



Coimisiún na Scrúduithe Stáit  
State Examinations Commission

**LEAVING CERTIFICATE APPLIED**  
**2012**

**MARKING SCHEME**

**MATHEMATICAL APPLICATIONS**

**COMMON LEVEL**

**MARKING SCHEME**  
**LEAVING CERTIFICATE APPLIED, 2012**

**MATHEMATICAL APPLICATIONS**

**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 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.
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) qualify for attempt marks only.
7. The phrase “and stops” means that no more work is shown by the candidate.

## QUESTION 1

<b>Part (a)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (b)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (c)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (d)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (e)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (f)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (g)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (h)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (i)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (j)</b>	<b>5 marks</b>	<b>Att 2</b>

<b>Part (a)</b>	<b>5 marks</b>	<b>Att 2</b>
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Find 31% of €158.87.
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<b>(a)</b>	<b>5marks</b>	<b>Att 2</b>
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<p>(a) <math>31\% \times \text{€ } 158.87</math>  <math>= \text{€ } 49.2497</math>  <math>= \text{€}49.25</math></p>
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\*Accept correct answer no work

\*Accept answer in cent form but must indicate this

*Blunders(-3)*

B1: Inverts 31% ( 512.483871)

B2: Inverts €158.87 ( 0.195128092)

B3: Misplaced decimal.

*Slips (-1)*

S1: Each numerical error to a max. of -3.

S2: Failure to round or incorrect rounding.

S3: Evaluates 131% (€208.12)

S4: Calculates 69% (€ 109.62)

*Attempts(2)*

A1:  $31 \pm 158.87$  (€189.87 or €127.87)

*Misreading(-1)*

M1: Calculates 13% of €158.87 (€20.65)

**Part (b)**

**5 marks**

**Att 2**

Ann has €2.80 in 20 cent coins. How many coins does she have?

**(b)**

**5 marks**

**Att 2**

(b)  $€2.80 = 280c$  or  $2.80 \div .20 = 14$  coins  
 $280c \div 20c = 14$  coins

\* Accept correct answer with no work.

*Blunders(-3)*

B1: Multiplies instead of divides (5600).

B2: Misplaced decimal.

B3: Inverts ( $20 \div 2.80 = 7.142857143$ )

*Slips(-1)*

S1: Each numerical error to a max. of -3

*Worthless(0)*

W1: Adds (300) or subtracts (2.60)

**Part (c)**

**5 marks**

**Att 2**

Calculate the size of the angle marked A in the given triangle

**(c)**

**5marks**

**Att 2**

(c)  $180^\circ - (90^\circ + 34^\circ) = 56^\circ$

\* Accept correct answer with no work.

*Blunders(-3)*

B1: Adds rather than subtracts from  $180^\circ$  ( $90+34+180=304$ )

B2: Ignores  $90^\circ$  plus B1 (214).

B3: Uses  $360^\circ$  and continues (234)

B4: Answer =  $124^\circ$  and stops

B5: Answer =  $180 - 34 = 146^\circ$  and stops

B6: Answer =  $180 - 90 = 90^\circ$  and stops with work

*Slips (-1)*

S1: Each numerical error to a max. of -3

S2: Incorrect or omitted units

*Attempts (2)*

A1: Answer =  $180^\circ$  and stops

A2: Answer =  $90^\circ$

*Worthless (0)*

W1: Answer = 34 and stops

W2: Answer =  $2(34) = 68$  and stops

**Part (d)**

**5 marks**

**Att 2**

Time in Auckland is 12 hours ahead of time in Dublin.  
When it is 06:00 in Dublin, what time is it in Auckland?

**(d)**

**5marks**

**Att 2**

(d)  $06:00 + 12 = 18:00$  or 6 p.m.

\* Accept correct answer with no work.

\* Accept answer = 6 in the evening

*Blunders(-3)*

B1: Subtracts instead of adds

B2: 1 hour  $\neq$  60 minutes

*Slips(-1)*

S1: Each numerical error to a max. of -3

S2: Incorrect or omitted units (pm)

S3: Answer = 18 and stops

*Attempts(2)*

A1: Answer = 06:12.

A2: Answer = any hours forward not covered above

**Part (e)**

**5 marks**

**Att 2**

A die is thrown. What is the probability of getting a number greater than 4?

**(e)**

**5marks**

**Att 2**

(e)  $\frac{2}{6}$  or  $\frac{1}{3}$

\* Accept answer written as 1:3,2:6, 2 in 6, 1 in 3, 2 out of 6, or 1 out of 3 or

0.33333 $\bar{3}$

*Blunders(-3)*

B1: No fraction or ratio set up.

B2: Answer = 2+ B1.

B3: Answer = 6 + B1.

B4: Answer = 1+ B1.

B5: Answer  $\frac{6}{2}$  or  $\frac{3}{1}$

B6: Answer =  $\frac{1}{6}$ .

B7: Answer = 2 to 6 or 1 to 3 or 2 is to 6 or 1 is to 3

B8 Answer = 4/6 or 2/3

*Slips(-1)*

S1: Truncates decimal answer.

*Attempts(2)*

A1: Any proper fraction other than,  $\frac{2}{6}$ ,  $\frac{1}{3}$ ,  $\frac{1}{6}$

A2: Answer = 2 – 6

A3: Answer = 1 – 3

*Worthless (0)*

W1: Answer = 4×6 = 24

**Part(f)**

**5 marks**

**Att 2**

A stereo costs €240.50, including VAT at 30%.  
Calculate the cost of the stereo excluding VAT.

