2020.M25

2020L003B1EL

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2020

Mathematics

Foundation Level

2 hours 30 minutes

300 marks

Examination Number

Day and Month of Birth

For example, 3rd February is entered as 0302

Centre Stamp

Do not write on this page

Instructions

There are **two** sections in this examination paper.

Section A	200 marks	8 questions
Section B	100 marks	2 questions

Answer all ten questions.

Write your examination number into the box on the front cover.

Write your answers in blue or black pen. You may use pencil in graphs and diagrams only.

This examination booklet will be scanned and your work will be presented to an examiner on screen. Anything that you write outside of the answer areas may not be seen by the examiner.

Write all answers into this booklet. There is space for extra work at the back of the booklet. If you need to use it, label any extra work clearly with the question number and part.

The superintendent will give you a copy of the *Formulae and Tables* booklet. You must return it at the end of the examination. You are not allowed to bring your own copy into the examination.

You will lose marks if your solutions do not include relevant supporting work.

You may lose marks if the appropriate units of measurement are not included, where relevant.

You may lose marks if your answers are not given in simplest form, where relevant.

Write the make and model of your calculator(s) here:

Section A — 200 marks

Answer **all eight** questions from this section.

Question 1 **(25 marks)**

(a) There are 3 prizes to be won in a raffle.
The first prize is €2500.
The second prize is €1000 and the third prize is €500.
The total printing costs amount to €400.

(i) Find the total cost of running this raffle.

(ii) A ticket in the raffle costs €10.
Find the number of tickets that must be sold in order to make a profit of €5000.

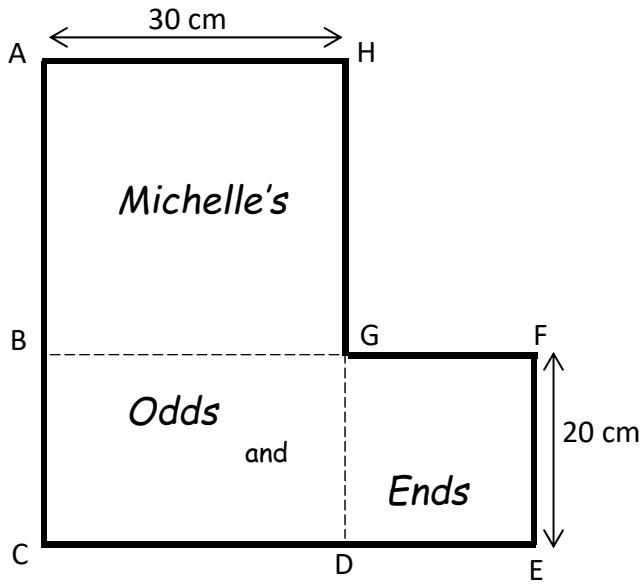
(b) Chris needs to buy oil for his lawnmower.
In a shop there is a 2 litre container of Oil A for sale at €15·50.
Also in the shop, a 0·5 litre container of Oil B sells at €4·49. This oil is on "Special Offer" so that, if he buys two 0·5 litre containers of oil, he will get a 15% discount.
What is the price per litre of the oil in each case?

Oil A:

Oil B:

Question 2 **(25 marks)**

Michelle wanted a metal sign, as in the diagram below, made for her shop.
ABGH and GDEF are squares of sides 30 cm and 20 cm, respectively.



(a) Find, in cm, the perimeter of the sign.

(b) Find, in cm^2, the area of the sign.

(c) The sign was cut from a square sheet of metal, 50 cm $\times$ 50 cm.
What **percentage** of the square sheet was used?

Question 3 **(25 marks)**

There are 30 students in a class.
Each student studies exactly one of the following languages: French, German, or Spanish.
The table below shows some of the class data.

	Boys	Girls	**Total**
French		4	15
German	2		8
Spanish		4	
Total	16		30

(a) Complete the table.

(b) **(i)** A student is chosen at random from the class.
What is the probability that the student studies Spanish?

(ii) A girl is chosen at random from the class.
What is the probability that she studies French?

Question 4 **(25 marks)**

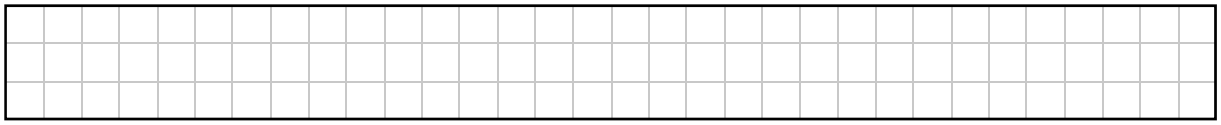
In the diagram on the next page, the points A, B, and C represent 3 towns.
Town A is 30 km due west of Town B.
The scale of the diagram is 1 cm = 5 km.

