



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2014

Mathematics
(Project Maths – Phase 3)

Paper 2

Higher Level

Monday 9 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	
9	
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	3 questions

Answer all nine questions.

In Section A, answer:

Questions 1 to 5 and
either Question 6A **or** Question 6B.

In Section B, answer Questions 7 to 9.

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 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.

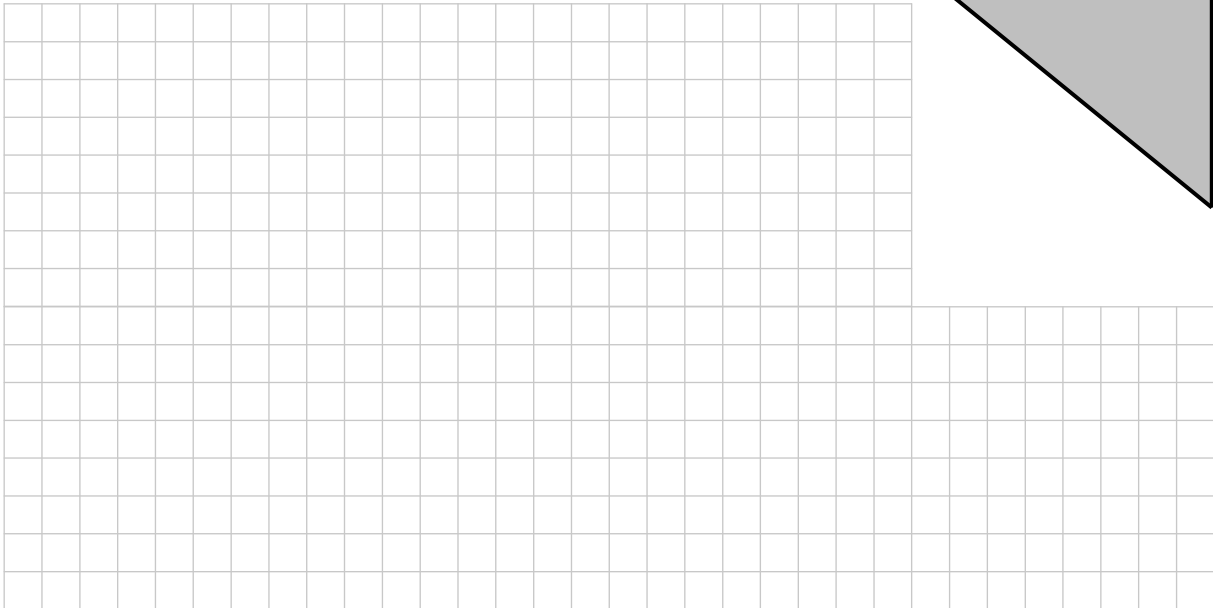
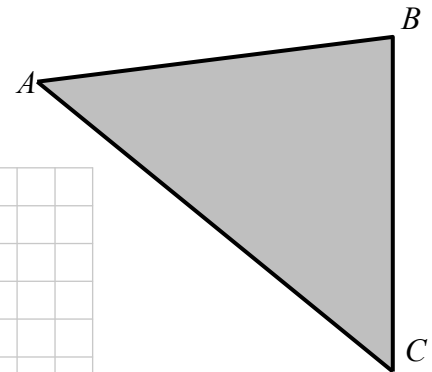
Write the make and model of your calculator(s) here:

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

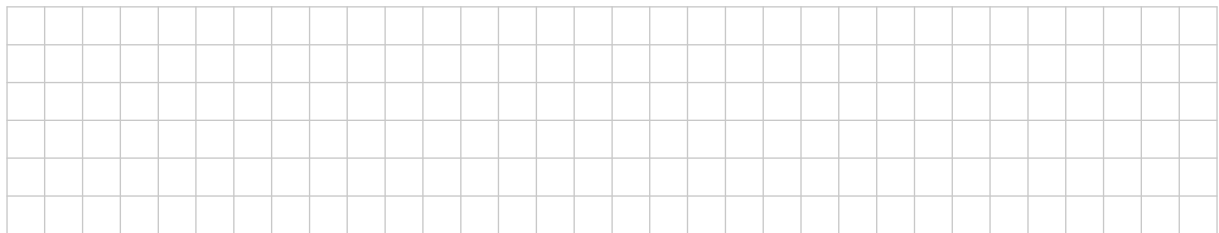
Question 1**(25 marks)**

The lengths of the sides of a flat triangular field ACB are,
 $|AB| = 120$ m, $|BC| = 134$ m and $|AC| = 150$ m.

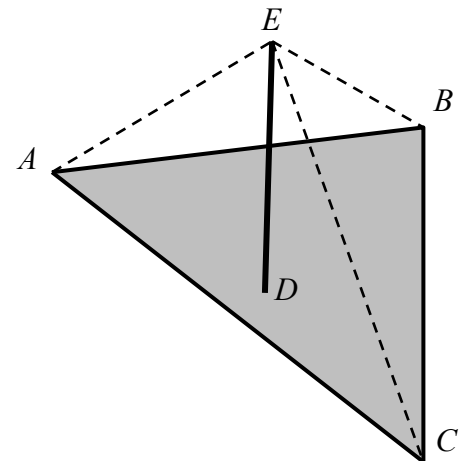
- (a) (i) Find $|\angle CBA|$. Give your answer, in degrees, correct to two decimal places.



