



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Applied 2015

Marking Scheme

Mathematical Applications

Common Level

Note to teachers and students on the use of published marking schemes

Marking schemes published by the State Examinations Commission are not intended to be standalone documents. They are an essential resource for examiners who receive training in the correct interpretation and application of the scheme. This training involves, among other things, marking samples of student work and discussing the marks awarded, so as to clarify the correct application of the scheme. The work of examiners is subsequently monitored by Advising Examiners to ensure consistent and accurate application of the marking scheme. This process is overseen by the Chief Examiner, usually assisted by a Chief Advising Examiner. The Chief Examiner is the final authority regarding whether or not the marking scheme has been correctly applied to any piece of candidate work.

Marking schemes are working documents. While a draft marking scheme is prepared in advance of the examination, the scheme is not finalised until examiners have applied it to candidates' work and the feedback from all examiners has been collated and considered in light of the full range of responses of candidates, the overall level of difficulty of the examination and the need to maintain consistency in standards from year to year. This published document contains the finalised scheme, as it was applied to all candidates' work.

In the case of marking schemes that include model solutions or answers, it should be noted that these are not intended to be exhaustive. Variations and alternatives may also be acceptable. Examiners must consider all answers on their merits, and will have consulted with their Advising Examiners when in doubt.

Future Marking Schemes

Assumptions about future marking schemes on the basis of past schemes should be avoided. While the underlying assessment principles remain the same, the details of the marking of a particular type of question may change in the context of the contribution of that question to the overall examination in a given year. The Chief Examiner in any given year has the responsibility to determine how best to ensure the fair and accurate assessment of candidates' work and to ensure consistency in the standard of the assessment from year to year. Accordingly, aspects of the structure, detail and application of the marking scheme for a particular examination are subject to change from one year to the next without notice.

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Structure of the marking scheme

Candidate responses are marked according to different scales, depending on the types of response anticipated. Scales labelled A divide candidate responses into two categories (correct and incorrect). Scales labelled B divide responses into three categories (correct, partially correct, and incorrect), and so on. The scales and the marks that they generate are summarised in this table:

Scale label	A	B	C
No of categories	2	3	4
5-mark scale	0, 5	0, 3, 5	0, 2, 3, 5
10-mark scale		0, 3, 10	0, 3, 7, 10

A general descriptor of each point on each scale is given below. More specific directions in relation to interpreting the scales in the context of each question are given in the scheme, where necessary.

Marking scales – level descriptors

A-scales (two categories)

- incorrect response (no credit)
- correct response (full credit)

B-scales (three categories)

- response of no substantial merit (no credit)
- partially correct response (partial credit)
- correct response (full credit)

C-scales (four categories)

- response of no substantial merit (no credit)
- response with some merit (low partial credit)
- almost correct response (high partial credit)
- correct response (full credit)

In certain cases, typically involving incorrect rounding, omission of units, or a misreading that does not oversimplify the work, a mark that is one mark below the full-credit mark may be awarded. Such cases are flagged with an asterisk. Thus, for example, Scale 10C* indicates that 9 marks may be awarded. The * is not applied for a missing euro symbol, unless otherwise specified.

The only marks that may be awarded for a question are those on the scale above, or *Full Credit –1*.

In general, accept a candidate's work in one part of a question for use in subsequent parts of the question, unless this oversimplifies the work involved.

Summary of mark allocations and scales to be applied

Question 1 (50)

- (a) 5B*
- (b) 5B*
- (c) 5B*
- (d) 5B
- (e) 5B*
- (f) 5B
- (g) 5B
- (h) 5B
- (i) 5B*
- (j) 5B*

Question 2 (50)

- (a) 5B; 5B
- (b) 5B*
- (c) 5B*
- (d) 5B*
- (e) 10C
- (f) 5B
- (g) 10C*

Question 3 (50)

- (a) 5C
- (b) 5C*
- (c) 5A
- (d) 10B
- (e) 5B*
- (f) 10B
- (g) 10B*

Question 4 (50)

- (a) 5C*
- (b) 5C*
- (c) 10B*
- (d) 10B*
- (e) 10C*
- (f) 10C*

Question 5 (50)

- (a) 10C
- (b) 10C*
- (c) 10B*
- (d) 10C*
- (e) 10C*

Solutions and detailed marking notes

The model solutions for each question are not intended to be exhaustive – there may be other correct solutions. Any Examiner unsure of the validity of the approach adopted by a particular candidate to a particular question should contact his / her Advising Examiner.

QUESTION 1

Part (a)	Scale 5B*	(0, 3, 5)
Part (b)	Scale 5B*	(0, 3, 5)
Part (c)	Scale 5B*	(0, 3, 5)
Part (d)	Scale 5B	(0, 3, 5)
Part (e)	Scale 5B*	(0, 3, 5)
Part (f)	Scale 5B	(0, 3, 5)
Part (g)	Scale 5B	(0, 3, 5)
Part (h)	Scale 5B	(0, 3, 5)
Part (i)	Scale 5B*	(0, 3, 5)
Part (j)	Scale 5B*	(0, 3, 5)

(a) Scale 5B* (0, 3, 5)

Find 4.8% of €535.40.

$$\begin{aligned}\text{€}535.40 \times \frac{4.8}{100} &= \text{€}25.6992 \\ &= \text{€}25.70 \quad (\text{nearest cent})\end{aligned}$$

** Accept correct answer with no work.

** Accept answer in euro without unit.

* Failure to round or incorrect rounding.

