



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination, 2011

Mathematics (Project Maths – Phase 2)

Paper 2

Ordinary Level

Monday 13 June Morning 9:30 – 12:00

300 marks

Examination number

Centre stamp

Running total	
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For examiner	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
Total	

Grade

Instructions

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

Section A	Concepts and Skills	150 marks	6 questions
Section B	Contexts and Applications	150 marks	2 questions

Answer **all eight** questions, as follows:

In Section A, answer:

Questions 1 to 5 and

either Question 6A **or** Question 6B.

In Section B, answer Question 7 and Question 8.

Write your answers in the spaces provided in this booklet. 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 booklet of *Formulae and Tables*. You must return it at the end of the examination. You are not allowed to bring your own copy into the examination.

Marks will be lost if all necessary work is not clearly shown.

Answers should include the appropriate units of measurement, where relevant.

Answers should be given in simplest form, where relevant.

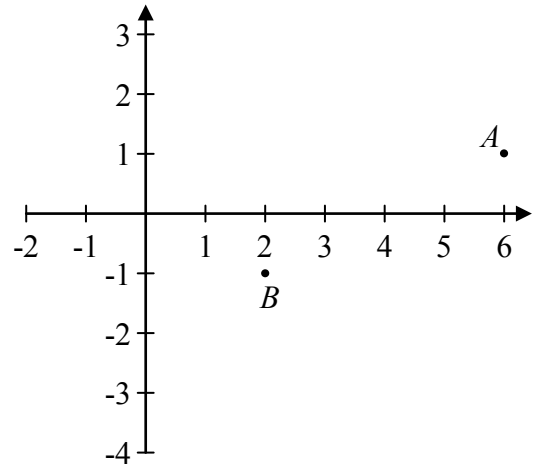
Write the make and model of your calculator(s) here:

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

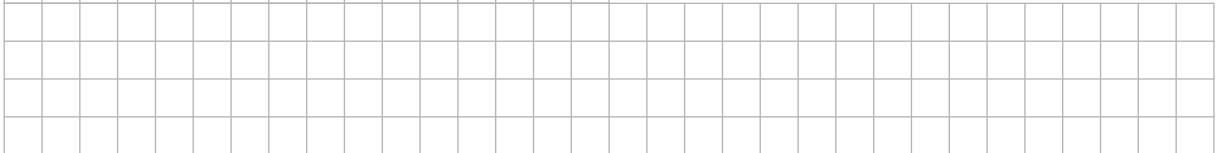
Question 1

(25 marks)

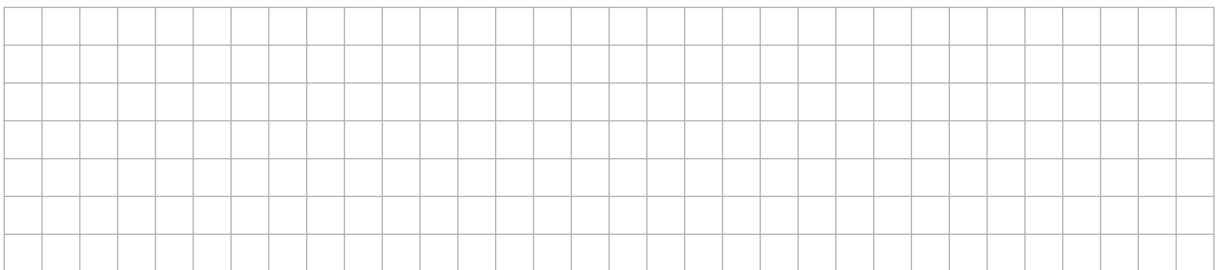
The points $A(6, 1)$ and $B(2, -1)$ are shown on the diagram.



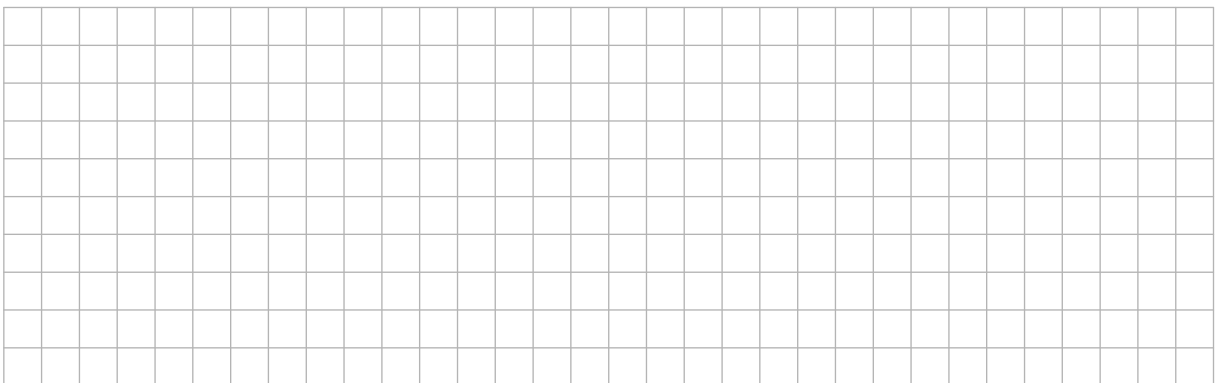
- (a) Find the equation of the line AB .



- (b) The line AB crosses the y -axis at C . Find the co-ordinates of C .



- (c) Find the ratio $\frac{|AB|}{|AC|}$, giving your answer in the form $\frac{p}{q}$, where p and q are whole numbers.