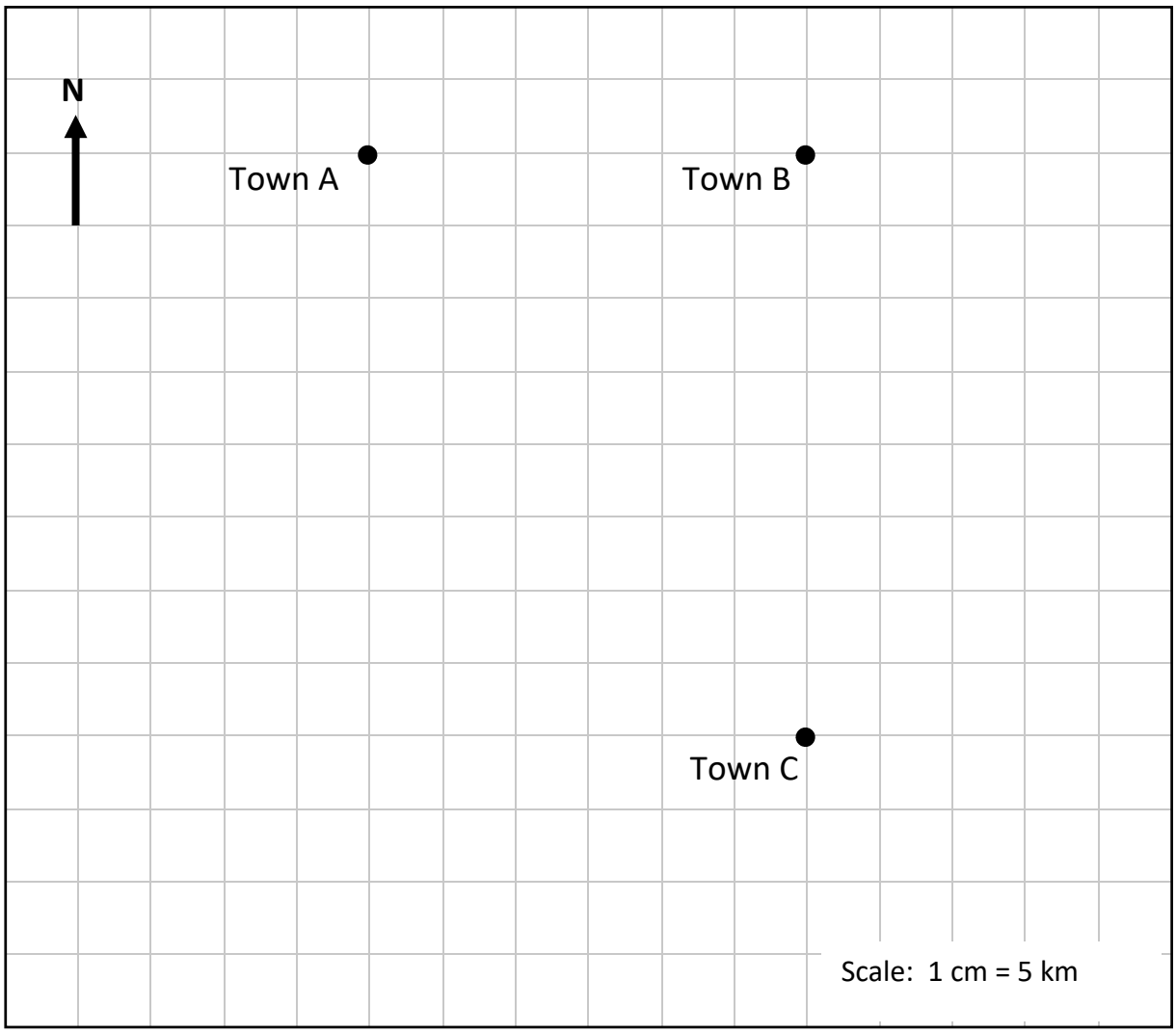
(a) **(i)** C is a point due south of B. Find, in km, the distance from Town B to Town C.

(ii) Use Pythagoras' Theorem to find the distance from Town A to Town C.
Give your answer in km.

(b) Rory and Aoife want to build a house for themselves.
Rory works in Town A and doesn't want to live more than 30 km away from Town A.
Aoife works in Town C and doesn't want to live more than 30 km away from Town C.

On the diagram below, draw and shade in the region where it would be possible to build a house that satisfies both of these conditions.

