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JUNIOR CERTIFICATE EXAMINATION 2002

Marking Scheme

MATHEMATICS–FOUNDATION LEVEL

GENERAL INSTRUCTIONS 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 as B1, B2, B3,.., S1, S2, S3,.., M1, M2, etc. Note that these lists are not exhaustive.

2. When awarding attempt marks, e.g. Att (3), it is essential to 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. Note that these lists are not exhaustive.

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

5. 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.

6. Particular cases, verifications and answers derived from diagrams (unless requested) generally qualify for attempt marks only.

7. The phrase "and stops" means that the candidate shows no more work.

QUESTION 1

15 marks **Att 5**

> A prize of €568 is shared equally between 8 people. How much does each person get?

$$\frac{€568}{8} = €71$$

Blunders (-3)

B1 €568×8
B2 Divides by a number other than 8 .

Slips (-1)
S1 Error in calculations once only.
S2 Incorrect decimal.

Attempts (5 marks)
A1 €568 ± 8

Worthless (0)
W1 Incorrect answer without work.

QUESTION 2.

(i)	10 marks	Att 3
(ii)	5 marks	Att 2

A box of pencils costs €2.60.

(i)   How much will it cost to buy 7 boxes of pencils?

(ii)   How much change will I get if I pay for the 7 boxes of pencils with a €20 note?

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

$$€2.60 \times 7 = €18.20$$

Blunders (-3)
B1   €2.60 ÷ 7
B2   €2.60 multiplied by a number other than 7.

Slips (-1)
S1   Error in calculations.
S2   Incorrect or no decimal point.

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

(ii)   How much change will I get if I pay for the 7 boxes of pencils with a €20 note?

$$€20 - €18.20 = €1.80$$

*   Use candidate's total from (i) with no further penalty.

Blunders (-3)
B1   €20 + €18.20.

Slips (-1)
S1   Error in calculations.
S2   Incorrect or no decimal point.

Worthless (0)
W1   Multiplied or divided by €18.20.

QUESTION 3.

Part (i)	5 marks	Att 2
Part (ii)	10 marks	Att 3

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

Copy and complete $\dfrac{1}{2} = \dfrac{[\ ]}{12}$

Copy and complete $\dfrac{1}{2} = \dfrac{[6]}{12}$

Blunders (-3)

B1   Incorrect answer without work (but watch for S2).

Slips (-1)

S1   24 given as answer without work.

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

Write $\dfrac{1}{2} + \dfrac{1}{4} - \dfrac{1}{3}$ as a single fraction.

$$\frac{1}{2} + \frac{1}{4} - \frac{1}{3} = \frac{6}{12} + \frac{3}{12} - \frac{4}{12} = \frac{9}{12} - \frac{4}{12} = \frac{5}{12}$$

$$\text{Ans: } \frac{5}{12}$$

Blunders (-3)

B1   Incorrect denominator.
B2   Incorrect numerators, once only.
B3   Each fraction omitted.

Slips (-1)

S1   Error in calculations.
S2   Error in equivalent decimal or percentage.

Attempt (3)

Any relevant decimal or percentage equivalent correctly calculated.

QUESTION 4.

Part (i)	**5 marks**	**Att 2**
Part (ii)	**5 marks**	**Att 2**
Part (iii)	**5 marks**	**Att 2**

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

Find the value of 125.6×10

$125.6 \times 10 = 1256$

Blunders (-3)
B1 125.6 ± 10

Slips (-1)
S1   Error in calculations.
S2   Misplaced decimal point.

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

Find the value of $125.6 \div 10$

$125.6 \div 10 = 12.56$

Blunders (-3)
B1 125.6 ± 10

Slips (-1)
S1   Error in calculations.
S2   Misplaced decimal point.

Misreading (-1)
M1 $125.6 + 10.$

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

Find the value of $(125.6 \times 10) + (125.6 \div 10)$

$1256.00 + 12.56 = 1268.56$

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

Slips (-1)
S1   Error in calculations.
S2   Misplaced or no decimal point.

Misreading (-1)
M1   Tries to multiply divide or subtract.

QUESTION 5.

Part (i)	10 marks	Att 3
Part (ii)	5 marks	Att 2

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

> A car travels 150km in 2 hours. Calculate the average speed of the car.

$$\text{Average speed} = \frac{150}{2} = 75km/hr.$$

Blunders (-3)

B1 $\frac{2}{150}$.