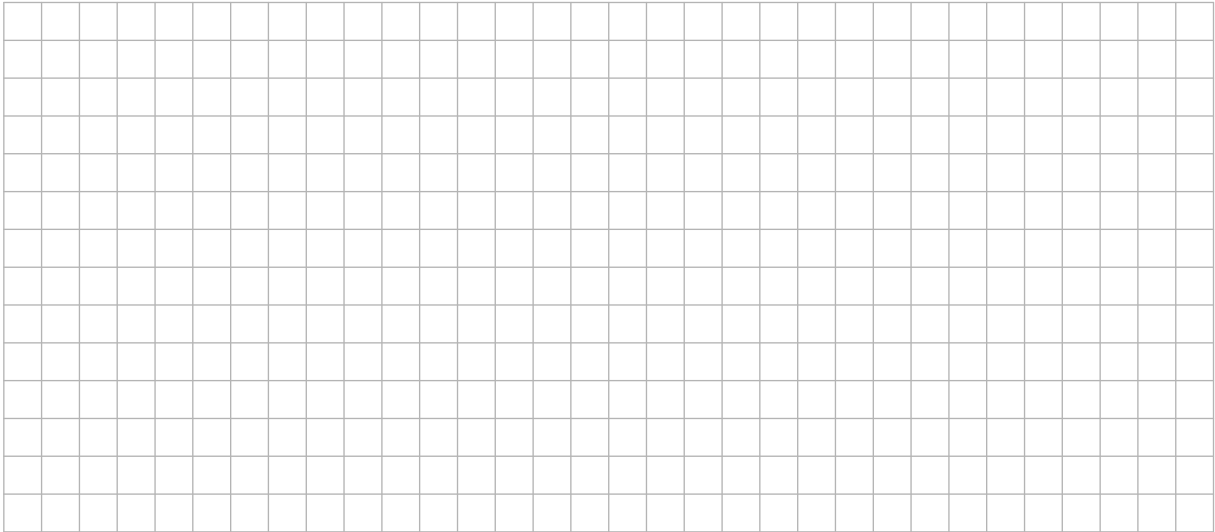
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Question 2

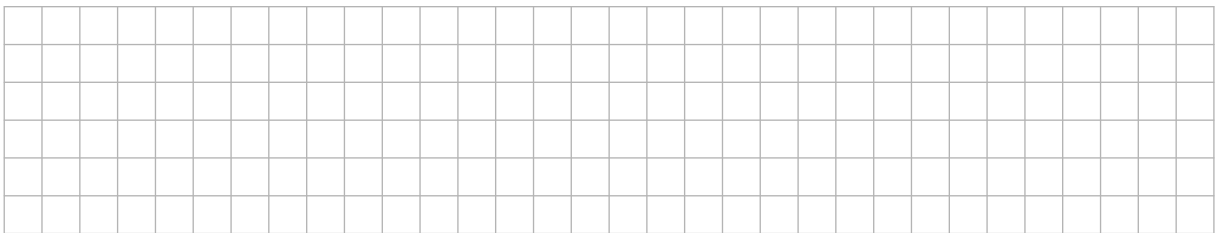
(25 marks)

A circle c_1 has centre $(0, 0)$ and diameter 8 units.

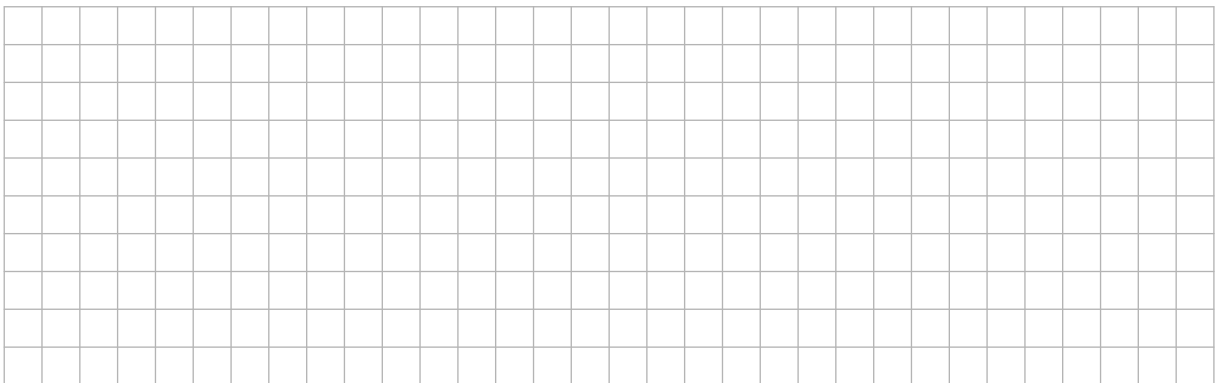
(a) Show c_1 on a co-ordinate diagram.



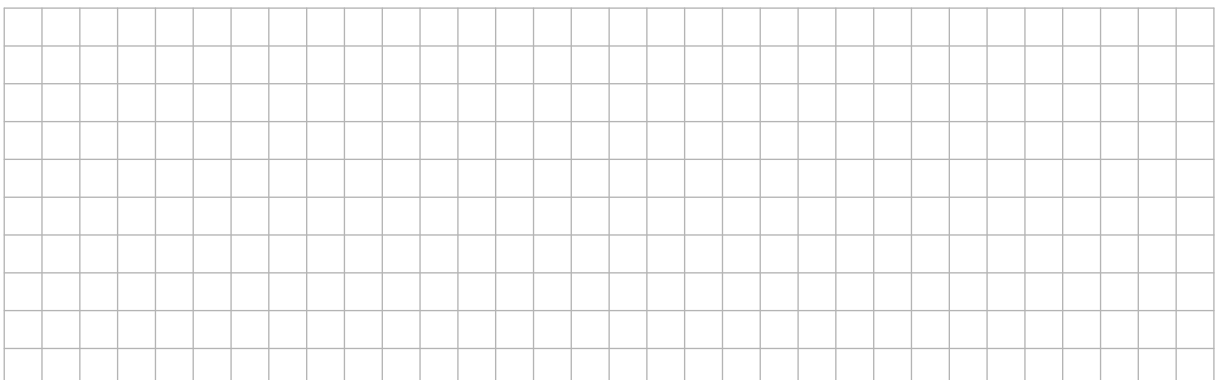
(b) Find the equation of c_1 .