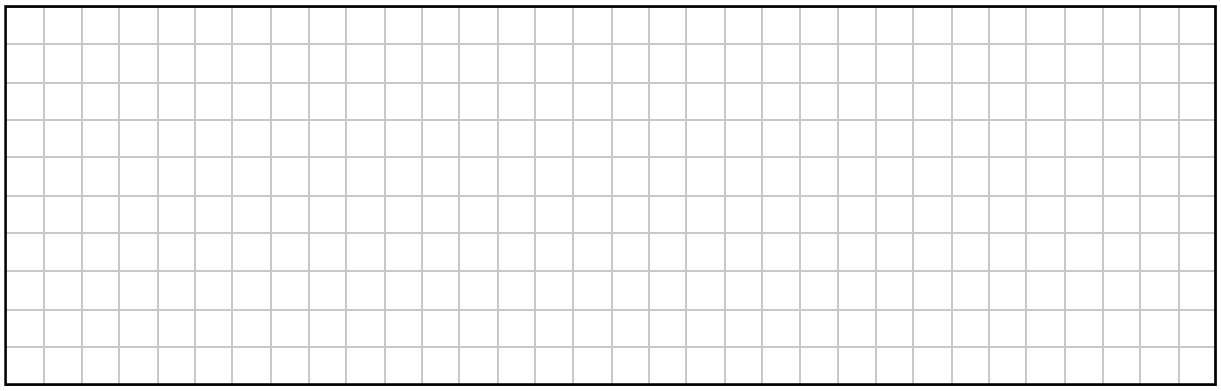




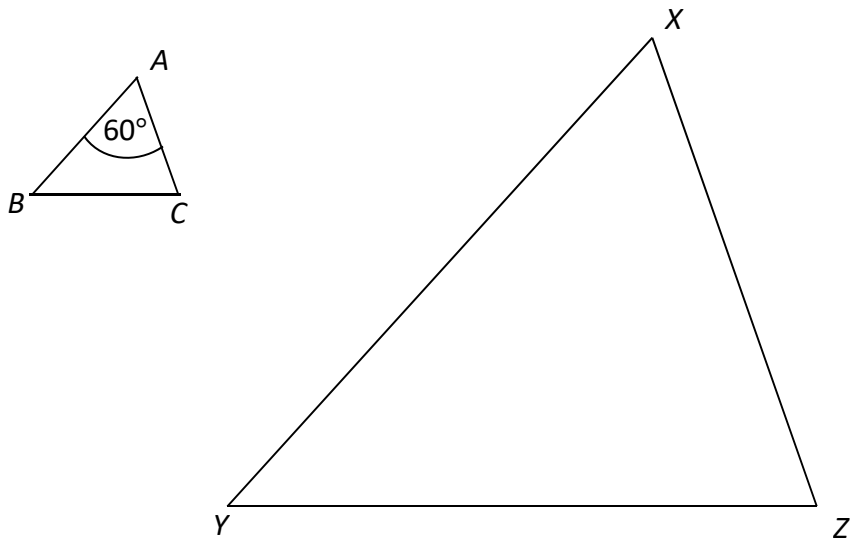
Question 5 **(25 marks)**

(a) Cliff has an aquarium (consisting of a tank, water and fish) at home.
He needs to know the weight of the empty tank, but does not want to remove the fish.
He weighs the tank when it is full of water and the weight is 11 kg.
He then removes water from the tank until it is exactly half full. The weight is now 7 kg.

What is the weight of the empty tank? (The weight of the fish is very small and can be ignored.)



(b) In the diagram below, $\triangle XYZ$ is the image of $\triangle ABC$ by an enlargement with a scale factor of 4. (The diagram is not to scale.)



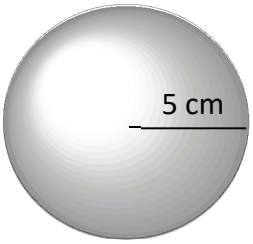
(i) $|AB| = 2$ cm. What is $|XY|$?

(ii) $|\angle CAB| = 60°$. What is $|\angle ZXY|$?

(iii) The area of $\triangle ABC$ is $1{\cdot}5$ cm^2. What is the area $\triangle XYZ$?

Question 6 **(25 marks)**

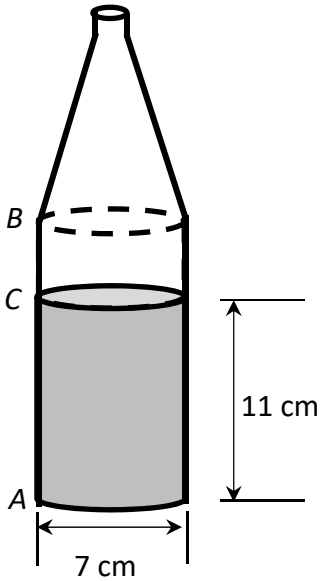
(a) A **sphere** of radius 5 cm is shown in the diagram below.



(i) Find the **volume** of the sphere correct to the nearest cm^3.

(ii) Find the **surface area** of the sphere correct to the nearest cm^2.

(b) The bottle in the diagram below contains 600 cm^3 of juice when it is full.
The bottom portion (from A to B) is in the shape of a cylinder of **diameter** 7 cm.
Carla pours some of the juice into a glass. The height of the juice remaining in the bottle is 11 cm, as shown. How much juice did Carla pour into the glass?
Give your answer correct to the nearest cm^3.



Question 7 **(25 marks)**

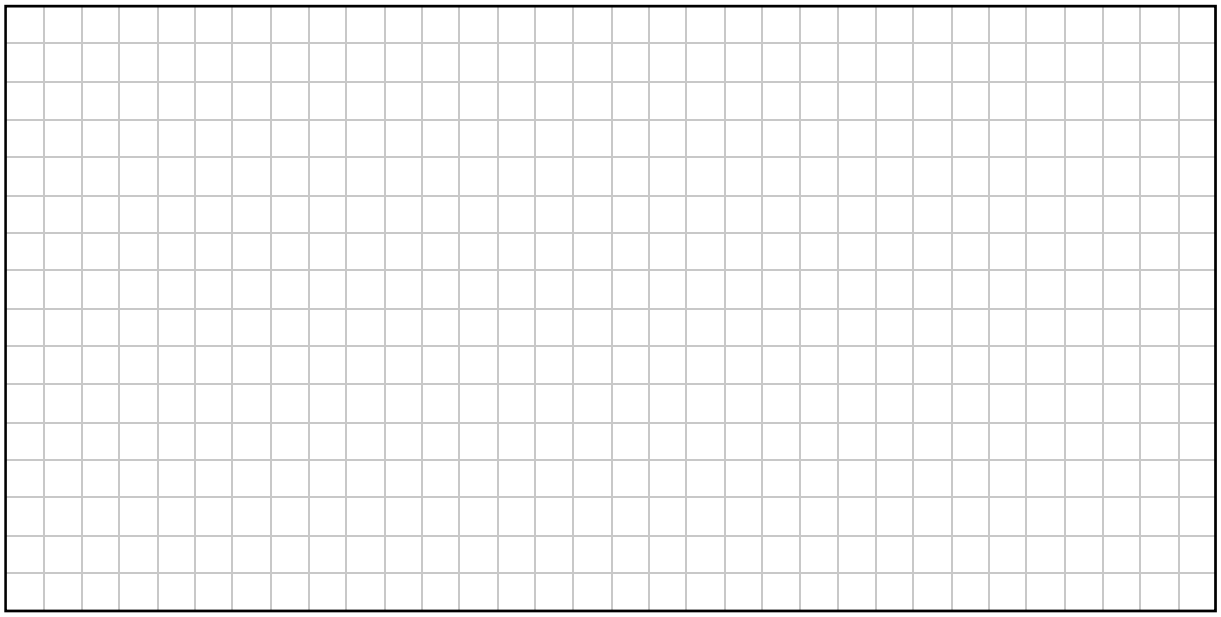
(a) Valerie earns €635 each week. She pays income tax at the standard rate of 20%.