**(f)**

**5marks**

**Att 2**

$$\begin{aligned} \text{(f)} \quad 130\% &= €240.50 \\ 1\% &= \frac{€240.50}{130} = €1.85 \\ 100\% &= €1.85 \times 100 = €185. \end{aligned}$$

\* Accept correct answer with no work

*Blunders(3)*

B1: Misplaced decimal

B2: Multiplies rather than divides by 130 /Inverts (312.65)

B3: Finds 30% of €240.50 (€72.15) and continues. (€168.35)

*Slips(-1)*

S1: Each numerical error to a max of -3.

S2: Failure to round or incorrect rounding.

*Attempts(2)*

A1: Divides by 30 and stops.

A2: €240.50 reduced by any number not covered above

**Part (g)**

**5 marks**

**Att 2**

Alan spent  $\frac{2}{3}$  of his money. He then had €19 left.  
How much money had he at the start?

**(g)**

**5marks**

**Att 2**

$$\begin{aligned} \text{(g)} \quad \frac{1}{3} &= €19 \Rightarrow \text{ at the start he had } €19 \times 3 \\ &= €57. \end{aligned}$$

\* Accept correct answer with no work

*Blunders(3)*

B1: Misplaced decimal

B2: Calculates  $\frac{1}{3}$  of €19 (€6.33)

B3: Calculates  $\frac{2}{3}$  and stops (€12.67)

B4 Calculates  $3/2$  of 19 (€28.50)

*Slips(-1)*

S1: Each numerical error to a max. of -3.

S2: Failure to round or incorrect rounding.

*Attempts(2)*

A1: Answer =  $\frac{1}{3}$  and stops.

A2: Answer = 19 increased by any number

**Part (h)**

**5 marks**

**Att 2**

Find the median of the numbers  
5, 11, 4, 15, 3, 7, 10, 12, 15.

**(h)**

**5marks**

**Att 2**

(h) Median of 3, 4, 5, 7, 10, 11, 12, 15, 15  
= 10

\* Accept correct answer with no work.

*Blunders(-3)*

B1: Ignores numerical order and answer = 3

*Slips(-1)*

S1: List evident....each score omitted to a max of -3

*Attempts(2)*

A1: Calculates the mean correct or incorrect ( $82 \div 9 = 9.11111$ )

A2: Finds mode (15)

*Worthless(0)*

W1: Answer = any other number from the list.

**Part (i)**

**5 marks**

**Att2**

A car travels 130 km in 2.6 hours. Calculate the average speed of the car.

**(i)**

**5marks**

**Att 2**

(i)  $S = \frac{130}{2.6} = 50$  km per hour

\* Accept correct answer with no work.

\* Accept answer = 0.83333 km/min

*Blunders(-3)*

B1:  $130 \times 2.6 = 338$  km/h

B2: Inverts  $\frac{130}{2.6}$  and continues ( 0.02 km/h)

B3: Misplaced decimal

B4: Each incorrect substitution

B5: Correct substitution and stops + possible S2.

*Slips(-1)*

S1: Each numerical error to a max. of -3.

S2: Incorrect or omitted units

S3: Truncates or rounds decimal answer

*Attempts(2)*

A1: One substitution correct/incorrect

A2:  $130 \pm 2.6$  (132.6/127.4)



**Part (j)**

**5 marks**

**Att 2**

(j) Christine scored 20 out of 25 in a Mathematics quiz.  
What percentage did she score?

**(j)**

**5marks**

**Att 2**

$$\frac{20}{25} \times 100 = 80\%$$

\* Accept correct answer with no work.

*Blunders(-3)*

B1: Inverts  $\frac{20}{25}$  and continues (125%)

B2: Misplaced decimal

B3: Answer = 20/25 and stops

*Slips(-1)*

S1: Each numerical error to a max. of -3.

*Attempts(2)*

A1: Answer = greater than 50%.

A2: Any use of 100

## QUESTION 2

<b>Part (a)</b>	<b>25(5,5,2,2,2,2,2,5) marks</b>	<b>Att 2,2,0,0,1,1,1,2</b>
<b>Part (b)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (c)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (d)(i)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (d)(ii)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (d)(iii)</b>	<b>5 marks</b>	<b>Att 2</b>

<b>Part (a) (i)</b>	<b>5 marks</b>	<b>Att 2</b>
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Unit usage

<b>(a)(i)</b>	<b>5 marks</b>	<b>Att 2</b>
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(a)(i)  $37807 - 36826 = 981$

\* Accept correct answer with no work

*Blunders(-3)*

B1: Adds instead of subtracts (74633).

*Slips(-1)*

S1: Each numerical error to a max of -3.

*Attempts(2)*

A1: Answer = 37807 or 36826

A2: Multiplies the numbers.(37807×36826 = 1392280582)

<b>Part (a)(ii)</b>	<b>5 marks</b>	<b>Att 2</b>
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Amount

<b>(a)(ii)</b>	<b>5 marks</b>	<b>Att 2</b>
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(a)(ii)  $981 \times 0.1619 = 158.8239 = \text{€}158.82$

\* Accept correct answer without work

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

*Blunders(-3)*

B1: Divides instead of multiplies ( $981 \div 0.1619 = 6059.295$  or  $0.1619 \div 981 = 0.000165035$ )

B2: Misplaced decimal

*Slips(-1)*

S1: Each numerical error to a max of -3.

