JUNIOR CERTIFICATE EXAMINATION

2011

MARKING SCHEME

MATHEMATICS
FOUNDATION LEVEL

GENERAL GUIDELINES FOR EXAMINERS

1.   Penalties of three types are applied to candidates' work as follows:
  *   Blunders - mathematical errors/omissions   (-3)
  *   Slips- numerical errors   (-1)
  *   Misreadings   (provided task is not oversimplified)   (-1).

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

2.   When awarding attempt marks, e.g. Att(3), note that
  *   any *correct, relevant* step in a part of a question merits at least the attempt mark for that
      part
  *   if deductions result in a mark which is lower than the attempt mark, then the attempt
      mark must be awarded
  *   a mark between zero and the attempt mark is never awarded.

3.   Worthless work is awarded zero marks. Some examples of such work are listed in the
      scheme and they are labelled as W1, W2,…etc.

4.   The phrase "hit or miss" means that partial marks are not awarded – the candidate receives
      all of the relevant marks or none.

5.   The phrase **"and stops"** means that no more work is shown by the candidate.

6.   Special notes relating to the marking of a particular part of a question are indicated by an
      asterisk. These notes immediately follow the box containing the relevant solution.

7.   The sample solutions for each question are not intended to be exhaustive lists – there may
      be other correct solutions.

8.   Unless otherwise indicated in the scheme, accept the best of two or more attempts – even
      when attempts have been cancelled.

9.   The *same* error in the *same* section of a question is penalised *once* only.

10.   Particular cases, verifications and answers derived from diagrams (unless requested)
      qualify for attempt marks at most.

11.   A serious blunder, omission or misreading results in the attempt mark at most.

12.   Do not penalise the use of a comma for a decimal point, e.g. €5.50 may be written as €5,50.

QUESTION 1

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 (10, 10) marks	Att (3, 3)
Part (a)	10(5, 5) marks	Att 2,2

(i) 34 + 66 =

(ii) 21 × 57 =

(a) (i)	**5 marks**	**Att 2**
(i)	100	

*No penalty for work not shown: no ✍

Blunders (-3)
B1   Uses incorrect operator (with work)

Slips (-1)
S1   Numerical errors (once only)

Misreadings (-1)
M1   Error in copying down a digit (once only)

Attempts (2 marks)
A1   Special cases: −32 (−), 2244 (×), 17/33 or   0.51 (÷) without work

Worthless (0)
W1   Incorrect answer without work but check A1

(a)(ii)	**5 marks**	**Att 2**
(ii)	1197	

* No penalty for work not shown: no ✍

Blunders (-3)
B1   Uses incorrect operator (with work)

Slips (-1)
S1   Numerical errors (once only)

Misreadings (-1)
M1   Error in copying down a digit (once only)

Attempts (2 marks)
A1   Special cases: 78 (+), −36 (−), 7/19 or 0.3684(÷) without work

Worthless (0)
W1   Incorrect answer without work but check A1

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

(i)   Write 16·3 correct to the nearest whole number.

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

(i)	16

*No penalty for work not shown: no ✍

Blunders (-3)
B1   Incorrect whole number other than S1

Slips (-1)
S1   17

Misreadings (-1)
M1   Error in copying down a digit (once only)

Worthless (0)
W1   Incorrect answer (not a whole number) without work

(ii)   Write 3·7 correct to the nearest whole number.

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

(ii)	4

*   No penalty for work not shown: no ✍

Blunders (-3)
B1   Incorrect whole number other than S1

Slips (-1)
S1   3

Misreadings (-1)
M1   Error in copying down a digit (once only)

Worthless (0)
W1   Incorrect answer (not a whole number) without work

(iii)	Use the answers from parts **(i)** and **(ii)** to estimate the value of $\dfrac{16\cdot3}{3\cdot7}$	
(b) (iii)	**5 marks**	**Att 2**

(iii)	✎	$\dfrac{16.3}{3.7} = \dfrac{16}{4} = 4$

*   Accept candidates incorrect answers from parts (i) and/or (ii)

Blunders (-3)
B1   Correct answer without work (✎)
B2   Uses incorrect operator (with work)

Slips (-1)
S1   Arithmetic error in calculation
S2   Decimal error
S3   Incorrect rounding off

Misreadings (-1)
M1   Error in copying down a digit (once only)

Attempts (2 marks)
 A1   Special Cases : 20(+), 12.6(–), 64, 60.3 or 60.31(×) or similar without work.
 A2   Any attempt at division

Worthless (0)
W1   Incorrect answer without work but check A1

(iv)	Using a calculator or otherwise find the value of $\dfrac{16\cdot3}{3\cdot7}$ correct to one decimal place.	
(b) (iv)	**5 marks**	**Att 2**

(iv)	$\dfrac{16\cdot3}{3\cdot7} = 4.4$

*No penalty for work not shown: no ✎

Blunders (-3)
B1   Uses incorrect operator

Slips (-1)
S1   Arithmetic error in calculation (once only)
S2   Incorrect rounding off

Misreadings (-1)
M1   Error in copying down a digit (once only)

Attempts (2 marks)
A1   Special Cases : 20(+), 12.6(–), 64,60.3 or 60.31(×) or similar without work
A1   Any attempt at division

Worthless (0)
W1   Incorrect answer without work but check A1

Part (c)   **20 (10, 10) marks**   **Att (3, 3)**

(c) (i)   **10 marks**   **Att 3**

(i) In a restaurant, dinner for an adult costs €25·50 and dinner for a child costs €15.
Find the cost of dinner for two adults and three children.

