Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2016

Mathematics

Foundation Level

Friday 10 June   Afternoon 2:00 – 4:30

300 marks

Examination number

Centre stamp

Running total	

For examiner	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total	

Grade

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 answers in the spaces provided in this booklet. You may lose marks if you do not do so. There is space for extra work at the back of the booklet. You may also ask the superintendent for more paper. 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 you do not show all necessary work.

You may lose marks if you do not include appropriate units of measurement, where relevant.

You may lose marks if you do not give your answers in simplest form, where relevant.

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

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

Question 1 (25 marks)

(a) A bag contains 6 yellow discs, 7 blue discs and 14 red discs.
   (i) What is the total number of discs in the bag?

   (ii) A disc is picked at random from the bag. What is the probability that the disc is red?

   (iii) A disc is picked at random from the bag.
   What is the probability that the disc is yellow or blue?

(b) There are girls and boys in a class.
16 of the students in the class are girls.
9 of these girls play hockey.

   (i) A girl is selected at random from the class.
   What is the probability that this girl plays hockey?

   (ii) There are 28 students in the class. The remaining students are boys and 8 of these boys
   play hockey. A boy is selected at random from the class.
   What is the probability that this boy plays hockey?

   (iii) A student is selected at random from the class.
   What is the probability that this student does **not** play hockey?

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Question 2 **(25 marks)**

(a) The side of a square is 8 cm.

(i) Six of these squares have been put together to form the shape shown in the diagram. Find the length of the perimeter of the shape.

8 cm

(ii) The six squares are re-arranged as shown. Find the length of the perimeter of this new shape.

8 cm

(b) The surface area of a sphere is given by the formula $A = 4\pi r^2$, where r is the radius of the sphere.

(i) Taking π as 3 and r as 2 cm, estimate the surface area of the sphere in the diagram.

$A = 4 \times 3 \times 2^2 =$

(ii) The actual radius of the sphere in the diagram is 1·9 cm. Taking π as 3·142 and r as 1·9 cm find a more accurate estimate for the surface area of the sphere. Give your answer correct to one decimal place.

(iii) Find the difference between your answers in part **b(i)** and part **b(ii)** above.

Question 3 (25 marks)

(a) Carla left home at 12 noon for a bicycle ride. The graph represents part of her journey.

(i) At 12.45 p.m., Carla stopped for a rest. After the rest she continued her journey. How long did she stop for?

(ii) How far from home was she at 1.30 p.m.?

(iii) Carla stopped at 2 p.m. and rested for one hour.
She then cycled for 2 hours at a steady speed until she arrived back at her home.
Use this information to complete the graph above.

(b)   A, B, and C are towns. The town B lies on the road from A to C, as shown. The distance from A to C is 42 km. Aideen drives from A to C and then back to A. She completes this return journey 4 times each week.

(i)   What distance does Aideen travel in one week?

(ii)   Brian drives from B to C and back to B. He completes this return journey 5 times each week. Overall, each week, Brian drives 14 km more than Aideen.
Find the distance from A to B.

Question 4 **(25 marks)**

(a) A local supermarket had punnets of blackberries for sale. John counted the number of blackberries in each of 19 punnets. The stem-and-leaf diagram below shows the results.

Blackberries

1	8 9 9
2	0 0 1 3 5 6 6 8 8
3	0 1 2 2 2 3 4

Key: 2|5 = 25 Blackberries

(i) What is the median of the data?

(ii) What is the range of the data?

(b) The histogram below shows how much time people spent in a supermarket on a particular morning.

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

Time (minutes)	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Number of people	30				

(10 – 20 means 10 or more but less than 20, etc.)

(ii) How many people were in the supermarket on that morning?

(iii) What percentage of people spent 30 minutes or more in the supermarket?
Give your answer correct to the nearest percent.

(iv) What is the maximum number of people who could have spent 25 minutes or less in the supermarket?

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Question 5   **(25 marks)**

Rena wants to buy a new car. She intends to trade in her old car.
She has found three different options, A, B, and C.
Calculate what the new car will cost Rena for each of the options A, B, and C.

(a)   **Option A**

The new car will cost €20 100. In exchange for her old car, she will get a discount of $\frac{1}{3}$ on this price. How much will she have to pay?

(b)   **Option B**

The new car will cost €21 500. In exchange for her old car, she will get a 40% discount on this price. How much will she have to pay?

(c)   **Option C**

She trades in her old car. The new car will then cost €272·50 **per month** for 4 years. How much will she have to pay?

(d)   Which option should Rena choose if she wants to spend the least amount of money overall?