(i) Find Valerie's gross tax per week.

(ii) She has a tax credit of €62 per week. Find her net tax.

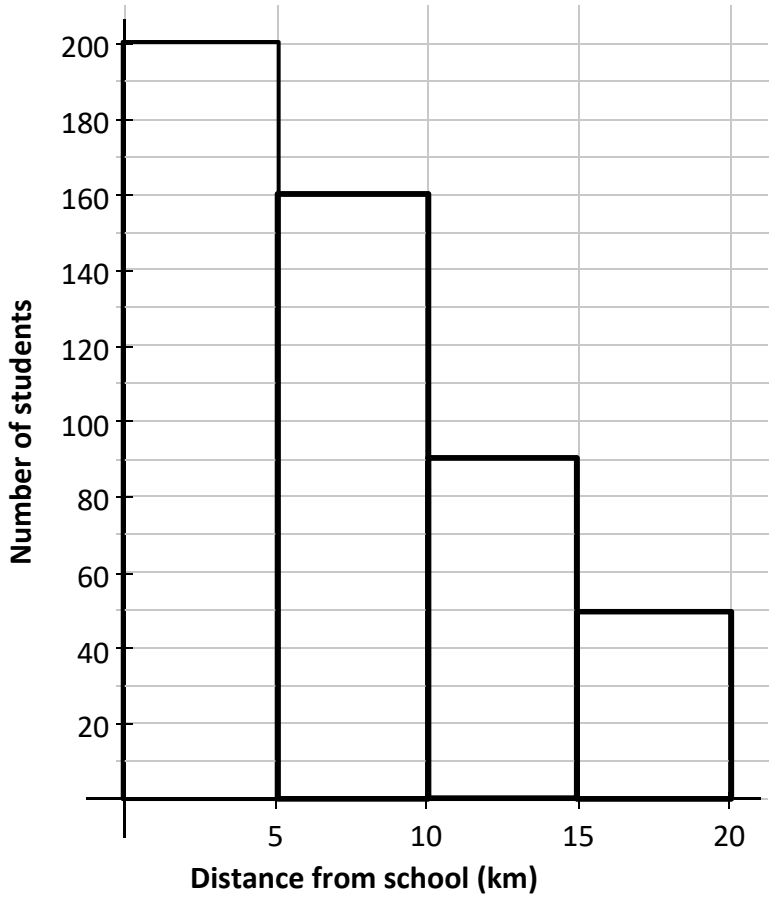
(iii) She also pays PRSI of €11·50 and USC of €18·80 per week.
Find Valerie's weekly take-home pay.

(b) Sonya also earns €635 each week. Her take-home pay is €533·40.
What percentage (%) of €635 is her take-home pay?



Question 8 **(25 marks)**

Students in a class did a survey on the distance (to the nearest km) that each student in the school travelled from their home to reach the school. The data is displayed in the histogram below.



(a) **(i)** Use the data shown in the histogram to complete the table.

Distance from school (km)	0 – 5	5 – 10	10 – 15	15 – 20
Number of students	200			

(Note: 5 – 10 means 5 km or more, but less than 10 km, etc.)

(ii) How many students are in the school?

(iii) What fraction of the students live between 5 km and 15 km from the school?

(b) Jamie did a quick survey among some of his classmates.
He surveyed 7 students about the distance they travelled to school.
They each gave **different** answers.
He put the numbers **in order** in the boxes below.
The median distance was 7 and the range was 15.

Use this information to fill in the missing distances in the boxes below.

1	5			14		

Section B — 100 marks

Answer **Question 9** and **Question 10** from this section.

Question 9 **(50 marks)**

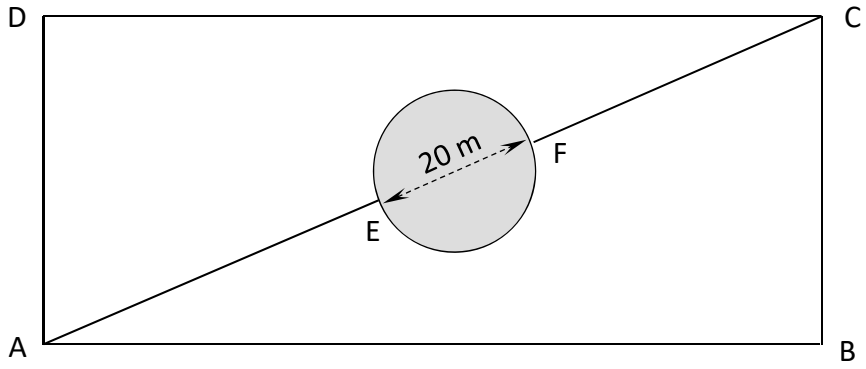
Laura lives in Sligo with her parents and twin brothers.