* Answer given in cent, but with no unit.

Partial Credit

- Evaluates 104.8% (€561.10)
- Calculates 95.2% (€509.70)
- Inverts 4.8% (€11154.17)
- Inverts €535.40 (€0.000089)
- Misplaced decimal
- Answer = 535.40 ± 4.8 (€540.20 or €530.60)
- Any use of 100

(b)

Scale 5B*

(0, 3, 5)

Find the value of $\sqrt{216}$, correct to one decimal place.

$$\begin{aligned}\sqrt{216} &= 14.696938\dots \\ &= 14.7 \quad (1 \text{ decimal place})\end{aligned}$$

** Accept correct answer with no work.

* Failure to round or incorrect rounding.

* Calculates $\sqrt[3]{216} = 6$.

Partial Credit

- Misplaced decimal
- Evaluates $216^2 = 46656$
- Evaluates $\frac{1}{2}(216) = 108$
- Answer = $216 \times 2 = 432$
- Answer = $6\sqrt{6}$

(c)

Scale 5B*

(0, 3, 5)

A heater costs €1.24 per hour to run.
How much will it cost to run the heater for 2 hours and 15 minutes?

$$15 \text{ minutes} = 0.25 \text{ hours}$$

$$€1.24 \times 2.25 = €2.79$$

** Accept correct answer with no work.

** Accept answer in euro without unit.

* Answer given in cent, but with no unit.

* Failure to round or incorrect rounding.

Partial Credit

- Uses 1 hour = 100 minutes (€2.666)
- Misplaced decimal
- Inverts 2.25 (€0.55) or $1.24 \div 2.15 = €0.5767441$
- Ignores 15 minutes (€2.48)
- Answer = 135 minutes $\times 1.24 = €167.40$
- Mishandles 15 minutes

No Credit

- Answer = $€1.24 \pm 2$

(d)

Scale 5B

(0, 3, 5)

A prize of €450 is shared between Frank and Walter in the ratio of 2:3.
How much money does each person get?

$$2 + 3 = 5 \Rightarrow \text{Frank gets } \frac{2}{5} \text{ and Walter gets } \frac{3}{5}.$$

$$\text{Frank gets } €450 \times \frac{2}{5} = €180$$

$$\text{Walter gets } €450 \times \frac{3}{5} = €270$$

** Accept correct answer with no work.

** Accept answer in euro without unit.

Partial Credit

- Calculates $\frac{1}{5}$ only (€90)
- Correctly calculates one amount only
- Inverts €450
- Inverts the fractions ($450 \times 5/2 = 1125$; $450 \times 5/3 = 750$)
- Misplaced decimal
- Answer = 5 and stops
- Answer = $450 \div 2 \cdot 3 = €195 \cdot 65$
- Answer = $450 \times 2 \cdot 3 = €1035$
- Answer = $450 \div 2 = €225$
- Answer = $450 \div 3 = €150$

No Credit

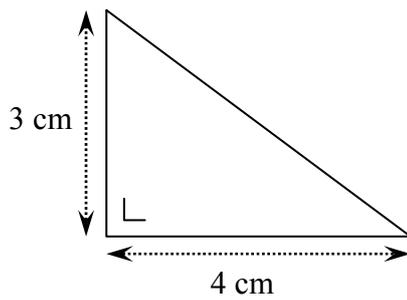
- Answer = $€450 \pm 2$ or $€450 \pm 3$

(e)

Scale 5B*

(0, 3, 5)

Calculate the area of this triangle:



$$\begin{aligned}\text{Area} &= \frac{1}{2} \times 4 \text{ cm} \times 3 \text{ cm} \\ &= \frac{1}{2} \times 12 \text{ cm}^2 \\ &= 6 \text{ cm}^2.\end{aligned}$$

** Accept correct answer with no work.

* Failure to round or incorrect rounding.

* Omitted or incorrect units.

Partial Credit

- Ignores or mishandles $\frac{1}{2}$
- Omits base or height in calculating area
- Misplaced decimal
- One correct substitution and stops
- Answer = $\frac{1}{2} \times 4 = 2$, or $\frac{1}{2} \times 3 = 1.5$

No Credit

- Answer = 4 ± 3

(f)

Scale 5B

(0, 3, 5)

Geraldine was born on a Tuesday. Seán was born 37 days later.
On what day was Seán born?

$$37 \div 7 \text{ (7 days in a week)} = 5 \text{ remainder } 2.$$

2 days on from Tuesday = Thursday.

** Accept correct answer with no work.

Partial Credit

- Answer = 2 days before Tuesday, i.e. Sunday
- Counting error evident on candidate's counting matrix

No Credit

- Answer = any other day besides Thursday or Sunday with no work shown

(g)

Scale 5B

(0, 3, 5)

Liam has a gross income of €520 this week. His tax rate is 20%.
Find Liam's **gross tax** for this week.

$$€520 \times 0.20 = €104$$

** Accept correct answer with no work.

** Accept answer in euro without unit.

Partial Credit

- Misplaced decimal
- Inverts 20% and continues (2600)
- Inverts €520 and continues (0.0003846)
- Calculates 120% (€624)
- Answer = €520 ± 20 (500 or 540)
- Any use of 100
- Answer = €416
- Answer = €520 + 0.2 = €520.20

(h)