S2: Failure to round or incorrect rounding

*Attempts(2)*

A1: Answer =  $981 \pm 0.1619$  ( $981.1619/980.8381$ )

<b>Part (a)(iii)</b>	<b>2 marks</b>	<b>H/M</b>
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Total Electricity charges

<b>(a)(iii)</b>	<b>2 marks</b>	<b>H/M</b>
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(a)(iii)  $\text{€}158.82$

- Accept answer from part a(ii)

**Part (a)(iv)** **2 marks** **H/M**  
days

**(a)(iv)** **2 marks** **H/M**

(a)(iv) 42

**Part (a)(v)** **2 marks** **Att 1**

Standing charge

**(a)(v)** **2 marks** **Att 1**

(a)(v)  $42 \times \text{€}0.3857 = 16.1994 = \text{€}16.20$

\* Accept answer from part a(iv)

*Blunders(-3)*

B1: Divides instead of multiplies. ( $42 \div 0.3857 = 108.892922$ )

B2: Misplaced decimal

*Slips(-1)*

S1: Each numerical error to a max. of -3.

S2: Failure to round or incorrect rounding

**Part (a)(vi)** **2 marks** **Att 1**

VAT on

**(a)(vi)** **2 marks** **Att 1**

(a)(vi)  $\text{€}16.20 + \text{€}4.54 + \text{€}158.82 = \text{€}179.56$

\* Accept answer from part a (ii) and part a (iv)

\* Accept correct answer with no work

*Blunders(-3)*

B1: Omits one of the list

B2: Misplaced decimal

B3: Subtracts instead of adding

B4: Each extra cost

*Slips(-1)*

S1: Each numerical error to a max of -3.

S2: Failure to round or incorrect rounding

*Attempt(1)*

A1: Answer =  $\text{€}16.20$  or  $\text{€}4.54$  or  $\text{€}158.82$

**Part (a)(vii)** **2 marks** **Att 1**

VAT at 13.5%

**(a)(vii)** **2 marks** **Att 1**

(a)(vii)  $\text{€}179.56 \times 13.5\% = \text{€}24.24$

- \* Accept answer from part a(vi)
- \* Accept correct answer with no work

*Blunders(-3)*

B1: Inverts 179.56

B2: Inverts 13.5%.

B2: Misplaced decimal.

*Slips(-1)*

S1: Each numerical error to a max. of -3.

S2: Failure to round or incorrect rounding

S3: Evaluates 113.5% (203.8006)

*Attempt(1)*

A1: Calculates 13.5% of a relevant number

A2: Any use of 100

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

Total due

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

(a)(viii)  $\text{€}179.56 + \text{€}24.24 = \text{€}203.80$  or  $158.82 + 16.20 + 4.54 + 24.24 = \text{€}203.80$

- \* Accept answer from part a(vii)
- \* Accept correct answer with no work

*Blunders(-3)*

B1: Misplaced decimal

B2: Each cost omitted

B3: Subtracts instead of adds

B4: Each extra cost

*Slips(-1)*

S1: Each numerical error to a max of -3

S2: Failure to round or incorrect rounding

*Misreadings(-1)*

M1: If 113.5% filled in part a(vii) and part (viii)

M2: Part (vii) blank but correct answer in part (viii)

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

Calculate the average cost per day of the electricity bill.

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

(b)  $€203.80 \div 42 = €4.85$

- \* Accept correct answer with no work
- \* Accept answer from part a(iv) days and a(viii)

*Blunders(-3)*

B1: Multiplies by 42 ( $203.80 \times 42 = 8559.6$ )

B2: Misplaced decimal

*Slips(-1)*

S1: Each numerical error to a max of -3

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

What percentage of the total bill is the PSO levy?

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

(c)  $\frac{4.54}{203.80} \times \frac{100}{1} = 2.23\%$

- \* Accept correct answer with no work
- \* Accept answer from part a (viii)

*Blunders(-3)*

B1: Inverts  $\frac{4.54}{203.80}$  and continues ( $0.02276741$  or  $203.80 \div 4.54 = 44.88986784$ )

B2: Misplaced decimal.

*Slips(-1)*

S1: Each numerical error to a max of -3.

*Attempts(2)*

A1:  $€4.54 \pm €203.80$  ( $208.34/199.26$ )

A2: Any use of 100

A3: One correct substitution (eg  $4.54/100/\text{total}$ )

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

Calculate the area of the ceiling.

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

$$(d) (i) \quad 17.20 \text{ m} \times 8.76 \text{ m} = 150.672 \text{ m}^2$$

\* Accept correct answer without work

*Blunders(-3)*

B1: Divides instead of multiplies. (1.96347032)

B2: Misplaced decimal

*Slips(-1)*

S1: Each numerical error to a max of -3

S2: Omitted or incorrect units

S3: Truncates or rounds answer

*Attempts(2)*

A1: Answer =  $17.20 \pm 8.76$  (25.96/8.44)

A2: Calculates perimeter  $34.4 + 17.52 = 51.92$

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

How many tins of paint will Carol need?

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

$$(d)(ii) \quad 1 \text{ litre covers } 17 \text{ m}^2 \Rightarrow 5 \text{ litres covers } 85 \text{ m}^2$$

$$150.672 \div 85 = 1.7726$$

$$= 2 \text{ tins}$$

$$2 \text{ coats} \Rightarrow 4 \text{ tins}$$

\* Accept candidate's answers from parts d (i)

\* Accept correct answers with no work.

*Blunders(-3)*

B1: Multiplies instead of dividing

B2: Misplaced decimal

B3: Ignores/mishandles 5 litres coverage

*Slips(-1)*

S1: Failure to round or incorrect rounding

S2: Each numerical error to a max of -3

S3: Ignores or mishandles the two coats

*Attempts(2)*

A1:  $150.672 \pm 17$

A2: Answer = 3 tins.

**Part (d)(iii)**

**5 marks**

**Att 2**

How much will the paint cost Carol?