- (ii) Find the area of the triangle ACB correct to the nearest whole number.



- (b) A vertical mast, $[DE]$, is fixed at the circumcentre, D , of the triangle. The mast is held in place by three taut cables $[EA]$, $[EB]$ and $[EC]$. Explain why the three cables are equal in length.



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Question 6

(25 marks)

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

Question 6A

- (a) Prove that, if two triangles $\triangle ABC$ and $\triangle A'B'C'$ are similar, then their sides are proportional, in order:

$$\frac{|AB|}{|A'B'|} = \frac{|BC|}{|B'C'|} = \frac{|CA|}{|C'A'|}.$$

Diagram:

Given:

To Prove:

Construction:

Proof:

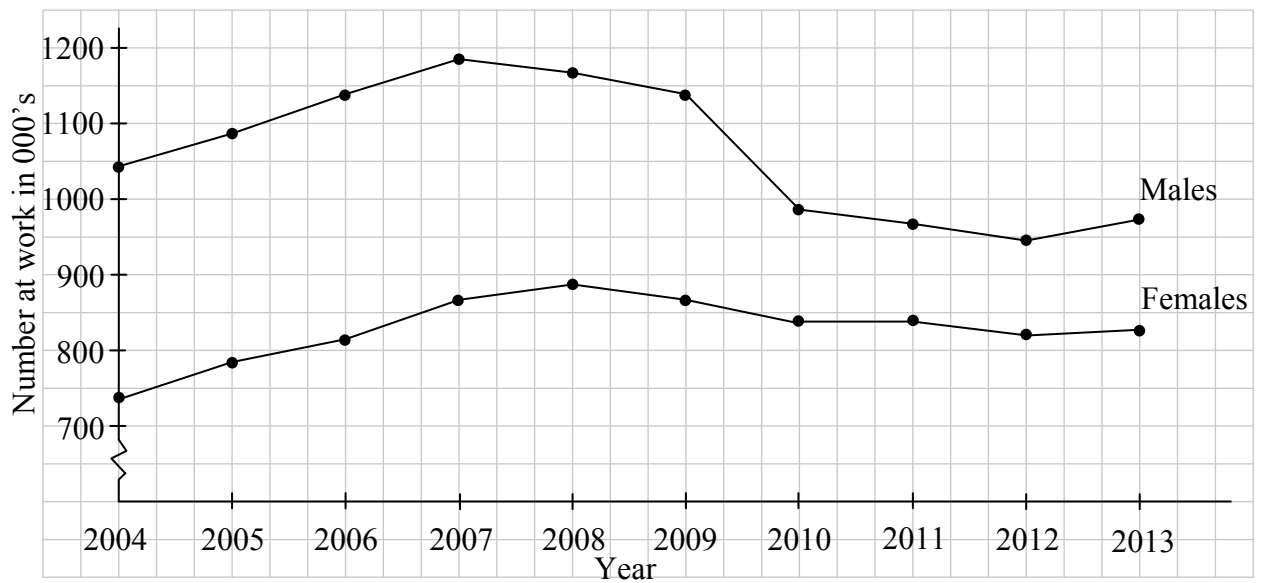
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- (b) Given the line segment $[BC]$, construct, without using a protractor or set square, a point A such that $|\angle ABC| = 60^\circ$. Show your construction lines.