Scale 5B

(0, 3, 5)

An Olympic sprinter can run 100 m in 10 seconds.
Find this speed in km per hour.

$$100 \text{ m} \div 10 = 10 \text{ m in 1 sec}$$

OR $\Rightarrow 600 \text{ m in 60 secs, i.e. 1 min}$

$$\Rightarrow 10 \text{ m} \times 60 \times 60 = 36\,000 \text{ m in 1 hour}$$

$$\Rightarrow 36\,000 \text{ m in 60 min, i.e. 1 hour}$$

$$\Rightarrow 36 \text{ km in 1 hour.}$$

$$\Rightarrow 36 \text{ km in 1 hour}$$

** Accept correct answer with no work.

** Accept answer without unit.

Partial Credit

- Misplaced decimal
- Speed in km per minute
- Uses 1 hour = 100 minutes
- Answer = $10 \times 100 = 1000 \text{ km/hr}$
- Answer = correct formula for speed (distance \div time)
- Divides instead of multiplying (e.g. 0.0002777777)
- Answer = 60

No Credit

- Answer = 100 m and stops

(i)

Scale 5B*

(0, 3, 5)

Write the following fractions in order, from the smallest to the largest.

$$\frac{3}{2}, \frac{5}{7}, \frac{3}{4}$$

$$\frac{3}{2} = 1.5$$

$$\frac{5}{7} = 0.71428\dots$$

$$\frac{3}{4} = 0.75 \quad (\text{decimal form})$$

OR

$$\frac{3}{2} = \frac{42}{28}$$

$$\frac{5}{7} = \frac{20}{28}$$

$$\frac{3}{4} = \frac{21}{28} \quad (\text{common denominator of 28})$$

$$\text{Answer} = \frac{5}{7}, \frac{3}{4}, \frac{3}{2}$$

** Accept correct answer with no work.

** Accept correct answer given in decimal form.

* Order given from largest to smallest (misreading).

Partial Credit

- Incorrect denominator, if used
- Misplaced decimal
- Only two in correct consecutive order
- One fraction converted to decimal form only

No Credit

- Answer = any one of the fractions from the given list

(j)

Scale 5B*

(0, 3, 5)

A car dealer buys a car for €3500. He sells it for €4130.
Find his percentage profit.

$$\text{Profit} = €4130 - €3500 = €630$$

$$\% \text{ Profit} = \frac{630}{3500} \times \frac{100}{1} = 18\%$$

** Accept correct answer with no work.

* Failure to round or incorrect rounding.

Partial Credit

- Adds €4130 + €3500 and continues ($€7630 \div 3500 \times 100 = 218\%$)
- Inverts any of the used fractions (e.g. $3500 \div 630 \times 100 = 555.5555\%$)
- Calculates %Profit on selling price ($€630 \div 4130 \times 100 = 15.2542\%$)
- Misplaced decimal
- Calculates €630
- Any use of 100
- Answer = €3500 + €4130 = €7630

QUESTION 2

Part (a)	Scale 5B; 5B	(0, 3, 5); (0, 3, 5)
Part (b)	Scale 5B*	(0, 3, 5)
Part (c)	Scale 5B*	(0, 3, 5)
Part (d)	Scale 5B*	(0, 3, 5)
Part (e)	Scale 10C	(0, 3, 7, 10)
Part (f)	Scale 5B	(0, 3, 5)
Part (g)	Scale 10C*	(0, 3, 7, 10)

(a) Scale 5B; 5B (0, 3, 5); (0, 3, 5)

A group of students set up a mini-company called *Blooming Fantastic*.
 They sold window boxes with flowers in them.
 The Shares Summary for this mini-company is shown below.

Shares Summary	Number of shares issued	Money into the company (€)
Each student gets 15 free shares	120	0
Each student buys a further 10 shares at a reduced price of €1.20 each	80	96
Each student sells a further 10 public shares at the full price of €2.00 each	80	160
TOTAL SHARES ISSUED	280	256

Fill in the **two** missing details in the Shares Summary

(a) Number of Shares issued

Scale 5B

(0, 3, 5)

[See table above]

$$120 \div 15 = 8 \text{ students} \quad \Rightarrow \quad \text{number of shares} = 8 \times 10 = 80$$

OR $96 \div 1.20 = 80 \text{ shares}$

OR $280 - (120 + 80) = 80 \text{ shares}$

** Accept correct answer without work.

Partial Credit

- Answer = $120 + 80 + 280 = 480$ shares
- Misplaced decimal
- $96 \times 1.20 = 115.2$
- $96 \div 120 (0.8)$
- Answer = $120 + 80 = 200$ and stops
- Answer = $15 \times 1.20 = 18$
- Answer = $10 \times 1.20 = 12$
- Answer = 8 and stops
- Answer = $120 - 80 = 40$

No Credit

- Answer = 120 and stops

(a) Money into the company (€)

Scale 5B

(0, 3, 5)

[See table above]

$$\text{Total Money} = 96 + 160 = \text{€}256$$

** Accept correct answer without work.

Partial Credit

- Misplaced decimal
- Subtracts instead of adds ($160 - 96 = 64$)
- Answer = 96
- Answer = 160
- Answer = $96 \times 160 = 15360$

No Credit

- Adds in number(s) from the shares column

(b)

Scale 5B*

(0, 3, 5)

The **total profit** of the mini-company was €980.
Use this to find the Final Share Value of the mini- company.

$$\text{Final Share Value} = \frac{\text{Total profit}}{\text{total number of shares issued}}$$

$$\frac{980}{280} = €3.50$$

** Accept correct answer without work.

** Accept answer in euro without unit.

* Answer given in cent, but with no unit.