**(d) (iii)**

**5 marks**

**Att 2**

$$(d)(iii) \quad 4 \times \text{€}19.99 = \text{€}79.96$$

\* Accept correct answer with no work

\* Accept candidates answer from parts (d) (ii)

*Blunders(-3)*

B1: Divides instead of multiplying (4.9975 rounded to 5)

B2: Misplaced decimal

*Slips(-1)*

S1: Each numerical error

*Attempts(2)*

A1: Answer =  $\text{€}19.99 \times 2 = \text{€}39.98$  or  $5 \times \text{€}19.99 = \text{€}95.95$

*Worthless(0)*

W1: Answer =  $\text{€}19.99$  (unless answer from d(ii) = 1 tin)

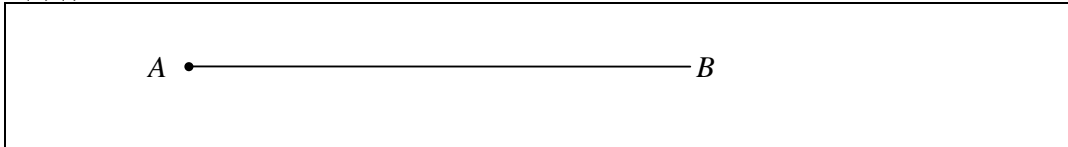
### QUESTION 3

<b>Part (a)</b>	<b>20(15,5) marks</b>	<b>Att 5,2</b>
<b>Part (b)</b>	<b>10 marks</b>	<b>Att 3</b>
<b>Part (c)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (d)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (e)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (f)</b>	<b>5 marks</b>	<b>Att 2</b>

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

(a)(i) In the box below, starting at A, draw a line segment  $[AB]$  of length 7 cm.

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



\* Tolerance  $\pm 0.1$  cm

*Blunders(-3)*

B1: Line segment outside a tolerance of 0.5 cm

*Slips(-1)*

S1: Incorrect units.

S2: Line between tolerance of 0.1 and 0.5

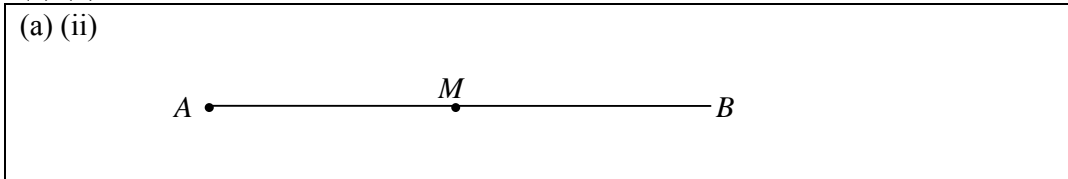
*Misreadings(-1)*

M1: Ignores the given point A

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

a(ii) Mark the midpoint of this line segment and label it M

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



\* Accept answer from part a (i)

\* Tolerance  $\pm 0.1$  cm

*Blunders(-3)*

B1: Midpoint outside tolerance of 0.5 cm

B2: No dot but  $M$  or 3.5 written on the line

*Slips(-1)*

S1: Midpoint between tolerance of 0.1 and 0.5 cm.

S2: Midpoint marked but not labeled

*Attempts(2)*

A1:  $M = A$

A2:  $M = B$

*Worthless(0)*

W1:  $M \notin [AB]$

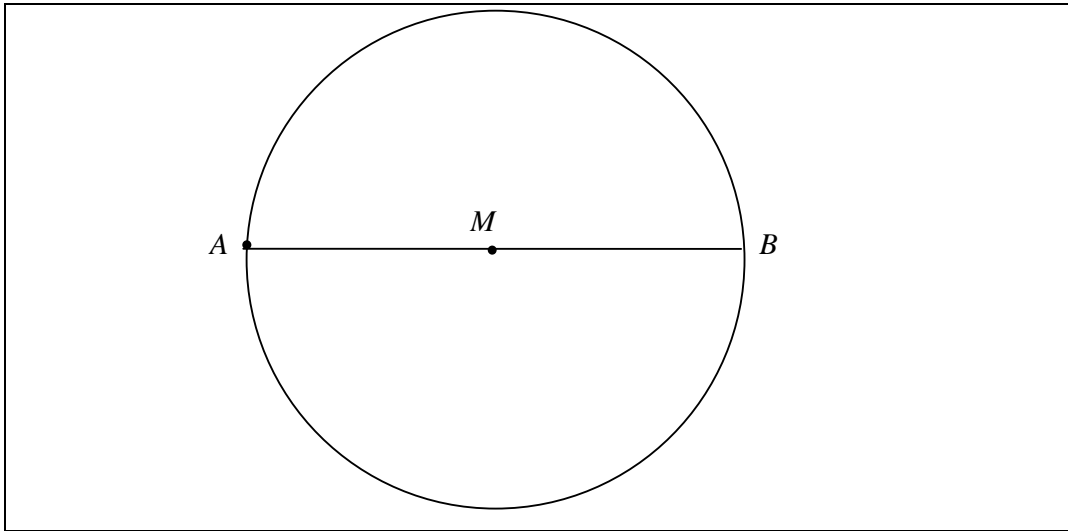


(b)

10 marks

Att 3

(b) In the box above construct a circle with  $M$  as centre and  $[AB]$  as diameter.



\* Accept correct answer from part (a)

\* Accept tolerance of  $\pm 0.1$  cm

*Blunders (-3)*

B1: Measurement outside tolerance of 0.5 cm

B2: Ignores  $M$  and uses  $A$  or  $B$  as centre

*Slips (-1)*

S1: Radius between a tolerance of 0.1 cm and 0.5 cm

S2: Incorrect units.