B2 150×2 .

Slips (-1)
S1 Error in calculations.

Attempts (3)
A1 Defines average speed.
A2 1hr = 60 mins.

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

> Another car travels 150km at an average speed of 50 km/h. How long does this car take to travel the 150km?

$$\text{Time taken} = \frac{150}{50} = 3hrs.$$

Blunders (-3)

B1 $\frac{50}{150}$.

B2 150×50 .
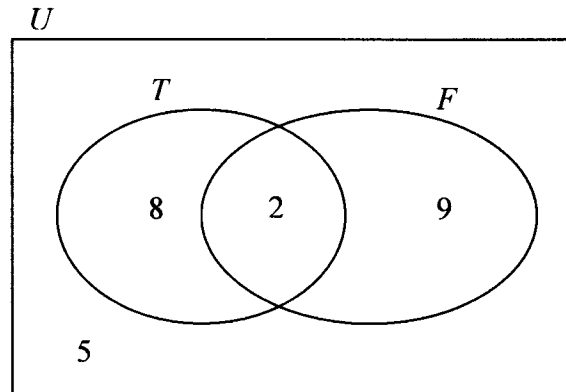
Slips (-1)
S1 Error in calculations.

QUESTION 6.

Part (i)	5 marks	Att 2
Part (ii)	5 marks	Att 2
Part (iii)	5 marks	Att 2

U is the set of pupils in a class.
T is the set of pupils who play Tennis.
F is the set of pupils who play Football.

(i)   How many pupils play both games?

(ii)   How many pupils play Tennis?

(iii)   How many pupils are in this class?

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

How many pupils play both games?

Both games = 2.

Blunders (-3)
B1   Makes no use of 2 in calculations.

Slips (-1)
S1   Any incorrect use of 2 in calculations.

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

How many pupils play Tennis?

Play tennis = 10.

Blunders (-3)
B1   Makes no use of 8 in calculations.

Slips (-1)
S1   Any incorrect use of 8 in calculations.

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

How many pupils are in this class?

Number of pupils = 24

Blunders (-3)
B1   Makes no use of 5 in calculations.
Slips (-1)
S1   Any incorrect use of 5 in calculations.

QUESTION 7.

Part (i)	5 marks	Att 2
Part (ii)	5 marks	Att 2
Part (iii)	5 marks	Att 2

(i)   Find 20% of €35

(ii)   Find $\dfrac{3}{8}$ of 240 metres.

(iii)   Find 0.5 of 28 litres.

20% of €35 = €7

Blunders (-3)

B1 $€35 \times \dfrac{100}{20}$ (no division by 100 or equivalent indicated).

Slips (-1)
S1   Error in calculations.

Attempt (2)
A1   Gives 20% as $\frac{1}{5}$ and stops.
Worthless
W1   €35 ± 20

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

$$\dfrac{240}{1} \times \dfrac{3}{8} = 90m$$

Blunders (-3)
B1   Divides 240 by 3 (no division by 8 or equivalent indicated).

Slips (-1)
S1   Error in calculations.

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

$$28 \times 0.5 = 14$$

Blunders (-3)
B1   Divides 28 by 5 or by 0.5

Slips (-1)
S1   Error in calculations.

Worthless
W1   28 ± 0.5

QUESTION 8.

The number of goals scored by each of 20 teams in a competition is shown below:

3	3	4	1	5
2	5	3	2	4
5	2	2	3	3
1	3	4	4	2

(i) Copy and complete the table below:

Goals	1	2	3	4	5
Number of teams					

(ii) Write down the mode

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

Goals	1	2	3	4	5
Number of teams	2	5	6	4	3

Slips(-1)

S1   Each incorrect or omitted value on candidate's copy of the table.

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

Mode = 3

Slips (-1)

S1   Gives 6 as the answer.

Attempts (2)

A2   Calculates mean.

Part (i)	10 marks	Att 3
Part (ii)	5 marks	Att 2

A bicycle was bought for €300. It was sold for €360.

(i) Calculate the profit.

(ii) Express the profit as a percentage of the cost price.

Part (i)	10 marks	Att 3

Profit = €360 - 300 = €60

Blunders (-3)
B1   360 + 300.

