Contents

STATE EXAMINATIONS COMMISSION
MARKING SCHEME

LEAVING CERTIFICATE EXAMINATION 2004

MATHEMATICS

FOUNDATION LEVEL

PAPER 1

GENERAL GUIDELINES FOR EXAMINERS - PAPER 1

1. Penalties of three types are applied to candidates' work as follows:
    - Blunders   - mahematical 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), 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 *same* error in the *same* section of a question is penalised *once* only.

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

8. A serious blunder, omission or misreading merits the ATTEMPT mark at most.

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

10. Accept the best of two or more attempts – even when attempts have been cancelled.

11. Allow comma for decimal point, e.g. €5.50 may be written as €5,50.

QUESTION 1

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

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

(i) Find $\sqrt{55}$, correct to two decimal places.

$$\sqrt{55} = 7.416 = \mathbf{7.42}$$

Blunders (-3)
B1: Square root mistaken for square (Ans. 3025)
B2: Square root mistaken for half (Ans. 27.5)
B3: Incorrect or omitted round-off

Slips (-1)
S1: If $55\sqrt{55} = 408.1$
S2: Misplacing decimal point e.g. 74.2 or 0.742

Misreadings (-1)
M1: $\sqrt{5.5} = 2.345$
M2: $\sqrt{0.55} = 0.741$

Attempts
Att: Writes 55^2 and stops
Att: Writes $55/2$ and stops
Att: Work at estimating answer e.g. $\sqrt{64} = 8$ or $\sqrt{49} = 7$

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

(ii) Find the exact value of $(17.5)^2 - (2.5)^2$.

$$(17.5)^2 - (2.5)^2 = 306.25 - 6.25 = \mathbf{300}$$

or

$$(17.5)^2 - (2.5)^2 = (17.5 + 2.5)(17.5 - 2.5) = (20)(15) = \mathbf{300}$$

Blunders (-3)
B1: Square mistaken for square root (Ans. $4.1833 - 1.5811 = 2.6022$)
B2: Square mistaken for twice (Ans. $35 - 5 = 30$)
B3: Blunder in precedence e.g. 15^2
B4: Square not found, each time
B5: $17.5 \times 10^2 - 2.5 \times 10^2 = 1500$

Slips (-1)
S1: Early round-off or truncation, each time
S2: Misplacing the decimal point, each time
S3: Subtraction omitted

Misreadings (-1)
M1: Misplaced digits or misread numbers, each time

Attempts
Att: Work at estimating answer e.g. 400

(iii)   Find $(4.08)^3$, correct to three decimal places.

$$(4.08)^3 = 67.917312 = \mathbf{67.917.}$$

Blunders (-3)
B1: Calculates $(4.08)3$; (Ans. 12.24)
B2: Third root calculated instead of power of 3; (Ans. 1.5979)
B3: Interprets $(4.08)^3$ as 4.08×10^3; (Ans. 4080)
B4: Calculates $(4.08)^2$; (Ans. 16.6464)
B5: Incorrect or omitted round-off

Slips (-1)
S1: Misplacing decimal point

Misreadings (-1)
M1: Power other than 3 or 2 worked

Attempts
Att: Writes $(4.08)3$ and stops
Att: Writes 4.08×10^3 and stops
Att: Work at estimating answer e.g. 64

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

(iv) Find the exact value of $61.09 + \dfrac{3.24}{0.08}$.

$$61.09 + \frac{3.24}{0.08} \;=\; 61.09 + 40.5 \;=\; \mathbf{101.59}$$

Blunders (-3)
B1: Blunder in precedence e.g. $(61.09 + 3.24)/0.08 \;=\; 804.125$
B2: Blunder in calculating fraction e.g. $0.08/3.24 \;=\; 0.0246$ or $3.24 \;\pm\; 0.08$

Slips (-1)
S1: Misplacing decimal point, e.g. 6.109, each time
S2: Slip in addition or addition omitted

Misreadings (-1)
M2: Reads $\times$ for $+$ (Ans. 2474.145)

Attempts
Att: Work towards a correct step

Note: $(61.09 \div 0.08) + 3.24 = 763.5 + 3.24 = 766.74$
            $61.09 + (0.08 \div 3.24) = 61.1146$
            $(61.09 + 3.24) + 0.08 = 64.41$
               $(61.09 + 3.24) - 0.08 = 64.25$

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

(v) Find 21% of €43.27, correct to the nearest cent.

€43.27 $\times$ 0.21 = €9.0867 = **€9.09**

Blunders (-3)
Any blunder in calculating the percentage results in 4 marks at most.

B1: Calculates 121% (Ans. €52.3567)
B2: Calculates 79% (Ans. €34.18)
B3: Calculates 1% of €43.27
B4: Incorrect or omitted round-off

Slips (-1)
S1: Numerical slips in calculation

Attempts
Att: Writes 21/100 without working
Att: 43.27/ 21 or 21/43.27 and stops

(vi) A book costs £18 sterling. Find its cost in euro if €1= £0.72 sterling.

$$\frac{£18.00}{£0.72} \;=\; €25.$$

Blunders (-3)
B1: Calculates 18 × 0.72 (Ans. 12.96)

Slips (-1)
S1: Misplacing decimal point

Attempts
Att: Calculates 1/0.72 = 1.38888
Att: Calculates 1/18 = 0.0555

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

(vii)   Write $\dfrac{6}{11} - \dfrac{3}{13}$, as a decimal, correct to one decimal place .

$$\frac{6}{11} - \frac{3}{13} \;=\; 0.54 - 0.23 \;=\; 0.31 \;=\; \mathbf{0.3}$$

or

$$\frac{6}{11} - \frac{3}{13} \;=\; \frac{6 \times 13 - 3 \times 11}{11 \times 13} \;=\; \frac{78 - 33}{143} \;=\; \frac{45}{143} \;=\; 0.31 \;=\; \mathbf{0.3}$$

Blunders (-3)
Blunder in converting fraction to decimal merits attempt mark at most except where candidate works correctly to 45/143.

B1: Each step of three omitted
B2: Incorrect or omitted round-off

Slips (-1)
S1: Slip in minus sign

Misreadings (-1)
M1: Reads ÷ for − (Ans. 2.363)

Attempts
Att: Works with 3/3 or 9/24 or 78/33 or 33/78 or 6/2 or 3/2 or 6/24 or 3/24

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

> **(viii)**   In an examination, a student scores 116 marks out of a possible 140 marks.
>   Express this score as a percentage, correct to the nearest whole number.

$$\frac{116}{140} \times 100 = 82.85 = \mathbf{83}.$$

Blunders (-3)
Any blunder in calculating the percentage results in 4 marks at most.
B1: Incorrect or omitted round-off

Slips (-1)
S1: Slips in multiplication or addition

Misreadings (-1)
M1: Misreading any number

Attempts
Att: Effort at calculating any step.
Att: Answer of 24, 14 or 34

(ix)   Find the exact value of

$$\frac{\left(1.25 \times 10^4\right) - \left(9.1 \times 10^3\right)}{\left(6.8 \times 10^1\right)}.$$

$$\frac{\left(1.25 \times 10^4\right) - \left(9.1 \times 10^3\right)}{\left(6.8 \times 10^1\right)} = \frac{12500 - 9100}{68} = \frac{3400}{68} = \mathbf{50}$$

or

$$\frac{\left(1.25 \times 10^4\right) - \left(9.1 \times 10^3\right)}{\left(6.8 \times 10^1\right)} = \frac{12.5 \times 10^3 - 9.1 \times 10^3}{6.8 \times 10^1} = \frac{3.4 \times 10^3}{6.8 \times 10^1} = 0.5 \times 10^2 = \mathbf{50}$$