*Misreadings (-1)*

M1: Constructs a semi circle.

*Attempts (3)*

A1: Draws a circle free hand

*Worthless (0)*

W1: Constructs triangle/rectangle

**Part (c)**

**5 marks**

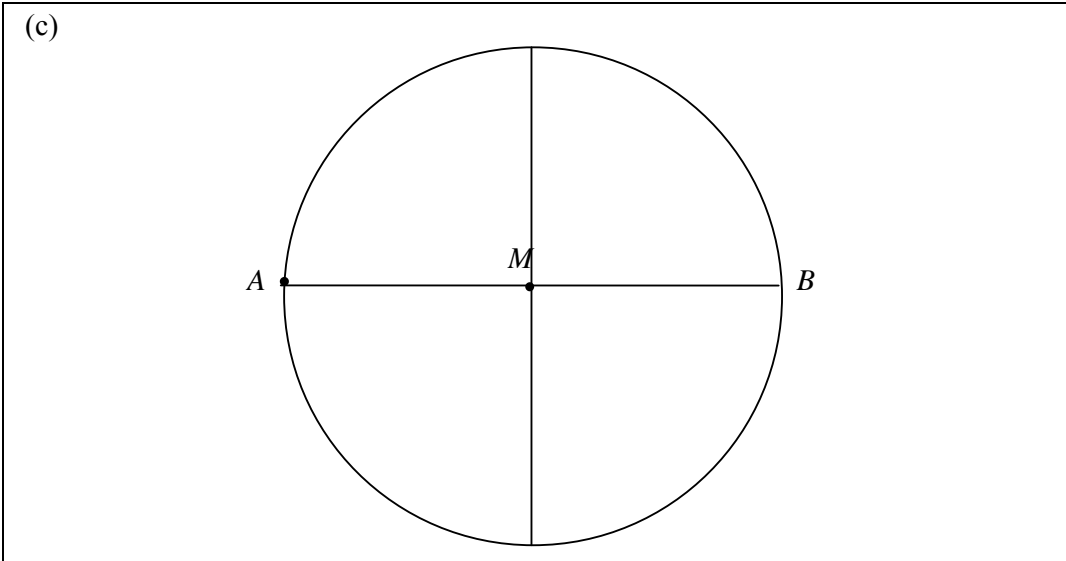
**Att 2**

(c) Divide the circle into four equal parts.

(c)

**5marks**

**Att 2**



\* Accept candidate's answer for parts (a) and (b)

\* Tolerance  $\pm 5^\circ$

\* Accept any 2 diameters perpendicular to each other

*Blunders(-3)*

B1: Each diameter angle outside tolerance of  $10^\circ$  to a max of  $-6$

*Slips(-1)*

S1: Angle between tolerance of  $5^\circ$  and  $10^\circ$

*Attempts(2)*

A1: One sector only drawn and within tolerance

A2: Uses parallel lines to divide the circle

*Misreadings (-1)*

M1: Divides into equal parts  $\neq 4$  unless A1

*Worthless (0)*

W1: lines drawn outside the circle

**Part (d)**

**5 marks**

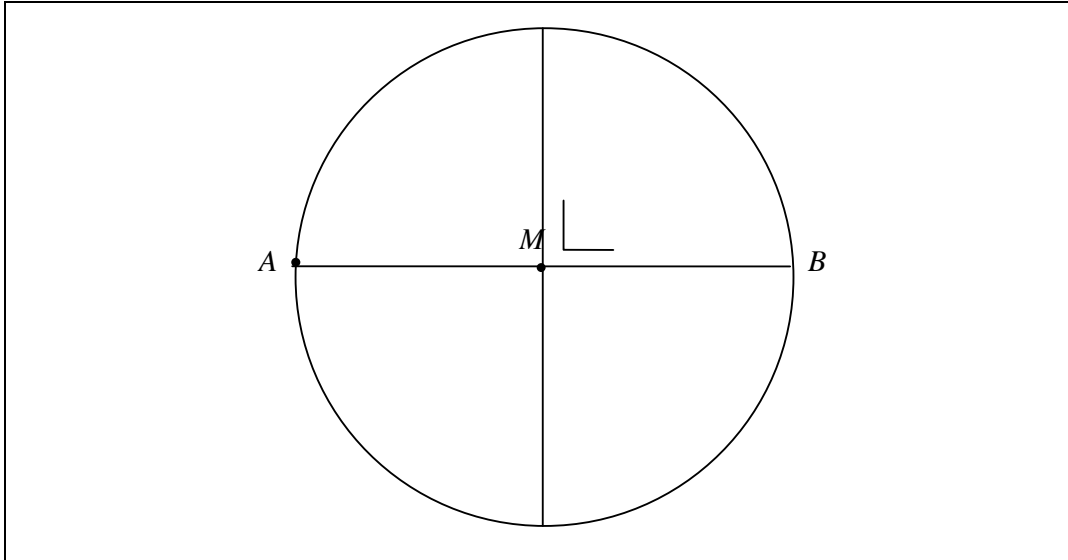
**Att 2**

(d) Mark in a right angle on your diagram

(d)

**5 marks**

**Att 2**



\* Accept candidates answer for part (c)

*Attempts(2)*

A1: Constructs  $90^\circ$  angle not relevant to candidate's diagram

A2: States right angle =  $90^\circ$  only

A3: Candidate's states that in his diagram there is no right angle.

**Part (e)**

**5 marks**

**Att 2**

Calculate the area of the circle, using  $\pi = 3.142$ .

