Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Applied 2023

Mathematical Applications

(200 marks)

Friday 9 June
Morning 9:30 to 11:30

General Directions

1. Write your EXAMINATION NUMBER in this space:
2. Write all answers in the boxes or spaces in this answerbook.
3. Show all supporting work in the space provided.
4. Include the appropriate units of measurement in your answer, where relevant.
5. Calculators may be used.
6. A copy of the *Formulae and Tables* booklet is available from the superintendent.
7. There are 7 questions on this examination paper. Answer **all** questions. Questions do not necessarily carry equal marks.

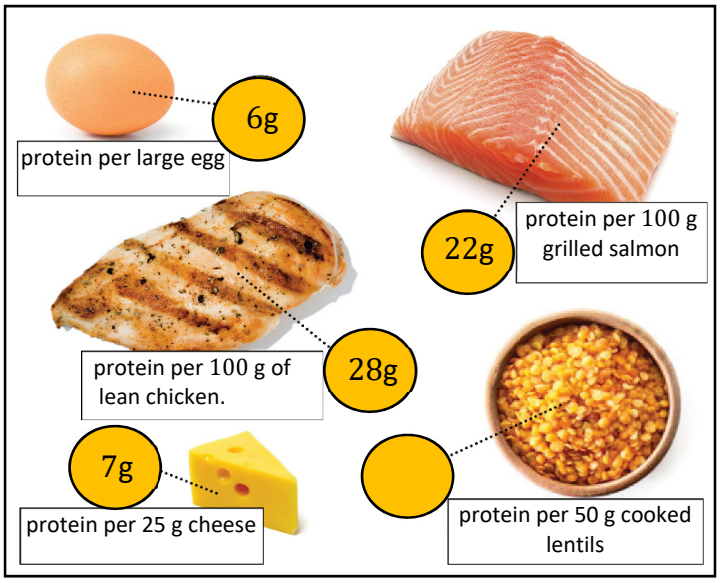
For Superintendent
Centre Stamp

For Examiner	
Running Total	
Credit	

For Examiner		
Q	Ex.	Adv. Ex.
1		
2		
3		
4		
5		
6		
7		
Total		

Question 1

Ciarán found the information shown on the right on a Healthy Eating website. He uses it to help him plan a meal. Use this information to answer the questions below.

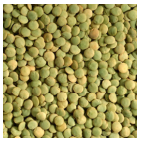


(a) **(i)** How many grams of protein are there in **3 large eggs**?

(ii) Work out how many grams of protein there are in **250 g of lean chicken**.

(iii) There are 48 g of protein in 300 g of cooked lentils. **Work out** how many grams of protein there are **in 50 g of cooked lentils.**

(b) Ciarán buys the following ingredients:

				
A bunch of cherry tomatoes	2 courgettes	Fresh cream	2 pieces of salmon	Green lentils
€2·99	€1·19	€1·49	€8·10	79 c

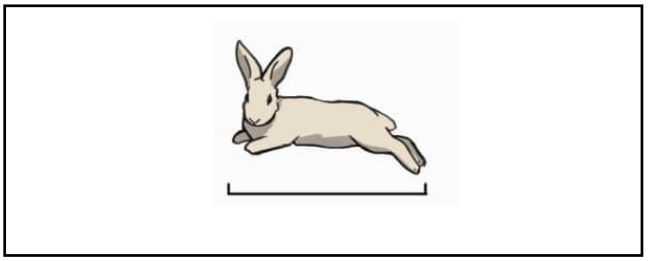
(i) Work out the **total cost** of these ingredients.

(ii) Later that week Ciarán plans a menu for a full week and goes shopping for ingredients. His bill comes to €74·21. He pays using **one** €50 and **two** €20 notes. Work out how much **change** he receives.

Question 2

Ellie is considering buying a rabbit. She carries out some research on caring for rabbits. She plans to keep her rabbit in a hutch in the shape of a cuboid. The image below contains information about the minimum dimensions of the base of the hutch required by rabbits.