Blunders (-3)
B1: Blunders in dealing with scientific notation
B2: Blunders in order of precedence
B3: Each omitted or incorrect step, if slips not clear
B4: Fraction inverted (Ans (0.02))
B5: Blunder 1.25×40, once only, if blunder consistent

Slips (-1)
S1: Any number incorrect by factor of 10 when written in decimal form

Attempts
Att: Some correct work, e.g. approximation with correct order of magnitude
Att: $\dfrac{1.25 - 9.1}{6.8} = -1.154$

Note: $(12500 \div 68) - 9100 = -8916.176$
              $12500 - (9100 \div 68) = 12366.176$

(x)   Find the exact value of
$$\frac{59.4 - 3.85}{6.54 + 4.46}.$$

$$\frac{59.4 - 3.85}{6.54 + 4.46} = \frac{55.55}{11} = \mathbf{5.05}.$$

Blunders (-3)
B1: Blunders in order of precedence, applied once
B2: Each omitted or incorrect step if slips not clear
B3: Fraction inverted (Ans. 0.198)

Slips (-1)
S2: Numerical slips, including misplacing decimal point – max. of 3

Misreading (-1)
M1: Uses $\times$ instead of $+$ or $\div$ instead of $-$ vice versa

Attempt
Att: Some correct step
Att: Work at estimating answer

Note: $(59.4 \div 6.54) - (3.85 \div 4.46) = 9.0825 - 0.8632 = 8.2193$
         $(59.4 \div 6.54) + (3.85 \div 4.46) = 9.0825 + 0.8632 = 9.9457$
         $59.4 - [3.85 \div (6.54 + 4.46)] = 59.4 - 0.35 = 59.05$
         $(59.4 - 3.85) \div 6.54 + 4.46 = 55.55 \div 6.54 + 4.46 = 8.4938 + 4.46 = 12.9538$
         $59.4 - (3.85 \div 6.54) + 4.46 = 59.4 - 0.5886 + 4.46 = 63.2714$

QUESTION 2

Part (a)	**10 marks**	**Att 0**
Part (b)	**20 marks**	**Att 8**
Part (c)	**20 marks**	**Att 0**

Part (a)	**10 (5 + 5) marks**	**Hit or miss**

(a) Change to metres
      (i)   2.5 km
      (ii) 650 cm.

    (i) $2.5 \text{ km} = 2.5 \times 1000 = \textbf{2500 m}$

    (ii) $650 \text{ cm} = \dfrac{650}{100} = \textbf{6.5 m}$.

(i)   Correct answer 5 marks, otherwise 0

(ii)   Correct answer 5 marks, otherwise 0

(b) Michael is paid €8.50 per hour. The table below shows the hours he worked last week.

Day	Starting Time	Finishing Time
Monday	10:00	13:00
Tuesday	15:00	17:30

(i) How many hours did Michael work last week?

(ii) How much did he earn last week?

(i) Number of hours $= 3 + 2.5 + 3 =$ **8.5 hours**

(ii) Earns €8.5 $\times$ 8.5 $=$ **€72.25**

Section (i):

Blunders (-3)

B1: Blunder in calculating hours worked, each time, if not consistent

B2: Incorrect conversion of hours and minutes

B3: Time interval not calculated, each time

Slips (-1)

S1: Slips in addition

Attempts

Att: One time interval calculated.

Note: No work shown other than 8.5 written allow 10 marks for part (i)

Section (ii):   *Work from candidates answer to part (i)*

                Apply maximum of three slips if long multiplication used.

Blunders (-3)

B1: Writes €8.5 $\times$ 8.5 without working

Slips (-1)

S1: Slips in multiplication

Part (c)   **20 (5 + 5 + 10) marks**   **Hit or miss**

(c)   A family travelled 110 km by car from Cavan to Dublin, and a further 50 km to
Wicklow. The total time for the journey was 4 hours.

(i) Calculate the total distance travelled.
(ii) Calculate the average speed for the whole journey.
(iii) The average speed from Cavan to Dublin was 44 km/hr. How long did this
part of the journey take?

(i)   Total distance $= 110 + 50 =$ **160 km**

(ii) Speed $= \dfrac{160}{4} =$ **40 km per hour**

(iii) Time $= \dfrac{110}{44} =$ **2.5 hours**

(i)   Correct distance merits 5 marks, otherwise 0

(ii)   Correct average speed merits 5 marks, otherwise 0

(iii)   Correct time merits 10 marks, otherwise 0.

QUESTION 3

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

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

(a) A student estimates the height of a tree to be 12 metres. The true height of the tree is 11.35 metres.
Find
(i) the error in the estimate.
(ii) the percentage error, correct to two decimal places.

(i) Error $= 12 - 11.35 = $ **0.65**

(ii) Percentage error $= \dfrac{0.65}{11.35} \times 100 = 5.726\% = $ **5.73%**

Blunders (-3)
B1: Takes $12 + 11.35$ (Ans. 23.35)
B2: Blunders in percentages e.g. 11.35/0.65 (Ans. 24)
B3: Divides by 12
B4: Incorrect or omitted round-off

Slips (-1)
S1: Writes $(12/11.35) \times 100 = 105.73\%$

Attempts
Att: Writes 12/11.35 and stops
Att: Writes 11.35/12 and stops
Att: Writes 12×11.35 and stops
Att: Writes 100/11.35
Att: Writes 11.35×100 or 11.35/100
Att: Mean of 12 and 11.35 found

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

(b)   **(i)** Express the ratio 15:21 in its simplest form.

      (ii)   A prize of €72 is divided between two people in the ratio 15:21. How much does each person get?

(i) $15 : 21 = \mathbf{5 : 7}$

(ii) $5 + 7 = 12$

One person gets $\dfrac{72}{12} \times 5 = \mathbf{€30}$

Second person gets €72 - €30 = **€42** *or* $\dfrac{72}{12} \times 7 = \mathbf{€42}$.

Section (i)
Blunders (-3)
B1: Blunder in simplifying ratio
B2: Answer 7 : 5

Slips (-1)
S1: Correct ratio not in simplest form e.g. 30 : 42
S2: Numerical slips in calculation

Section (ii)
Blunders (-3)
B1: Uses incorrect ratio e.g. 5/7 or 7/5
B2: Calculates 1/5 or 1/7 as person's shares
B3: Calculates only one person's share

Slips (-1)
S1: Numerical slips in calculation

Attempts
Att: Answer 72/2 = 36

(c)   €3500 is invested for four years at a fixed rate of compound interest. During the first year it earns €140.
(i) What is the annual rate of interest?
(ii)   How much will the investment be worth at the end of the four years?
Give your answer correct to the nearest euro.

(i)   rate $= \dfrac{140}{3500} \times 100 \ = \ 4\%.$

(ii)   A $= €3500(1 + 0.04)^4 \ = \ €3500(1.04)^4 = €3500(1.169858)$
               $= €4094.50$ $= \mathbf{€4095}$

or

     Year 1: Principal €3500,   Interest   €140
     Year 2: Principal €3640,   Interest   €145.60
     Year 3: Principal €3785.60,   Interest   €151.424
     Year 4: Principal €3937.024,   Interest   €157.48096
     Amount after 4 years €4094.50 = **€4095**

Section (i)
Correct answer merits 10 marks, otherwise 0.

Section (ii)
Blunders (-3)
Working with an incorrect rate from (i) merits attempt mark at most.

Award 10 marks for a fully correct answer.
Award 7 marks for a correct answer not rounded correctly.
Award Attempt 4 for any other work of merit.