(c) Prove that the point $(3, 2)$ is inside c_1 and that the point $(3, 3)$ is outside it.



(d) Another circle, c_2 , has centre $(0, 1)$ and just touches the circle c_1 . Show c_2 on your diagram in part **(a)** above and find the equation of c_2 .



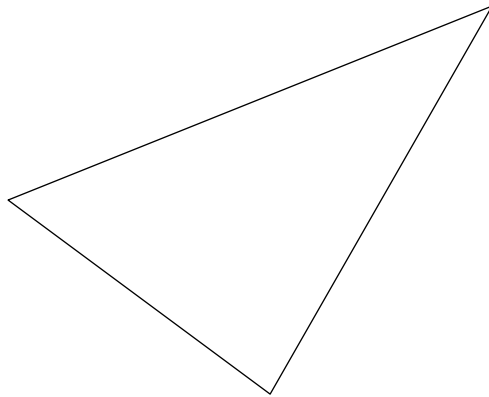
Question 6

(25 marks)

Answer **either** 6A **or** 6B.

Question 6A

- (a)** Show clearly how to construct the centroid of the triangle below.
(Note: all instruments are permitted. If you are using measurements, show your measurements and calculations.)



- (b)** State what is meant by the word *axiom*, and explain why axioms are needed in order to prove theorems.

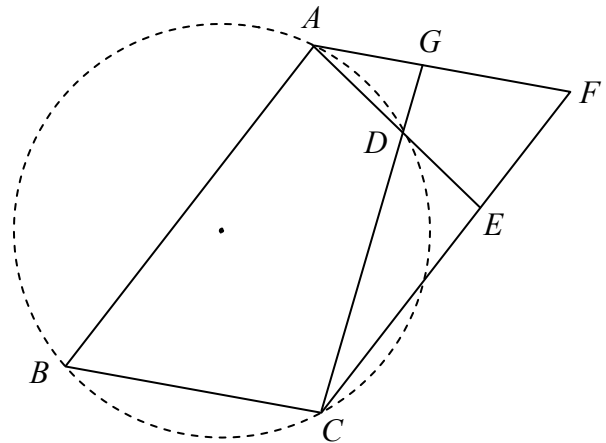


OR

Question 6B

In the diagram, $ABCD$ is a cyclic quadrilateral and $ABCF$ is a parallelogram.

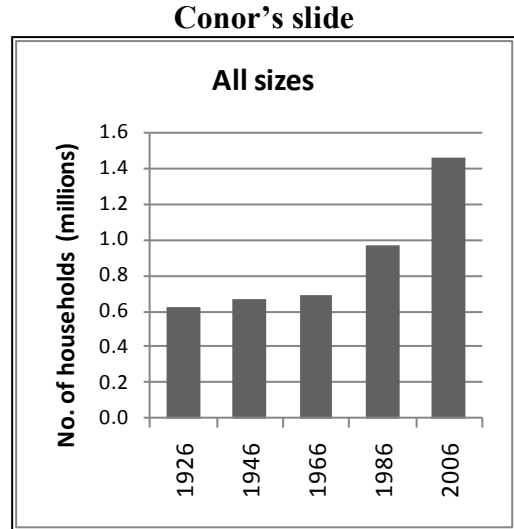
Show that $DEFG$ is a cyclic quadrilateral.



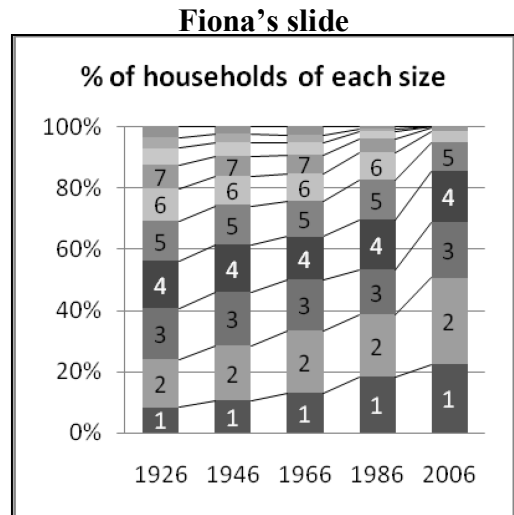
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- (b) Conor, Fiona, and Ray were each asked, separately, to make a presentation about the patterns they could see in the data. They each spoke for one minute and showed one slide. The slides they made are shown below. By considering the slides, state the main point or points that each of them was trying to make.

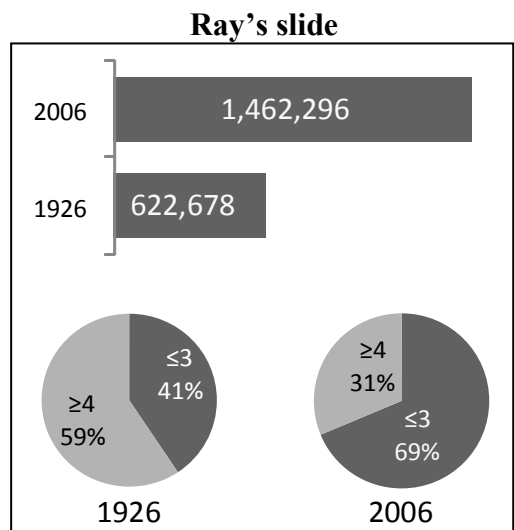
Conor was trying to show...



