$ 

Attempts (6)

- A1 Measures from diagram
- A2 Evaluates sin59°, cos59°, or tan59° and stops

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

Part (a) 10 marks Att 4

- (a) A factory produces a range of wigs, as follows:
  - The wigs can have either short hair or long hair.
  - The colour can be blond or black or red.
  - The hair can either be straight or curly.

How many different wigs in this range can the factory produce?

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

Blunders (-3)

- B1 2 + 3 + 2 = 7 or 7 written down
- B2 2! Etc
- B3 2 by 2 +3 by 3 +2 by 2 or similar

*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 5 apples, 4 pears, 3 oranges and 2 bananas. A child chooses a piece of fruit at random from the bag.
  - Find the probability that the fruit chosen is
  - (i) a pear
  - (ii) an orange
  - (iii) an apple or an orange
  - (iv) not a banana.

# Each Part 5 marks Att 2

Answers: (i) 
$$\frac{4}{14}$$
 (ii)  $\frac{3}{14}$  (iii)  $\frac{8}{14}$ 

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) 4 (ii) 3 (iii) 8 (iv) 12 merits 17 marks

or

Answers:(i)  $\frac{1}{4}$  (ii)  $\frac{1}{3}$  (iii)  $\frac{1}{8}$  (iv)  $\frac{1}{12}$  merits 17 marks

Part (c)

## 20 (5, 5, 5, 5) marks

Att (2, 2, 2, 2)

**(c)** The table below shows how a class of 90 students normally travel to school.

	Walk	Car	Bus
Girls	9	15	21
Boys	10	16	19

A student is chosen at random.

What is the probability that the student

- (i) is a boy who comes to school by bus
- (ii) is a girl
- (iii) travels to school by car
- (iv) does not walk to school.

**Each part** 

5 marks

Att 2

Answers: **(i)**  $\frac{19}{90}$ 

(ii)  $\frac{45}{90}$ 

**(iii)**  $\frac{31}{90}$ 

(iv)  $\frac{71}{90}$ 

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) 19 (ii) 45 (iii) 31

(iv) 71 merits 17 marks

Answers: (i)  $\frac{1}{19}$  (ii)  $\frac{1}{45}$ 

(iii)  $\frac{1}{31}$  (iv)  $\frac{1}{71}$  merits 17 marks

 Part (a)
 5 marks
 Att 2

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

 Part (c)
 20(5, 15) marks
 Att (2, 6)

Part (a) 5 marks Att 2

(a) Find the mode of the numbers

3, 2, 2, 3, 1, 3.

(a) 5 marks Att 2

Mode = 3

*Slips(-1)* 

S1 Calculates mean

S2 Finds median

Attempts (2)

A1 Incorrect answer of some merit

Part (b)

### 25 (5, 10, 5, 5) marks

Att (2, 4, 2, 2)

**(b)** The table below shows the time taken by 60 people to get ready for work in the morning, correct to the nearest minute.

Number of minutes	0 - 15	16 - 30	31 - 45	46 - 60	61 - 75
Number of people	3	15	26	14	2

Copy and complete the cumulative frequency table.

Number of minutes	≤ 15	≤ 30	≤ <b>4</b> 5	≤ 60	≤ 75
Number of people					

Draw the cumulative frequency curve. Use your curve to estimate

- (i) the median number of minutes taken to get ready
- (ii) the number of people who took more than 20 minutes to get ready.

**Cumulative Frequency Table** 

## 5 marks

Att 2

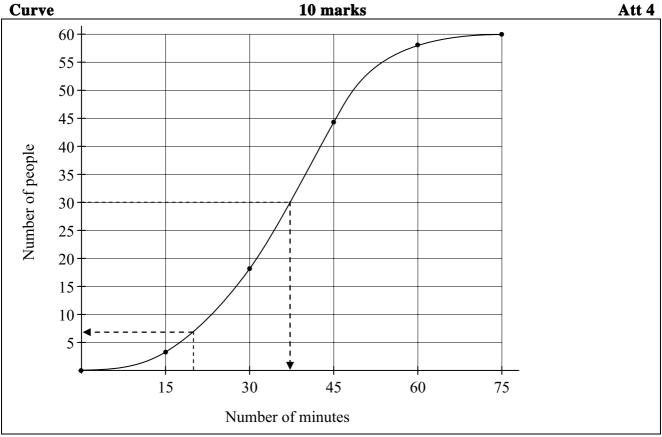
Time Taken (in Minutes)	≤ 15	≤ 30	≤ <b>4</b> 5	≤ 60	≤ 75
Number of Employees	3	18	44	58	60

*Slips (-1)* 

S1 Each incorrect or omitted value in the table

Attempts (2)

A1 Copies table



\* Tolerance of  $\pm 2$  units

Blunders(-3)

B1 Plots on the midpoints

B2 Error in scales, one blunder

B3 Points not joined

*Slips* (-1)

S1 Each incorrectly plotted point

S2 Reverses axes

S3 Joins points with straight lines.

Attempts (4)

A1 Draws axes only

(i)		5 marks	Att 2
(ii)		5 marks	Att 2
(i)	Median = 35	(ii) More than 20 minutes = $60 - 7 = 53$	

Blunders(-3)

B1 Uses wrong axis for median.