(a) The sum of the ages of Laura and her twin brothers is 44 years.
In 6 years' time each of the twins will be 20 years old.
What age will Laura be in 6 years' time?

(b) Laura's family plan to travel to Dublin for the day. Laura must decide what to wear.
She can choose from 5 tops, 3 pairs of jeans, and 2 pairs of runners.
How many different outfits (a top and a pair of jeans and a pair of runners) can she choose for her trip?

(c) The family leave their home at 7:20 am and arrive in Dublin at 9:50 am.
The distance from Sligo to Dublin is 210 km.
What is their average speed, in km/h, for the journey?

(d) While in Dublin, they visit a small rectangular park with a circular pond in the centre.
The pond is 20 m in diameter.
The length of the diagonal [AC] (the straight line from A to C) is 130 m.
The lines on the diagram below show all the paths in the park.



(i) Laura and her parents walk through the park from A to E, then around the pond from E to F and continue on to C.
How far did they have to walk? Give your answer correct to the nearest metre.

(ii) The distance from A to B is 120 m. Find the distance from B to C.

Question 10 **(50 marks)**

There are 2 fuel tanks, Tank A and Tank B, on a factory site.

(a) In the diagram drawn on the next page, the line shows the amount of fuel in Tank A over a number of days. The tank is full at the beginning of day 0.

(i) How many litres of fuel are in Tank A when it is full?

(ii) After how many days is Tank A empty?

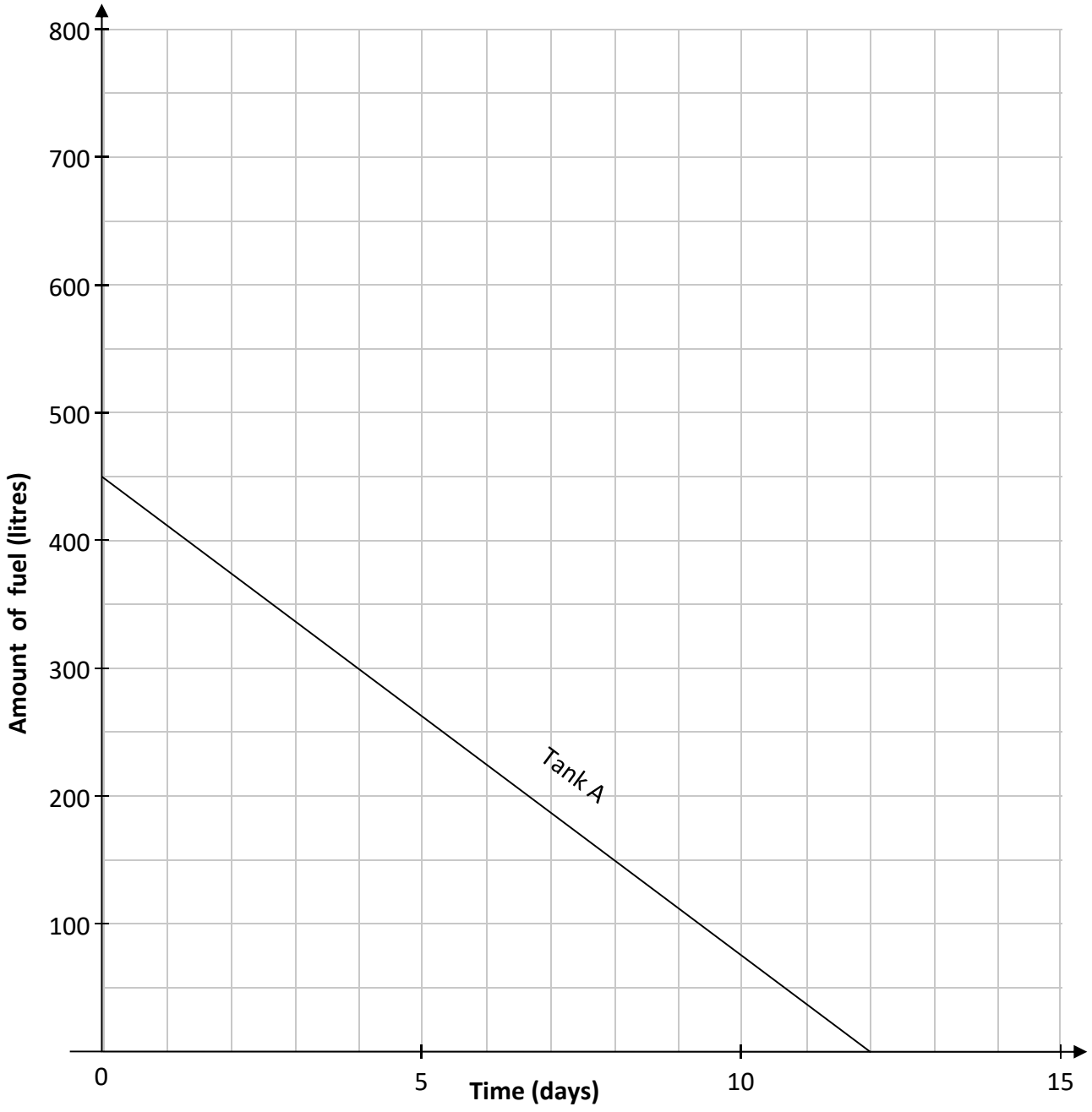
(iii) How many litres of fuel are used from Tank A each day?