Fiona was trying to show...



Ray was trying to show...



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(ii) There are approximately 81,000 households in South Dublin. Approximately how many people live in 4-person households in South Dublin?

(iii) What is the median size for a household in Dublin City?

(iv) A person is selected at random from among all those living in Dublin City. Which is more likely: that the person lives alone, or that the person lives in a three-person household? Explain your answer.

Question 8**(75 marks)**

The tables in a primary school classroom are like the one in the photograph. The top of the table is in the shape of a trapezium, as shown in the diagram below the photograph.



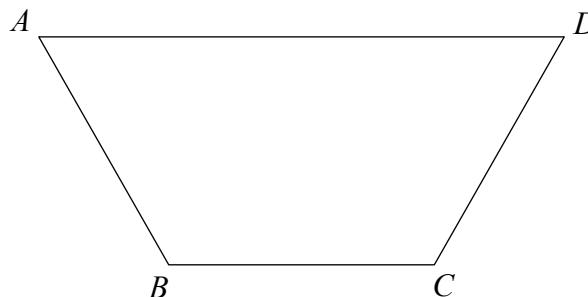
The measurements are as follows:

$$|AD| = 140 \text{ cm}$$

$$|BC| = 70 \text{ cm}$$

$$|AB| = |DC|$$

$$|\angle ADC| = |\angle DAB| = 60^\circ.$$



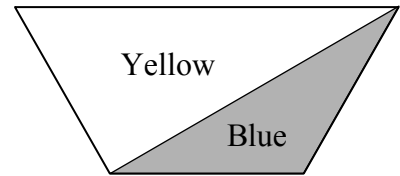
- (a) Show that $|AB| = 70 \text{ cm}$.



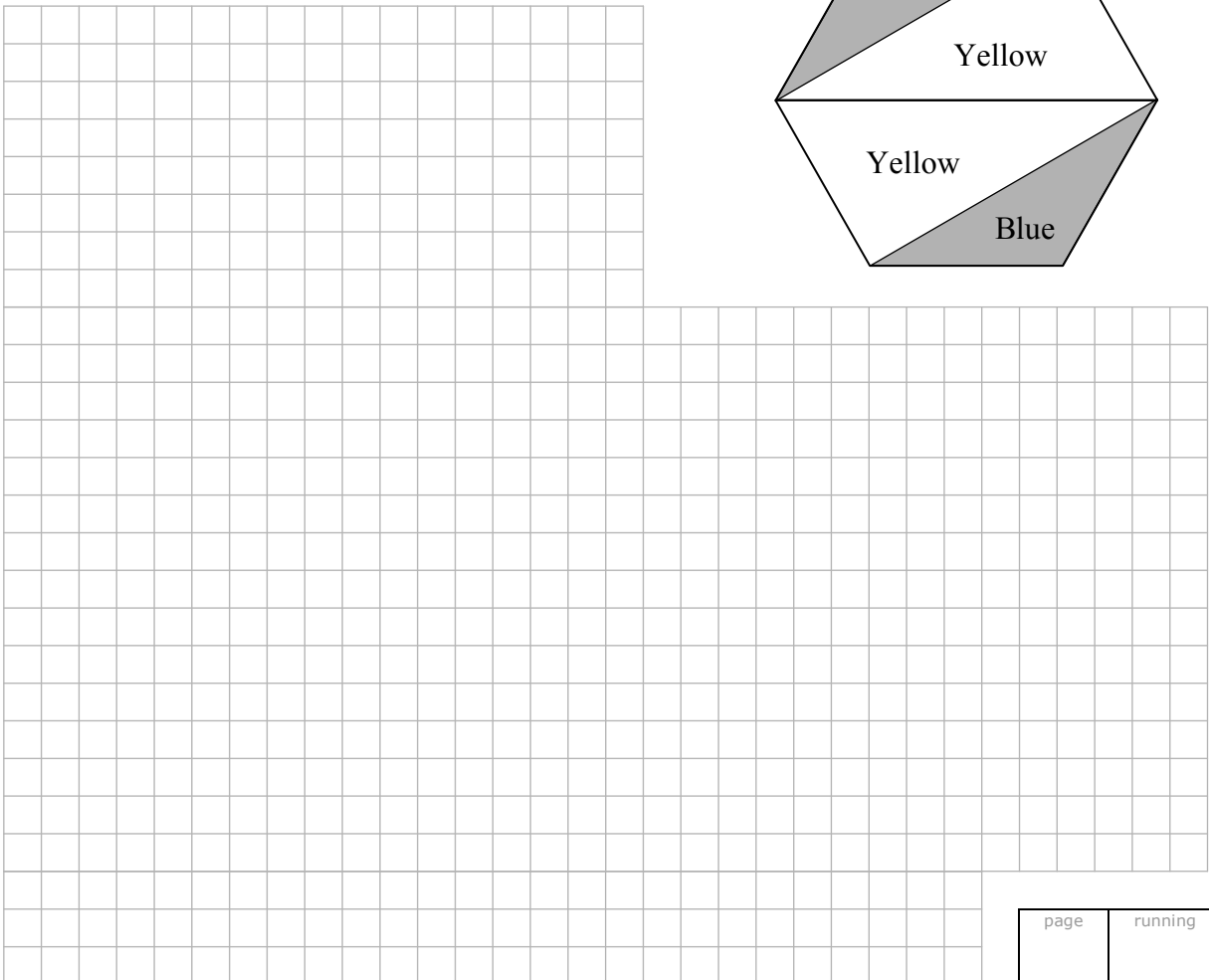
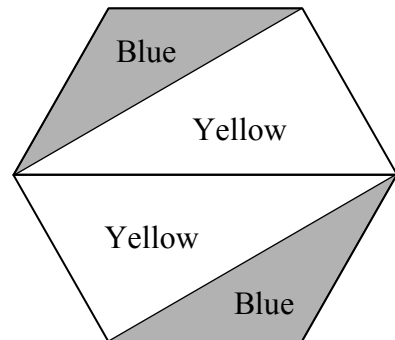
- (b) Find the distance between the parallel sides $[AD]$ and $[BC]$. Give your answer in centimetres, correct to one decimal place.