Slips (-1)
S1   Error in calculations.

Part (ii)	5 marks	Att 2

$$\text{Profit \%} = \frac{60}{300} \times \frac{100}{1} = 20\%$$

Blunders (-3)

B1   Inverts any of the fractions for example $\dfrac{300}{60}$ or $\dfrac{1}{100}$.

Slips (-1)
S1   Error in calculations.
S2   Calculates on SP.

QUESTION 10.

Part (i)	5 marks	Att 2
Part (ii)	10 marks	Att 3

(i) How many centimetres are in 4.37 metres?

(ii) A piece of timber is 4.37 m long. It is cut into two pieces. One piece is 248 cm. How long is the other piece?

Part (i)	5 marks	Att 2

4.37 metres = 437cm.

Slips (-1)
S1   Errors in calculations.
S2   Different arrangement of digits e.g. 347.
S3   Incorrect decimal point.

Part (ii)	10 marks	Att 3

Answer = 437 - 248 = 189 cm.

Blunders (-3)
B1   Adds the given lengths.
B2   437 or 248 divided by 2 or multiplied by 2.

Slips (-1)
S1   Errors in calculations.

Worthless
W1   Multiplication or division.

QUESTION 11.

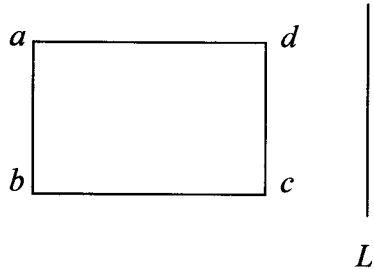| Part (i)	5 marks	Att 2
Part (ii)	10 marks	Att 3

(i)   Copy the diagram into your answer book.

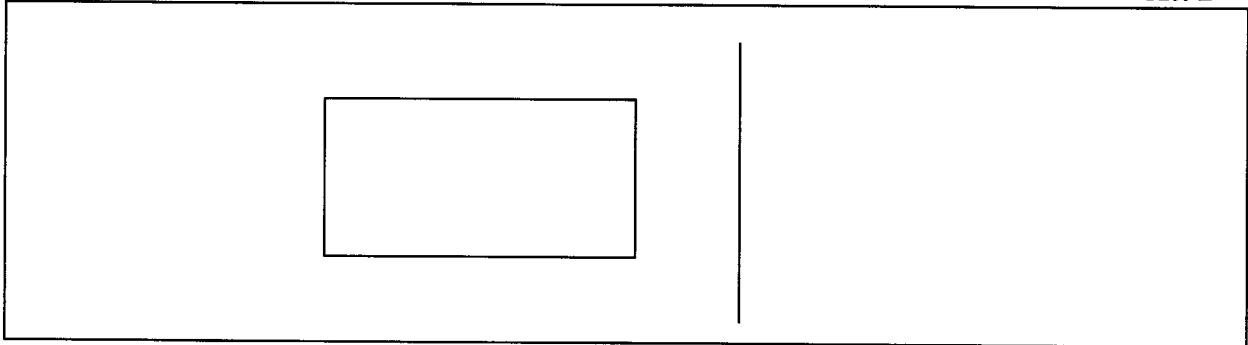
(ii)   Construct the image of the rectangle *abcd* under the axial symmetry in the line *L*.

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

Blunders (-3)
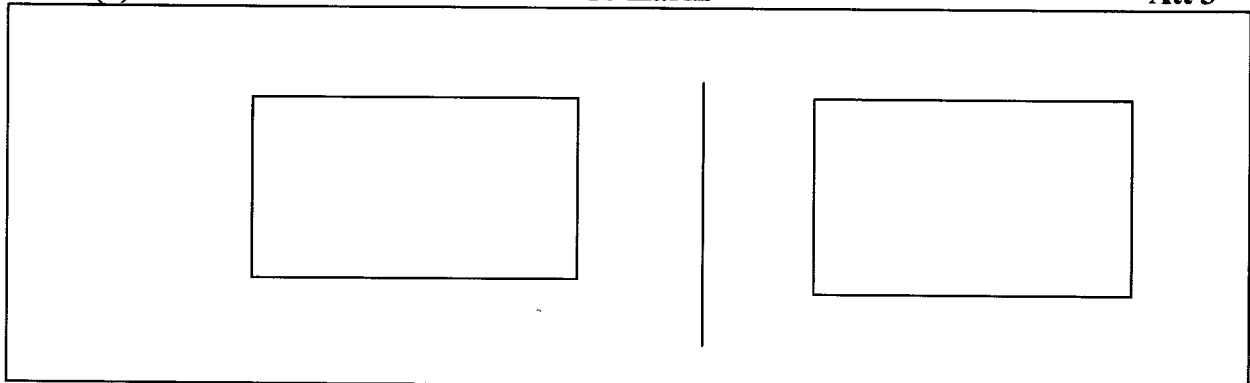B1   Does not draw a rectangle.