**(e)**

**5 marks**

**Att 2**

$$\begin{aligned} \text{(e)} \quad \text{Area of circle} &= \pi r^2 \\ \text{Area of circle} &= 3.142 \times (3.5)^2 \\ &= 3.142 \times 12.25 \\ &= 38.4895 \text{ cm}^2 \end{aligned}$$

\* Accept answer = 38.48451001 cm<sup>2</sup>

\* Accept answer using  $\pi = \frac{22}{7}$  (38.5 cm<sup>2</sup>)

*Blunders(-3)*

B1: Radius = diameter ( $7 \times 7 \times 3.142 = 153.958 \text{ cm}^2$ )

B2: Uses  $2r$  for  $r^2$  ( $2 \times 3.5 \times 3.142 = 21.994$ )

B3: Correct substitution and stops + B2 + possible S2.

B4: Radius  $\neq \frac{1}{2}$  (diameter) i.e.  $r = 3$  or  $4$

B5: Failure to substitute for  $\pi$  and continues ( $12.25\pi$ )

B6: Area =  $\pi r$  and continues ( $3.5 \pi = 10.997$ )

B7: Misplaced decimal.

B8: Area =  $\frac{\pi}{r^2}$  and continues ( $0.25648 \text{ cm}^2$ )

*Slips(-1)*

S1: Each numerical error to a max of -3

S2: Incorrect or omitted units

S3: Truncates or rounds

S4: Uses  $\pi = 3$  ( $12.25 \times 3 = 36.75$ )

*Attempts(2)*

A1: Answer =  $3.142 r^2$  and stops.

A2: Answer =  $3.142 + 3.5 + 3.5 = 10.142$

A3: Any relevant substitution, correct or incorrect, into formula

**Part (f)**

**5 marks**

**Att 2**

How much will Declan owe at the end of 3 years if he makes no repayments in the meantime?

**(f)**

**5 marks**

**Att 2**

$$\begin{aligned} \text{(f)} \quad A &= P \left( 1 + \frac{R}{100} \right)^n \\ &= 9000 \left( 1 + \frac{R}{100} \right)^3 \\ &= 9000(1 + 0.1166)^3 \\ &= 9000(1.1166)^3 \\ &= 9000(1.392171922) \\ A &= 12\,529.5473 \\ A &= \text{€}12\,529.55 \end{aligned}$$

\* Accept correct answer with no work

\* Allow candidate to calculate on a yearly basis

\* Note : If compound interest is calculated on a yearly basis, blunder for each omission of interest calculation and each omission of amount calculation.

*Blunders(-3)*

B1: Each incorrect substitution each time

B2: Misplaced decimal

B3:  $(1.1166)^3 = 3(1.1166)$  (3.3498)

B4:  $1 + \frac{R}{100} = \frac{1+R}{100}$  (18.261801886)

B5:  $1 + \frac{R}{100} = \frac{1 \times R}{100}$  (14.26718066)

B6: Correct substitution and stops + B3 + B4

*Slips(-1)*

S1: Each numerical error to a max of -3

S2: Failure to round or incorrect rounding

S3: Calculates interest only (€3529.55)

*Attempts(2)*

A1:  $11.66\% \times 3$  and stops (34.98)

A2: Any substitution into formula correct or incorrect

A3: Answer = €3148.20 Simple Interest

A4:  $9000 \times 3 = 27000$  and stops or  $9000 \div 3 = 3000$

A5:  $11.66 \div 3 = 3.886666$

## QUESTION 4

<b>Part (a)</b>	<b>10 marks</b>	<b>Att 3</b>
<b>Part (b)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (c)</b>	<b>20(3,3,3,3,3,5) marks</b>	<b>Att 1,1,1,1,1,2</b>
<b>Part (d)</b>	<b>15 marks</b>	<b>Att 5</b>
<b>Part (a)</b>	<b>10 marks</b>	<b>Att 3</b>

(a) Calculate the daily hours worked by Pauline each day and write your answers on her Time Card.

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

	Mon	Tues	Wed	Thur	Fri	Sat	Sun
<b>Daily hours</b>	-	3:45	4:35	3:35	4:15	4:15	1:40

*Blunders(-3)*

B1: Adds/mishandles/ignores 15 minute break once only unless S1

B2: 1 hour = 100 minutes once only

B3: Adds times

*Slips(-1)*

S1: Ignores 15 min break in Daily Hours but rectifies it in the Summary section

S2: Each blank box provided 2 are filled

*Attempts(3)*

A1: Any effort to subtract two times.

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

Fill in the Summary section of Pauline's Time Card.

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

<p><b>SUMMARY</b></p> <p>Total Sat/Sun hours <input style="width: 150px; height: 25px;" type="text" value="5:55"/></p>	<p>Total Weekday hours <input style="width: 150px; height: 25px;" type="text" value="16:10"/></p>
--	---

\* Accept answer from part (a)

*Blunders(-3)*

B1: 1 hour = 100 minutes

B2: Failure to calculate Sat/Sun hours

B3: Sat/Sun hours included in weekday hours (22:05)

*Slips(-1)*

S1: Each numerical error to a max. of -3

S2: Hours filled into part (c) but omitted in Summary

S3: Puts Sat/Sun hours in Weekday hours box or vice versa

*Attempts(2)*

A1: Adds/attempts to add time for 2 days

**Part (c)**

**3,3,3,3,5 marks**

**Att 1,1,1,1, 2**

Fill in the table to calculate her gross earnings for the week.