Length of base: 4 × Length of Rabbit



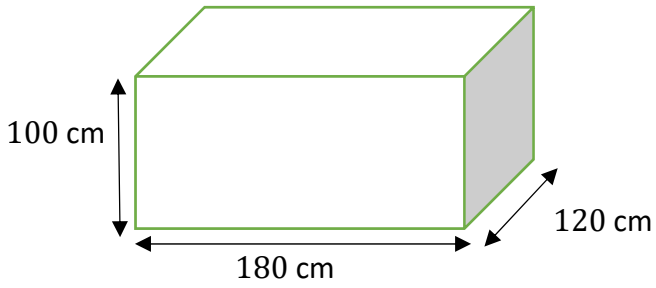
Width of base:
$2{\cdot}5$ × Length of Rabbit

(a) Ellie is going to buy a fully-grown rabbit that is $32{\cdot}4$ cm long. Work out the **minimum length and width** of the base of the hutch required for a rabbit of this size.

Give your answers in centimetres.

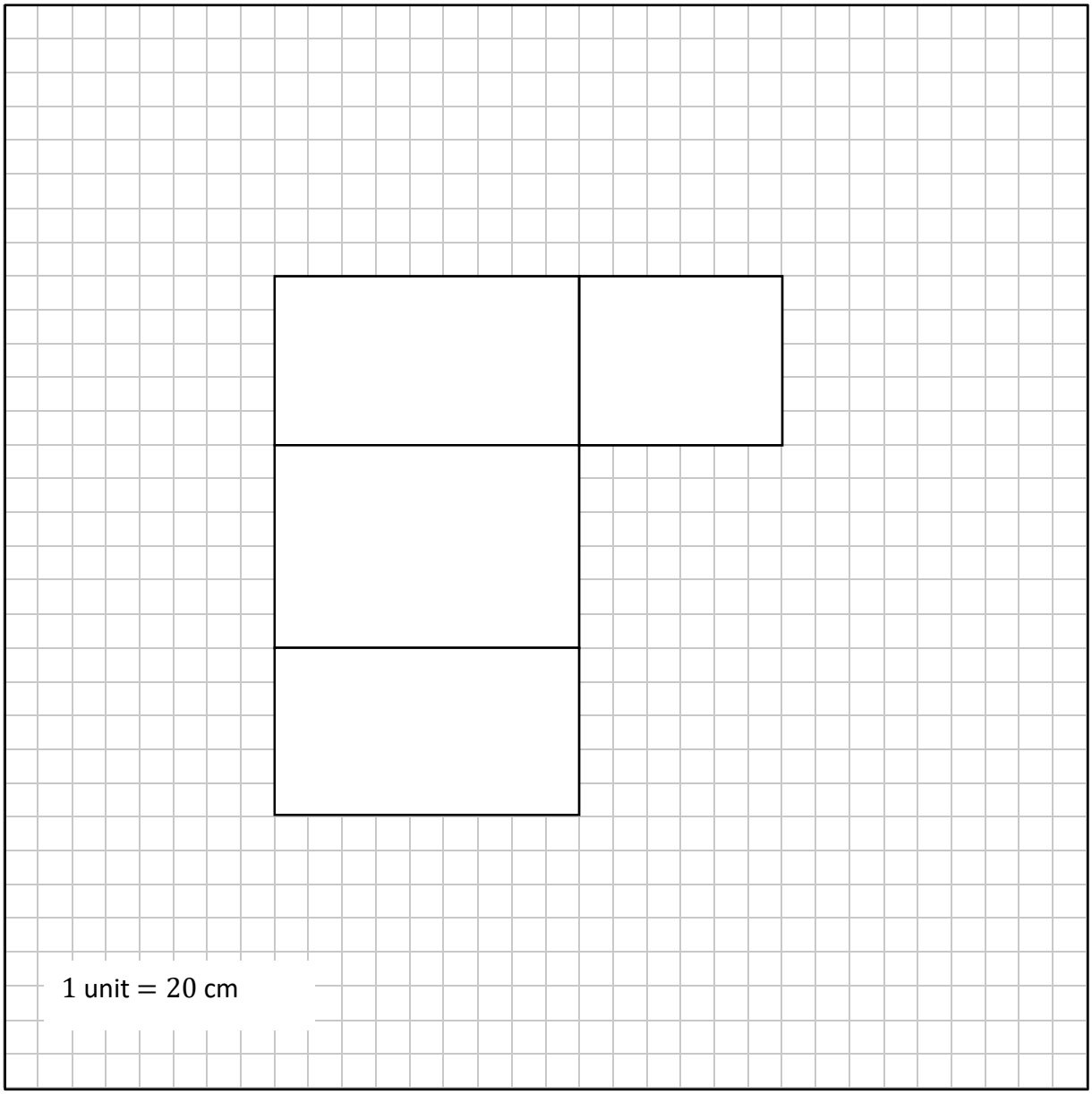
Length: _____ Width: _____

(b) Ellie decides to buy a hutch in the shape of a cuboid of length 180 cm, width 120 cm, and height 100 cm.



(i) Work out the **volume** of the hutch.

(ii) Complete the **net** of the rabbit hutch in the space provided below, as accurately as you can. There are 6 faces. Four of the faces are already drawn for you.



(iii) The original cost of this hutch was €189·99. This was **reduced by 21%** in a sale. Work out the sale price of the hutch. Give your answer correct to the nearest euro.

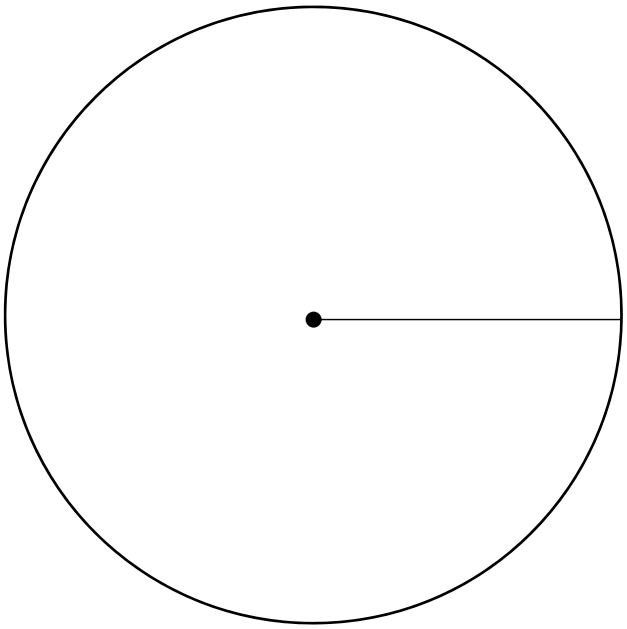
Question 3

Emma carried out a survey to find out how students in her school feel about changing from 40 minute classes to 1-hour classes. She selected a sample of 30 students to take part in the survey. The responses she received are listed in the table below.

Response	Frequency
In favour of change	15
Not in favour of change	6
Undecided	9

(a) Complete the **pie chart** below to show the data in the table above.
Label each sector **and** the size of the angle clearly.

Work out the degrees
for each sector.
Show your working out:



(b) The 30 students that Emma selected were from 6th year. Later Emma realised that she had not chosen a **representative sample**.
Suggest one way that Emma could have ensured that her sample was **representative of all students in her school.**

Question 4

A group of 5th year students are planning a class trip for **74 students**. They are exploring two different venues: a Trampoline Park and a Climbing Centre.
The cost for each activity is listed below. The Trampoline Park charges a rate per person, while the charge for the Climbing Centre is based on the number of instructors required.

Trampoline Park	Climbing Centre
90 mins Bouncing **€11 per person**	90 minutes Climbing **€60 per instructor** Each instructor can take up to **6** students

(a) **(i)** Work out the cost of a trip for 74 students to the **Trampoline Park**.

(ii) Show that the cost of a trip for 74 students to the **Climbing Centre** is €780.