- (c) Some of the tables are painted with a yellow and blue pattern as shown. What fraction of the surface is yellow? Show your work.



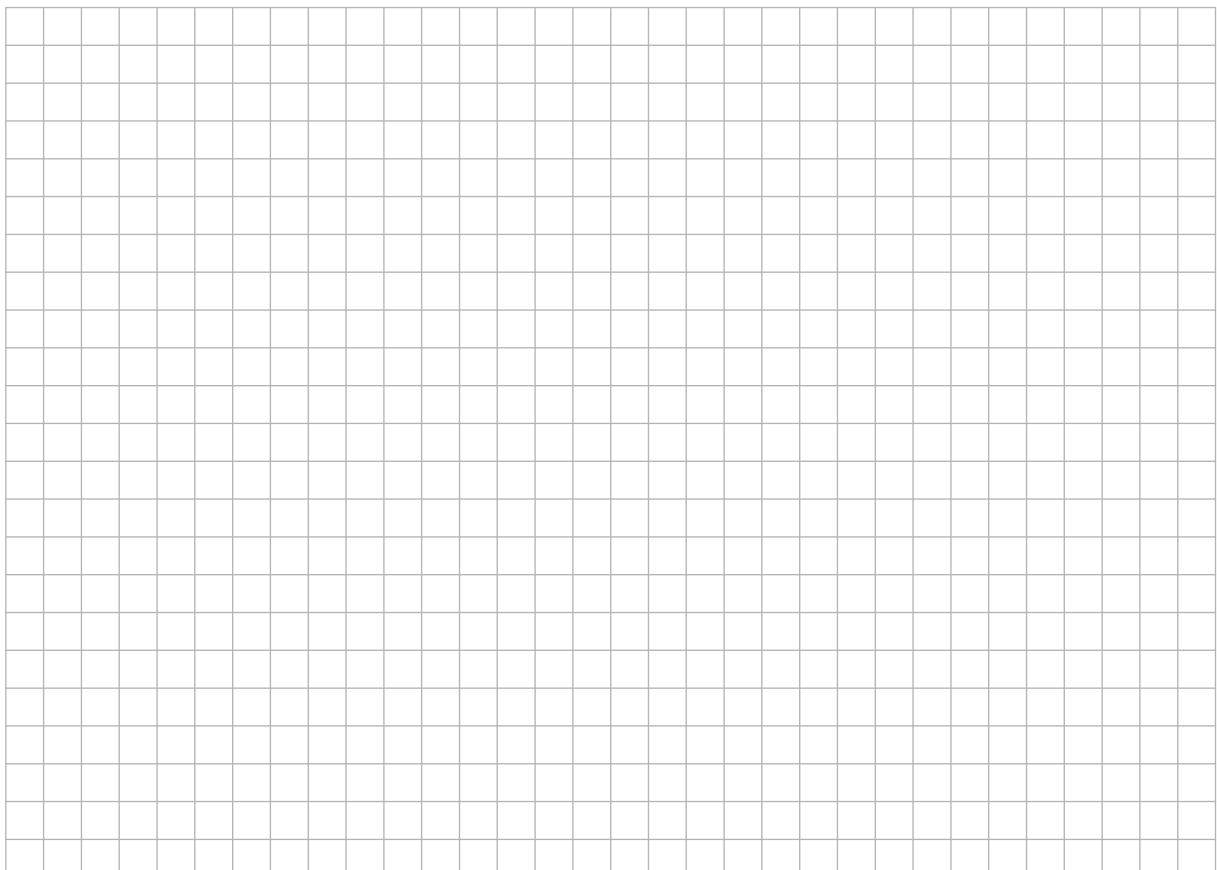
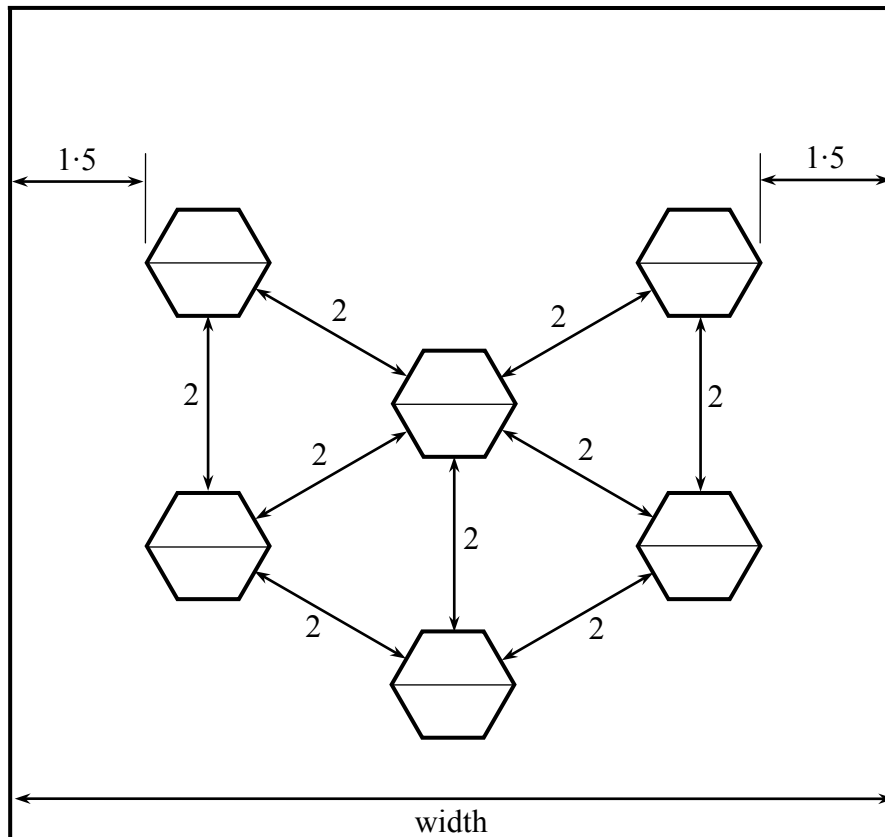
- (d) Two of the tables, painted as in part (c) above, are arranged to form a hexagon. Prove that the yellow area is a rectangle.