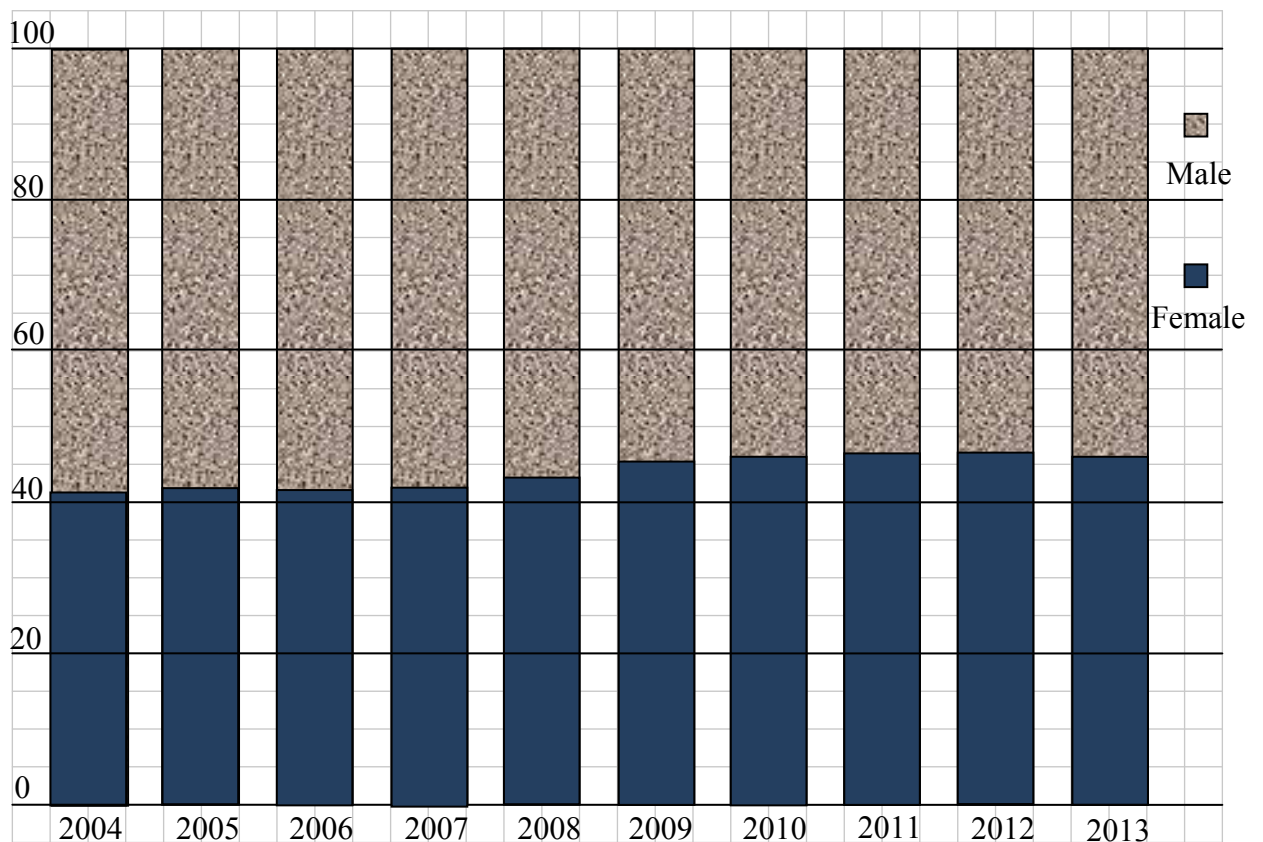


- (d) Liam and Niamh are analysing the number of males and the number of females at work over the period 2004 to 2013.

Liam draws the following chart, using data from Table 1.

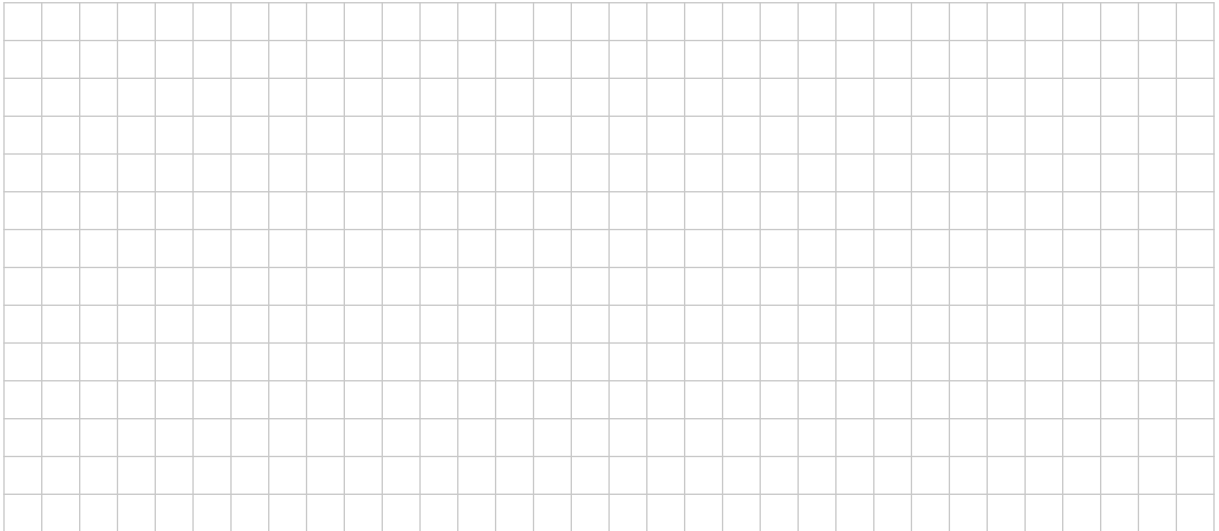


Niamh uses the same data and calculates the number of females at work as a percentage of the total number of persons at work and then draws the following chart.