The students decide to visit the Climbing Centre. Some additional information about the trip is listed in the table below.

- Climbing gloves are compulsory and cost an additional €2 per person
- The students will receive a donation of €170 from the Parents' Association towards the cost of their trip
- Transport to and from the venue will cost €350 in total
- The students hosted a bake sale and raised €182

They prepare a budget to help them work out how much they will need to charge each student.

(b) **(i)** Use the information on the previous page to help you complete the budget.
Add in the **Parents' Association Donation**, **Climbing Gloves**, **Fundraising,** and **Transport**. Work out the **total income** and **total expenditure**.
The charge for the Climbing Centre is already included.

Budget			
Income	€	**Expenditure**	€
		Charge for Climbing Centre	780
Total Income		**Total Expenditure**	

(ii) Based on your calculations, work out the **deficit** in their budget.

(iii) By considering the **deficit**, work out the **cost per student** for the trip. Remember there are 74 students going on the trip. Give your answer to the nearest euro (€).

Question 5

CyberSafeIreland carried out a survey into the online activity of children in Ireland in 2019.

3867 children were surveyed. Of these, 92% owned their own smart device.

(a) According to their survey, how many of the children surveyed **did not own** their own smart device in 2019? Give your answer correct to the nearest whole number.

CyberSafeIreland also made the following claim:

'Children spend the equivalent of 61 full days a year online'

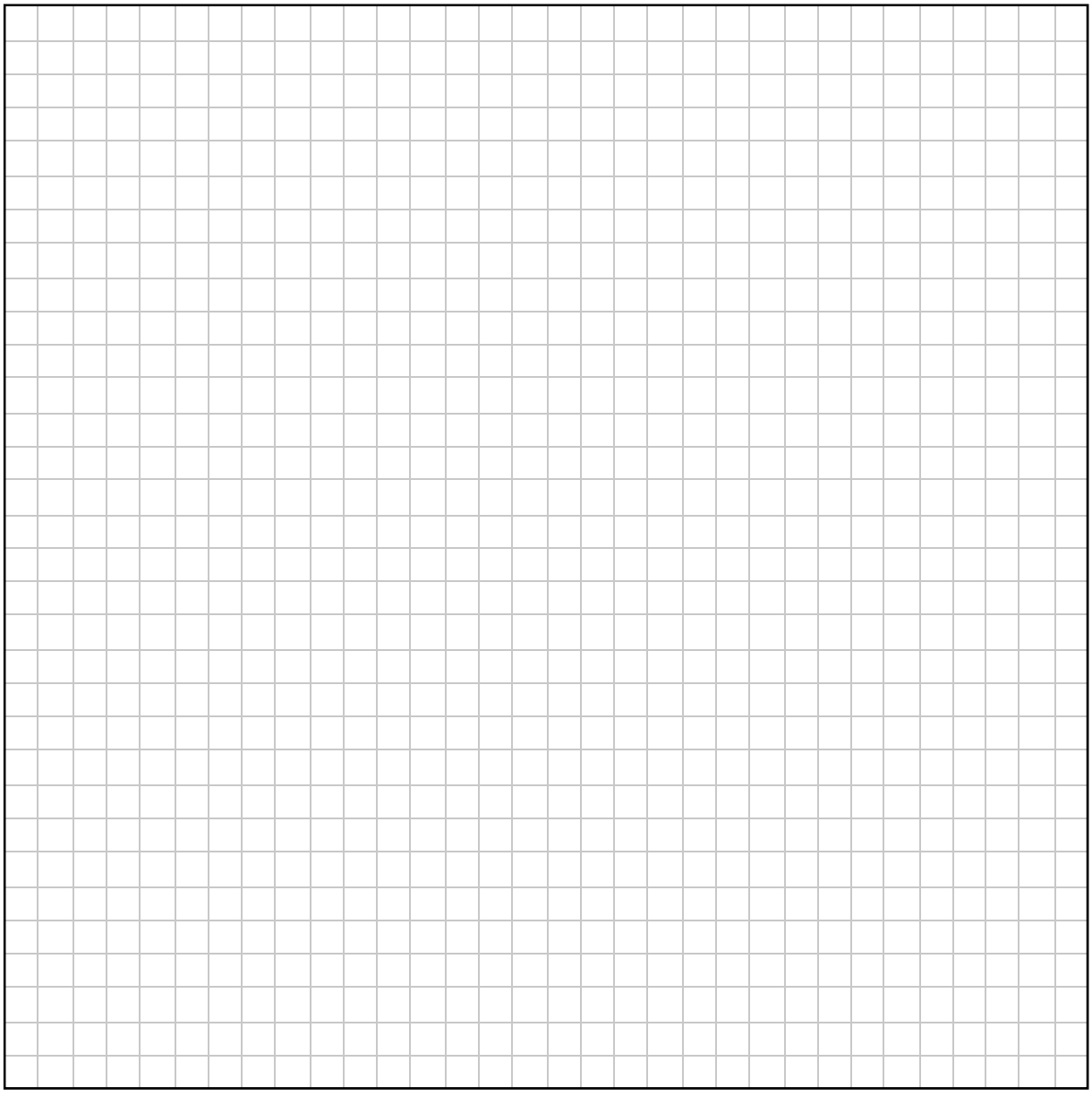
(b) **(i)** How many **hours** are there in 61 days?