(c) (i)   **10 marks**   **Att 3**

(i) ✍

Adults: 2× €25·50	= €51
Children: 3× €15	= €45
Total	= €96

Blunders (-3)
B1   Correct answer without work (✍)
B2   Ignores multiples of items shown (once only). Answer given as 40.50
B3   Fails to add subtotals
B4   Subtracts subtotals

Slips (-1)
S1   Arithmetic error in calculation each time (to a maximum of −3)
S2   Decimal error each time
S3   Final total left as an improper fraction or mixed number

Misreadings (-1)
M1   Error in copying down a digit (once only)

Attempts (3 marks)
A1   Any attempt at multiplication/division

Worthless (0)
W1   Incorrect answer without work

(c) (ii)   **10 marks**   **Att 3**

> **(ii)** Dinner is paid for with two €50 notes. How much change should there be?

Part (c) (ii)   **10 marks**   **Att 3**

> ✎   €50 × 2 = €100.   €100 − €96 = €4   Change = €4.

* Accept candidate's answer from (c) (i)
* Accept answer in cents

Blunders (-3)
B1 Correct answer without work (✎)
B2 Adds instead of subtracts
B3 Order of subtraction reversed but accept 96 – 100 = 4

Slips (-1)
S1 Arithmetic error in calculation (once only)
S2   Final answer left as an improper fraction or mixed number
S3 Decimal error

Misreadings (-1)
M1 Error in copying down a digit (once only)

Worthless (0)
W1 Incorrect answer without work.

QUESTION 2

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

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

Draw arrows from set M to set N to show the relation "is equal to".

M N

$\frac{1}{2}$ •

$\frac{1}{4}$ •

$\frac{3}{4}$ •

• 0·75

• 0·25

• 0·5

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

M N

$\frac{1}{2}$ •

$\frac{1}{4}$ •

$\frac{3}{4}$ •

• 0·75

• 0·25

• 0·5

* No penalty for work not shown: no ✍

* Accept any correct indication

Blunders (-3)

B1   Each incorrect indication

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

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

(b)	(i)	Given that $y = 2x + 5$, complete the table below.

Show all your work in the box provided.

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

x	1	2	3	4	5
y	7	9	[11]	13	15

x	$y = 2x + 5$	y
1	$y = 2(1) + 5$	7
2	$y = 2(2) + 5$	9
4	$y = 2(4) + 5$	13
5	$y = 2(5) + 5$	15

* Answers need not be written in table
* Correct answers without work merit full marks

Blunders (-3)
B1   Omitted or incorrect entry
B2   Error e.g. $y = 2x$ or $y = x + 5$

Slips (-1)
S1   Adds in top line of table (8, 11, 14, 17, 20) or (8, 11, 11, 17, 20)
S2   Arithmetic error in calculation (Max −3)

Misreadings (-1)
M1   Error in copying down equation if task is not over-simplified

Attempts (2 marks)
A1   Any one correct entry other than 11 with or without work
A2 $x = 3$ (only one worked out correctly) i.e. $y = 11$
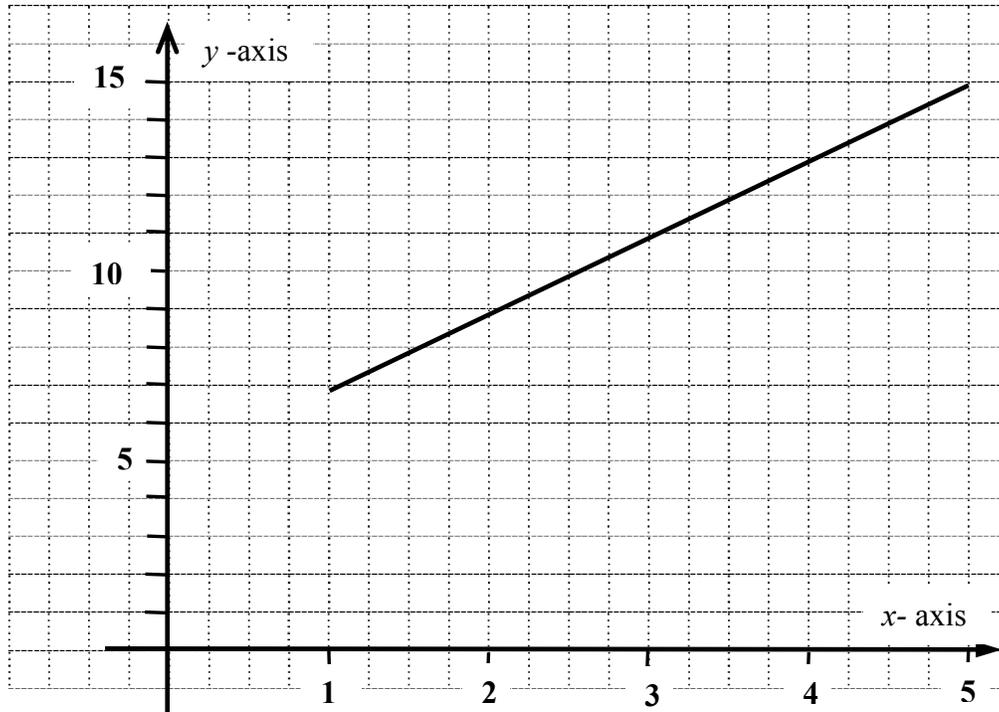A3   9, 10, 11, 12, 13

Worthless (0)
W1   Table completed with spurious numbers

(ii)   Using your answers from **(i)**, draw the graph of $y = 2x + 5$
from $x = 1$ to $x = 5$.