*Slips (-1)* 

S1 Median not specified

S2 Fails to subtract reading in (ii)

- **(c) (i)** Find the mean of the numbers 3, 4, 6, 8, 9.
  - (ii) Find the standard deviation of the numbers 3, 4, 6, 8, 9, correct to two decimal places.

Mean Standard Deviation 5 marks 15 marks Att 2

Att 6

(i) Mean = 
$$\frac{\sum x}{n} = \frac{3+4+6+8+9}{5} = \frac{30}{5}$$
 or 6

(ii) Standard Deviation 
$$=\sqrt{\frac{\sum d^2}{n}}$$

$$= \sqrt{\frac{(3-6)^2 + (4-6)^2 + (6-6)^2 + (8-6)^2 + (9-6)^2}{5}}$$

$$= \sqrt{\frac{9+4+0+4+9}{5}}$$

$$= \sqrt{\frac{26}{5}}$$

$$= 2.2803$$

$$\approx 2.28$$

Blunders (-3)

B1 3+4+6+8+9 or 30 and stops

B2 Incorrect substitution

*Slips (-1)* 

S1 Numerical errors to a max of 3

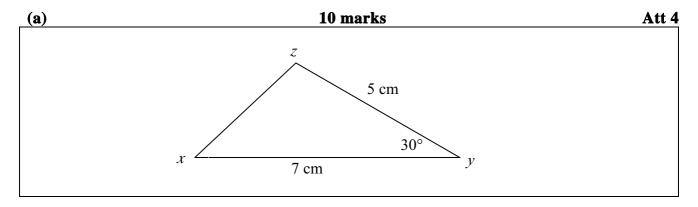
Attempts (2, 6)

A1 Any addition

A2 Work on SD or defines SD

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

Part (a)10 marksAtt 4(a)Construct a triangle xyz where |xy| = 7 cm, |yz| = 5 cm,  $|\angle xyz| = 30^{\circ}$ .



Blunders(-3)

B1 Each omitted side.

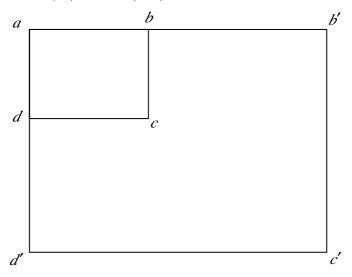
B2 Incorrect angle  $\pm 5^{\circ}$ 

*Slips (-1)* 

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

**(b)** The rectangle ab'c'd' is an enlargement of the rectangle abcd. The centre of the enlargement is a.

$$|dc| = 4 \text{ cm}, |bc| = 3 \text{ cm}, |d'c'| = 10 \text{ cm}.$$



- (i) Find the scale factor.
- (ii) Find the length of [b'c'].
- (iii) Find the length of  $\lceil bb' \rceil$
- (iv) Find the area of the rectangle ab'c'd'.

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

(i) scale factor = 
$$\frac{10}{4}$$
 or 2.5.

**(ii)** 
$$|b'c'| = 3 \times 2.5 = 7.5 \text{ cm}$$

**(iii)** 
$$|bb'| = 10 - 4 = 6$$
 cm

(iv) Area 
$$ab'c'd' = 7.5 \times 10 = 75 \text{ cm}^2$$
, or area =  $4 \times 3 \times 2.5^2 = 75 \text{ cm}^2$ .

### Blunders(-3)

- B1 Incorrect scale factor
- B2 Error in area formula
- B3 Does not square scale factor

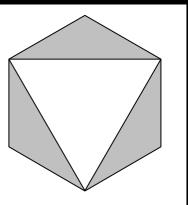
### *Slips* (-1)

- S1 Numerical errors to a max of 3
- S2 Multiplication for division or vice versa

### Attempts (2, 2, 2, 2)

A1 Incorrect answer of some merit

- **(c)** The diagram shows a patterned hexagonal tile.
  - (i) State whether the tile has a central symmetry (that is, a point of symmetry).
  - (ii) How many axial symmetries does the tile have?
  - (iii) How many rotational symmetries does the tile have?
  - (iv) List the angles of the rotational symmetries.



	Ans: <b>(i)</b> No	<b>(ii)</b> 3	<b>(iii)</b> 3	<b>(iv)</b> $0^0$ , $120^0$ , $240^0$	
(iv)		5	marks		Att 2
(iii)		5	marks		Att 2
(ii)		5	marks		Att 2
<b>(i)</b>		5	marks		Att 2

Blunders(-3)

B1 Answer greater than 3

*Slips (-1)* 

- S1 Each symmetry omitted.
- S2 Each angle omitted
- S3 Each additional angle in list

# MARCANNA BREISE AS UCHT FREAGAIRT TRÍ GHAEILGE

### (Bonus marks for answering through Irish)

Ba chóir marcanna de réir an ghnáthráta 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 gnáthráta agus is é 300 iomlán na marcanna don pháipéar. Mar sin, bain úsáid as an ngnáthráta 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 – bunmharc] × 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