Partial Credit

- Misplaced decimal
- Inverts (0.285714285)
- Incorrect substitution
- Multiplies instead of divides (274400)
- Answer = $\frac{980}{280}$ and stops
- Uses money into company ($980 \div 256 = €3.83$)
- Any use of €980

(c)

Scale 5B*

(0, 3, 5)

Ted is one of the students in the mini-company. Ted has 25 shares in the company.

Find how much Ted paid for his shares.

Remember that he got some of them for free.

$$25 - 15 = 10 \text{ shares @ } €1.20 = €12.00$$

** Accept correct answer without work.

** Accept answer in euro without unit.

* Answer given in cent, but with no unit.

Partial Credit

- Misplaced decimal
- Ignores free shares ($25 \times 1.20 = €30$)
- Mishandles €1.20
- Answer = 10

(d)

Scale 5B*

(0, 3, 5)

Find the profit that Ted will get from his 25 shares.

Use your answers from parts (b) and (c).

$$25 \text{ shares} \times €3.50 = €87.50$$

$$€87.50 - €12.00 = €75.50.$$

** Accept correct answer without work.

** Accept answer in euro without unit.

** Accept candidate's answer from parts (b) and (c).

* Answer given in cent, but with no unit.

Partial Credit

- Misplaced decimal
- Divides instead of multiples
- Adds instead of subtracts €12 ($€87.50 + 12 = €99.50$)
- Any shares $\times €3.50$
- Use of answers from either part (b) or (c) or both (except as described in note below for *No Credit*)

No Credit

- Answer 25 ± 12 and stops (37 or 13)

(e)

Scale 10C

(0, 3, 7, 10)

A second group of students set up a mini-company called *Milkshake Madness*. They made and sold milkshakes in their school during lunch break.

Put a tick (✓) in the correct box in each line in the table below to show whether each item was *Income* or *Expenditure* for the mini-company. One is already done for you.

Item	Income	Expenditure
Bought ice-cream and fruit for milkshakes.		✓
Sold 200 shares in the mini-company.	✓	
Bought Oreo biscuits for milkshakes.		✓
Rented a blender to make the milkshakes.		✓

High Partial Credit

- Two correct ticks only

Low Partial Credit

- One correct tick only

No Credit

- None correct

(f)

Scale 5B

(0, 3, 5)

Write down **one** other item that this mini-company might have had as *Income*.

Sales of smoothies **OR** *Any other item of income*

Partial Credit

- Item of *Expenditure* other than what is mentioned above

(g)

Scale 10C*

(0, 3, 7, 10)

A third group of students set up a mini-company called *Maths Matters*.
They made Maths revision notes, and sold them to Junior Certificate students in their school.
The **total cost** of making the notes was €240.

They sold 60 copies of the notes for €5 each.
They sold 20 more copies at “half price”.

Find the **total profit** they made from these sales.

$$€5 \times 60 = €300$$

$$€2.50 \times 20 = €50$$

$$\Rightarrow \text{Total Sales} = €350$$

$$\Rightarrow \text{Profit} = \text{Sales} - \text{Cost}$$

$$= €350 - €240 = €110$$

** Accept correct answer with no work.

** Accept answer in euro without unit.

* Answer given in cent, but with no unit.

High Partial Credit

- Incorrect “half price” and continues
- Misplaced decimal
- Fails to subtract cost of making notes (answer = €350)
- Calculates both €300 and €50

Low Partial Credit

- Calculates sale of 60 copies only (€300)
- Calculates sale of 20 copies only (€50)
- Incorrect total but correctly subtracts €240 (cost of making notes)

No Credit

- Answer = 240

QUESTION 3

Part (a)	Scale 5C	(0, 2, 3, 5)
Part (b)	Scale 5C*	(0, 2, 3, 5)
Part (c)	Scale 5A	(0, 5)
Part (d)	Scale 10B	(0, 3, 10)
Part (e)	Scale 5B*	(0, 3, 5)
Part (f)	Scale 10B	(0, 3, 10)
Part (g)	Scale 10B*	(0, 3, 10)

(a) **Scale 5C** **(0, 2, 3, 5)**

A survey was carried out on a group of students to find out how they usually travel to school. The results are shown in the table below.

Walk	Bus	Bus	Walk	Cycle	Car	Bus	Bus	Bus	Bus
Bus	Walk	Car	Bus	Walk	Bus	Walk	Bus	Walk	Walk
Cycle	Car	Train	Car	Walk	Bus	Walk	Cycle	Bus	Car

Use these data to complete the frequency table below.