* Tolerance ± 0.5cm (± 1 box on grid).
* Allow candidate's work from (i)
* Ignore join to origin

Blunders (-3)
B1   Scale error (once only)

Slips (-1)
S1 (y, x) consistently drawn (penalise once only).
S2   All points not joined.
S3   Each incorrectly plotted point [subject to S1] or omitted end point.

Attempts (3)
A1   Random straight line or lines.
A2   One correct point

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

> **(iii)**   Use your graph to find the value of y when $x = 3 \cdot 5$.

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

> ✎ $y = 12$

* Tolerance ± 0.5cm (one box)

Blunders (-3)
B1   Answer within tolerance, but no indication on graph or substitution

Slips (-1)
S1   Indicates the correct answer on graph but does not specify the y value.
S2   Correct answer got from substituting into equation

Attempts (2)
A1   Locates 3.5 on either axis.
A2   Draws any line on graph.

| **Part (c)** | **20 (10, 10) marks** | **Att (3, 3)** |
| **(c) (i)** | **10 marks** | **Att 3** |

(i) Find the value of $x^2 + 5x + 2$ when $x = 4$.

| **Part (c) (i)** | **10 marks** | **Att 3** |

✍	$(4)^2 + 5(4) + 2$
	$= 16 + 20 + 2$
	$= 38$

Blunders (-3)
B1 Correct answer without work (✍)
B2 $(4)^2 + 5(4) + 2$ and stops
B3 Association error, e.g. $(4)^2 + 5(4) + 2 = 16 + 5(4+2) = 16+30 = 46$
B4 Mathematical error e.g. $(4)^2 + 5(4) + 2 = 16 + 54 + 2$ and continues
B5 $4^2 = 8$ or similar and continues $(8+20+2=30)$

Slips (-1)
S1 Arithmetic error in calculation, max -3
S2 Fails to finish, no addition (stops at $16+20+2$)

Misreadings (-1)
M1 Error in copying down a component, provided it doesn't oversimplify question

Attempts (3 marks)
A1 $x^2 + 5x + 2 = 4$ and continues
A2 Any correct step *e.g.* $(4)^2$ or 5×4 and stops

Worthless (0)
W1 Incorrect answer without work

| **Part (c) (ii)** | **10 marks** | **Att 3** |

(ii) Solve for x: $4(x - 2) = 28$

| **Part (c) (ii)** | **10 marks** | **Att 3** |

✍	$4x - 8 = 28$
	$4x = 36$
	$x = 9$

Blunders (-3)
B1 Correct answer without work (✍)
B2 Error in distributive law $(4x - 2 = 28)$
B3 Error in transposition
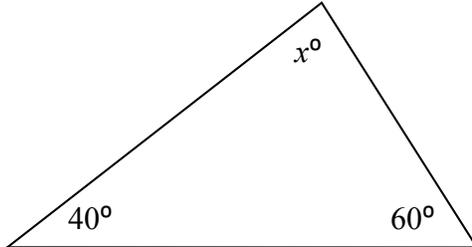B4 Stops at $4x = 36$

Slips (-1)
S1 Numerical errors to a max of -3
S2 Leaves answer as 36/4 or similar

QUESTION 3

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

Part (a)	**15 marks**	**Att 5**

(a)   Find the value of x in the following diagram.

(a)	**15 marks**	**Att 5**

$$60° + 40° = 100°$$
$$180° - 100° = 80°$$
$$x = 80°$$

* No penalty for omission of degree symbol

* 100° without work is worth 9 marks

Blunders (-3)

B1   Correct answer without work (✍)

B2   Performs addition (60+ 40 =100) and stops

B3   Subtracts 100 from any number except 180

Slips (-1)

S1   Arithmetic error in calculation

S2   Decimal error

S3   Writes 100 – 80 and stops

Misreadings (-1)

M1   Error in copying down a component/digit

Attempts (5 marks)

A1   Measures angle from diagram with tolerance of ± 5 ° (*i.e.* 85± 5°) but 80° is B1

A2   Any mention of 180°, 90° or 360°

A3   Treats as an isosceles triangle (answer = 60°or 40°)

Worthless (0)

W1   Copies diagram and stops

W2   Incorrect answer without work (but note attempts)

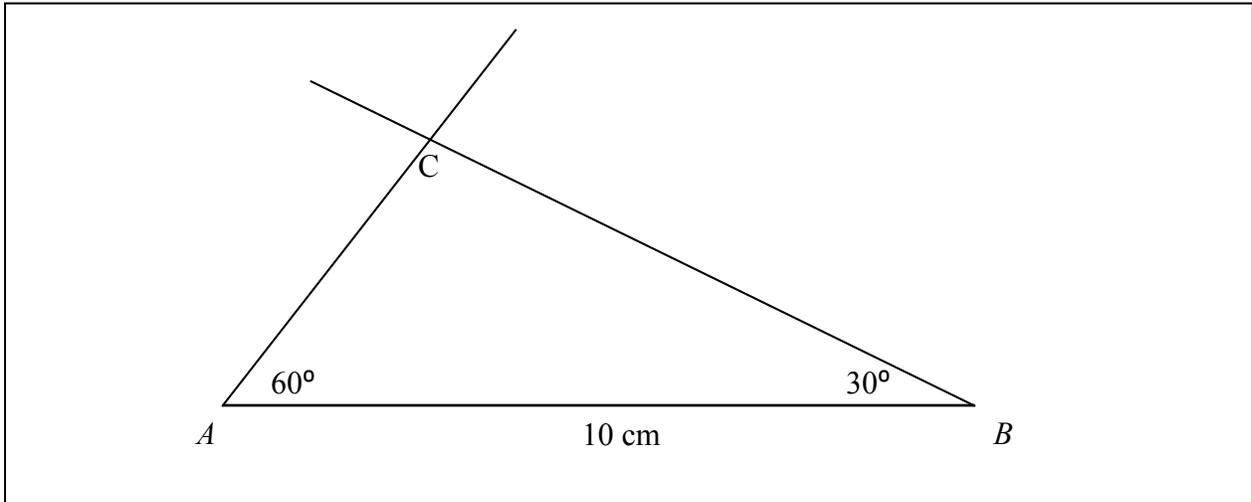**Part (b)**   **20(15, 5) marks**   **Att (5,2)**
(b) (i)   **15 marks**   **Att 5**

> **(b)   (i)   Construct a triangle *ABC* with**
>
> $|AB| = 10\,\text{cm}$, $|\angle ABC| = 30°$ and $|\angle BAC| = 60°$.
>
> Show all your construction lines.