(b) Tank B holds 800 litres, when full. This tank is also full at the beginning of day 0. Each day 100 litres of fuel from this tank are used.

(i) Complete the table below to show the amount of fuel remaining in the tank at the beginning of each of the following 8 days.

Time (days)	0	1	2	3	4	5	6	7	8
Amount of fuel (litres)	800								

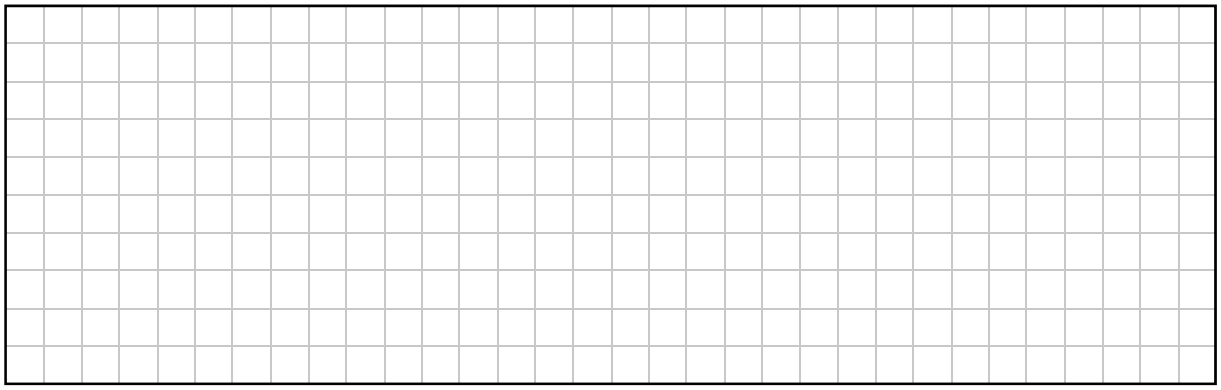
(ii) Plot all the points from the table on the diagram below and join them with a line.



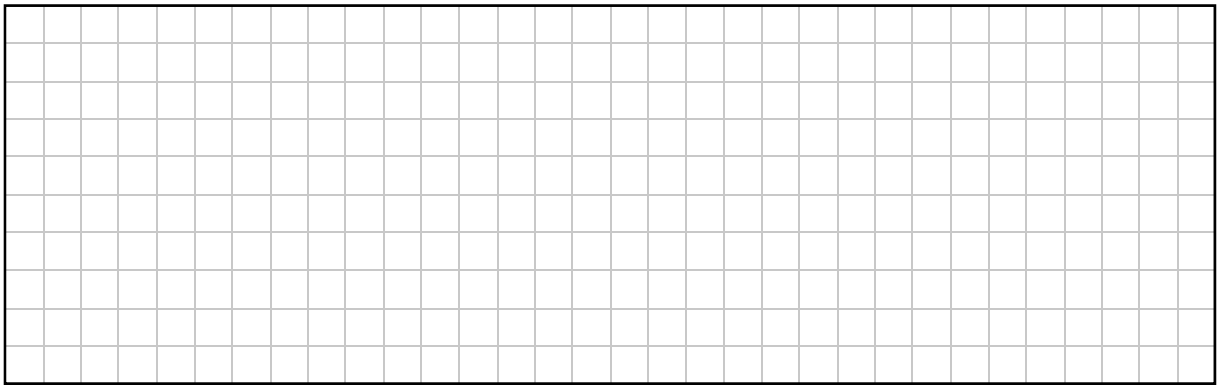
This question continues on the next page.

(c) Each tank is refilled as soon as it is empty.