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

Slips (-1)
S1   Each incorrect vertex or vertex omitted.
S2   Vertices plotted but not joined.

QUESTION 12.

Part (i)	5 marks	Att 2
Part (ii)	10 marks	Att 3

(i) Find the value of $5x + 1$ when $x = 3$.

(ii) Find the value of x for which $5x + 1 = 11$.

Part (i)	5 marks	Att 2

$$x = 3$$
$$5(3) + 1 = 15 + 1 = 16$$

Blunders (-3)
B1   No multiplication i.e. 53 or 5 + 3.
B2   Takes $5x + 1 = 3$.

Slips (-1)
S1   Errors in calculations.

Part (ii)	10 marks	Att 3

$$5x + 1 = 11$$
$$5x = 11 - 1$$
$$5x = 10$$
$$x = 2$$

*   Accept 5(2) + 1 = 11 for full marks.

Blunders (-3)
B1   Transposition error each time.

Slips (-1)
S1   Errors in calculations.

Attempts
A1   Uses trial and improvement.

QUESTION 13.

An electricity bill shows the following meter readings:

READING	PRESENT	PREVIOUS
UNITS	83796	83654

(i) How many units were used between these two readings?

(ii) Find the cost of the units used at 7.5 cent per unit.

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

Present = 83796
Previous = 83654
Used   = 142

Blunders (-3)
B1   83796 + 83654.

Slips (-1)
S1   Errors in calculations.

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

Cost = 142 x 7.5 = €10.65

Blunders (-3)
B1   142 ÷ 7.5.

Slips (-1)
S1   Errors in calculations.
S2   Multiplies 83796 or 83654 by 12.
S3   Error in decimal point.

QUESTION 14.

Part (i)	**5 marks**	**Att 2**
Part (ii)	**10 marks**	**Att 3**

(i) How many minutes are in 1hour and 17 minutes?

(ii) A train left Galway at 12:35 and arrived in Athlone at 14:17. How long did this journey take?

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

1hr and 17 min = 77mins

Blunders (-3)
B1   1 hr =100 minutes.

Attempts (2)
A1   117 minutes.

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

Time taken = 14:17 - 12:35 = 1hr and 42 minutes (102mins)

Blunders (-3)
B1   1hr ≠ 100minutes, if not already penalised above.
B2   14:17 + 12:35.

Slips (-1)
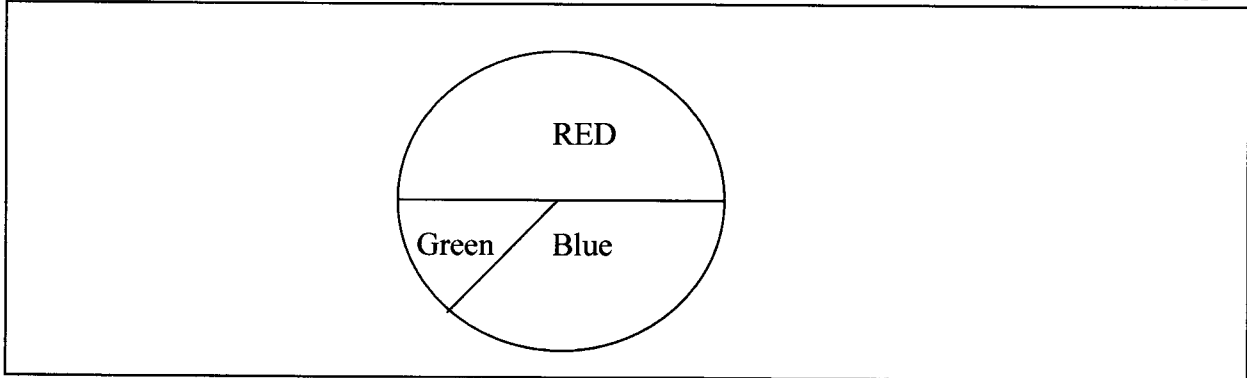S1   Errors in calculations.