Method of travel	Bus	Walk	Train	Car	Cycle
Number of students	12	9	1	5	3

High Partial Credit
 • 4 entries correct

Low Partial Credit
 • At least one entry correct

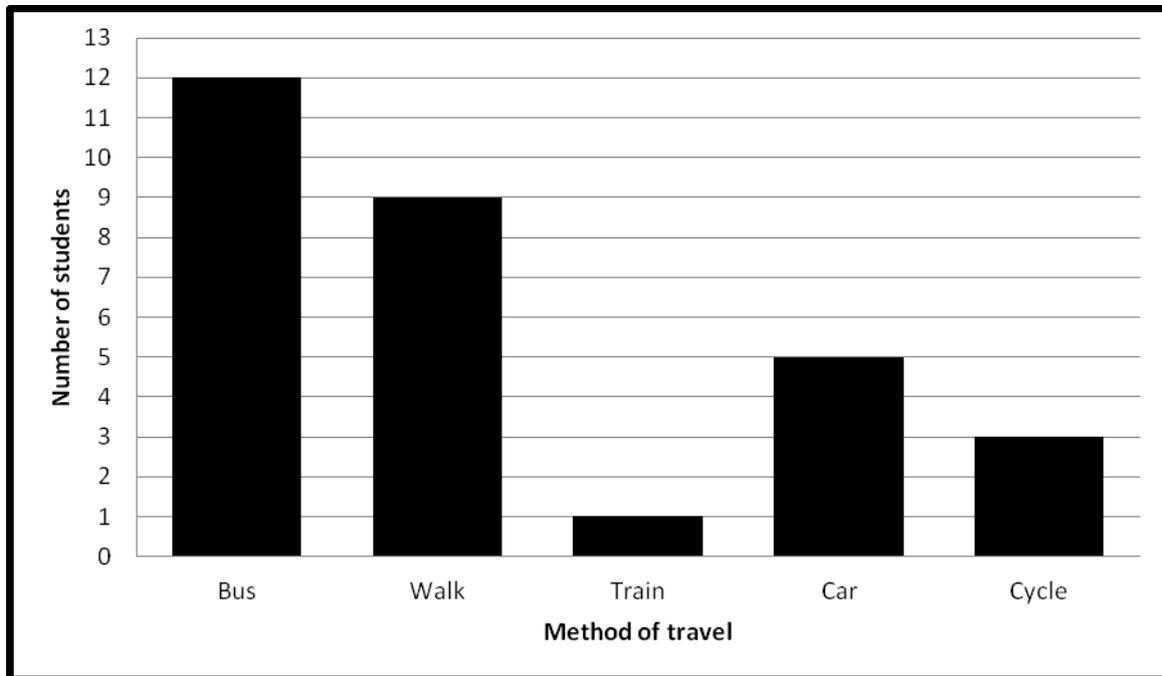
No Credit
 • No entry correct

(b)

Scale 5C*

(0, 2, 3, 5)

Draw a bar chart to represent these data



** Accept candidate's answer from part (a).

** Accept horizontal bar chart.

** Tolerance ± 1 on height of bars from candidate's scale.

* Omits labelling axes.

High Partial Credit

- Omits one bar
- Omits labelling bars
- Incorrect scaling of frequency axis
- Draws a correct line plot or trend graph or pie chart

Low Partial Credit

- Draws an incorrect line plot or trend graph or pie chart
- Draws bars with no axes
- Draws and labels one or two axes only, correct or incorrect
- At least one bar correctly drawn

(c)

Scale 5A

(0, 5)

Write down the modal method (**mode**) of travelling to school.

Bus

(d)

Scale 10B

(0, 3, 10)

What **percentage** of students walk to school?

$$\frac{9}{30} \times \frac{100}{1} = 30\%.$$

** Accept correct answer with no work.

** Accept answer from part (a).

Partial Credit

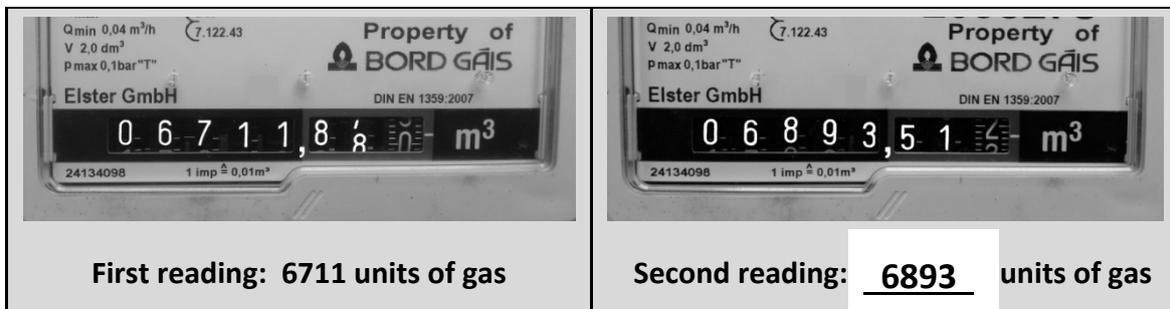
- Inverts $\frac{9}{30}$ ($30 \div 9 \times 100 = 333.33\ldots\%$)
- Misplaced decimal
- Incorrect total number of students
- Mishandles 100%
- Answer = 9 only
- Answer = $\frac{9}{30}$
- Any use of 100

(e)

Scale 5B*

(0, 3, 5)

The table below shows two photographs of a gas meter, taken 57 days apart.
The reading for one of the photographs is given.



Fill in the second reading in the table above.

[See table above]

6893.

** Accept correct with no work.

* Incorrect rounding, i.e. 6894.