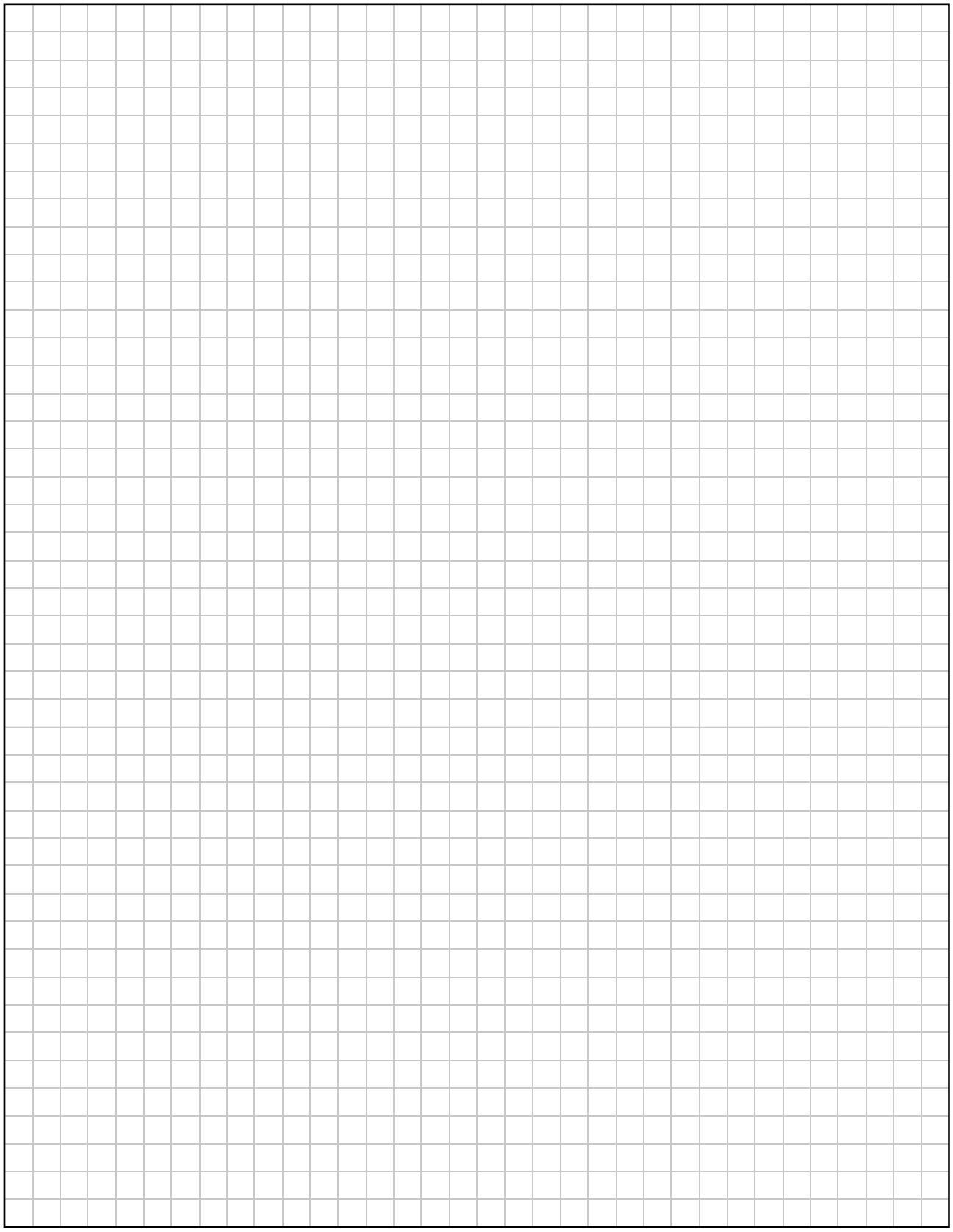
(i) If both tanks are full on day 0, how many days will pass until both tanks are empty together?



(ii) A refill of fuel for Tank B costs €738 which includes VAT at 23%.
How much is the VAT?



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



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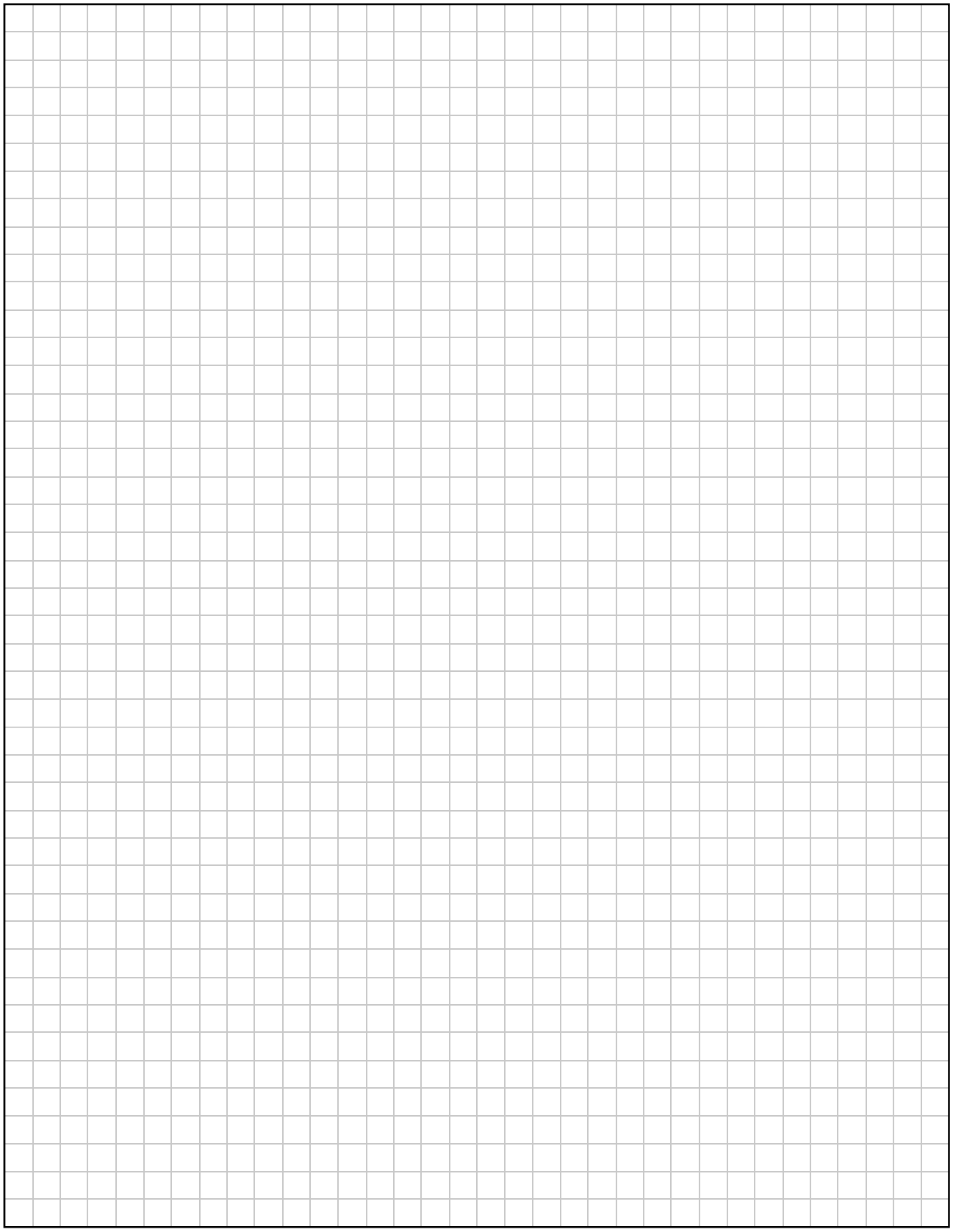