Weekday	<input type="text" value="16:10"/>	hours @ €8.75	= €	<input type="text" value="141.46"/>
Weekend	<input type="text" value="5:55"/>	hours @ €	<input type="text" value="17.50"/>	= € <input type="text" value="103.54"/>
Gross Earnings				<input type="text" value="245"/>

**Part (c) (i)**

**3 marks**

**Att 1**

Weekday hours

**(c)(i)**

**3 marks**

**Att 1**

\* Accept candidate's answer from part (b)

*Blunders(-3)*

B1: Uses weekend hours

*Slips(-1)*

S1: Each numerical error to a max of -3

*Attempts(1)*

A1: Uses any time from table in part (a)

A2: Uses 39 hours

**Part (c)(ii)**

**3 marks**

**Att 1**

**(c)(ii)**

**3 marks**

**Att 1**

\* Accept correct answer without work

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

*Blunders(-3)*

B1: Divides instead of multiplies

B2: Misplaced decimal.

B3: 1 hour = 100 minutes ( $16.10 \times 8.75 = €140.87$ )

*Slips(-1)*

S1: Each numerical error to a max of -3

S2: Failure to round or incorrect rounding

*Attempts(1)*

A1: Answer  $16.10 \pm 8.75$  (24.85/7.35)

**Part (c)(iii)** **3 marks** **Att 1**

Weekend hours

**(c)(iii)** **3 marks** **Att 1**

(c)(iii) 5:55

\*Accept answer from part( b)

*Attempts(1)*

A1: Uses weekday hours

**Part (c)(iv)** **3 marks** **Att 1**

Double time for weekend work

**(c)(iv)** **3 marks** **Att 1**

(c)(iv)  $€8.75 \times 2 = €17.50$

*Blunders (-3)*

B2: Overtime rate  $\neq$  double time.

B3: Divides by 2 to double the rate

**Part (c)(v)** **3 marks** **Att 1**

Weekend 5:55 @ €17.50 =

**(c)(v)** **3 marks** **Att 1**

(c)(v)  $5:55 = 5.91666666 \times €17.50 = €103.54$

\* Accept answer from part c(iv)

*Blunders(-3)*

B1: Divides instead of multiplies

B2: Misplaced decimal.

B3: 1 hour = 100 minutes ( $5.55 \times 17.50 = €97.13$ )

*Slips(-1)*

S1: Each numerical error to a max. of -3

S2: Failure to round or incorrect rounding



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

Gross Earnings

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

(a)(vi) €141.46 + €103.54 = € 245

\* Accept answer from part c (ii) and part c (v)

\* Accept correct answer with no work

*Blunders(-3)*

B1: Omits one of the list

B2: Misplaced decimal

B3: Subtracts instead of adding

B4: Each extra amount

*Slips(-1)*

S1: Each numerical error to a max of -3

S2: Failure to round or incorrect rounding

*Attempt(2)*

A1: Answer = Any relevant number

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

Given an exchange rate of 1€ = 4.36843 zloty convert the €500 to Polish zloty

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

(d)(i) €500 × 4.36843 = 2184.215 zloty = **2184.22 zloty**

\* Accept correct answer with no work

*Blunders(-3)*

B1: Divides instead of multiplies ( 114.4575969 )

B2: Inverts €500 (0.00873686)

B3: Misplaced decimal

*Slips(-1)*

S1: Each numerical error to a max of -3.

S2: Failure to round or incorrect rounding

S3: Truncates.

*Attempts(3)*

A1: Answer = 500 ± 4.36843 and stops (504.36843/495.63157)

**Part (d)(ii)**

**5 marks**

**Att 2**

He is charged a commission of 2.5%. How many Polish zloty does he receive?

**(d)(ii)**

**5 marks**

**Att 2**

$$\begin{aligned} \text{(d)(ii) Commission} \Rightarrow \frac{2.5}{100} \times 2184.215 &= \frac{5460.5375}{100} \\ &= 54.6053754 \text{ zloty} = 54.61 \text{ zloty} \end{aligned}$$

$$\begin{aligned} \text{After commission paid} \quad 2184.22 \text{ zloty} - 54.61 \text{ zloty} \\ = 2129.61 \text{ zloty left} \end{aligned}$$

\* Accept candidate's answer for part (d)(i)

\* Accept correct answer with no work

*Blunders(-3)*

B1: Inverts  $\frac{2.5}{100}$  and continues

B2: Adds commission (2238.820375)

B3: Calculates commission and fails to calculate what is left + B2

B4: Misplaced decimal

*Slips(-1)*

S1: Each numerical error to a max of -3

S2: Truncates or rounds

*Attempts(2)*

A1: Answer = €2184.215 ± 2.5 and stops (2186.715)

A2: Any use of 100

A3: Answer = 2184.22 ÷ 2.5 = 873.69

A4: Answer = 500 × 2.5 ÷ 100 = €12.50

## QUESTION 5

<b>Part (a)</b>	<b>10 marks</b>	<b>Att 3</b>
<b>Part (b)</b>	<b>10marks</b>	<b>Att 3</b>
<b>Part (c)</b>	<b>10 marks</b>	<b>Att 3</b>
<b>Part (d)</b>	<b>10 marks</b>	<b>Att 3</b>
<b>Part (e)</b>	<b>5 marks</b>	<b>Att 2</b>
<b>Part (f)</b>	<b>5 marks</b>	<b>Att 2</b>

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

What is the probability that they will win the prize?

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

(a)  $\frac{5}{250}$  or  $\frac{1}{50}$

\* Accept answer written as 5:250, 1:50, 5 in 250, 1 in 50, 5 out of 250, 1 out of 50 or 0.02 or 2%.

*Blunders(-3)*

B1: No fraction or ratio set up.