(ii) Using your answer from part **(b)(i)**, work out, on average, how long CyberSafeIreland claim the children spend online **each day**.
Give your answer in **hours**, correct to the nearest hour.
You can assume a year has 365 days.

(c) Another organisation published a report in 2021 which highlighted trends amongst children and young people during the academic year 2020/2021. They collected data on the most popular apps amongst survey respondents. The table below shows the percentage of respondents who used each app listed.

	YouTube	TikTok	Snapchat
Viewing videos	74%	47%	37%
Posting videos	16%	80%	30%

Draw a graph (or graphs) to help compare the results for the various apps. Show any relevant working out. Label your graph(s) clearly.



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(d) The table below gives information gathered by a school about the amount of time $8 – 12$ year olds are allowed to spend online.

(i) Complete the table by filling in the missing percentages.

Time allowed online	Percentage in 2019	Percentage in 2022
Never allowed	14	3
Rarely allowed	24	
At weekends for an agreed amount of time		20
At weekends for as long as I want	12	28
I can go online whenever I want	24	42
Total	**100**	**100**

(ii) Sorcha says 'Children are allowed to spend more time online in 2022 than they were in 2019'. Do you agree or disagree with Sorcha?

(Tick (✓) **one** box only) Agree ☐ Disagree ☐

Give **one** reason for your answer.
Use data from the table above to support your argument.

Reason:

Question 6

Jamie has signed up for an exercise class. Before his first class he had to provide his height in metric units. Jamie is 5 feet 11 inches tall.

(a) Complete Jamie's sign-up sheet by adding his height in **centimetres.**
Give your answer correct to the nearest centimetre.

Conversion Chart	Sign Up Sheet	
• 5 feet 9 inches = 1·7526 m • 5 feet 10 inches = 1·778 m • 5 feet 11 inches = 1·8034 m • 6 feet 0 inches = 1·8288 m	**Name**	Jamie O'Dwyer
	Date of Birth	10th February 1995
	Weight	82 kg
	Height	

Two payment options available for these classes are shown below.

Pay as You Go	Pay in Advance
€15 per class	€115 for 12 classes

(b) Jamie attends 12 classes. **How much does he save in total** by paying in advance?