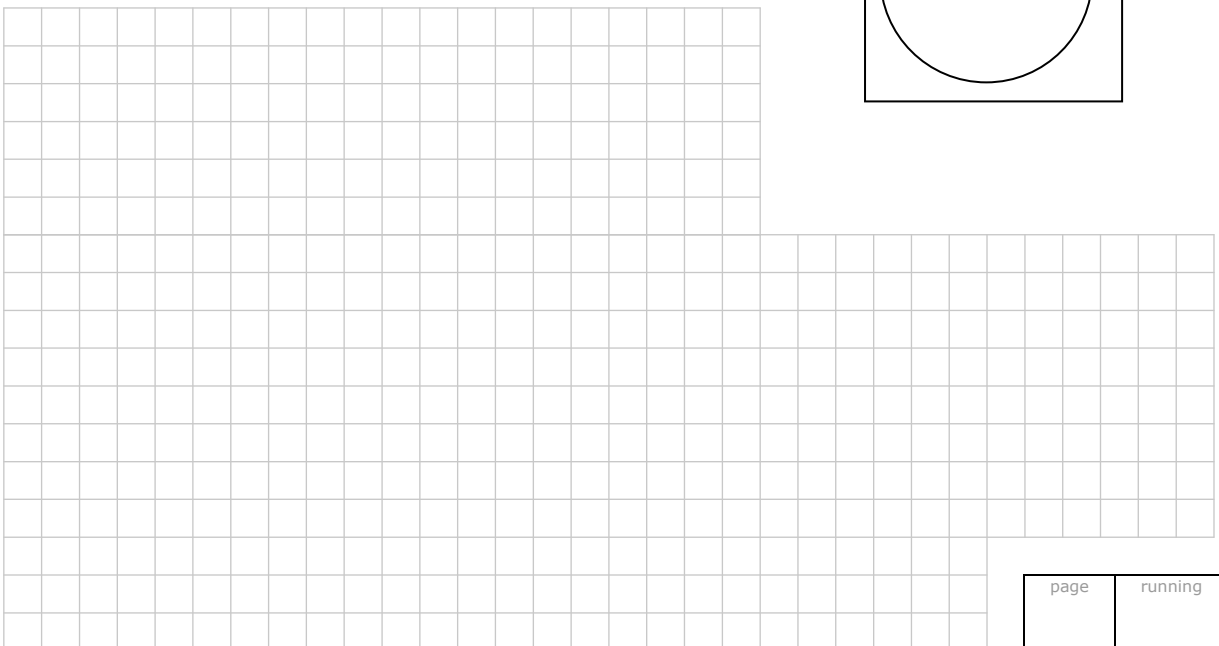
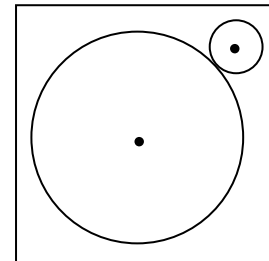




- (iv) The translation which maps the midpoint of $[DE]$ to the point C maps the circle k to the circle j . Find the equation of the circle j .



- (v) The glass square is of side length l . Find the smallest whole number l such that the two cogs, h and k , are fully visible through the glass.