Part (b) (i)   **15 marks**   **Att 5**

* Tolerance ± 5°
* Does not have to name *C*

Blunders (-3)
B1   Each angle omitted

Slips (-1)
S1   Angles at *A* and *B* interchanged
S2   Each angle or side outside tolerance

Attempts (5marks)
A1   Pilot Diagram (free-hand)
A2   Mentions third angle is 90°.

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

> Use your ruler to measure the length of the side [*AC*] .

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

> Length of Side [AC] = 5 cm

*Accept answer based on candidate's diagram.
*Allow candidate's measurement of his/her [*AC*].
* Tolerance ± 0.5cm
* Accept answer in cm/mm/inches (1 inch = 2.54cm).

Slips (-1)
S1   Measurement outside tolerance

Part (c)   **15(5, 10) marks**   **Att (2, 3)**
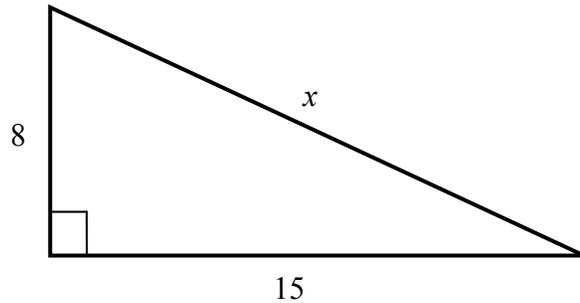
(c) (i)   **5 marks**   **Att 2**

Use the Theorem of Pythagoras to find the length of the side marked x in
the right-angled triangle below.

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

$$x^2 = 8^2 + 15^2$$

$$x^2 = 64 + 225$$

$$x^2 = 289$$

$$x = 17$$

Blunders (-3)
B1   Correct answer without work (✐)

B2   Mathematical error in squaring (once)
B3   Fails to get √
B4   Mathematical error in getting √

Slips (-1)
S1   Arithmetic slip to a max of -3

Attempts (2 marks)
A1   8+15=23 or 8×15= 120
A2   Measures length: ± 0·5 cm. (7.9)
A3   One or more squares drawn on sides.
A4 x^2 or 8^2 or 15^2 and stops
A5   Candidate states Pythagoras's Theorem.
A6   Indicates x is the hypotenuse

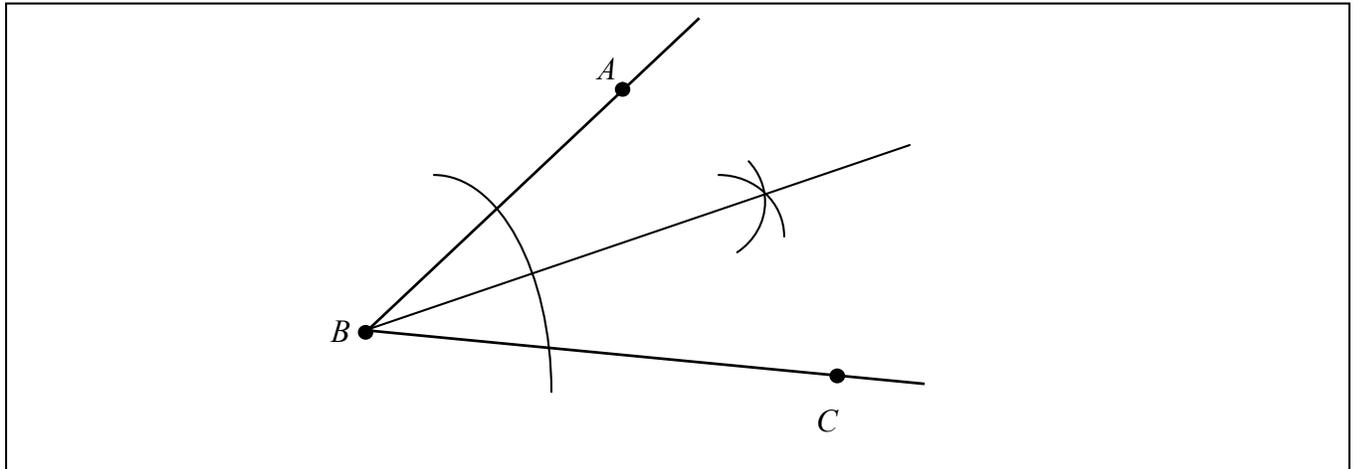*Worthless (0)*
W1   Incorrect answer without work

(c) (ii)   **10 marks**   **Att 3**

Using ruler and compass only, bisect the angle *ABC*.
Show all construction lines.