QUESTION 4

Part (a)	10 marks	Att 4
Part (b)	20 marks	Att 8
Part (c)	20 marks	Att 6

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

(a) Solve $5x - 7 = 2x + 14$.

$$5x - 7 = 2x + 14 \implies 5x - 2x = 14 + 7 \implies 3x = 21 \implies \boldsymbol{x = 7}$$

* *Award full marks for a correct answer with no work shown*

Blunders (-3)
B1: Blunders in grouping terms e.g. $2x + 14 = 16x$
B2: Each step omitted
B3: $3x = 21 \implies x = 18$ or $x = 24$ or $x = 63$

Slips (-1)
S1: Slips in signs on crossing "=", each time

Attempts
Att: Some correct step towards solution
Att: Stops after one transposition
Att: Effort at trial and error, by substitution

(b) Solve the simultaneous equations

$$x + 3y = 4$$
$$2x - y = 15$$

$$
\begin{aligned}
x + 3y &= 4 \quad \Rightarrow \quad x + 3y = 4 \\
2x - y &= 15 \quad \Rightarrow \quad \underline{6x - 3y = 45} \\
& 7x = 49 \quad \Rightarrow \quad \mathbf{x = 7}
\end{aligned}
$$

$$x + 3y = 4 \quad \Rightarrow \quad 7 + 3y = 4 \quad \Rightarrow \quad 3y = 4 - 7 = -3 \quad \Rightarrow \quad \mathbf{y = -1}$$

First variable found:

Award 15 marks for first variable fully correct, with or without work.
Award Attempt 6 for other work of merit, e.g. work towards cancelling one variable.

Second variable found:
Award 5 marks for second variable correct (from candidates previous work) otherwise 0.

Worthless (0)
W1: Incorrect answers, no work shown

Part (c)   **20 (10 + 10) marks**   **Att (4 + 4)**

(c) When 8 is added to five times a certain number, the result is the same as when 12 is added to three times the number.

Let x represent this number.

(i) Write this information as an equation in x.
(ii) Solve the equation to find the value of x.

(i) $5x + 8 = 3x + 12$

(ii) $5x + 8 = 3x + 12 \implies 2x = 4 \implies x = 2$

* There must be an effort to set up equation in x, including 5 or 3, for the award of any of the first 10 marks.
* For award of marks for solving – use candidate's equation.

Blunders (-3)
B1: Blunder in setting up equation e.g. $5(8 + x)$ for $5x + 8$
B2: Each omitted step of three steps, $5x + 8$, $3x + 12$, equality

Slips (-1)
S1: Slips in signs

Attempts
Att: Set-up: Writes $5x$ or $x + 8$ etc. and stops
Att: Effort at trial and error

QUESTION 5

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

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

(a) (i) Write down the whole number factors of 20.
    (ii) Write down the factors of 20 that are prime.

(i) 1, 2, 4, 5, 10, 20
(ii) 2, 5

Section (i)
Slips (-1)
S1: Each omitted or incorrect factor

Attempts
Att: Any one correct value

Section (ii)
Slips (-1)
S1: Each omitted or incorrect prime number

Attempts
Att: Attempt at factors of 20
Att: Defines prime number
Att: List from (i) is repeated in (ii).

(b)   Solve the quadratic equation $2x^2 + 5x - 1 = 0$.
Give your answers correct to two decimal places.

$$2x^2 + 5x - 1 = 0 \Rightarrow x = \frac{-5 \pm \sqrt{25 - 4(2)(-1)}}{2(2)} = \frac{-5 \pm \sqrt{25 + 8}}{4} = \frac{-5 \pm \sqrt{33}}{4}$$

$$\Rightarrow x = \frac{-5 \pm 5.744}{4} = \frac{0.744}{4} \ or \ \frac{-10.744}{4} \Rightarrow x = 0.186 \ or \ -2.686$$

$$\Rightarrow x = \mathbf{0.19} \ \ or \ \ -\mathbf{2.69}$$

Award 20 marks for fully correct (both solutions) correctly rounded.

Award 17 marks for both solutions correct but one or both not correctly rounded.

Award 10 marks for one correct solution (rounded or otherwise)

Award Attempt 8 for any work of merit.

Part (c)   **0 (5 + 5 + 10)**   **Att (2 + 2 + 4)**

(c)   **(i)** Solve $2x - 5 \leq 1$
      (ii) Solve $4 - x \leq 3$
      (iii)   Write down all the whole numbers which satisfy both
        $2x - 5 \leq 1$ and $4 - x \leq 3$.

(i) $2x - 5 \leq 1 \Rightarrow 2x \leq 6 \Rightarrow \boldsymbol{x \leq 3}$

(ii) $4 - x \leq 3 \Rightarrow -x \leq -1 \Rightarrow \boldsymbol{x \geq 1}$

(iii)   **{1, 2, 3}**

(i)   Award 5 marks for fully correct answer.
     Award attempt 2 for anything else of merit.

(ii)   Award 5 marks for fully correct answer.
     Award attempt 2 for anything else of merit.

(iii) Award 10 marks for fully correct answer.
     Award attempt 4 for anything else of merit.
     Candidates answers to (i) and (ii) not both correct => attempt 4 at most.

QUESTION 6

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

The graph below shows the number of shirts that a shop sold each day in a certain week .
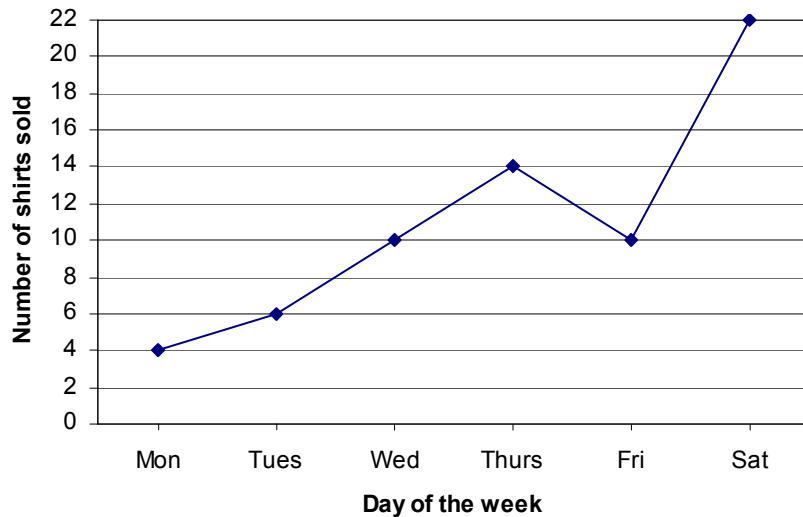
Part (i)	**10 marks**	**Att 4**

(i) How many shirts were sold on Tuesday?

6 shirts

Blunders(-3)
B1: Answer 14 (Thursday)

Attempts
Att: Ans is 4 or 10 or 22

Worthless
W1: Any other value

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

(ii) On which day of the week was the smallest number of shirts sold?

Monday

Blunders(-3)
B1: Answer is 4
B2: Answer is Saturday

Worthless (0)
W1: Any other day given

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

(iii) The shop had 100 shirts at the start of the week. How many were left at the end of the week?

$100 \ - \ (\ 4 + 6 + 10 + 14 + 10 + 22) \ = \ 100 \ - \ (\ 66) \ = \ \textbf{34 shirts}$

Blunders (-3)
B1: Subtraction omitted

Slips (-1)
S1: Each omitted or incorrect value in calculating addition

Attempts
Att: One correct value read
At: 100 – one day's sales (Ans 96, 94, 90, 86, 78)

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

> **(iv)** Calculate the average number of shirts sold per day.

> Average = $\dfrac{66}{6}$ = **11 shirts**

Blunders (-3)
B1: Blunder in average e.g. division by 7
B2: 34/6 = 5.6
B3: Answer left as 66/6 or equivalent.
Slips (-1)
S1: Slips in calculation

Attempts
Att: Some effort at finding average

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

> **(v)** The shirts were sold for €10 each. The shop paid €6 for each shirt. Calculate the average daily profit from shirt sales.