Partial Credit

- Any 4 digits from the second photograph

(f)

Scale 10B

(0, 3, 10)

Find the number of units of gas used in this period.

$$\text{Units} = 6893 - 6711$$

$$= 182.$$

** Accept correct answer with no work.

** Accept answer from part (e).

Partial Credit

- Adds instead of subtracts (13604)

No Credit

- Answer = one of the readings only

(g)

Scale 10B*

(0, 3, 10)

The total charge (in €) for this period is given by this formula, where U is the number of units used:

$$\left(\frac{113.5}{100} \times 0.6563 \times U \right) + 12.81$$

Using the formula, and your answer to part (f), find the total charge for this period.

$$\begin{aligned} & \left(\frac{113.5}{100} \times 0.6563 \times 182 \right) + 12.81 \\ = & (135.571891) + 12.81 \\ = & 148.381891 \\ = & \text{€}148.38 \quad (\text{nearest cent}) \end{aligned}$$

** Accept correct answer with no work.

** Accept answer in euro without unit.

** Accept candidate's answer from part (f).

* Failure to round or incorrect rounding.

* Answer given in cent, but with no unit.

Partial Credit

- Ignores or mishandles 12.81
- Mishandles $\frac{113.5}{100}$ and continues
- Misplaced decimal
- Correct substitution and stops
- Uses 6711 or 6893 for U
- Fails to substitute for U (i.e. takes $U = 1$) and continues (€13.55)

QUESTION 4

Part (a)	Scale 5C*	(0, 2, 3, 5)
Part (b)	Scale 5C*	(0, 2, 3, 5)
Part (c)	Scale 10B*	(0, 3, 10)
Part (d)	Scale 10B*	(0, 3, 10)
Part (e)	Scale 10C*	(0, 3, 7, 10)
Part (f)	Scale 10C*	(0, 3, 7, 10)

(a) Scale 5C* (0, 2, 3, 5)

The diagram below shows the line segment $[CD]$, where $|CD| = 8$ cm.

Mark the **midpoint** of the line segment $[CD]$.

Label the midpoint M .



** Accept tolerance of ± 0.1 cm.

* Tolerance between 0.1 cm and 0.5 cm.

* Midpoint marked but not labelled M .

High Partial Credit

- $M \in (CD)$ outside tolerance of 0.5 cm.

Low Partial Credit

- $M = C$
- $M = D$

No Credit

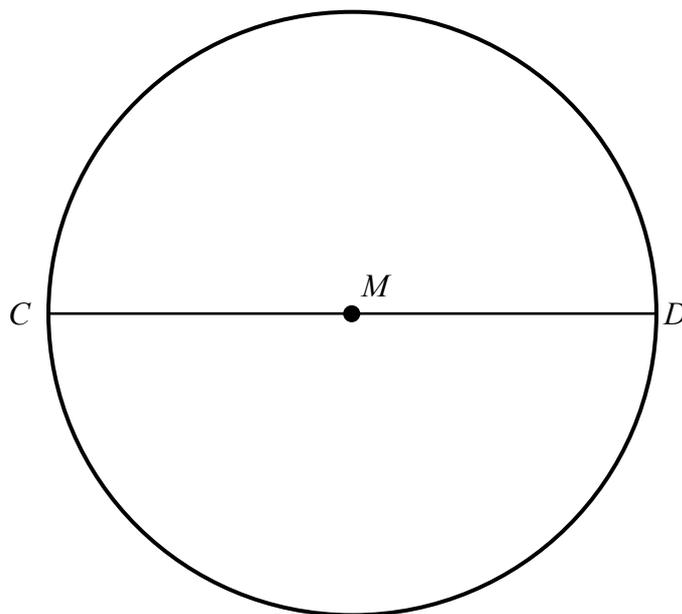
- $M \notin [CD]$

(b)

Scale 5C*

(0, 2, 3, 5)

Construct a **circle** with its centre at M and $[CD]$ as a diameter.



** Accept tolerance of ± 0.1 cm.

* Tolerance between 0.1 cm and 0.5 cm.

High Partial Credit

- Ignores M and uses C or D as centre
- Radius outside tolerance of 0.5 cm
- Constructs a semi- circle

Low Partial Credit

- Draws a circle free hand

No Credit

- Constructs another shape, e.g. a triangle or rectangle

(c)

Scale 10B*

(0, 3, 10)

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

Give your answer in cm^2 , correct to two decimal places.

$$\text{Area} = \pi r^2.$$

$$\begin{aligned}\text{Area} &= 3.142 \times (4)^2 \\ &= 3.142 \times 16 \\ &= 50.272 \\ &= 50.27 \text{ cm}^2 \text{ (2 decimal places)}\end{aligned}$$

** Accept correct answer with no work.

* Incorrect or omitted units.

* Failure to round or incorrect rounding.

Partial Credit

- Mishandles r^2 , e.g. uses $2r^2$ for $r^2 = 3.142 \times 2 \times 4^2 = 100.544$
- Misplaced decimal
- Radius = 8 cm (201.088)
- One correct substitution
- Answer = $3.142 + 4 + 4 = 11.142$
- Answer = $3.142^2 \times 4 = 39.488656$
- Answer = $3.142^2 \times 4^2 = 157.954624$
- Answer = $3.142^2 \times 8^2 = 631.818496$
- Uses 3.14 for π (Answer = 50.24)