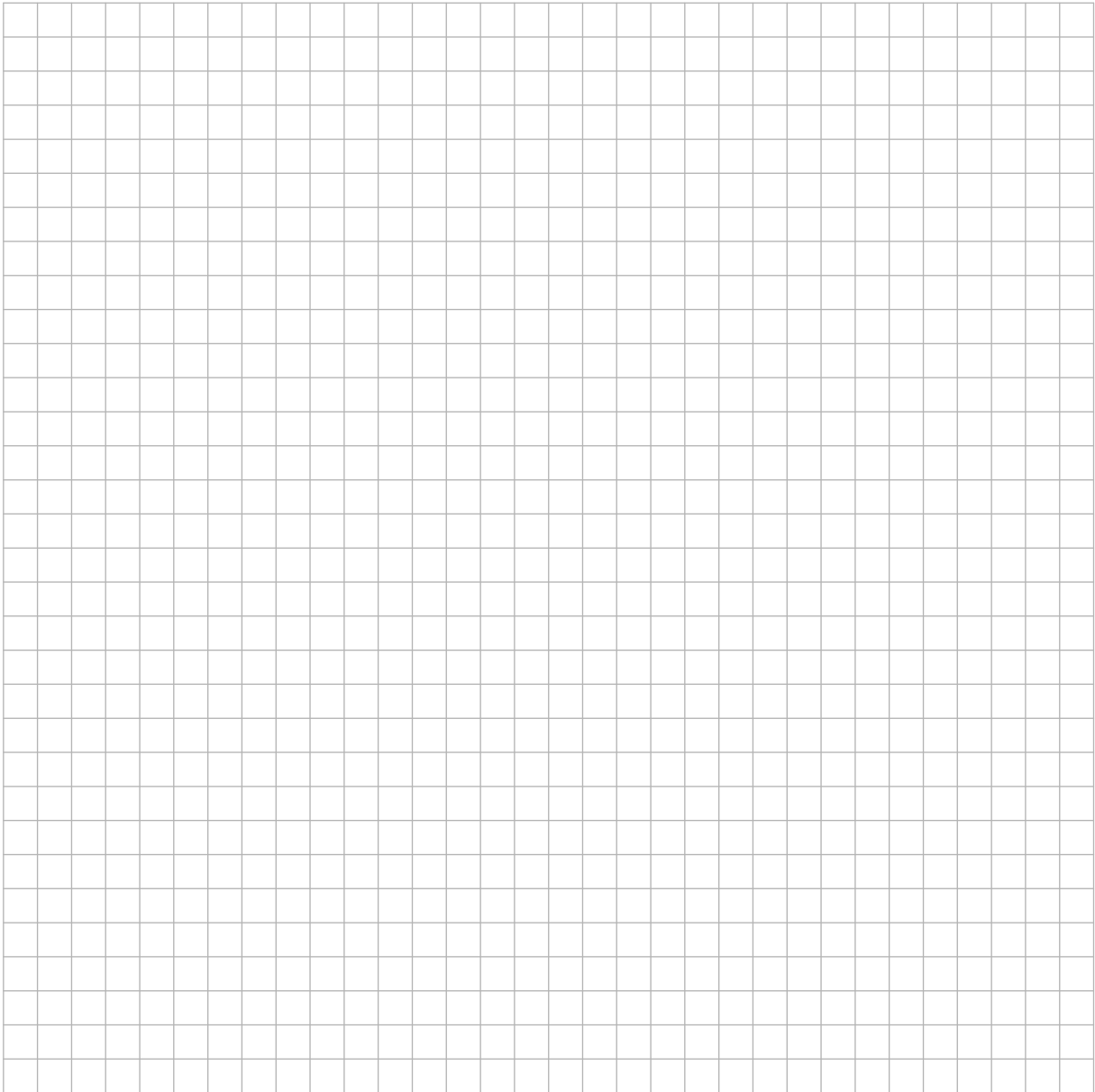
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- (e) Twelve of the tables are arranged as six hexagons in a classroom, as shown in the diagram. The clearance between neighbouring tables is 2 metres and the clearance to the side walls is 1.5 metres, as shown.

Find the total width of the classroom, in metres, correct to two decimal places.