> Profit on a shirt = €10 - €6 = €4.
> Average daily profit is (€4)(11 shirts) = **€44**.

* Accept incorrect answer from (iv) without further penalty

Blunders (-3)
B1: Omission of each step of three (maximum)
B2: Blunder in finding profit e.g. 10 + 6
B3: Profit for week calculated (Ans 264)

Slips (-1)
S1: Numerical slips

Attempts
Att: Some relevant calculation attempted

QUESTION 7

Graph	**30 marks**	**Att 12**
Values	**20 marks**	**Att 8**
Table	**30 marks**	**Att 8**
Graph	**10 marks**	**Att 4**

Draw the graph of the function
$$f : x \rightarrow 2x^2 - 4x + 1 \quad \text{for} \quad -1 \le x \le 3, \ x \in \mathbf{R}.$$

Blunders (-3)
B1: Additional line in table
B2: Blunder such as $2x^2 = (2x)^2$ or $4x$ or $+1 = x + 1$ or $+1 = x$ consistently across full line
    Otherwise (-1) applied to each incorrect value in the line

Slips (-1):
S1: Each incorrect or omitted value in body of table
S2: Each incorrect or omitted $f(x)$ value, calculated from candidate's work
S3: Error in sign applied consistently across a line

Attempts:
Att: Any four correct calculated values in the table or function form

Plotting Graph:
If candidate's values not fully correct than attempt mark at most for graph.

Blunders (-3)
B1: Points joined in incorrect order
B2: Blunders in scales on axes, including reversing + for -.

Slips (-1):
S1: Each point plotted incorrectly, using students values
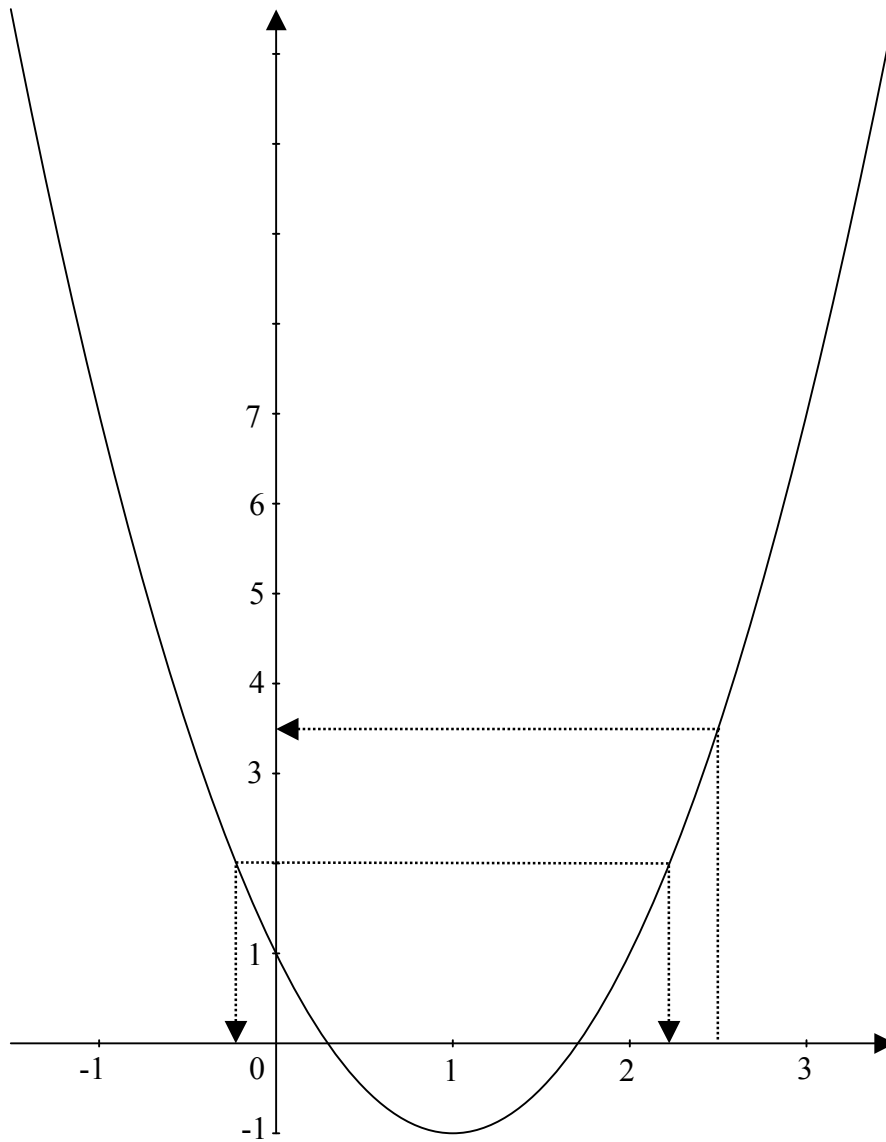S2: Each pair of successive points not joined, maximum of 3
S3: Points joined by line segments in the correct order
S4: Axes reversed

Attempts:
Att: Any two of candidate's points plotted.

x	-1	0	1	2	3
$2x^2$	2	0	2	8	18
- 4x	4	0	- 4	- 8	- 12
+ 1	1	1	1	1	1
$f(x)$	7	1	- 1	- 1	7

Values   **20 (5 + 5 + 5 + 5) marks**   **Att (2 + 2 + 2 + 2)**

Use your graph to estimate

  (i)   the minimum value of $f(x)$

  (ii)   the value of $f(2.5)$

  (iii) the values of x for which $f(x) = 2$

  (iv)   the range of values of x for which $f(x)$ is increasing.

(i) Minimum value of $f(x) = -1$

(ii) $f(2.5) = 3.5$

(iii) $f(x) = 2$ for $x = -0.2$ *or* $x = 2.2$

(iv) $f(x)$ is increasing for $1 < x \leq 3$

---

*   Accept candidate's value from graph for award of marks
*   Allow tolerance in reading values of ± 0.2

Blunders (-3)
B1: Each value outside the tolerance
B2: Only one value given in part (iii)

Misreading (-1)
M1: Misreads the value of x corresponding to the minimum of $f(x)$
M2: Misreads increasing for decreasing

Attempts:
Att: Effort at reading values from graph
Att: For solving equation algebraically, correctly

STATE EXAMINATIONS COMMISSION
MARKING SCHEME

LEAVING CERTIFICATE EXAMINATION 2004

MATHEMATICS

FOUNDATION LEVEL

PAPER 2

GENERAL GUIDELINES FOR EXAMINERS - PAPER 2

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

   Frequently occurring errors to which these penalties must be applied are listed in the scheme. They are labelled 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), 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 *same* error in the *same* section of a question is penalised *once* only.

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

8. A serious blunder, omission or misreading merits the ATTEMPT mark at most.

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

10. Accept the best of two or more attempts – even when attempts have been cancelled.

11. Allow comma for decimal point, e.g. €5.50 may be written as €5,50.

Part (a)	20 marks	Att 8
Part (b)	30 marks	Att 12

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

Find the area of the trapezium shown
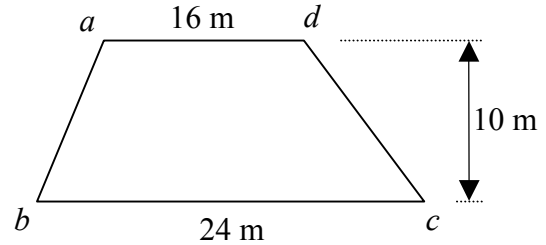
(a)	**20 marks**	**Att 8**

$$\text{Area} = \frac{10(16+24)}{2} = 200m^2$$

Blunders (-3)

B1 Area $= \dfrac{ah}{2}$ or $\dfrac{bh}{2}$ or $\dfrac{ab}{2}$ and continues

B2 Failure to divide by 2

B3 $10 \times 16 \times 24$ apply $2 \times (-3)$, no division by 2 and multiplication for addition.