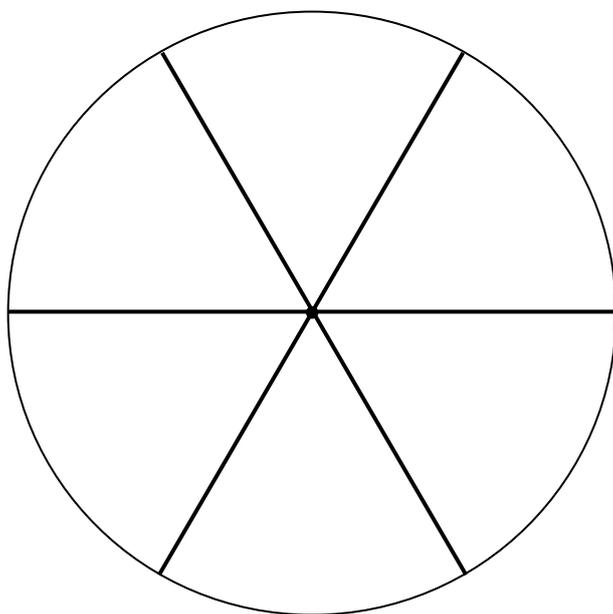
(d)

Scale 10B*

(0, 3, 10)

Perform a **construction** to divide the circle shown on the right into 6 sectors of equal area.

The centre of the circle is marked.



** Accept tolerance of $\pm 5^\circ$.

* Tolerance between 5° and 10° .

Partial Credit

- Circle divided into 6 regions, at least 1 outside of tolerance
- One sector only drawn, within tolerance
- Circle divided into less than 6 regions, with one correct diameter drawn

No Credit

- Lines drawn outside circle
- Draws more than 6 sectors

(e)

Scale 10C*

(0, 3, 7, 10)

Fiona is travelling from Dublin to Turkey.
She buys 2000 Turkish lira in Dublin.
The exchange rates are shown in the table below.

	Currency	We Buy	We Sell
	Turkish lira	2.80	2.74

Find how much the 2000 Turkish lira costs Fiona, in euro.

$$2000 \div 2.74 = \text{€}729.927007299 = \text{€}729.93 \text{ (nearest cent)}$$

** Accept correct answer with no work.

** Accept answer in euro without unit.

* Failure to round or incorrect rounding.

* Answer given in cent, but with no unit.

High Partial Credit

- Divides by *We Buy* rate ($2000 \div 2.80 = \text{€}714.29$)
- Misplaced decimal
- Inverts ($2.74 \div 2000 = 0.00137$)

Low Partial Credit

- Multiplies instead of divides by either rate ($2000 \times 2.74 = 5480$, or $2000 \times 2.80 = 5600$)
- Answer = 2000 ± 2.74 (2002.74 or 1997.26)
- Answer = 2.74
- Answer = $(2.80 - 2.74) \times 2000 = 120$
- Answer = $2.80 \div 2000 = 0.0014$

No Credit

- Answer = 2000 or 2.80

(f)

Scale 10C*

(0, 3, 7, 10)

Turkey is 2 hours ahead of Dublin.
Fiona's flight leaves Dublin at 11:10 a.m., local time.
Her flight takes 4 hours and 20 minutes.

At what time does Fiona's flight arrive in Turkey?
Give your answer in **local time** in Turkey.

$$11:10 + 2:00 + 4:20 = 17:30 \text{ OR } 5:30 \text{ p.m.}$$

** Accept correct with no work.

* Answer given using 12-hour clock, but "p.m." not indicated.

High Partial Credit

- 1 hour = 100 minutes
- Fails to add on 2-hour time difference, i.e. $11:10 + 4:20 = 15:30$ and stops
- Subtracts 2 hours, i.e. $15:30 - 2 = 13:30$ or 1:30 p.m.

Low Partial Credit

- Ignores flight time ($11:10 + 2:00 = 13:10$, and stops)

No Credit

- Answer = 2, or 11:10, or 4:20

QUESTION 5

Part (a)	Scale 10C	(0, 3, 7, 10)
Part (b)	Scale 10C*	(0, 3, 7, 10)
Part (c)	Scale 10B*	(0, 3, 10)
Part (d)	Scale 10C*	(0, 3, 7, 10)
Part (e)	Scale 10C*	(0, 3, 7, 10)

(a) Scale 10C (0, 3, 7, 10)

Siobhán is making cup cakes. Below is the recipe that she is going to use.

Makes approx. 20 cup cakes

Ingredients

- ▶ 150 g Flour
- ▶ 200 g Butter
- ▶ 120 g Sugar
- ▶ 2 Eggs

The recipe is for 20 cup cakes. Siobhán is going to make 50 cup cakes.

Find how much of each ingredient she will need to make 50 cup cakes.

$$50 \div 20 = 2.5 \quad \text{So:}$$

$$150 \text{ g} \times 2.5 = 375 \text{ g Flour}$$

$$200 \text{ g} \times 2.5 = 500 \text{ g Butter}$$

$$120 \text{ g} \times 2.5 = 300 \text{ g Sugar}$$

$$2 \text{ eggs} \times 2.5 = 5 \text{ Eggs}$$

** Accept correct answers with no work.

High partial credit

- Using an incorrect ratio at least 3 times
- One ingredient missing from a correct list
- Misplaced decimal
- Divides by 2.5 (60g flour, 80g butter, 48g sugar, and 0.8 eggs)

Low Partial Credit

- Only one correct ingredient

No Credit

- Answer = given ingredients for 20 cup cakes

(b)

Scale 10C*

(0, 3, 7, 10)

The recipe says: “Preheat the oven to 350° F.” Siobhán’s oven is in degrees Celsius.