B2: Answer = 5 + B1

B3: Answer = 250 + B1

B4: Answer =  $\frac{250}{5}$

B5: Answer =  $\frac{1}{5}$

B6: Answer = 5 to 250 or 1 to 50

B7: Answer =  $\frac{1}{100}$  + B5

B8: Answer = 10/250 (bought 5 tickets each)

*Slips(-1)*

S1: Truncates decimal answer.

*Attempt(3)*

A1: Any proper fraction other than  $\frac{5}{250}$ ,  $\frac{1}{50}$ ,  $\frac{250}{5}$ ,  $\frac{1}{5}$ ,  $\frac{1}{100}$

A2: Answer = 5- 250 or 1- 50

**Part (b)**

**10 marks**

**Att 3**

How much will each receive?

**(b)**

**10 marks**

**Att 3**

$$(b) \quad \frac{3}{5} \times 15000 = \text{€}9000 \quad \text{and} \quad \frac{2}{5} \times 15000 = \text{€}6000$$

\* Accept correct without work.

*Blunders(-3)*

B1: Ignores ratio.

B2: Divides by 3 and continues (€5000 and €10 000) plus B1

B3: Calculates  $\frac{1}{5}$  and continues (€3000 and €12000).

B4: Inverts  $\frac{3}{5}$  and/or  $\frac{2}{5}$  (25000 or 37500)

B5: Misplaced decimal

B6: Calculates one person's prize only.

*Slips(-1)*

S1: Each numerical error to a max. of -3.

S2: Failure to round or incorrect rounding.

*Attempts(3)*

A1:  $3 + 2 = 5$  and stops

A2:  $15000 \times 3.2 = 48000$  or  $\text{€}15000 \div 3.2 = \text{€}4687.5$

A3:  $15000 \div 2 = \text{€}7500$  divides equally

A4: Answer =  $3 \times 15000 = \text{€} 45000$  or  $2 \times 15000 = \text{€}30000$

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

The other costs of running the draw come to €2500.  
After all payments are made, what will be the profit from the draw?

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

(c) Ticket sales =  $250 \times €100 = €25\,000$ .  
Prize + other costs =  $€15\,000 + €2500 = €17\,500$   
Profit =  $€25\,000 - €17\,500$   
= €7500

\* Accept correct answer with no work

*Blunders(-3)*

B1: Cost omitted when calculating total cost

B2: Subtracts rather than adds when calculating total costs

B3: Misplaced decimal.

B4: Error in calculating the total ticket sales unless S1

B5: Ignores Prize when calculating profit +B2

B6: Adds instead of subtracting when calculating profit

B7: Failure to calculate profit + B6

*Slips(-1)*

S1: Each numerical error to a max of -3

*Attempt(3)*

A1: Calculates costs of ticket sales only (25000)

A2: Answer =  $€15\,000 - €2500$  and stops (12500)**Part (d)****10 marks****Att 3**

Calculate the valid poll

**(d)****10 marks****Att 3**

(d)  $1\,790\,438 - 18\,676 = 1\,771\,762 = \text{Valid Poll}$

\* Accept correct answer without work

*Blunders(-3)*

B1: Adds instead of subtracts (1809114)

B2: Answer  $18\,676 - 1\,790\,438 = 1\,771\,762$ *Slips(-1)*

S1: Each numerical error to a max of -3

*Attempt(3)*A1: Answer =  $1\,790\,438 \times 18\,676$ 

A2: Answer = 1 790 438 or answer = 18 676.

A3: Answer =  $1790438 \div 18676 = 95.86838723$

**Part (e)**

**5 marks**

**Att 2**

$$\text{Quota} = \frac{\text{Valid poll}}{\text{Number of seats} + 1} + 1$$

**(e)**

**5 marks**

**Att 2**

$$\begin{aligned} \text{(e)} \quad \text{Quota} &= \frac{\text{Valid poll}}{\text{Number of seats} + 1} + 1 \\ &= \frac{1771762}{1+1} + 1 = \frac{1771762}{2} + 1 \\ &= 885882 \end{aligned}$$

\* Accept correct answer with no work

\* Accept candidate's answer from part (d)

*Blunders(-3)*

B1: Ignores the second +1 in the formula (885883)

B2: Incorrect substitution unless S2

B3: Mishandles the order of operation

B4: Correct substitution and stops + B1 and B3

B5: Misplaced decimal

*Slips(-1)*

S1: Each numerical error to a max of -3

S2: Number of seats  $\neq$  1

S3: Incorrect rounding or failure to round

*Attempts(2)*

A1: One substitution, correct or incorrect, into formula and stops

**Part (f)**

**5 marks**

**Att 2**

The actual turnout was 52% of the electorate  
How many people were entitled to vote?

**(f)**

**5 marks**

**Att 2**

$$\begin{aligned} \text{(f)} \quad 52\% &= 1\,790\,438 \\ 1\% &= \frac{1790438}{52} = 34431.5 \\ 100\% &= 34431.5 \times 100 \\ &= 3\,443\,150 \text{ people} \end{aligned}$$

\* Accept correct answer with no work

*Blunders(-3)*

B1: Answer = 1 790 438 + 52% (2721465.76 rounded 2721466)

B2: Calculates 52% of 1 790 438 and stops plus B1 (931027.76 rounded 931028)

B3: Misplaced decimal.

B4: Inverts

*Slips(-1)*

S1: Each numerical error to a max of -3.

S2: Uses the answer from part (d)

S3: Failure to round or incorrect rounding

S4: Uses 48% to calculate

S5: Uses valid poll

*Attempt(2)*

A1:  $52 \pm 1\,790\,438$  (1790490/1790386)

A2: Any use of 100

A3: Any use of 52