B4 $16 + 24 = 40$ only, apply $2 \times (-3)$, no multiplication by h and no division

B5 $16 \times 10 = 160$ or $24 \times 10 = 240$ or 16×24 apply $2 \times (-3)$

Slips (-1)

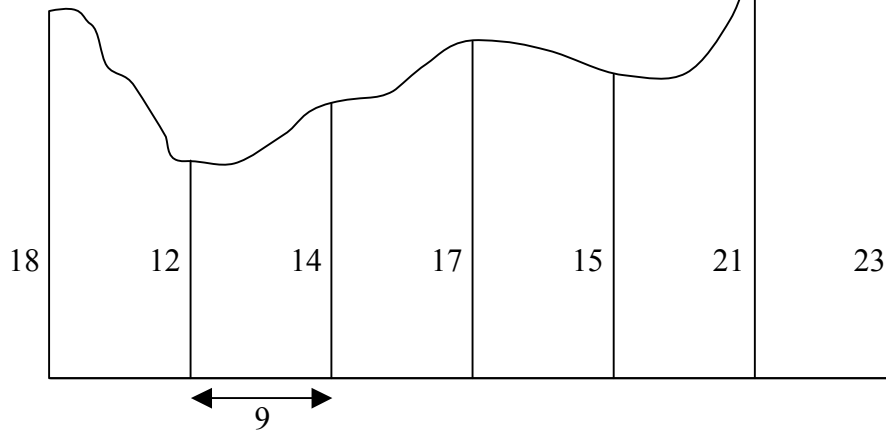S1 Numerical errors to a max of three

S2 Area $= \dfrac{24(10+16)}{2}$

Attempts (8 marks)

A1 Copies diagram

A2 Defines length or area.

A3 Correct formula only

Part (b)   **30 marks**   **Att 12**

A garden has one irregular side. Offsets of lengths 18, 12, 14, 17, 15, 21, and 23 metres are measured from the irregular side to the opposite side, as shown. The offsets are 9 metres apart.

Calculate the area of the garden using Simpson's Rule.

$$Area = \frac{1}{3}height\left[1^{st.} + Last + 2(odd) + 4(even)\right]$$

$$Area = \frac{9}{3}\left[18 + 23 + 2(14+15) + 4(12+17+21)\right]$$

$$Area = 3[299] = 897m^2$$

Blunders (-3)
B1   Uses 'four odd and twice even'

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.

Slips (-1)
S1   Each incorrect or omitted altitude
S2   Numerical errors to a max of three.

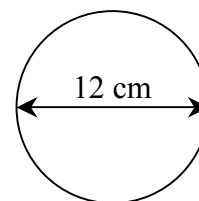*Attempts (12)*
A1   Gives Simpson's formula only
A2   Copies diagram

QUESTION 2

Part (a)	20 (10,10) marks	Att (4, 4)
Part (b)	30 (15, 15) marks	Att (6, 6)

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

(a) A disc has a diameter of 12 cm.
Write down the radius of the disc.
Find the area of the disc, correct to the nearest cm^2.

12 cm

Radius	**10 marks**	**Att 4**

$$Diameter = 12cm \Rightarrow Radius = 6cm$$

Blunders (-3)
B1   Multiplies 12 by 2

Slips (-1)
S1   Error in calculations

Attempts (3)
A1   Draws diagram
A2   Defines radius

Area	**10 marks**	**Att 4**

$$Area = \pi r^2 \Rightarrow Area = 113cm^2$$

$$or$$

$$Area = \frac{\pi d^2}{4} = \frac{\pi \left(12^2\right)}{4} = 113cm^2$$

Blunders (-3)
B1   Incorrect value of radius, accept candidate's value.
B2   Addition for multiplication
B3 $r^2 = 2r$
B4   Incorrect or no value for π.
B5   No round off or incorrect round off.

Slips(-1)
S1   Numerical errors
Misreading: uses $4\pi r^2$

Att(-4)
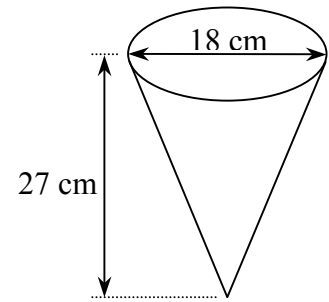A1   Gives any circle formula or value for π from any line with circle disc or sphere.

(b)(i)   **15 marks**   **Att6**

(b)   **A container in the shape of an inverted cone is filled with orange juice. The diameter of the cone is 18 cm and the height is 27 cm.**

      (i)   **Find the volume of orange juice in the container, in terms of π.**

18 cm

27 cm

(b)(i)   **15 marks**   **Att6**

$$Vol = \frac{\pi r^2 h}{3}$$

$$Vol = \frac{\pi \times (9)^2 \times 27}{3} = 729\pi$$

Blunders(-3)

B1 $r^2 = 2r$ or fails to evaluate r^2
B2   Incorrect value for r
B3   Incorrect or no value for h.
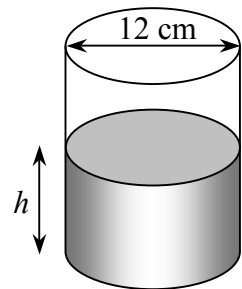B4   729 or 2290.22

Slips(-1)
S1   Numerical errors

Attempts
A1   Draws diagram

(ii)   **15 marks**   **Att 6**

The orange juice is then poured into a cylindrical can of diameter 12 cm. Find h, the depth of the orange juice in the can.

12 cm

h

(ii)   **15 marks**   **Att 6**

$$\pi r^2 h = 729\pi$$

$$\Rightarrow h = \frac{729\pi}{36\pi} = 20.25$$

Blunders(-3)
B1   Uses incorrect radius
B2   Transposition error
B3 $r^2 = 2r$

Slips(-1)   *Att(3)*
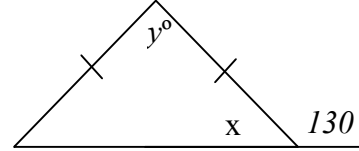S1   Numerical errors A1   Draws diagram

QUESTION 3

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 marks | Att (2, 2) |

(a) The diagram shows an isosceles triangle.
    (i)   Find the value of x
    (ii)   Find the value of y

| **(i)** x | 5 marks | Att 2 |
| **(ii)** y | 5 marks | Att 2 |

$$x = 180^o - 130^o = 50^o$$

$$y = 180^o - 100^o = 80^o$$

*   Accept answers on diagram

Blunders (-3)

B1   Sum of internal angles $\neq 180^o$

B2   Straight angle $\neq 180^o$

Slips(-1)

S1   Numerical error

Attempts(4,2,2)
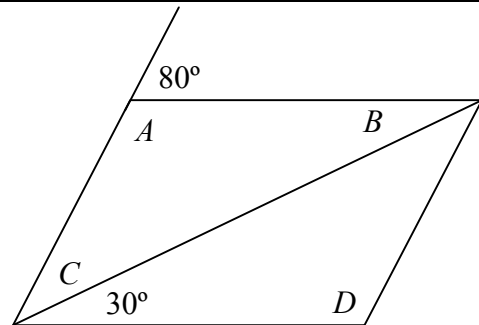
A1   Uses protractor

A2   Copies diagram

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**

80º A B C 30º D

Angle A	**5 marks**	**Att2**
Angle B	**5 marks**	**Att2**
Angle C	**5 marks**	**Att2**
Angle D	**5 marks**	**Att2**