Question 6 **(25 marks)**

(a) Construct a triangle *ABC*, where $|AB| = 5$ cm, $|\angle ABC| = 90°$ and $|AC| = 8$ cm.

(b) Measure $\angle BAC$ on your diagram.

$|\angle BAC| =$

(c) Use Pythagoras' Theorem to find the length of $[BC]$.
Give your answer correct to one decimal place.

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Question 7 (25 marks)

The triangle *ADE* is the image of the triangle *ABC* by an enlargement with centre *A*.

(a) Measure the length of [*AB*] and the length of [*AD*].

|*AB*| = |*AD*| =

(b) Hence, or otherwise, find the scale factor of the enlargement.

(c) The area of Δ*ABC* is 3 square units. Find the area of Δ*ADE*.

(d) On the diagram above, draw the image of Δ*ABC* under an enlargement, with centre *A* and a scale factor of 3.

Question 8 (25 marks)

(a) (i) Find the value of $(12 - 2) \times (3 + 1)$.

(ii) Find the value of $12 - 2 \times 3 + 1$.

(iii) Add brackets to make the statement in the box below correct.

$$12 - 2 \times 3 + 1 = 4$$

(b) A computer game costs €55. If Chris and Ruairí put their money together, they would need another €12 to buy the computer game.

(i) How much money do they have between them?

(ii) Ruairí has €7 more than Chris.
How much money does Chris have?

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

Question 9   **(50 marks)**

(a) Áine is planning to fit new thermostatic valves to some of the radiators in her house. The graph shows the callout charge and the fixed rate charged per radiator by one company, *Thermolok*, for this work.

(i)   What is the callout charge?

(ii)   If the company fits valves to 6 radiators what will Áine have to pay?

(iii) How many valves would the company fit for €160?

(iv) If the company fits 8 valves, what will Áine have to pay?

(b) Another company, *Fixrad*, has no callout charge. *Fixrad* charges €60 per radiator.

(i) Complete the table to show the amounts charged by *Fixrad*.

Number of radiators	Charge (€)
0	
1	60
2	
3	
4	
5	
6	

(ii) Plot the *Fixrad* charges on the diagram in part **(a)**.

(iii) What is the point of intersection of the two graphs?

(iv) Áine decides to fit valves to 5 radiators. Which company should she choose if she wants to pay the least amount of money? Justify your answer by finding the amount she would save.

Company:

Amount saved:

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Question 10 (50 marks)

(a) A rectangular block with dimensions 4 cm, 2 cm, and 3 cm is shown below.
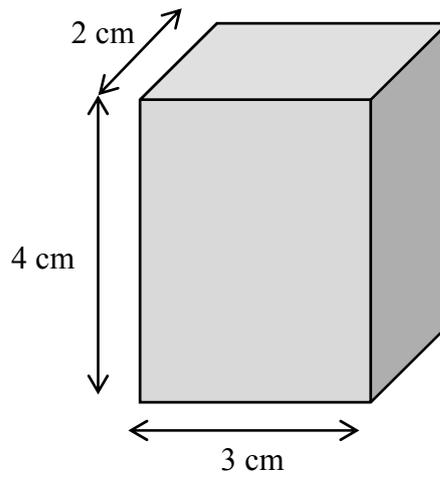
(i) Draw a net of the block on the grid below.
Mark in the dimensions on your net.