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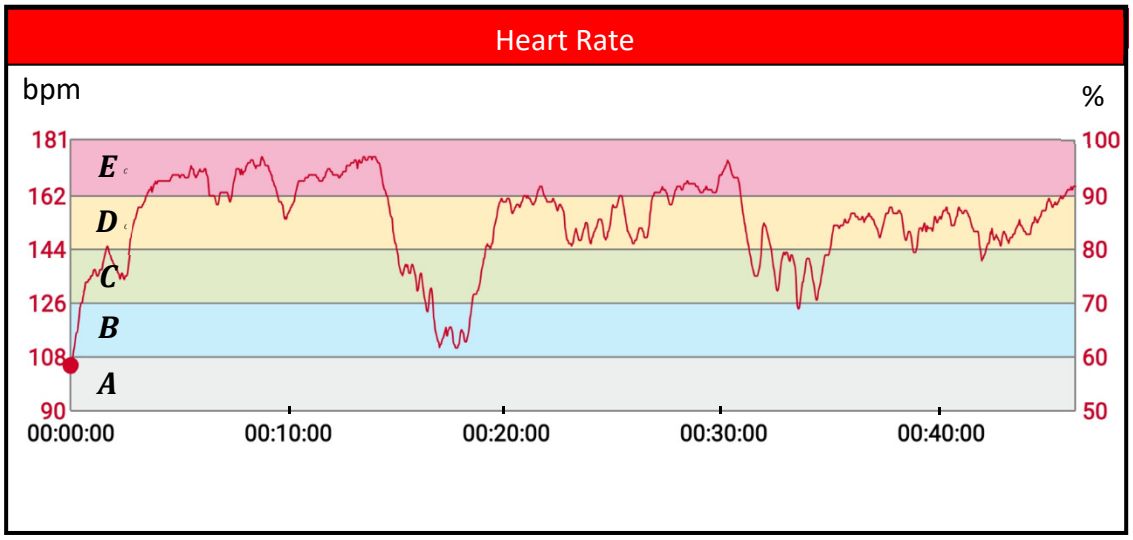
During each class Jamie wears a monitor that tracks his heart rate in beats per minute (bpm). The results for one class are shown on the graph below.



(c) At the beginning of the class Jamie's heart rate was 105 beats per minute (bpm).

(i) Use the graph above to find an **estimate for his maximum heart rate** during the class.

(ii) Tick the correct box to describe which **Zone** Jamie's heart rate was in **after 24 minutes.**

Grey Zone **A** 90 – 108 bpm	Blue Zone **B** 109 – 126 bpm	Green Zone **C** 127 – 144 bpm	Yellow Zone **D** 145 – 162 bpm	Pink Zone **E** 163 – 181 bpm
☐	☐	☐	☐	☐

Jamie receives a training summary at the end of each class, as follows:

	Class 1	**Class 2**	**Class 3**	**Class 4**
Duration (hrs:min:sec)	00: 47: 12	00: 46: 10	00: 47: 10	00: 45: 06
Max Heart Rate (bpm)	171	175	164	167
Min Heart Rate (bpm)	97	105	94	92
Average Heart Rate (bpm)	150	153	135	144
Calories Burned (kcal)	518	528	430	462

(d) Use the data from his first four classes to answer the following questions:

(i) Work out the **total amount of time** Jamie spent training during the four classes. Give your answer in **hours and minutes**, correct to the nearest minute.

(ii) Work out the **mean number of calories** burned by Jamie during the four classes.

Question 7

Mary recently started a new job with a travel agency. She is paid a basic wage of €11·30 per hour and also receives 5% commission on all sales.

(a) Complete the table below to work out Mary's total pay each week.

Week	Number of hours worked	Wages (€)	Total Sales (€)	Commission (€)	Total Pay (€)
1	34	384·20	5124	256·20	640·40
2	28		4856	242·80	
3	24	271·20	3079		
4	30	339	7960	398	737

(b) Mary is saving up for a deposit for her first home. She had €1000 in a bank account before she started working. Mary plans to save €200 at the end of every month.

Fill in the table below to show Mary's savings.

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Money Saved (€)	1200	1400			2000	

(c) Mary used some of her savings to go on a holiday to Dubai to visit some friends. She exchanged €500 into UAE Dirham. The exchange rate was €1 = 3·64 Dirham.

Work out how much money Mary got, in UAE Dirham.

(d) After some time Mary decides to transfer some of her savings to a deposit account.