$A = 100^o$
$B = 30^0$
$C = 50^0$
$D = 100^o$

Blunders(-3)

B1   Angle on straight line $\neq 180^o$

B2 $B \neq 30^o$

B3 $C \neq 50^o$

B4 $D \neq 100$ (watch for A=D)

Slips (-1)
S1   Numerical errors

Attempts(2)
A1   Additional material on a diagram
A2   Copies diagram

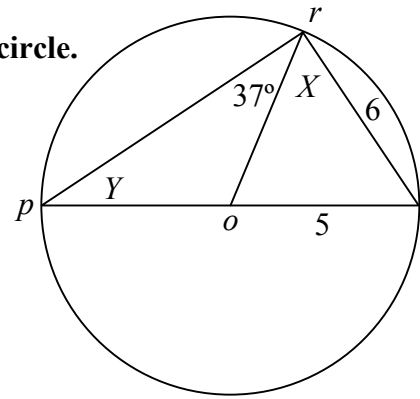**(c)**   **20 (5, 5, 5, 5) marks**   **Att (2, 2, 2, 2)**

> *o* is the centre of the circle,
> [*pt*] is a diameter of the circle and *r* is a point on the circle.
> $|\angle pro| = 37°$, $|rt| = 6$ cm and $|ot| = 5$ cm.
> Find:
> (i)   the measure of the angle *X*
> (ii)   the measure of the angle *Y*
> (iii) the length of the diameter [*pt*]
> (iv)   the length of [*pr*].

(i)	**5 marks**	**Att2**
(ii)	**5 marks**	**Att2**
(iii)	**5 marks**	**Att2**
(iv)	**5 marks**	**Att2**

$$(i)\, X = 90^o - 37^o = 53^o$$

$$(ii)\, Y = 37^o$$

$$(iii)\, |pt| = 10cm$$

$$(iv)\, |pr|^2 = 100 - 36$$

$$\Rightarrow |pr| = 8$$

Blunders (-3)

B1 $|\angle prt| \neq 90^o$

B2 $Y \neq 37^o$

B3   Diameter = 5 divided by 2

B4   Any error in setting up or solving Pythagoras

Slips (-1)

S1   Numerical errors

Attempts(2,2,2,2)

A1   Draws diagram

A2   Any attempt to define Pythagoras

A3   Uses trigonometric ratio unsuccessfully

QUESTION 4

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

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

(a)   p(3,6) and q(-3,-2) are two points.

Find the length of $[pq]$

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

$$|pq| = \sqrt{(-3-3)^2 + (-2-6)^2}$$
$$|pq| = 10$$

Blunders (-3)

B1   No use of square root

B2 $X^2 = 2X$

B3   Error in signs

Slips (-1)

S1   Numerical errors

S2   Each incorrect substitution

Attempts(6)

A1   Plots points only

A2   Correct slope or mid point formula plus some substitution

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

a(-1,3) and b(3,5) are two points.

(i)   Plot the points a and b on graph paper
(ii)   Write down the co-ordinates of the midpoint of [ab].
(iii)   Find the slope of ab
(vi)   Find the equation of the line ab

(i)	**5 marks**	**Att2**
(ii)	**5 marks**	**Att2**
(iii)	**5 marks**	**Att2**
(iv)	**5 marks**	**Att2**

(i)   Plot points

(ii) $Mid\ Point = \left(\dfrac{-1+3}{2}, \dfrac{3+5}{2} \right) = (1,4)$
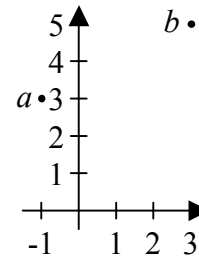
(iii) $Slope = \dfrac{5-3}{3-(-1)} = \dfrac{2}{4} = \dfrac{1}{2}$

(iv)

$$y - 5 = \frac{1}{2}(x - 3)$$

or

$$y - 3 = \frac{1}{2}(x + 1)$$

Blunders (-3)
B1   No division by 2
B2   No division
B3   Mathematical error

Slips(-1)
S1   Numerical errors
S2   Each incorrectly plotted point
S3   Each incorrect substitution

Atts(2)
A1   Draws axes

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

The line L has equation $4x + y - 7 = 0$
k is the point $(2,-1)$.

(i)   Show that the point k lies on the line L.
(ii) Write down the slope of L.
(iii) Find the equation of the line through point k $(2, -1)$ which is perpendicular to the line L.

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

(i)
$$4x + y - 7 = 0$$
$$4(2) + (-1) - 7$$
$$8 - 1 - 7 = 0$$

(ii)
$$4x + y - 7 = 0$$
$$\Rightarrow y = -4x + 7$$
$$\Rightarrow m = -4$$

(iii)
$$y - (-1) = \frac{1}{4}(x - 2)$$
$$\Rightarrow y + 1 = \frac{1}{4}(x - 2)$$

Blunders(-3)

B1   In (ii) slope = $4, \pm 1, \pm 7, \pm \frac{1}{4}, \pm \frac{7}{4}, \pm \frac{4}{7}$

B2   Incorrect slope in (iii)

Slips(-1)
S1   Numerical errors
S2   Each incorrect substitution
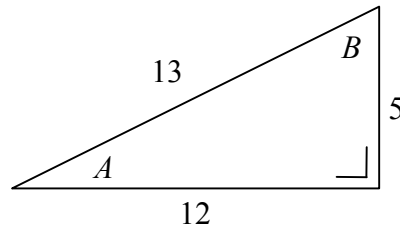
Attempts(2,2,2)
A1   Draws a sketch
A2   Writes down correct relevant formula

QUESTION 5

Part (a)	10 (5, 5) marks	Att (2, 2)
Part (b)	20 marks	Att 8
Part (c)	20(5, 15) marks	Att (2, 6)

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

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

(i) Write down $\sin A$ as a fraction
(ii) Write down $\cos B$ as a fraction

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

(i) $SinA = \dfrac{5}{13}$ **(ii)** $CosB = \dfrac{5}{13}$

*   Accept correct decimals

*   Accept $Sin\left(\dfrac{5}{13}\right), Cos\left(\dfrac{5}{13}\right)$

Blunders(-3)
B1   Incorrect trigonometric ratio

Slips
S1   Uses $Sin = Sin^{-1} or\ Cos = Cos^{-1}$ to find the value of the angle $A = 22.62^{o}\ or B = 67.38^{o}$

Attempts(2,2)

A1 $Cos = \dfrac{adj}{hyp}$ only, same for Sin .
A2   SOHCAHTOA or equivalent in (i),(ii)
A3   Draws diagram

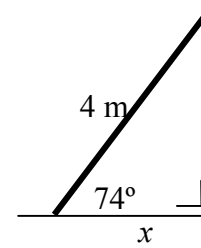**Part(b)**   **20 marks**   **Att 8**

A ladder leans against a wall. The ladder is 4 m long and makes an angle of 74˚ with the ground.

Find *x*, the distance from the base of the wall to the foot of the ladder.

4 m

74º

x

Give your answer correct to one decimal place.