(ii) Hence, or otherwise, find the surface area of the block.
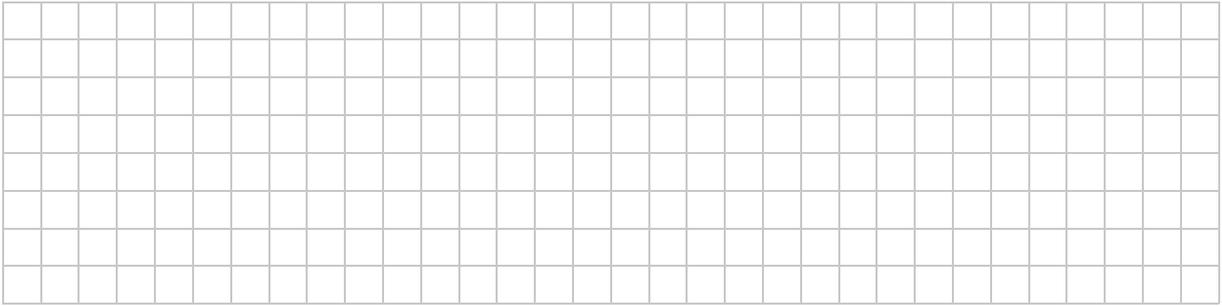
(iii) Find the volume of the block.
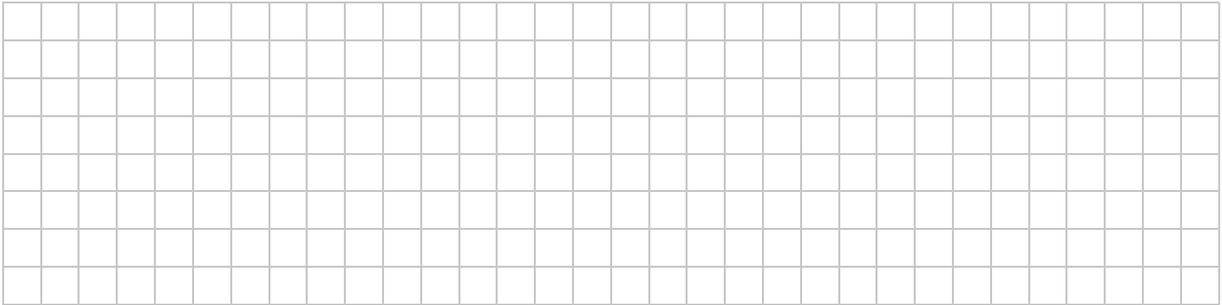
(b) A tube of toothpaste is in the shape of a cylinder with radius 1·6 cm and length 12 cm.

(i) Find the volume of toothpaste in the tube, correct to one decimal place.
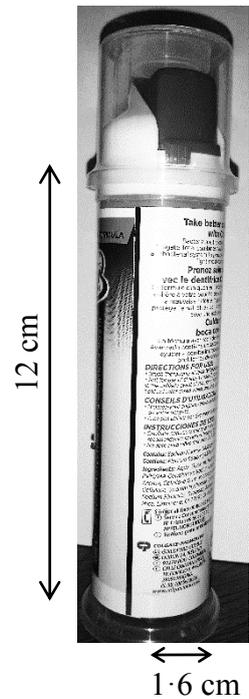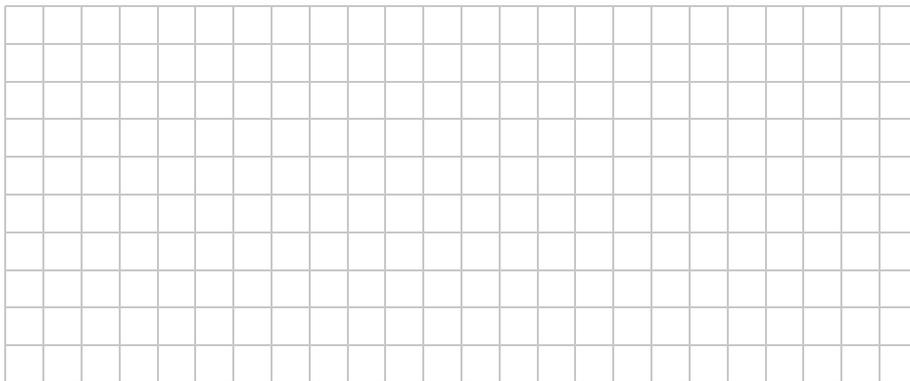
(ii) Each time Mary brushes her teeth she pumps approximately 0·5 cm³ of toothpaste onto her toothbrush.
How many times can Mary expect to brush her teeth from this tube of toothpaste?

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(c) A ladder is 4 metres long. It rests against a wall.
The base of the ladder is 1 metre from the base of the wall as shown in the diagram.
Safety regulations state that the angle (A) between the ladder and the ground should be approximately 76°.
Is it safe to use this ladder in the position shown in the diagram?
Use Trigonometry to justify your answer.