Blunders (-3)
B1   Each incorrect arc
B2   Bisector not drawn

Attempts (3marks)
A1   Any relevant step, i.e. any arc drawn.
A2   Joins *A* to *C*

QUESTION 4

Part (a)	10 marks	Att 3
Part (b)	20 marks	Att 7
Part (c)	20(5, 10, 5) marks	Att (2,3,2)

Part (a)	10 marks	Att 3

Find the mean of the following numbers:

$$8, \quad 5, \quad 4, \quad 11, \quad 10, \quad 16$$

(a)	10 marks	Att 3

$$\text{Mean} = \frac{8 + 5 + 4 + 11 + 10 + 16}{6}$$

$$= \frac{54}{6}$$

$$= 9$$

Blunders (-3)
B1   Correct answer without work (✍)
B2   Omits 6 or multiplies by 6 (54×6 =324)
B3   Addition not complete

Slips (-1)
S1   Arithmetic error in calculation
S2   Each incorrect, omitted or additional numbers (max -3)
S3   Count of numbers not equal to 6
S4   Fails to finish (Answer left as 54/6)

Misreadings (-1)
M1   Error in copying down a digit

Attempts (3marks)
A1   Finds median (8+10)/2=9
A2   Numbers arranged in ascending or descending order
A3   Mention of 6 or 54 without work

Worthless)
W1   Incorrect answer without work

(b)   40 people were asked to choose their favourite sport.
The table below shows the results.

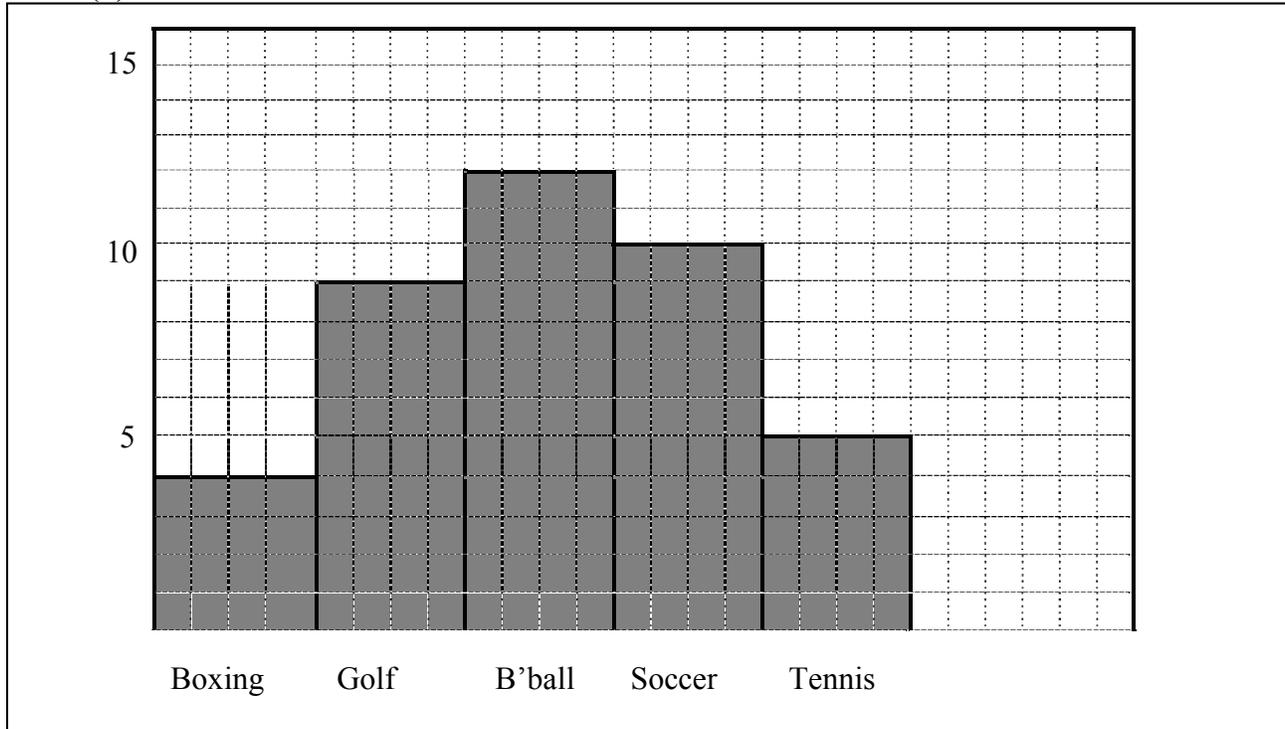| Sport	Boxing	Golf	Basketball	Soccer	Tennis
Number of people	4	9	12	10	5

Draw a bar chart to show this information.
Use the grid below to draw your bar chart.

Part (b)   **20 marks**   **Att 7**

* Accept correct graph with no labels.
* Accept horizontal or vertical bar chart.
* Accept bars of unequal widths or bars joined as a histogram.
* Accept lines for bars.

Blunders (-3)
B1   Axis with number of people not graduated uniformly.
B2   Draws a trend graph or pie chart.
B3   Each bar omitted