Convert 350° Fahrenheit into degrees Celsius, using the formula $C = \frac{5(F - 32)}{9}$.

Give your answer correct to the nearest whole number.

$$\frac{5(350 - 32)}{9} = 5(318) \div 9 = 1590 \div 9 = 176.666666... = 177^\circ \text{ (nearest whole number).}$$

** Accept correct answer with no work.

** Accept answer without units.

* Incorrect or omitted rounding.

High Partial Credit

- Ignores order of operations
- Mishandles $\frac{5}{9}$
- Misplaced decimal
- Incorrect substitution and continues
- Adds 350 + 32 and continues (212.22222...)

Low Partial Credit

- Substitutes for F , correctly or incorrectly, and stops

(c)

Scale 10B*

(0, 3, 10)

On a particular Sunday, Aleks started work at 09:50 and finished at 15:20.
He took one hour off for lunch.

How many hours did Aleks work on that Sunday?

9:50 to 15:20 = 5.5 hours

Excluding lunch = 4.5 hours.

** Accept correct answer with no work.

** Accept correct answer (in hours) without units.

** Accept answer in hours and minutes (4 hours, 30 minutes), or in minutes (270 minutes), but unit(s) must be given.

* Incorrect or omitted units, with correct answer other than 4.5.

Partial Credit

- 1 hour = 100 minutes
- Ignores or omits 1 hour for lunch (answer = 5.5 hours)
- Adds instead of subtracts
- Answer = 4 hours
- Answer = 4 hours + any minutes
- Incorrect answer for hours worked, but subtracts 1 hour for lunch correctly

(d)

Scale 10C*

(0, 3, 7, 10)

Aleks's basic rate of pay is €12.80 per hour.
He gets paid "time and a half" for working on Sundays.
How much did he earn on the Sunday described above?

$$12.80 \times 1.5 \times 4.5 = \text{€}86.40$$

OR

$$12.80 \times 4.5 = 57.60$$
$$12.80 \div 2 = 6.40$$
$$4.5 \times 6.40 = 28.80$$
$$57.60 + 28.80 = \text{€}86.40$$

OR

$$12.80 \div 2 = 6.40$$
$$12.80 + 6.40 = 19.20$$
$$19.20 \times 4.5 = \text{€}86.40$$

** Accept answer in euro without unit.

** Accept candidate's answer from part (c).

* Failure to round or incorrect rounding.

* Answer given in cent, but with no unit.

High Partial Credit

- Time and half $\neq 1.5$
- Misplaced decimal

Low Partial Credit

- Ignores time and half ($12.80 \times 4.5 = \text{€}57.60$)
- Answer = 19.20 or 6.40
- Mishandles 'time and a half' and mishandles time

(e)

Scale 10C*

(0, 3, 7, 10)

Samantha invested €7500 at 4% per annum compound interest.
Find the amount of the investment at the end of two years.
You may use one of the compound interest formulas below.

$$A = P \left(1 + \frac{R}{100}\right)^n \quad \text{OR} \quad F = P (1+i)^t$$

$$R = 4$$

$$\text{OR} \quad i = 0.04$$

$$\Rightarrow A = €7500 \left(1 + \frac{4}{100}\right)^2$$

$$\text{OR} \quad \Rightarrow F = €7500(1+0.04)^2$$

$$= €7500 (1.04)^2$$

$$= €7500(1.0816)$$

$$= €8112.$$

OR Year 1: 4% of €7500 = €300 $\Rightarrow €7500 + €300 = €7800$ @ end of Year 1.
 Year 2: 4% of €7800 = €312 $\Rightarrow €7800 + €312 = €8112$ @ end of Year 2.

** Accept candidate's answer with no work.

** Accept answer in euro without unit.

* Failure to round or incorrect rounding.

* Answer given in cent, but with no unit.

High Partial Credit

- Incorrect substitution of all 3 elements (i.e. €7500, 4%, and 2 years) and continues
- Doubles instead of squares
- Misplaced decimal
- $1 + \frac{r}{100} = 1 \times \frac{r}{100}$ and continues
- Calculates interest only = €612
- Ignores order of operation
- Answer = €300 interest for 1 year only
- Uses Simple Interest Formula $7500 \times 4 \times 2 \div 100 = €600$

Low Partial Credit

- Any substitution into formula, correct or incorrect and stops

Bonus marks for answering through Irish

Bonus marks are applied as follows:

If the mark achieved is 150 or less, the bonus is 5% of the mark obtained, rounded **down**.
For instance, $138 \text{ marks} \times 5\% = 6.9 \Rightarrow \text{bonus} = 6 \text{ marks}$.

If the mark achieved is above 150, the following table applies:

Bunmharc (Mark achieved)	Marc Bónais (Bonus mark)	Bunmharc (Mark achieved)	Marc Bónais (Bonus mark)
151 – 153	7	174 – 180	3
154 – 160	6	181 – 186	2
161 – 166	5	187 – 193	1
167 – 173	4	194 – 200	0

Credit mark ranges

Candidates are awarded a credit from 0 to 10, inclusive, depending on the mark they are awarded.
The mark ranges associated with each credit are shown below.

Mark Range	Credit
180 – 200	10
162 – 179	9
144 – 161	8
126 – 143	7
108 – 125	6
90 – 107	5
72 – 89	4
54 – 71	3
36 – 53	2
18 – 35	1
0 – 17	0