4 m

Ladder

A

1 m
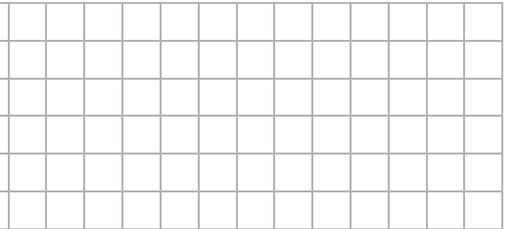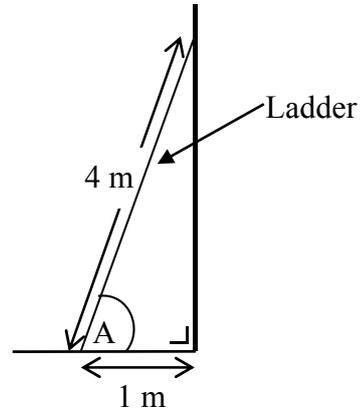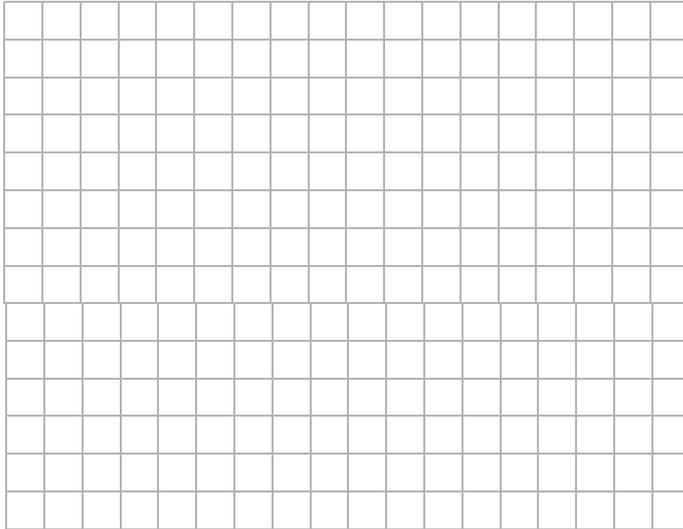