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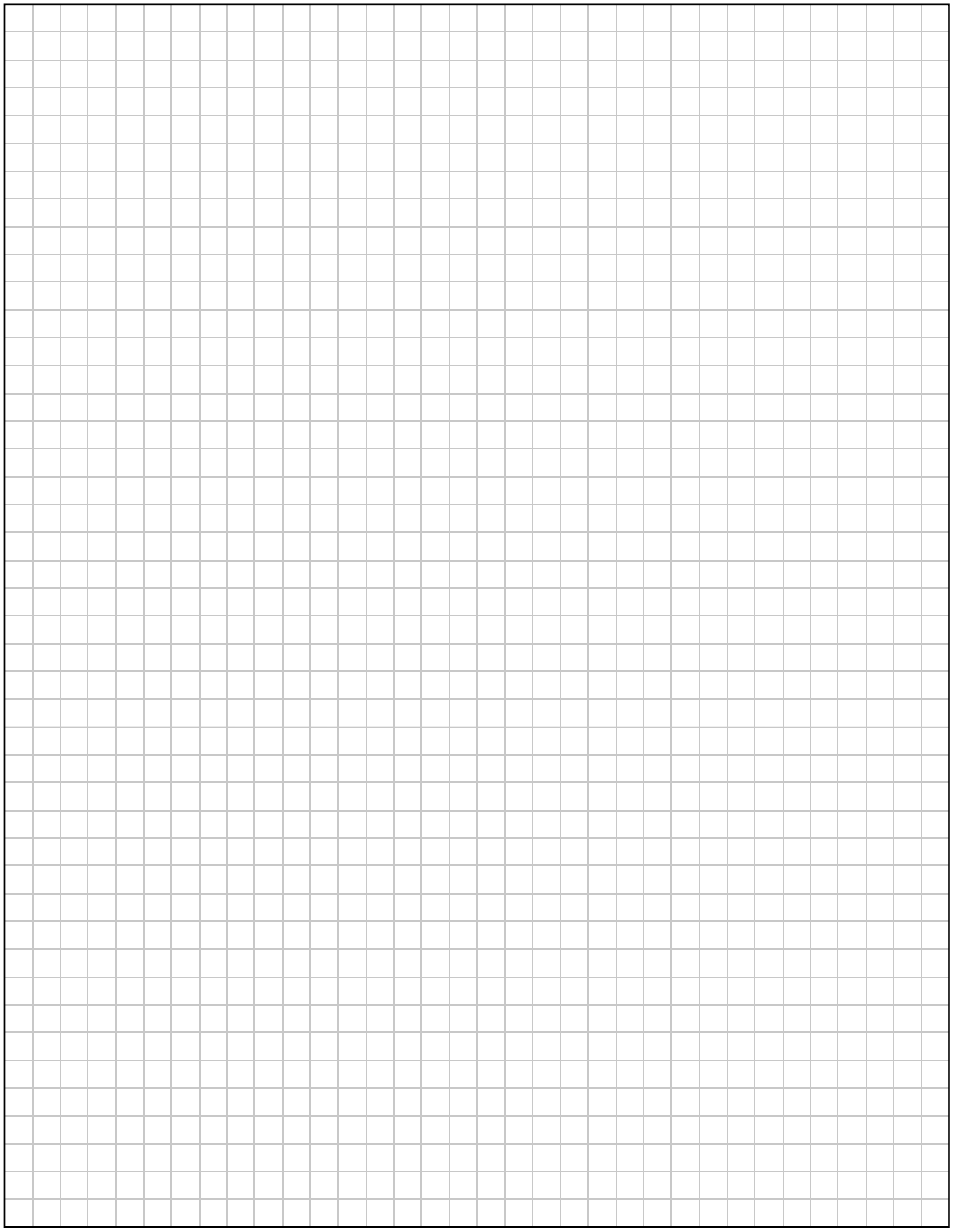

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Leaving Certificate – Foundation Level

Mathematics

2 hours 30 minutes