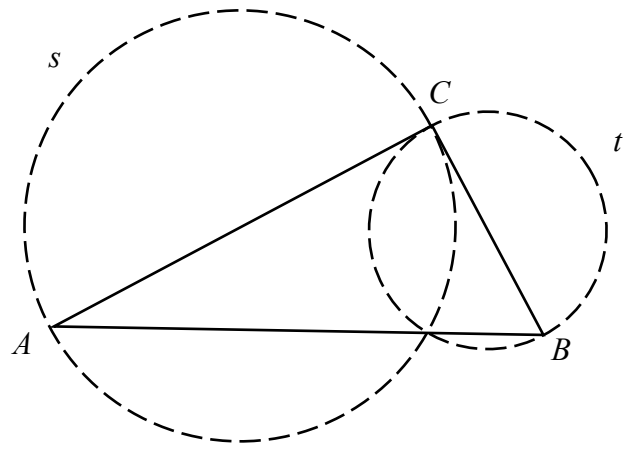


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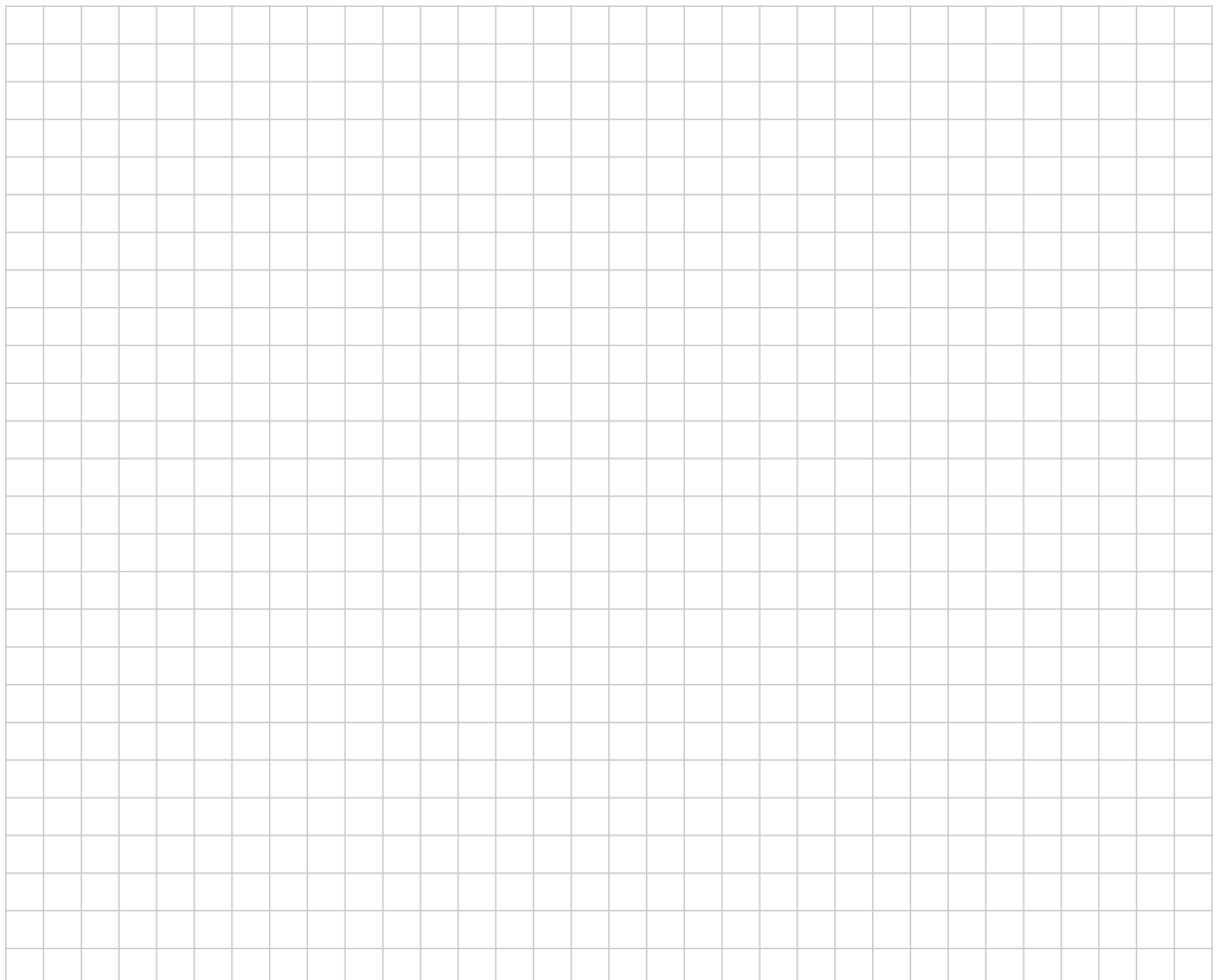
(b) The triangle ABC is right-angled at C .

The circle s has diameter $[AC]$ and the circle t has diameter $[CB]$.

(i) Draw the circle u which has diameter $[AB]$.