QUESTION 15.

There are 12 cars in a car park. 6 of the cars are red, 4 are blue and 2 are green. Draw a pie chart to show this information.

15 marks Att 5

Blunders (-3)

B1   Error in calculating angle (uses 90° or 180° or 100° as total).
B2   Angles calculated but no diagram drawn.
B3   Each angle omitted.

Slips (-1)

S1   Error in calculations.
S2   Tolerance of ± 5° when drawing angles.
S3   Labels left out (only two needed).

Attempts (5)

A1   States pie chart is 360°.
A2   Draws any incorrect diagram, without work.
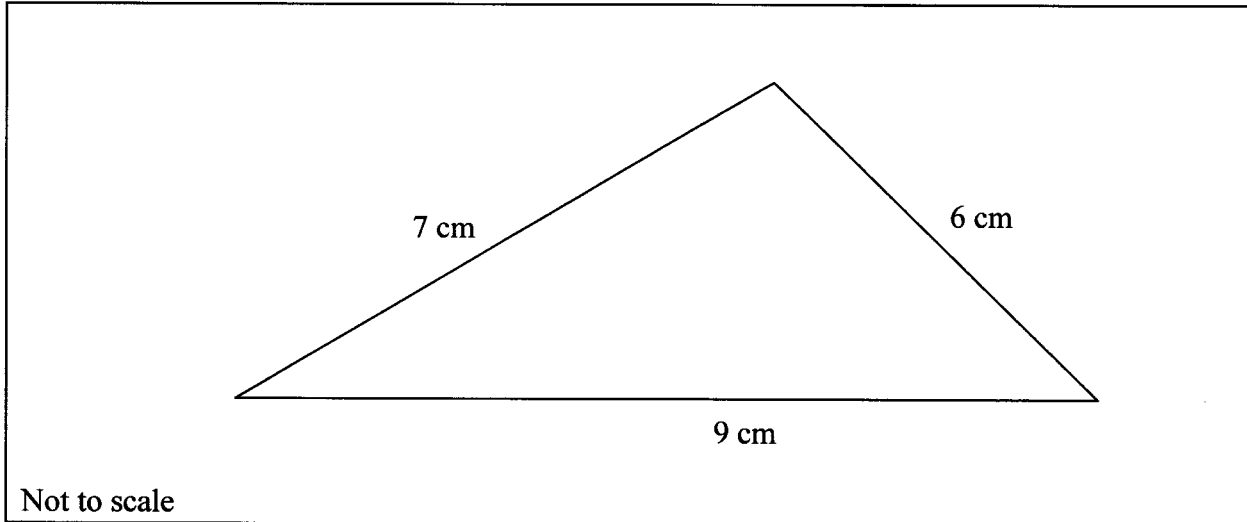A3   Draws a bar chart, pictogram or trend graph.

10 marks	**Att 3**
5 marks	**Att 2**

Use a ruler and compass to construct a triangle with sides 9cm, 7cm and 6cm.
Use a protractor to measure the largest angle in the triangle and write down your answer.

10 marks   **Att 3**

7 cm   6 cm

9 cm

Not to scale

Blunders (-3)
B1   Each side omitted.

Slips (-1)
S1   Sides outside of tolerance of $\pm 1\,cm$, each time.
S2   Uses inches, penalise once only.

5 marks   **Att2**

Largest angle = 87°

Slips (-1)
S1   Allow a tolerance of 5°, using candidate's triangle.

Misreading (-1)
M1   Does not measure the largest angle.

Attempts (2)
A1   States that sum of angles in a triangle is 180^{0}.