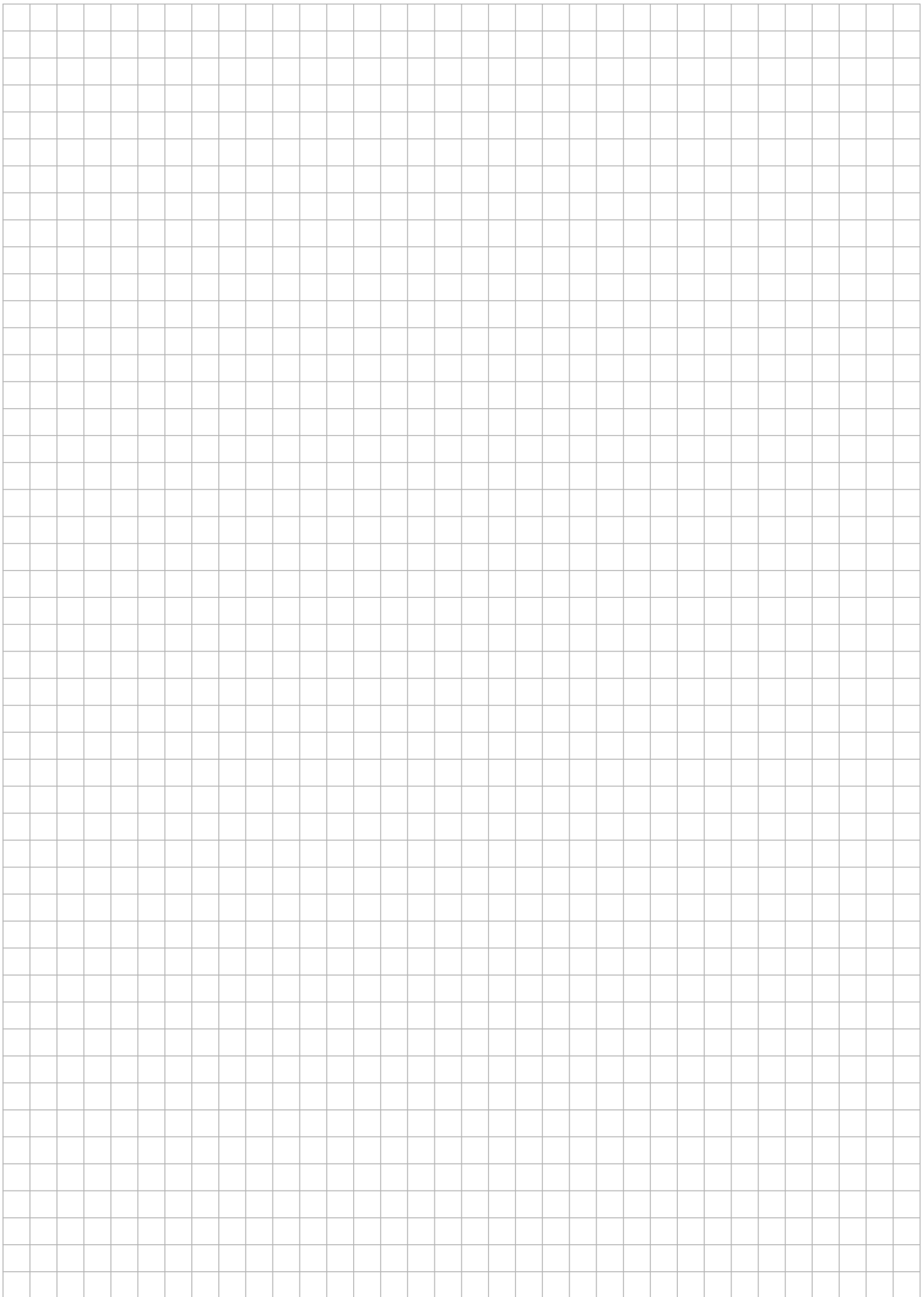


- (f) The tops of the trapezium tables are made of wood. The wood is 1.6 cm thick. Each cubic centimetre of the wood weighs 0.75 grams. Each table also has a metal frame weighing 6 kilograms. How much does each table weigh?
Give your answer in kilograms, correct to one decimal place.