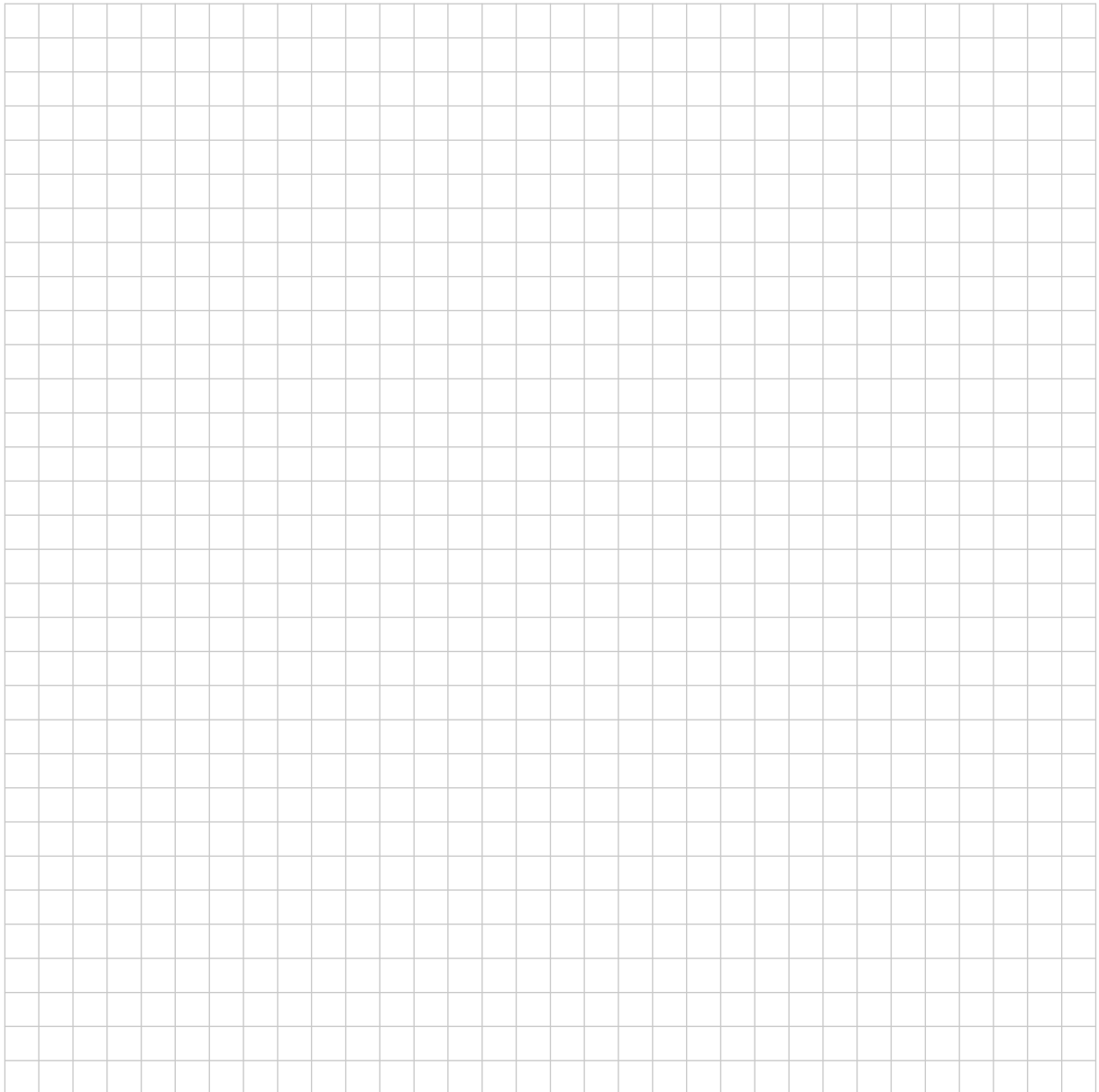
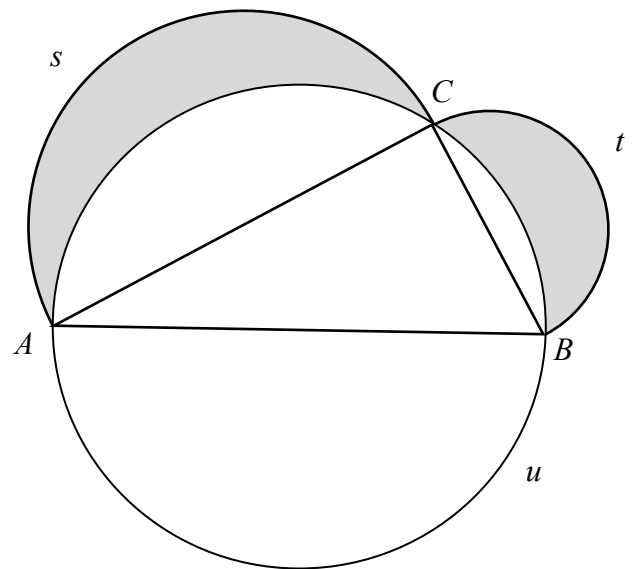
(ii) Prove that in any right-angles triangle ABC , the area of the circle u equals the sum of the areas of the circles s and t .



- (iii) The diagram shows the right-angled triangle ABC and arcs of the circles s , t and u .