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

$$Cos\,74^o = \frac{x}{4} \Rightarrow x = 4Cos\,74^o \Rightarrow x = 1.1m \,(to\,1\,dec.place)$$

Blunders(-3)
B1   Incorrect trigonometric ratio
B2   Transposition error

Slips(-1)
S1   Fails to round off
S2   Numerical errors
S3   Wrong mode (calculator)

Attempts(6)
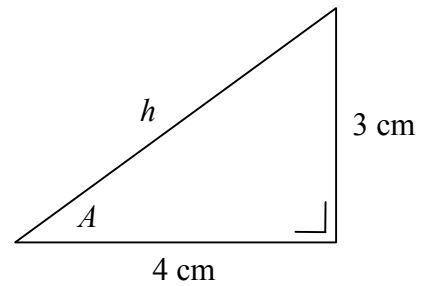A1   Measures from diagram
A2   Some attempt at Pythagoras
A3   Any combination of 4 and 7

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

> **(i)**   **Find the length of the side *h***
>   **in the diagram.**
>
> **(ii)**   **Find the measure of the angle *A*.**
>   **Give your answer to the nearest degree.**

h   3 cm

A   4 cm

(i)   **5 marks**   **Att2**

$$h^2 = 3^2 + 4^2$$
$$h = \sqrt{25} = 5$$

Blunders(-3)
B1   Any error in setting up Pythagoras
B2 $3^2 = 3 \times 2$

Slips(-1)
S1   Numerical errors

Attempts(-1)
A1   States Pythagoras

(ii)   **15 marks**   **Att 6**

$$TanA = 0.75$$
$$\Rightarrow A = 37^o$$

Blunders(-3)   *   *Note:*
B1   Uses incorrect ratio

Slips(-1)
S1   Numerical errors

Atts
A1   Copies diagram

RATIO	DRG	RAD	GRAD
$Cos(\frac{4}{5})$	0.013	0.6967	0.9999
$Sin(\frac{3}{5})$	0.01047	0.5646	0.0094
$Tan(\frac{3}{4})$	0.013	0.9315	0.0118

QUESTION 6

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

Part (a)	10marks	Att 4

(a) Lunch in a certain hotel consists of a main course and a dessert. There are five different main courses and three different desserts. How many different lunch selections are possible?

$$5 \times 3 = 15$$

Blunders(-3)
B1   3+5
B2   3! by 5!=720
B3   3! + 5!=126
B4   3 by 3 + 5 by 5 =34

Slips(-1)
S1   Numerical

Att(4)
A1   Number other than those above

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

A student has 15 homework copies in her bag. Eight of these are red, four are green and three are blue.
The student takes one copy at random from the bag. Find the probability that it is
    (i)   a blue copy
    (ii)   a green or a red copy
    (iii)   not a red copy.

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

(i) $P(\text{Blue}) = \dfrac{3}{15} = \dfrac{1}{5}$,   **(ii)** $P(\text{G or R}) = \dfrac{12}{15}$, **(iii)** $P(\text{Not Red}) = \dfrac{7}{15}$

Blunders(-3)
B1   Incorrect n(S)
B2   Incorrect n(E)
B3 $\dfrac{15}{3}$ or $\dfrac{5}{1}$

Slips(-1)
S1   Numerical

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

A school has two second-year classes: 2A and 2B. The table below shows the number of boys and girls in these classes.

	2A	2B
Boys	10	15
Girls	14	11

(i) How many second-year students are there in the school?
One second-year student is chosen at random.
Find the probability that the student
(ii) is a boy in 2A
(iii) is not a boy in 2A
(iv) is a girl.

(i)	**5 marks**	**Att2**
(ii)	**5 marks**	**Att2**
(iii)	**5 marks**	**Att2**
(iv)	**5 marks**	**Att2**

$(i) Students = 50$

$(ii) P(Boy / 2A) = \dfrac{10}{50} = \dfrac{1}{5}$

$(iii) P(Not / Boy 2A) = \dfrac{40}{50} = \dfrac{4}{5}$

$(iv) P(Girl) = \dfrac{25}{50} = \dfrac{1}{2}$

Blunders(-3)
B1   Incorrect n(S) apply once only, accept answer from (i)
B2   Incorrect n(E)
B3   Fails to divide by n(S) apply once only
B4   Inverted fraction apply once only

Slips(-1)
S1   Numerical errors

QUESTION 7

Part (a)	**10 marks**	**Att 4**
Part (b)	**25 (5, 10, 5, 5) marks**	**Att (2, 4, 2, 2)**
Part (c)	**15 (5,10) marks**	**Att (2, 4)**

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

Find th2 mean of the five numbers 6, 8, 12, 15, 19 .

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

$$Mean = \frac{6+8+12+15+19}{5} = 12$$

Blunders(-3)
B1   Incorrect numerator
B2   Incorrect denominator
B3   No division indicated

Slips(-1)
S1   Numerical errors

Attempts(4)
A1   Defines mean
A2   Picks a number between 6 and 19

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

The table below is a record of the number of days each of 80 students was absent during a school year.

Number of days absent	$0-5$	$6-10$	$11-15$	$16-20$	$21-25$
Number of students	8	12	30	24	6

Copy and complete the following cumulative frequency table.

Number of days absent	≤ 5	≤ 10	≤ 15	≤ 20	≤ 25
Number of students					

Draw the cumulative frequency curve.
Put the number of students on the vertical axis.
Use your curve to estimate
    (i)   the median number of days absent
    (ii)   the number of students who missed more than 18 days.

Table	**5m**	**Att 2**

Number of days absent	≤ 5	≤ 10	≤ 15	≤ 20	≤ 25
Number of students	*8*	20	50	74	80

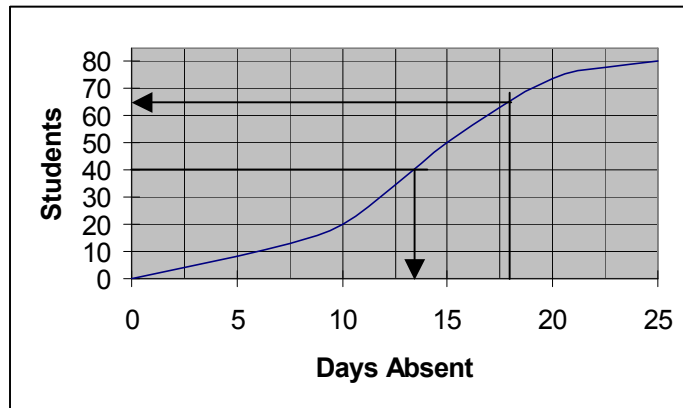| **Cumulative Frequency Curve**	**10 m**	**Att 4**
(i)	**5 marks**	**Att 2**
(ii)	**5 marks**	**Att 2**

(i)   Median = 14(±3)

(ii)   More than 18 days = 15

Blunders(-3)

B1   Plot on mid-points

B2   Error in scales one blunder

B3   Points not joined

B4   Uses incorrect axis for median

Slips(-1)

S1   Each incorrect or omitted value in table

S2   Median not specified

S3   Each incorrectly plotted point

S4   Reverses axes

S5   Joins points with straight lines

Attempts(2,4,2)

A1   Draws axes only

A2   Copies table

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

Find the mean and the standard deviation of the numbers

4, 6, 11, 15

correct to two places of decimals.