You may use this page for extra work.
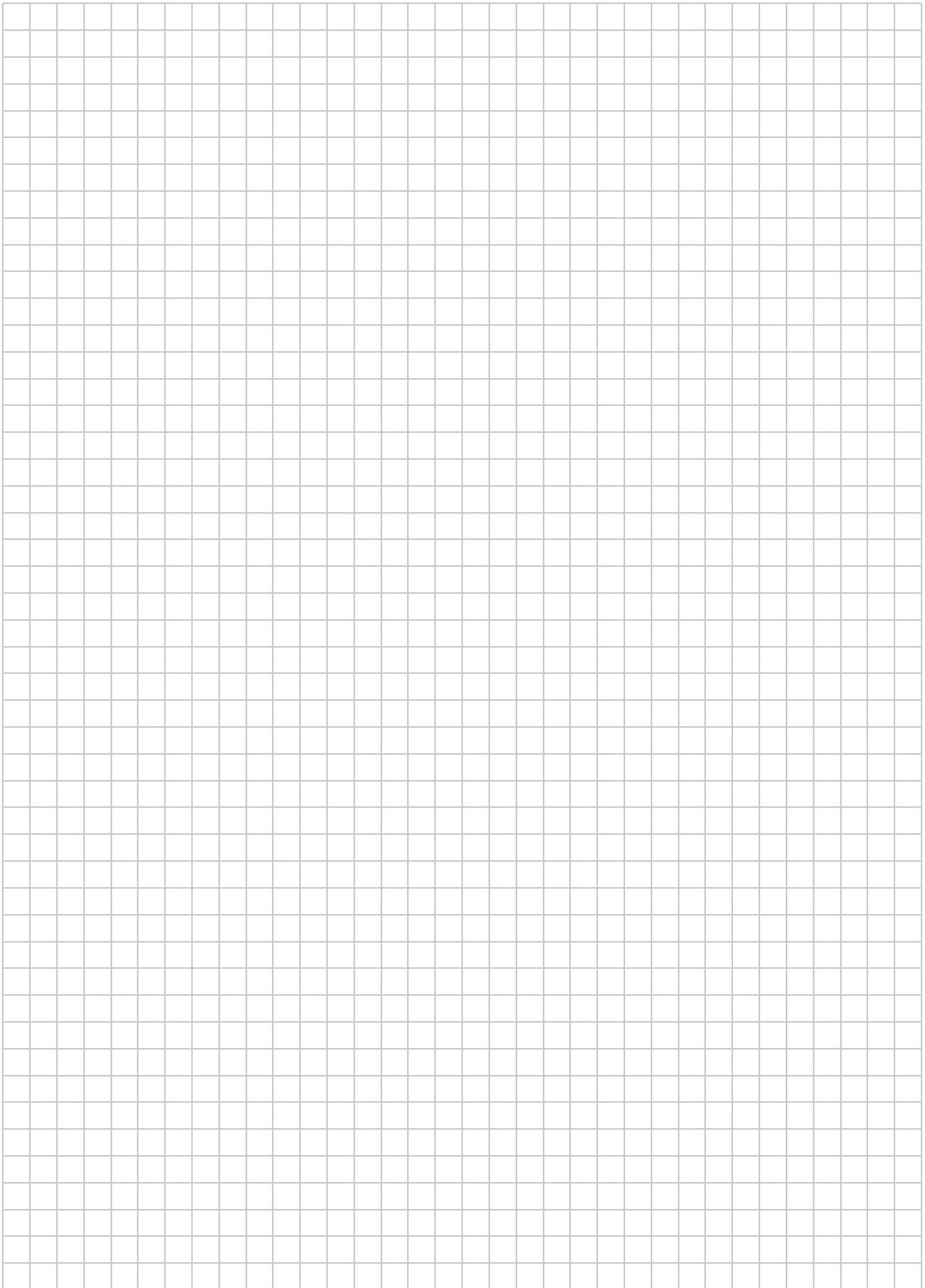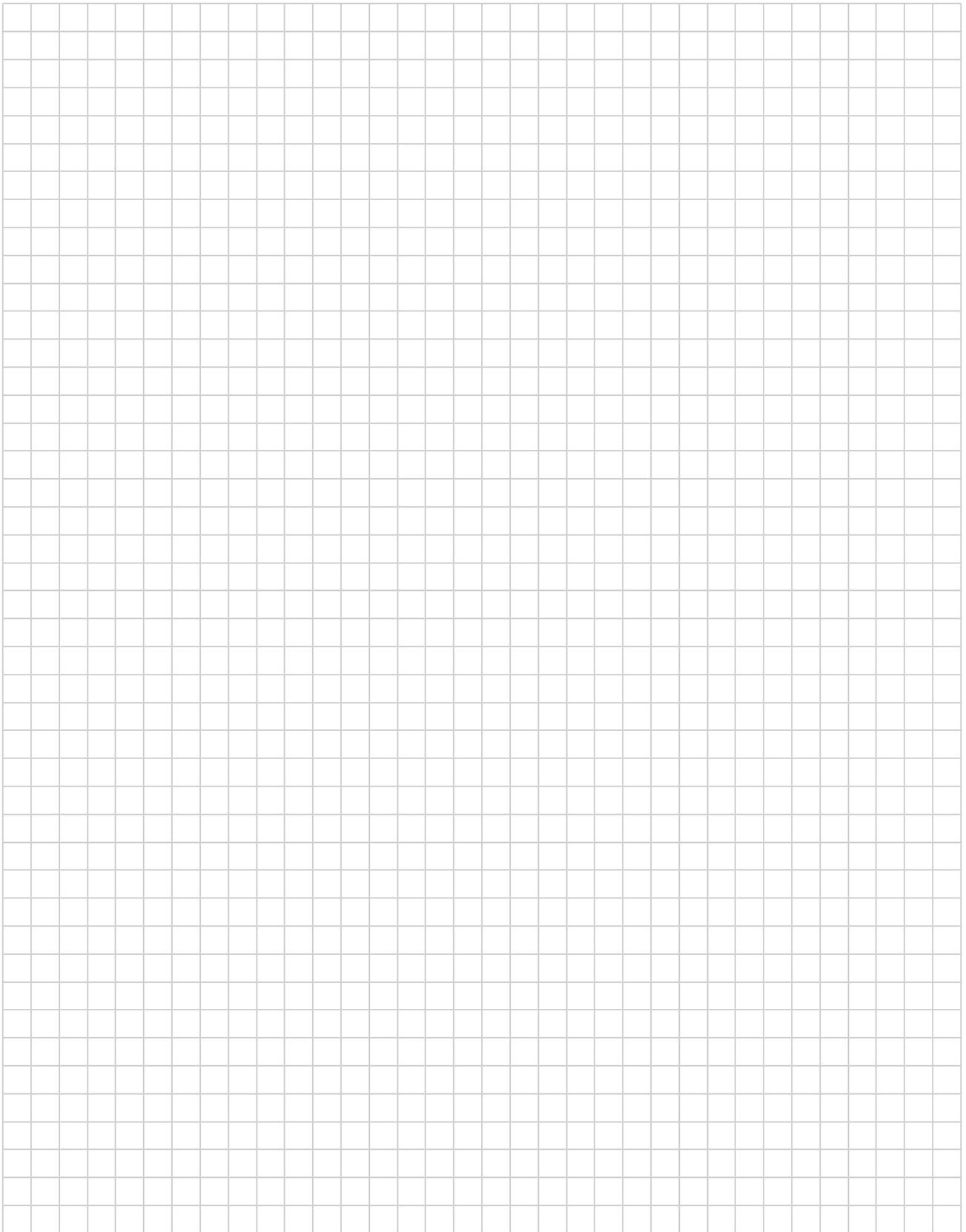
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