Slips (-1)
S1   Each incorrect bar outside of tolerance. Tolerance: $\pm \frac{1}{2}$cm, ± 1 box (to the eye) to max (-3).
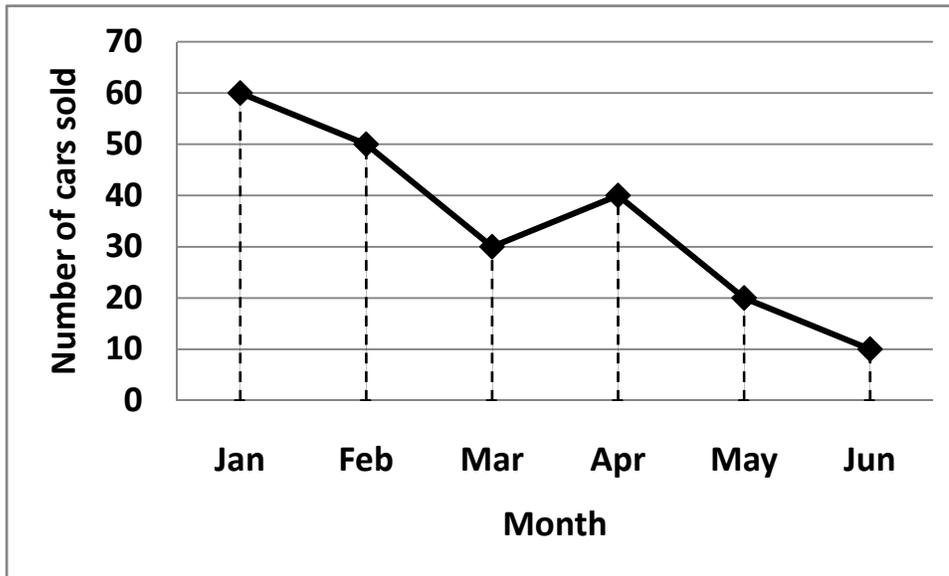
Attempts (7)
A1   Draws one or both axes.

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

The trend graph shows the number of cars sold by a garage during the first 6 months of the year:

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

How many cars were sold during March?

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

30 cars

*Accept indication on graph

Misreadings (-1)
M1   Clearly chooses the wrong month (60, 50, 40, 20, 10)

Attempts (2marks)
A1   Selects more than one of 10, 20, 30, 40, 50, 60.

Worthless (0)
W1   Any other incorrect number.

Part (c) (ii)   **10 marks**   **Att 3**

Find the total number of cars sold during the first six months of the year.

(c) (ii)   **10 marks**   **Att 3**

✍   Total = 60 + 50 + 30 + 40 + 20 + 10 = 210 cars

Blunders (-3)
B1   Correct answer without work (✍)
B2   Addition not complete.
B3   Multiplies values

Slips (-1)
S1   Arithmetic error in calculation.
S2   Each incorrect, omitted or additional number (Max −3),assuming at least one correct.

Misreadings (-1)
M1   Error in copying down a digit

Attempts (3 marks)
A1   Identifies any of the relevant numbers.

Worthless (0)
W1   Incorrect answer without work

Part (c) (iii)	**5 marks**	**Att 2**
Write the number of cars sold in March as a fraction of the total sold in the first six months?		

Part (c) (iii)	**5 marks**	**Att 2**
	$\dfrac{30}{210} = \dfrac{1}{7}$	

*   No penalty for work not shown: no ✍
*   Accept candidates answers from part (i) and/or (ii)
*   Accept 30/210 for full marks

Blunders (-3)
B1   Incorrect numerator.
B2   Incorrect denominator

Slips (-1)
S1   Arithmetic error in calculation or decimal error.
S2   Correct answer written as a decimal or percentage only
.
Attempts (2 marks)
A1   Identifies any of the relevant numbers.
A2   Any incorrect fraction.

Worthless (0)
W1   Incorrect answer without work (but see A2)

QUESTION 5

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

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

(i) $B = \{$,   ,   , $\}$

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

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

$$B = \{2, \ 3, \ 5, \ 7\}$$

* Accept appropriate shading.

Slips (-1)
S1   Each incorrect or omitted element (to max -3)
Attempts (2 marks)
A1   An element of $A \backslash B$
Worthless (0)
W1   No element of A or B in answer

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

$$A \cup B = \{1, \ 2, \ 3, \ 4, \ 5, \ 7\}$$

* Accept appropriate shading.

Blunders (-3)
B1   Shades or lists intersection
Slips (-1)
S1   Each incorrect or omitted element (to max −3)
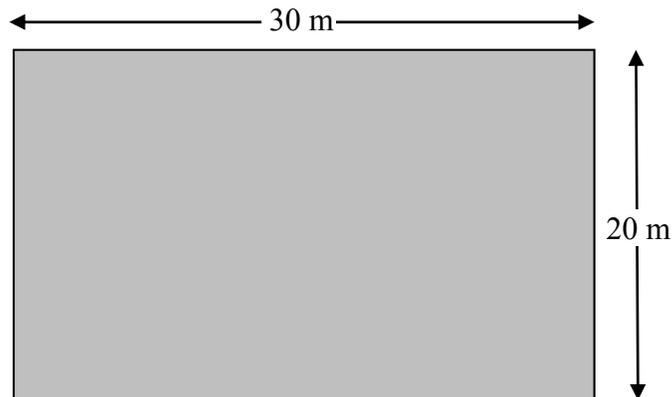*Attempts (3 marks)*
A1   Defines union
Worthless (0)
W1   No element of A or B in answer

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

A rectangular garden is 30 metres long and 20 metres wide.

←————— 30 m —————→

20 m

(b) (i)   **10marks**   **Att 3**

Find the area of the garden in m^2.

(b) (i)   **10marks**   **Att 3**

✍   Area $= 20 \times 30 = 600$ m^2

* No penalty for omission of units or inclusion of incorrect units

Blunders (-3)
B1   Correct answer without work (✍)
B2   Answer left as 20×30
B3   Mathematical error e.g. incorrect operator (with work shown):
       50 (+), 10(−), 1.5(÷) , 0.666 (÷), 360000($30^2 \times 20^2$)
B4   Incorrect formula used with work e.g. $2 \times 30 + 2 \times 20 = 100$ or ½ base × height = 300

Slips (-1)
S1   Arithmetic error in calculation to a max −3
S2   Decimal error (*e.g.* 6, 60, *etc*)

Misreadings (-1)
M1   Error in copying down a digit once only

Attempts (3marks)
A1   Mentions length, width, breadth, base or height
A2   0.66, 1.5, 10,50,100, 300, 360000 (without work)

Worthless (0)
W1   Copies diagram as is
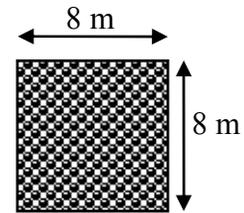W2   Incorrect answer without work, but note A2
W3   Incorrect formula with π, and stops

Part (b) (ii)	5marks	Att 2

A square flowerbed is dug in the garden.
The side of the flowerbed is 8 metres long.
Find the area of the flowerbed in m^2.