Mean   **5 marks**   **Att 2**
Standard Deviation   **10 marks**   **Att 4**

x	Mean	d	d^2
4	9	5	25
6	9	3	9
11	9	2	4
15	9	6	36
$\Sigma x = 36$			$\Sigma d^2 = 74$

$$Mean = \frac{\sum x}{n} = \frac{36}{4} = 9, \quad \text{Standard Deviation} = \sqrt{\frac{74}{4}} = 4 \cdot 3011 = 4 \cdot 30$$

*   Calculates mean merits 5, standard deviation merits 10
*   Accept correct answer without work
*   Any error in structure of SD merits attempt only

Blunders(-3)
B1 $4 + 6 + 11 + 15 = 36$ only
B2   Incorrect or no round off

Slips(-1)
S1   Numerical errors

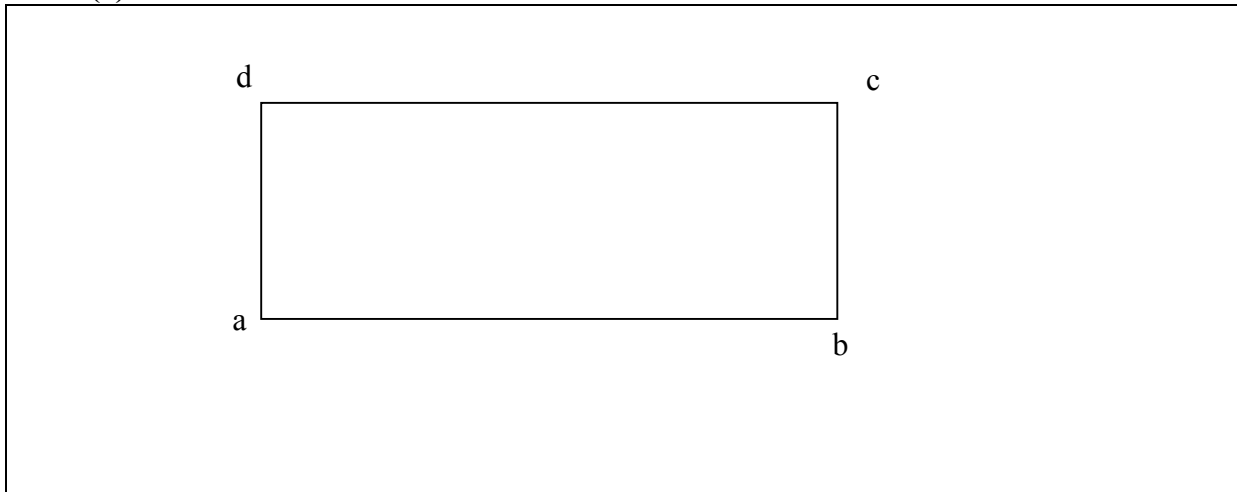*Attempts(2,4)*
A1   Any addition

QUESTION 8

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

Part (a)	10 marks	Att 4

Construct a rectangle abcd with
$$|ab| = 7 \text{ cm}, \quad |bc| = 4 \text{ cm}.$$

Part (a)	10 marks	Att 4

d   c

a   b

Blunders(-3)

B1   No two sides perpendicular
B2   One or two sides left out

Slips(-1)

S1   Each side outside tolerance $\pm 1 cm$

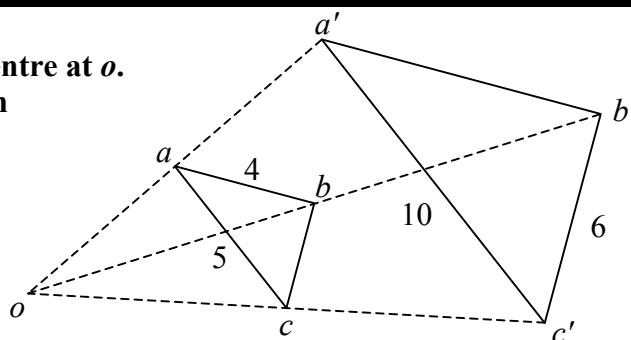S2   each angle outside tolerance of $\pm 5^{\circ}$

Att(4)
A1   Any straight line

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

**The triangle *a′b′c′* is the image of the
triangle *abc* under an enlargement with centre at *o*.
 ac| = 5 cm, |*ab*| = 4 cm, |*a′c′*| = 10 cm
and *b′c′*| = 6 cm.**

Find the scale factor.
Find the length of [*a′b′*].
Find the length of [*bc*].
The area of the triangle *abc* is 6 cm².
Find the area of the triangle *a′b′c′*.

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

$$\text{Scale Factor} = \frac{10}{5} = 2$$

Blunders(-3)
B1   Inverts fraction
B2   Incorrect numerator or denominator
B3   Multiplies lengths

Slips(-!)
S1   Numerical errors

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

$$|a'b'| = 4 \times 2 = 8$$

Blunders(-3)
B1   Makes no use of scale factor or uses incorrectly

Slips(-1)
S1   Division for multiplication
S2   Numerical once only

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

$$|bc| = \frac{6}{2} = 3$$

Blunders(-3)
B1   Makes no use of scale factor or uses incorrectly

Slips(-1)
S1   Multiplication for division

(iv)   **5 marks**   **Att 2**

$$a'b'c' = 6 \times 2^2 = 24$$

or

$$a'b'c' = \frac{1}{2}(6) \times (8) = 24$$

Blunders(-3)
B1   Does not square scale factor
B2   Error in area formula

Slips(-1)
S1   Division for multiplication
S2   Numerical error

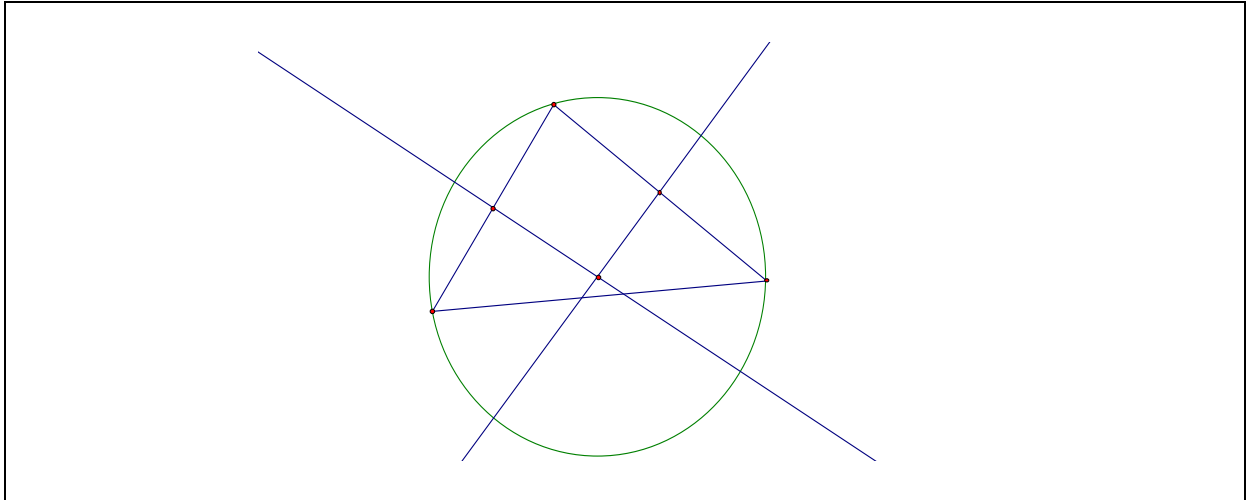**Part (c)**   **20 (5, 15) marks**   **Att (2, 6)**

Construct any triangle in your answerbook. Construct the circumscribed circle of the triangle. Show all construction lines clearly.

*   Draws any triangle is worth 5m

Blunders(-3)
B1   Omits bisectors each time
B2   Draws bisectors only, no circle

Slips(-1)
S1   Circle does not pass through vertices, each time

BONUS MARKS FOR ANSWERING THROUGH IRISH

Bonus marks are applied separately to each paper as follows:

If the mark achieved is less than 226, the bonus is 5% of the mark obtained, rounding *down*. (e.g. 198 marks × 5% = 9.9 ⇒ bonus = 9 marks.)

If the mark awarded is 226 or above, the following table applies:

Marks obtained	Bonus
226 – 231	11
232 – 238	10
239 – 245	9
246 – 251	8
252 – 258	7
259 – 265	6
266 – 271	5
272 – 278	4
279 – 285	3
286 – 291	2
292 – 298	1
299 – 300	0