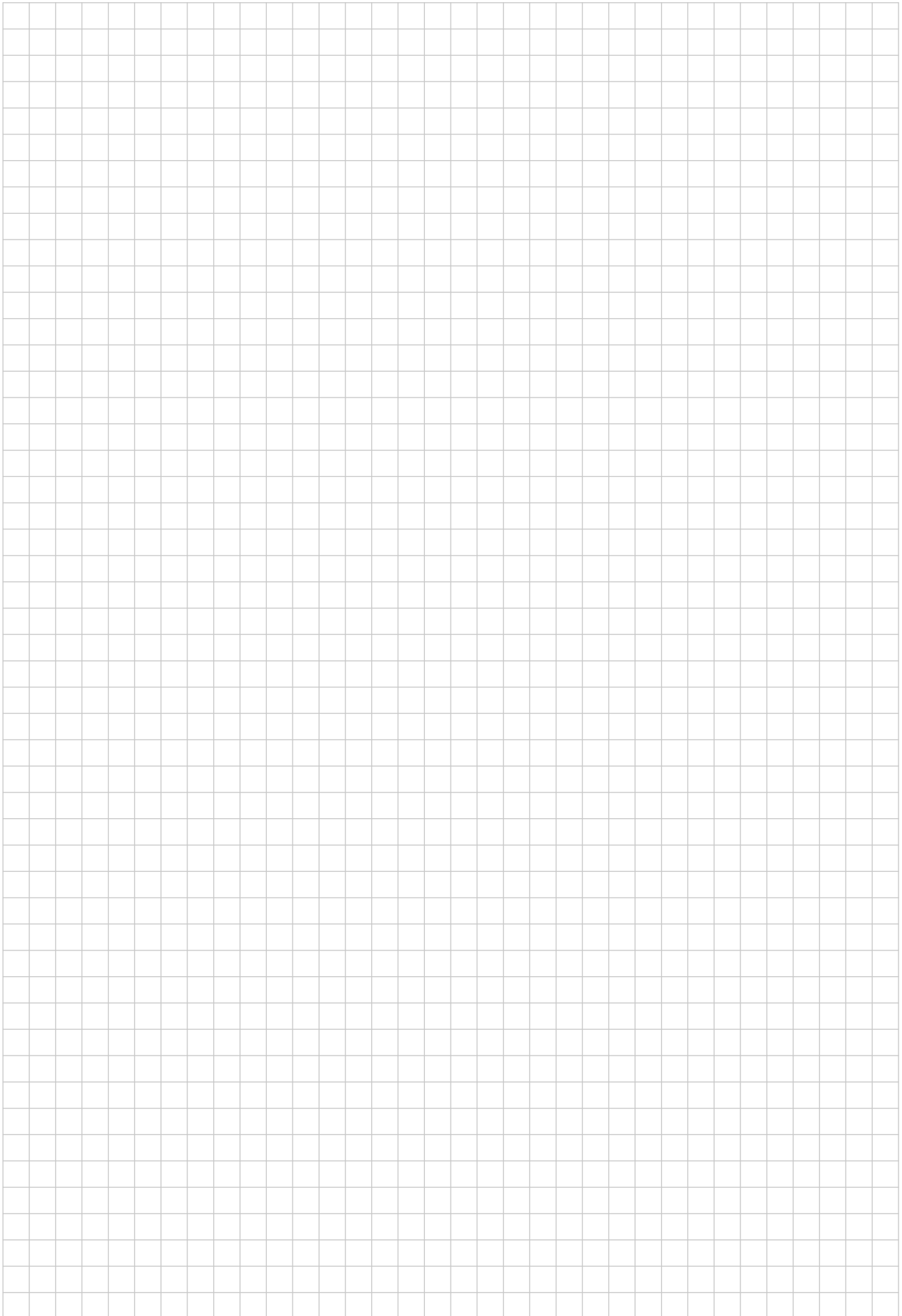
Each of the shaded areas in the diagram is called a lune, a crescent-shaped area bounded by arcs of the circles.

Prove that the sum of the areas of the two shaded lunes is equal to the area of the triangle ABC .