8 m

8 m

(b) (ii)	5 marks	Att 2

✎   Area = 8 × 8 = 64 m^2.

* No penalty for omission of units or inclusion of incorrect units

Blunders (-3)
B1   Correct answer without work (✎)
B2   Answer left as 8×8
B3   Mathematical error e.g. incorrect operator (with work shown): eg 1(÷),16(+),4096(82×82)
B4   Incorrect formula used with work 2×8+2×8= 32m or ½ base × height = 32

Slips (-1)
S1   Arithmetic error in calculation to a max −3
S2   Decimal error

Misreadings (-1)
M1   Error in copying down a digit (once only)

Attempts (2 marks)
A1   Mentions length, width, breadth, base or height
A2   1, 16, 32, 4096 without work

(b) (iii)	5 marks	Att 2

The rest of the garden is covered in grass. Find the area under grass in m^2.

(b) (iii)	5 marks	Att 2

✎   600 – 64 = 536 m^2.

* Accept candidates answers from (b)(i) and/or (b)(ii)

Blunders (-3)
B1   Correct answer without work(✎)
B2   Adds instead of subtracts
B3   Order of subtraction reversed but accept 64 – 600 = 536
Slips (-1)
S1   Arithmetic error in calculation (once only)
Misreadings (-1)
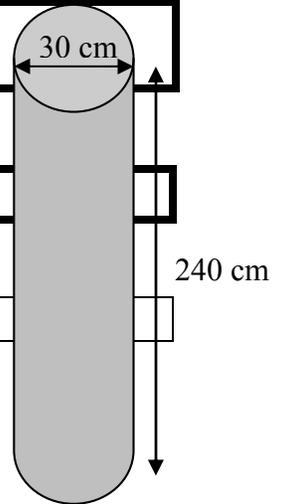M1   Error in copying down a digit (once only)
Worthless (0)
W1   Incorrect answer without work

Part (c)   **15(5, 5, 5) marks**   **Att (2, 2, 2)**

A concrete pillar is in the shape of a cylinder.

30 cm

The diameter of the pillar is 30 cm and its height is 240 cm.

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

Write down the length of the radius of the pillar.

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

240 cm

Radius = 15 cm.

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

Blunders (-3)
 B1   Multiplies 30 by 2 or divides 240 by 2

Slips (-1)
S1   Arithmetic error in calculation

Misreadings (-1)
M1   Error in copying down a digit

Attempts (2marks)
A1   Indicates diameter or radius on a sketch/diagram
A2   A phrase which attempts a definition of diameter or radius
A3   30 used with/without work for attempt
A4   Any effort at division involving 2

Worthless (0)
W1   Incorrect answer without work, but note B1 and A3

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

 Find the volume of the pillar, taking $\pi = 3\cdot142$.

$$\text{Volume} = \pi\, r^2 h$$
$$= 3.142 \times (15)^2 \times 240$$
$$= 3.142 \times 225 \times 240$$
$$= 169668 \,\text{cm}^3$$

* No penalty for omission of units or inclusion of incorrect units
* No penalty for using π from calculator, answer = 169646
* If other variations of π used, S (-1) applies to the following answers:

$\pi = \dfrac{22}{7}$ Volume = 169714

$\pi = 3\cdot14$ Volume = 169560
$\pi = 3\cdot1$ Volume = 167400
$\pi = 3$ Volume= 162000
$\pi = \pi$ Volume = 54000 π

* Accept candidate's radius from (i) above - figures will therefore vary.

Blunders (-3)
B1   Correct answer without work ( )
B2   Each incorrect or omitted substitution
B3   Mathematical error e.g.$15^2 = 30$
B4   Value of π not used in calculation ($15^2 \times 240 = 54000$)
B5   Fails to finish i.e. $3\cdot142 \times 15^2 \times 240$ and stops
B6   Formula for the Volume of a cone used

Slips (-1)
S1   Decimal error

Misreadings (-1)
M1   Error in copying down a digit

Attempts (2 marks)
A1   Mentions radius = 15, or corresponding value from (i)
A2   Some correct substitution

Worthless (0)
W2   Incorrect answer without work

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

Four of these pillars are used in a building.
Find the total volume of concrete needed for the four pillars.

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

✍ $169668 \times 4 = 678672$ cm^3.

* Accept candidates answer from c (ii)
* No penalty for omission of units or inclusion of incorrect units

Blunders (-3)
B1   Correct answer without work (✍)
B2   Incorrect operator with work

Slips (-1)
S1   Arithmetic error in calculation, to max (-3)

Attempts (2marks)
A1   Answer to c (ii) +, – or ÷ by 4 without work

Worthless (0)
W1   Incorrect answer without work but check A1

QUESTION 6

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

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

> A piece of wood is 3.65 metres in length.
> **(i)** What is the length of the piece of wood in centimetres?