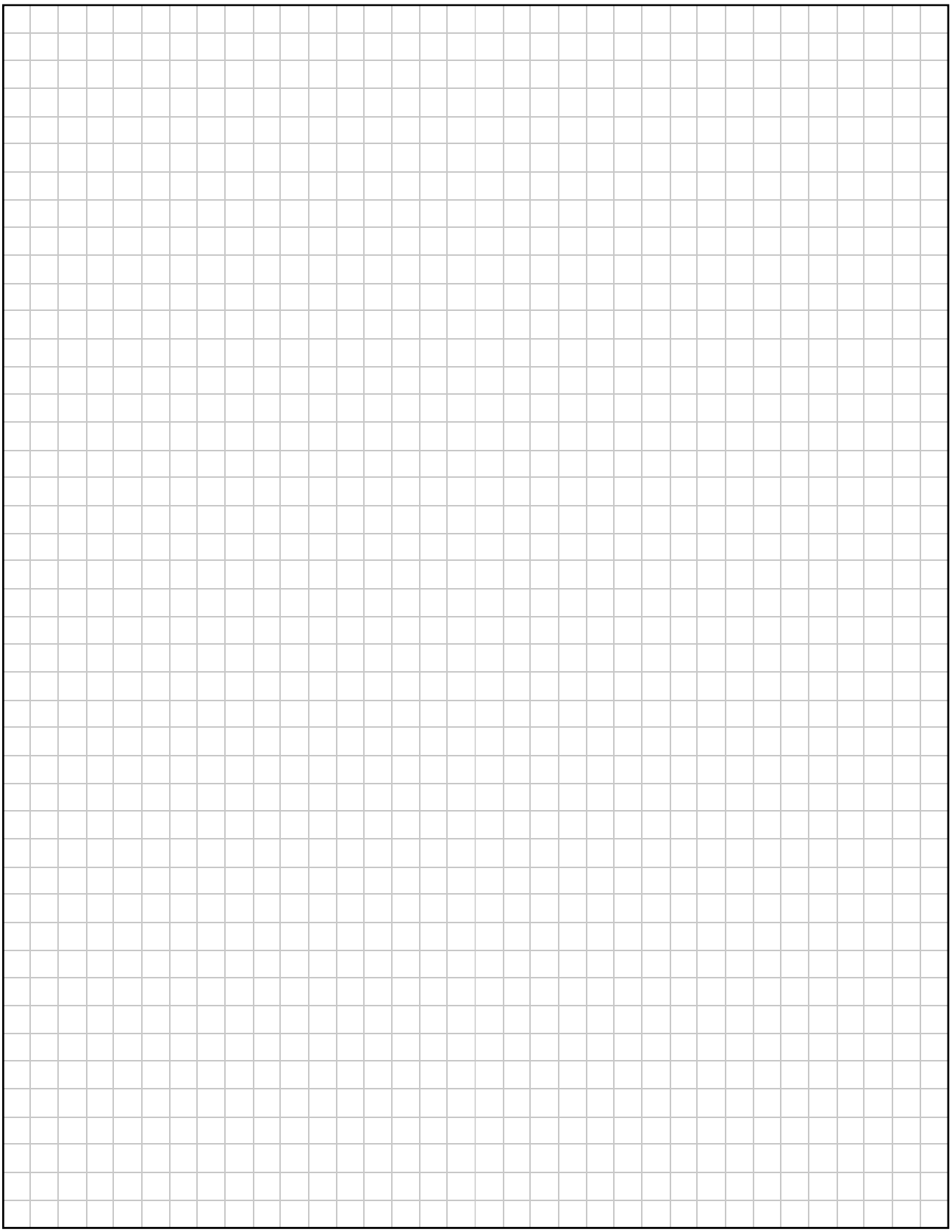
- She transfers €3000
- The rate is 4% per year
- She leaves the money in this account for 2 years

(i) How much money will Mary have in the account at the end of the first year?

(ii) At the end of the first year the interest is added on to Mary's €3000 and interest is then calculated for the second year.

How much money will Mary have in the account at the end of the second year.