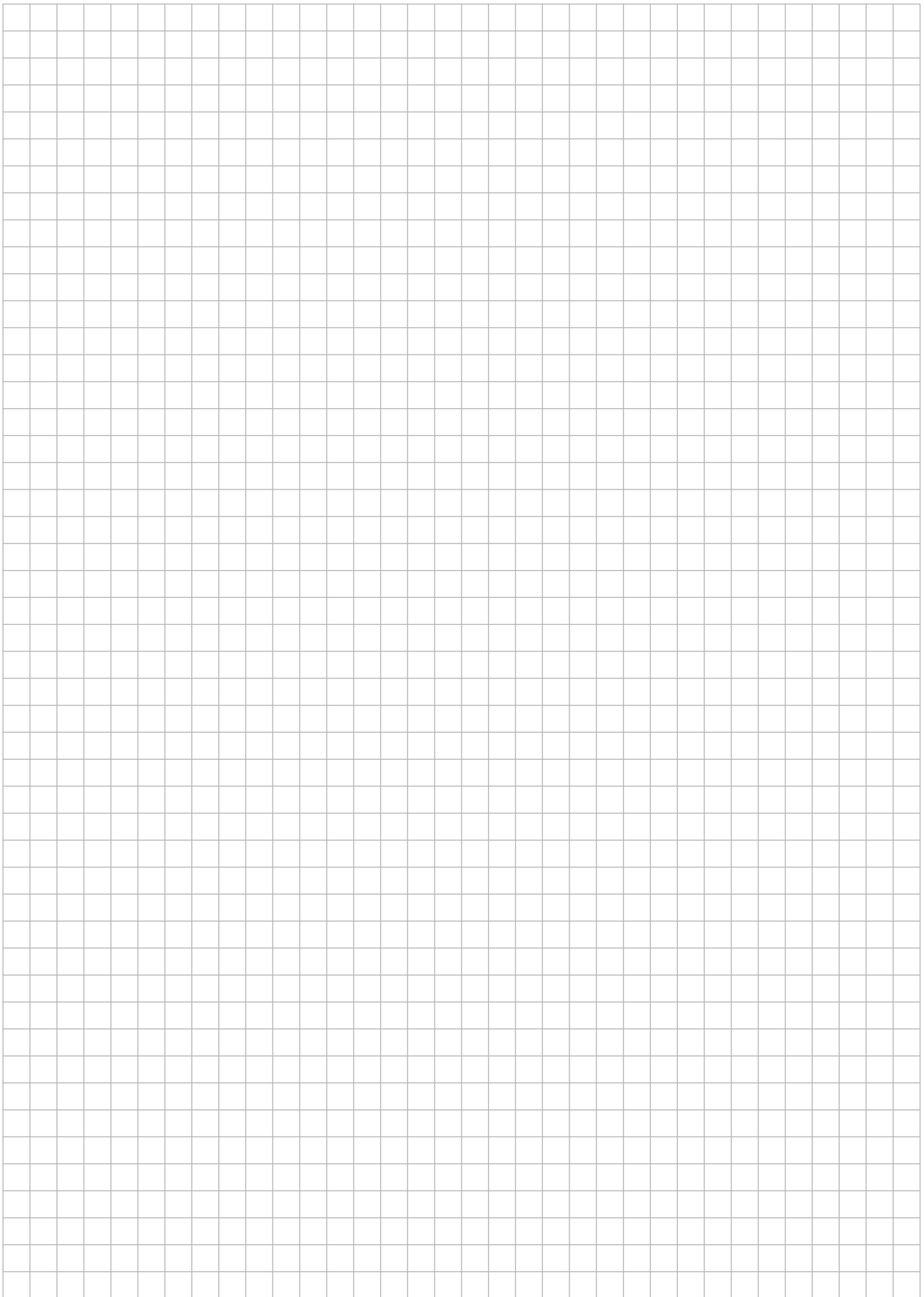
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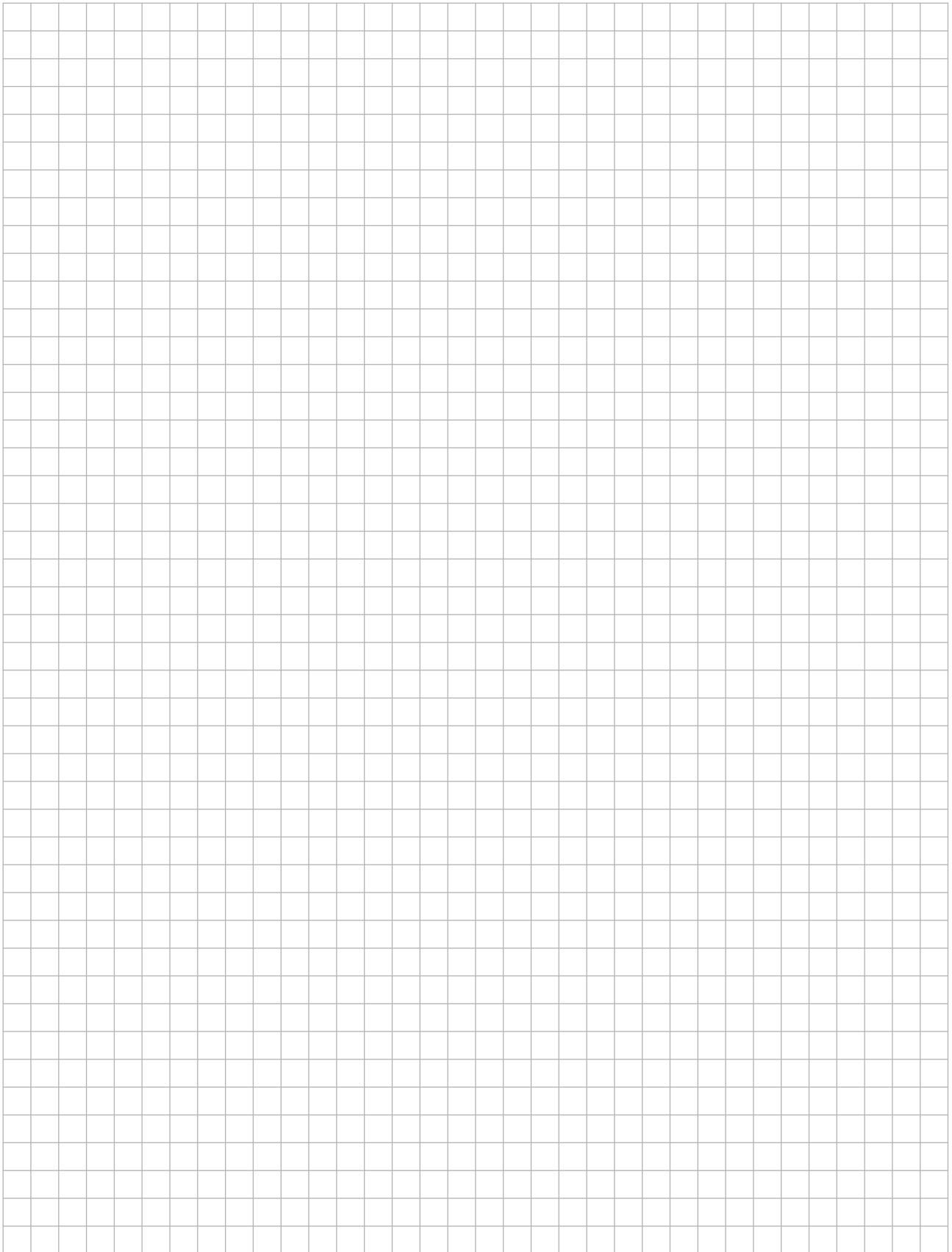


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