QUESTION 17.

| Part (i) | 10 marks | Att 3 |
| Part (ii) | 5 marks | Att 2 |

The table below shows the number of pupils who were late for school during a certain week:

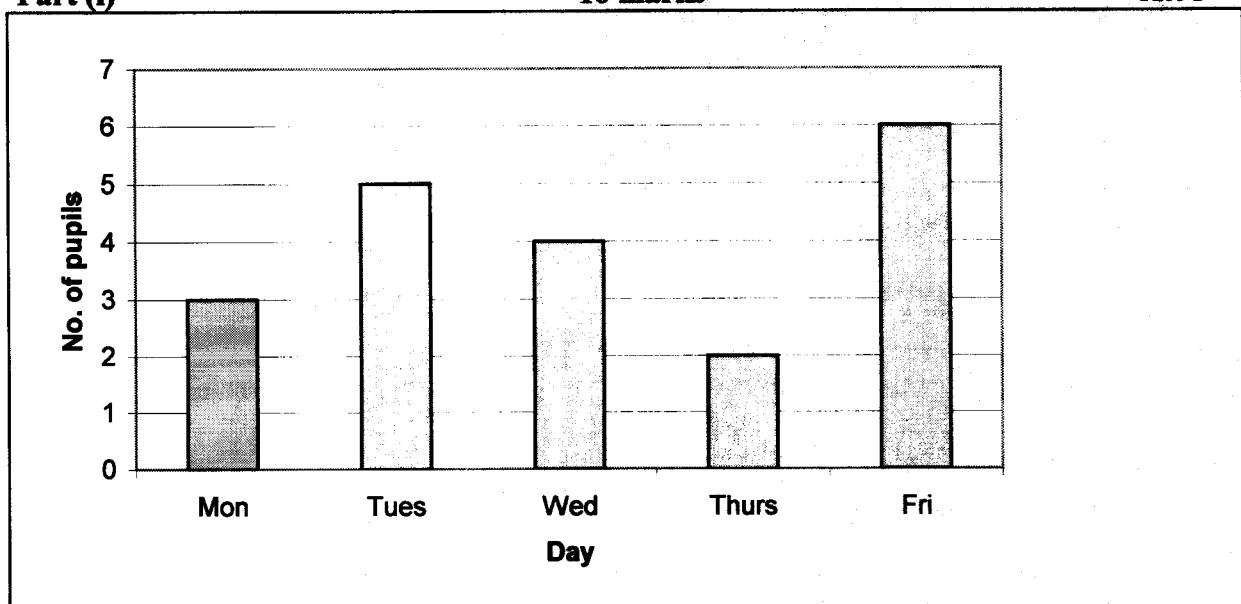| Day	Mon	Tues	Wed	Thurs	Fri
Number of pupils	3	5	4	2	6

(i) Draw a bar chart to show this information.

(ii) Find the mean (average) number of pupils late per day.

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

Attempts (3)
A1   Draws a trend graph or a pie–chart.

Slips (-1)
S1   Each rectangle omitted or incorrectly drawn.

Part (ii)   **5 marks**   **Att2**

$$\text{Mean} = \frac{3+5+4+2+6}{5} = \frac{20}{5} = 4$$

Blunders (-3)
B1   Does not divide by any number.

Slips (-1)
S1   Errors in calculations.
S2   Wrong denominator.

QUESTION 18

Part (i)	5 marks	Att 2
Part (ii)	5 marks	Att 2
Part (iii)	5 marks	Att 2

Find, using the Tables, pages 20 - 25:

(i) $\sqrt{11.9}$

(ii) $(2.4)^2$

(iii) $\sqrt{11.9} + (2.4)^2$

Part (i)	5 marks	Att 2

$$\sqrt{11.9} = 3.450$$

Blunders (-3)
B1 Multiplies or divides 11.9 by 2.
B2 Looks up wrong page, but watch for S1 or for $\sqrt{1.19} = 1.091$.

Slips (-1)
S1 11.9 by 11.9 or looks up 11.9^2.
S2 Misplaced or no decimal point.
S3 Looks up wrong line or column in Tables.

Part (ii)	5 marks	Att 2

$$(2.4)^2 = 5.760$$

Blunders (-3)
B1 Multiplies or divides 2.4 by 2.
B2 Looks up wrong page, but watch for S1.

Slips (-1)
S1 Looks up $\sqrt{2.4}$ or $\sqrt{24}$.
S2 Misplaced or no decimal point.
S3 Wrong line or column.
S4 2.4×2.4 and stops.

Part (iii)	5 marks	Att 2

$$\sqrt{11.9} + 2.4^2 = 3.45 + 5.76 = 9.21$$

* Use candidate's results in (i) and (ii) without further penalty.