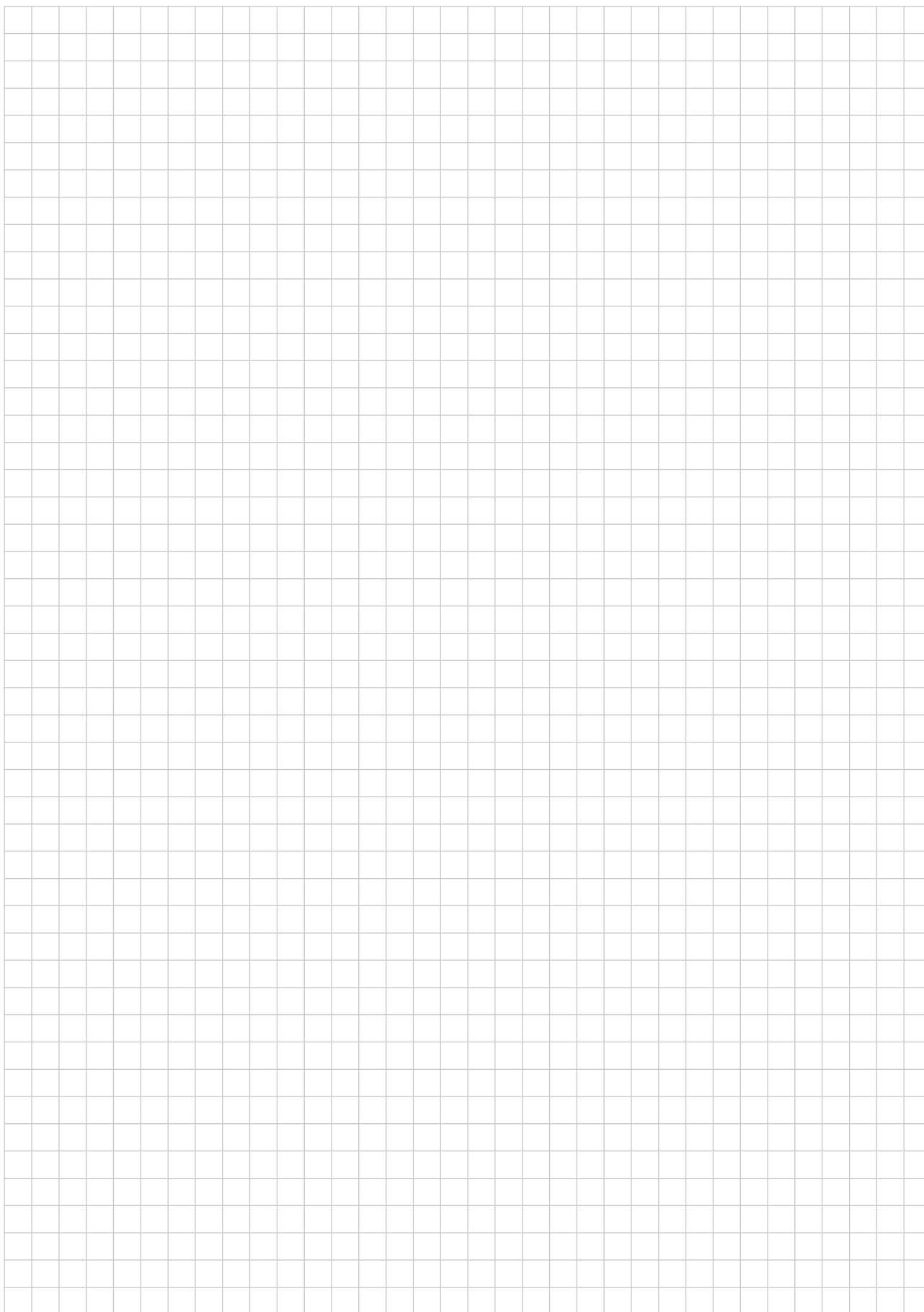


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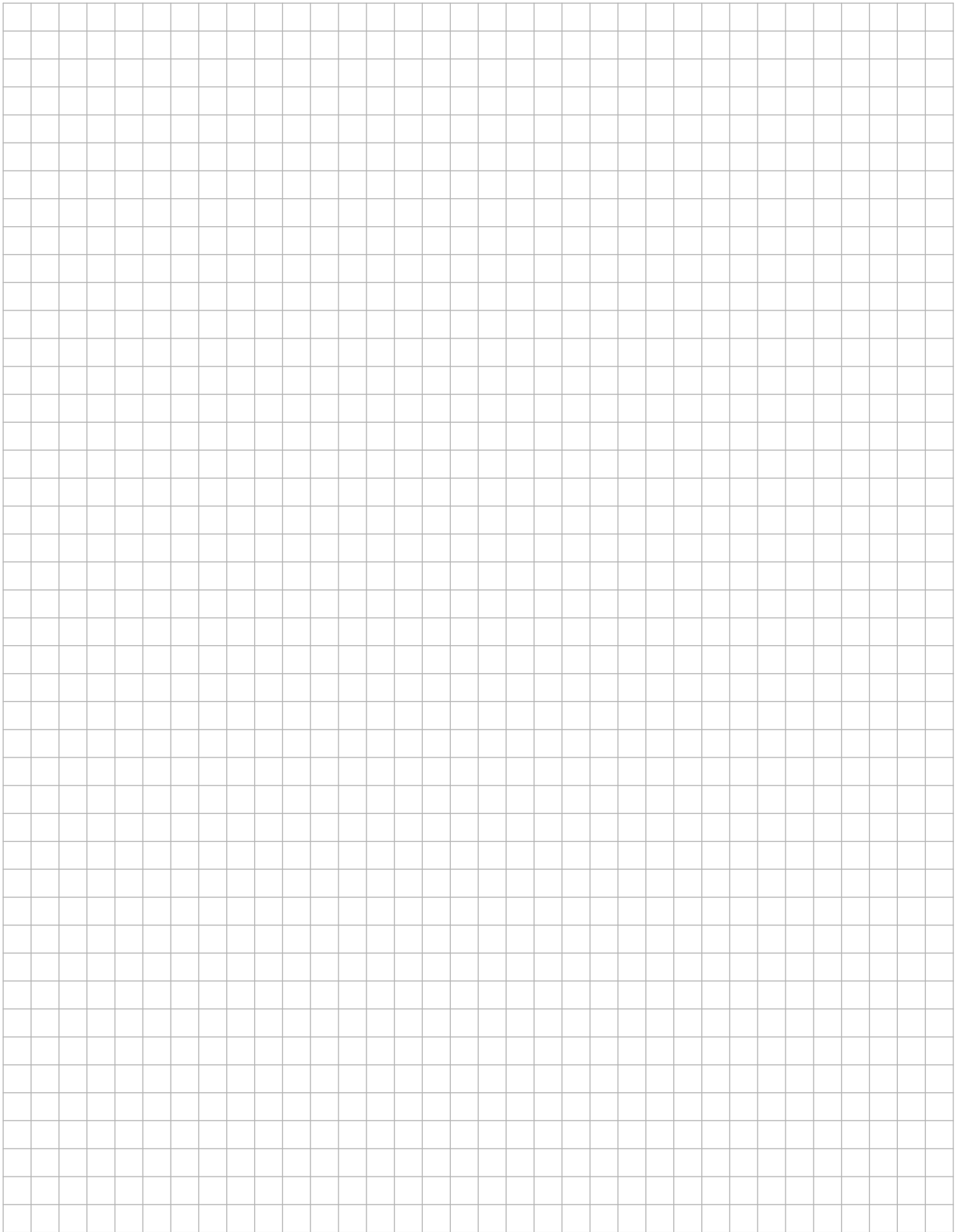
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