Page for extra work.
Label any extra work clearly with the question number and part.



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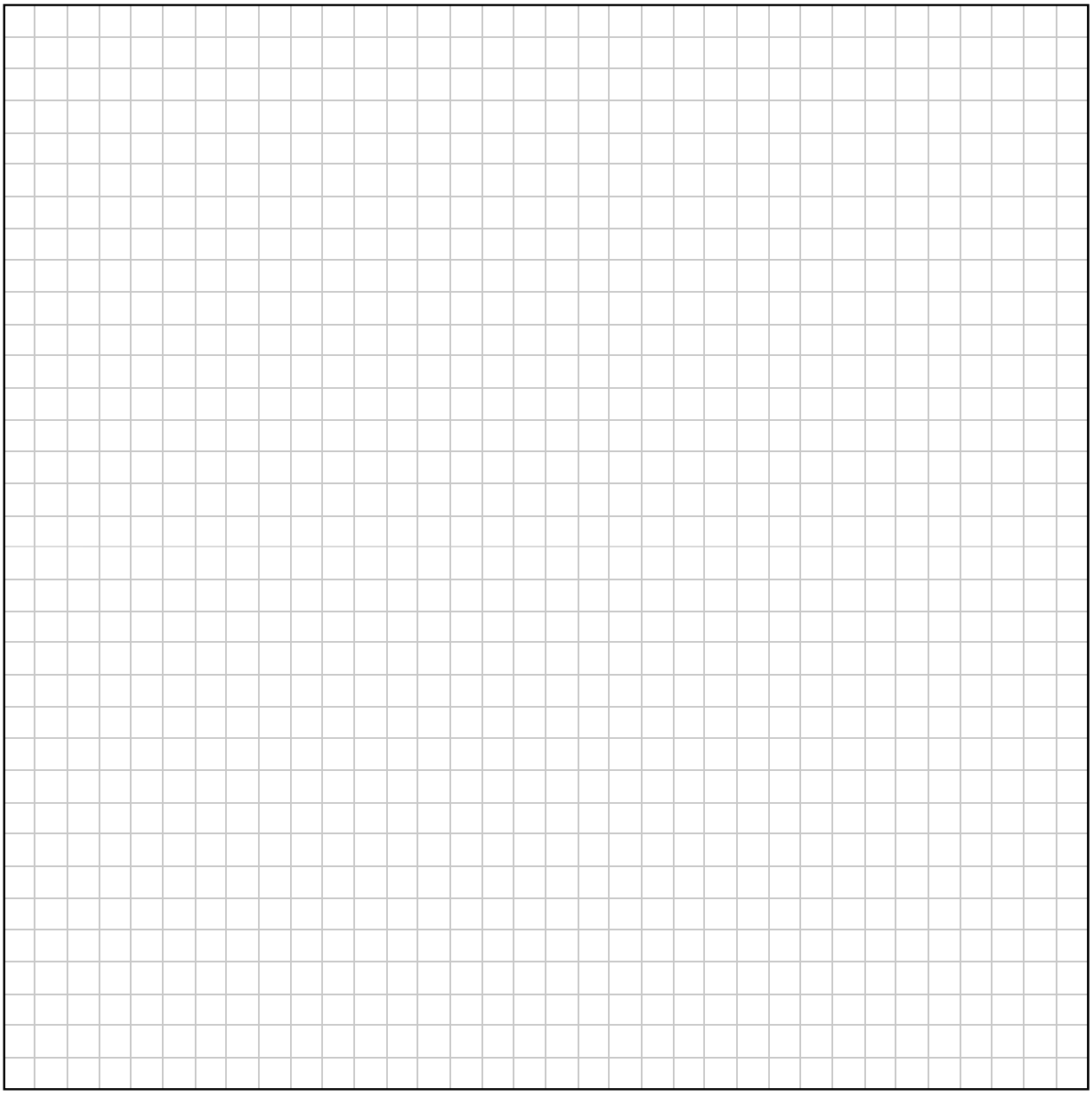

Acknowledgments

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