Slips (-1)
S1 Error in calculations.
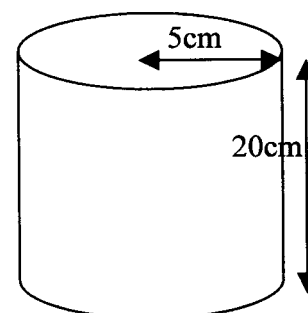S2 Incorrect or no decimal point.

QUESTION 19.

Find the volume of a cylinder of radius 5cm and height 20cm.

Volume of a cylinder $= \pi r^2 h.$

Take $\pi = 3.$

15 marks   **Att 5**

$$\text{Volume} = 3(5)^2 \, 20 = 1500 \text{ cm}^3$$

Blunders (-3)
B1   Does not multiply numbers substituted.
B2   Does not square 5.
B3   Uses other relevant formula.

Slips (-1)
S1   Error in calculations.
S2   Each incorrect substitution in formula.

Attempts (5)
A1   Uses $2\pi r$ or $2\pi rh$.
A2   Copies diagram.

Part (i)	10 marks	Att 3
Part (ii)	5 marks	Att 2

(i)   Given that $y = x + 1$, copy and complete the table below:

x	0	1	2	3
y				

(ii)   Plot these four points on graph paper and join them to form a line.

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

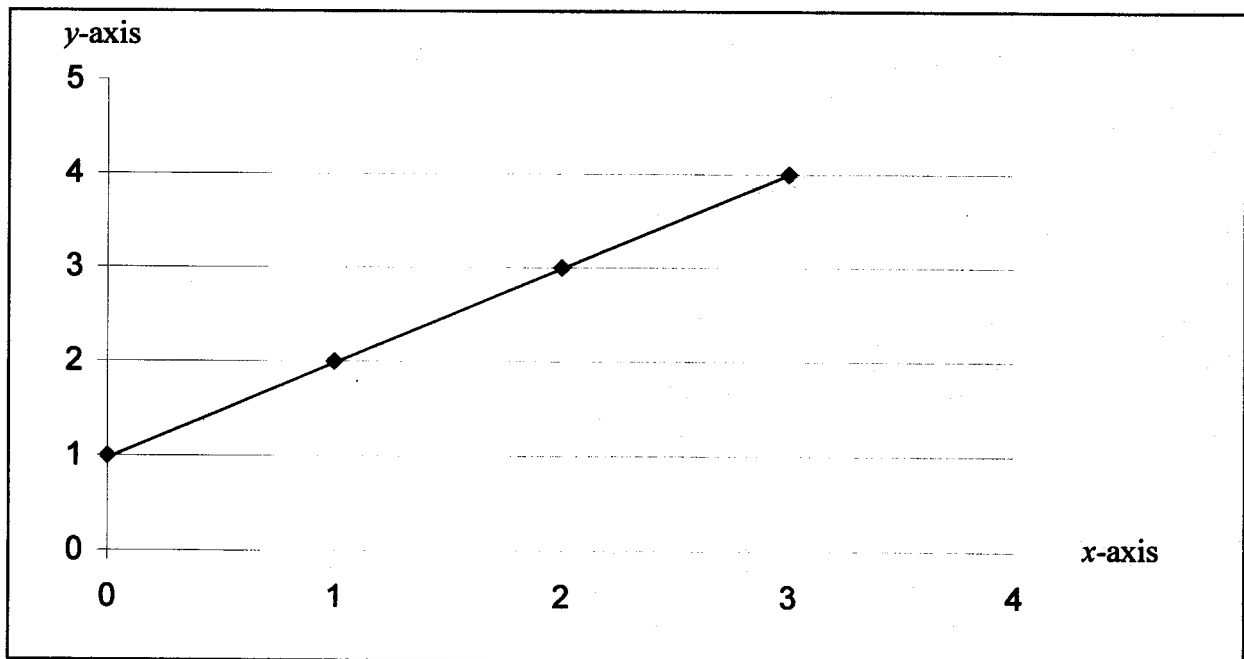| x	0	1	2	3
y	1	2	3	4

Slips (-1)

S1   Each wrong or omitted entry.

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

Slips (-1)

S1   Axes drawn incorrectly.
S2   Each incorrectly plotted or omitted point.
S3   Points not joined.