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

| ✎ | $3.65 \times 100 = 365 \, cm$ |

* No penalty for omission of units or inclusion of incorrect units

Blunders (-3)
B1   Correct answer without work (✎)
B2   1 m not equal to 100 cm
B3   Divides by 100

Slips (-1)
S1   Arithmetic error in calculation (once only)
S2   Decimal error

Misreadings (-1)
M1   Error in copying down a digit

Attempts (2)
A1   Answer with correct digits but incorrect decimal location (with no work)

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

> **(ii)** This piece of wood is cut in two. The longer piece is 195 cm long.
> Calculate the length of the shorter piece in cm.

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

| ✎ | 365 – 195 = 170 cm |

* No penalty for omission of units or inclusion of incorrect units

Blunders (-3)
B1   Correct answer without work. (✎)
B2   Adds instead of subtracts
B3   Order of subtraction reversed but accept 195–365=170

Slips (-1)
S1   Arithmetic error in calculation (once only)
Misreadings (-1)
M1   Error in copying down a digit (once only)

Attempts (2)
A1   Answer to a(i) written in this part

Worthless (0)
Incorrect answer without work, but see A1

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

(b) (i)   **10 marks**   **Att 3**

A train left Dublin at 11:30 and arrived in Cork at 14:00.
(i)   How long did the journey take?

Part (b) (i)   **10 marks**   **Att 3**

2.5 hours

*   Accept correct answer without work.
*   Accept 150 minutes or 150
*   No penalty for omission of units
*   2 hours with some incorrect number of minutes is 7 marks

Blunders (-3)
B1   Adds (Answer 24.30)

Slips (-1)
S1   Arithmetic error in calculation

Misreadings (-1)
M1   Error in copying down a digit

Attempts (3 marks)

A2   14:00 written as 2 o clock or similar
A3   1 hour = 60 minutes

Worthless (0)
W1   Incorrect answer without work
W2   Multiplication / division
W3   1 hour = 100 minutes and stops.

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

(ii)	The train travelled from Dublin to Cork at an average speed of 96 km/h. What distance did the train travel?

✍   Distance = Speed x Time
                                  = 96 x 2.5
                                  = 240 km

*   No penalty for omission of units
*   Candidate may convert to minutes in effort to get answer

Blunders (-3)
B1   Correct answer without work (✍)
B2   Incorrect operator with work
B3   Fails to finish

Slips (-1)
S1   Arithmetic error in calculation
S2   Decimal error

Misreadings (-1)
M1   Error in copying down a digit

Attempts (2 marks)
A1   D/S/T in triangle or mentioned
A2   Special cases: answers 98.5 (+),93.5 or −93.5 (−),14400(96×150), 38.4(96÷2.5)
        0.026(2.5÷96) or similar without work
A3   Attempt to use candidate's answer from (b)(i) in this section

Worthless (0)
W1   Incorrect answer without work but see A2

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

> **(iii)** A lorry took four hours to travel the same distance.
> What was the average speed of the lorry in km/h?

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$= \frac{240}{4}$$

$$= 60 \text{ km/h}$$

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

Blunders (-3)
B1   Correct answer without work
B2   Error in S, D, T e.g. 4/240 (0.016) or 240 × 4 = 960 with work
B3   Use of additional incorrect component

Slips (-1)
S1   Arithmetic error in calculation
S2   Decimal error

Misreadings (-1)
M1   Error in copying down a digit

Attempts (2 marks)
A1   Any mention of S, D, T
A2   Converts km to m or hours to minutes
A3   Special cases: 0.016 or 960 or similar without work.
A4   Some relevant step, correct numerator or correct denominator, must be a fraction

Part (c)   **20 (10, 10) marks**   **Att (3, 3)**

(c) (i)   **10 marks**   **Att 3**

(i)   A table in a furniture store was bought for €500. It was sold for €700.
Calculate the percentage profit on the cost price.

(c) (i)   **10 marks**   **Att 3**

✎   Selling Price = €700

Cost Price = €500

Profit = €200

Percentage Profit = $\dfrac{200}{500} \times \dfrac{100}{1} = 40\%$

Blunders (-3)
B1   Correct answer without work (✎)
B2   Adds €500 to €700
B4   Mishandles the calculation of profit as a percentage.
B5   Incorrect cancellation(s)
B6   Fails to multiply by 100
B7   Fails to finish

Slips (-1)
S1   Numerical errors to a max of -3
S2   Calculates profit as a percentage of the selling price

Attempts (3 marks)
A1   Some indication of subtraction
A2   Some use of 100

(c) (ii)   **10 marks**   **Att 3**

(ii)   Another table in the store is priced at €800.
The price will be reduced by 20% in a sale.
Calculate the sale price.

(c) (ii)   **10 marks**   **Att 3**

$$800 \times 0.2 = €160$$
$$\therefore \text{Sale Price} = €800 - €160 = €640$$

*800–20% = 640$\rightarrow$ **10 marks**
* 800 × 20% = 160 and stops $\rightarrow$ **7 marks**
* 800 –20% and stops $\rightarrow$ **4 marks** or 800× 20% and stops $\rightarrow$ **4 marks**
* 160 without work and stops merits **4** marks

Blunders (-3)
B1   Correct answer without work ✍
B2   Mishandles %
B3   No subtraction (as per candidates work)
B4   Adds the reduction (as per candidate's work)
B5   800 ×1.2 = 960

Slips (-1)
S1   Numerical errors to a max of −3
S2   Decimal error

Misreadings (-1)
M1   Error in copying down a digit (once only)

Attempts (3 marks)
A1   100% = 800 and stops

Worthless (0)
W1   Incorrect answer without work

BONUS MARKS FOR ANSWERING THROUGH IRISH

Bonus marks are applied separately to each paper as follows:

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

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

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