

# SAMPLE PAPER 6

## Leaving Certificate

# Mathematics

## Paper 2

## Ordinary Level

**Time:** 2 hours, 30 minutes

300 marks

Examination number
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Centre stamp
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Running total	
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For examiner	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total	

Grade
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## 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.

Write your answers in the spaces provided in this booklet. You will 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.

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:









**Question 4**

**(25 marks)**

$s$  is a circle with centre  $C(5, 3)$ .

$B(7, 5)$  is a point on the circumference of  $s$  on the diameter  $[AB]$ .

- (a) Find the coordinates of  $A$  and the slope of  $AB$ .

- (b) Find the radius and equation of circle  $s$ .

- (c) (i) If  $t$  is a tangent to the circle at  $B$ , find its equation.

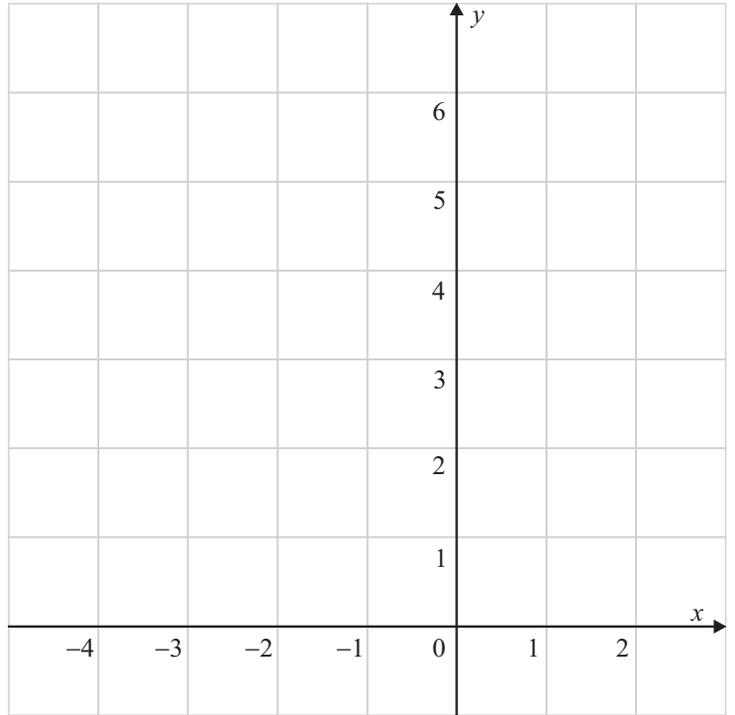
- (ii) Find where  $t$  intersects the  $x$  and  $y$  axes.

**Question 5**

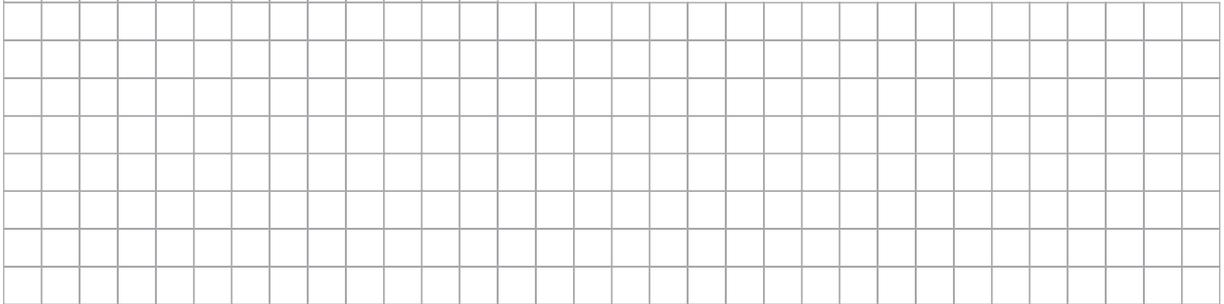
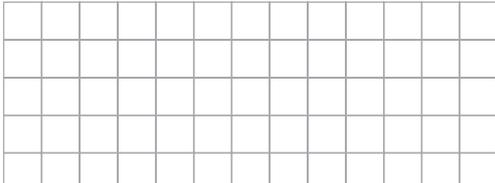
**(25 marks)**

$A(-4, 6)$  and  $B(2, 3)$  are two points.

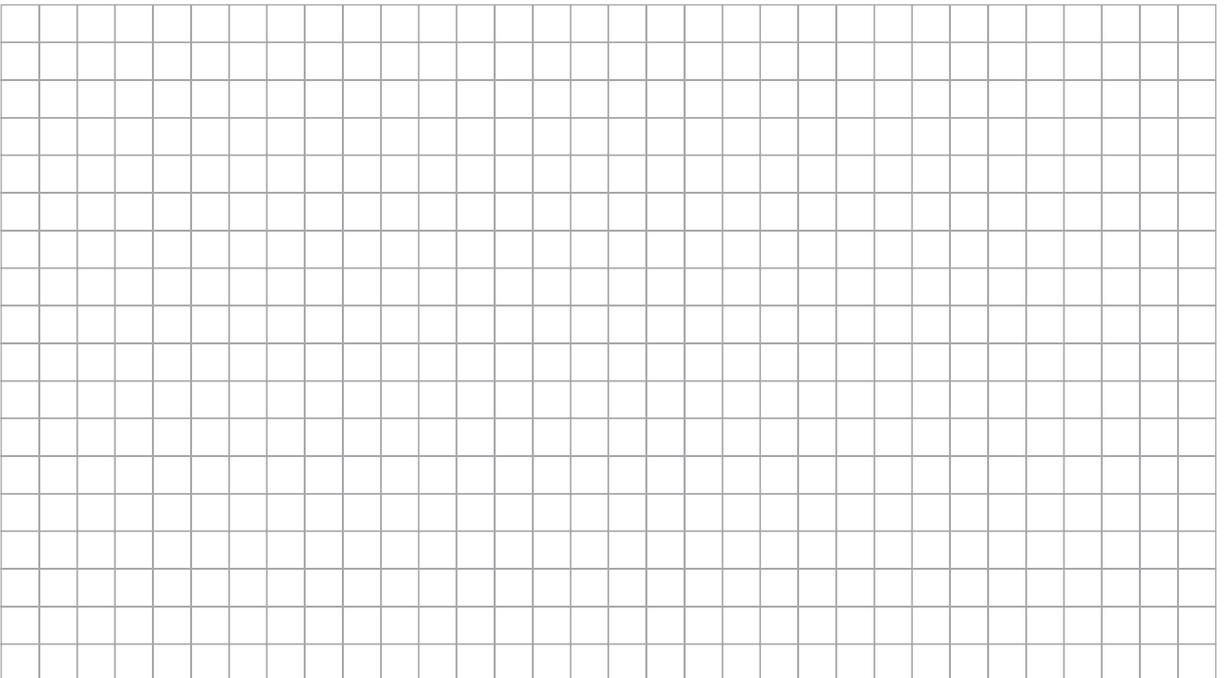
- (a) Plot  $A$  and  $B$  on the grid shown.
- (b) From your diagram write down the coordinates of the point at which line  $AB$  cuts the  $y$ -axis.  
y-intercept: \_\_\_\_\_



- (c) Find the equation of  $AB$ . Find algebraically where the line  $AB$  cuts the  $y$ -axis. Does your answer agree with part (b)?



- (d) Calculate the area of triangle  $ABC$ , where the coordinates of  $C$  are  $(-2, 1)$ . Sketch the triangle  $ABC$  on the grid above.

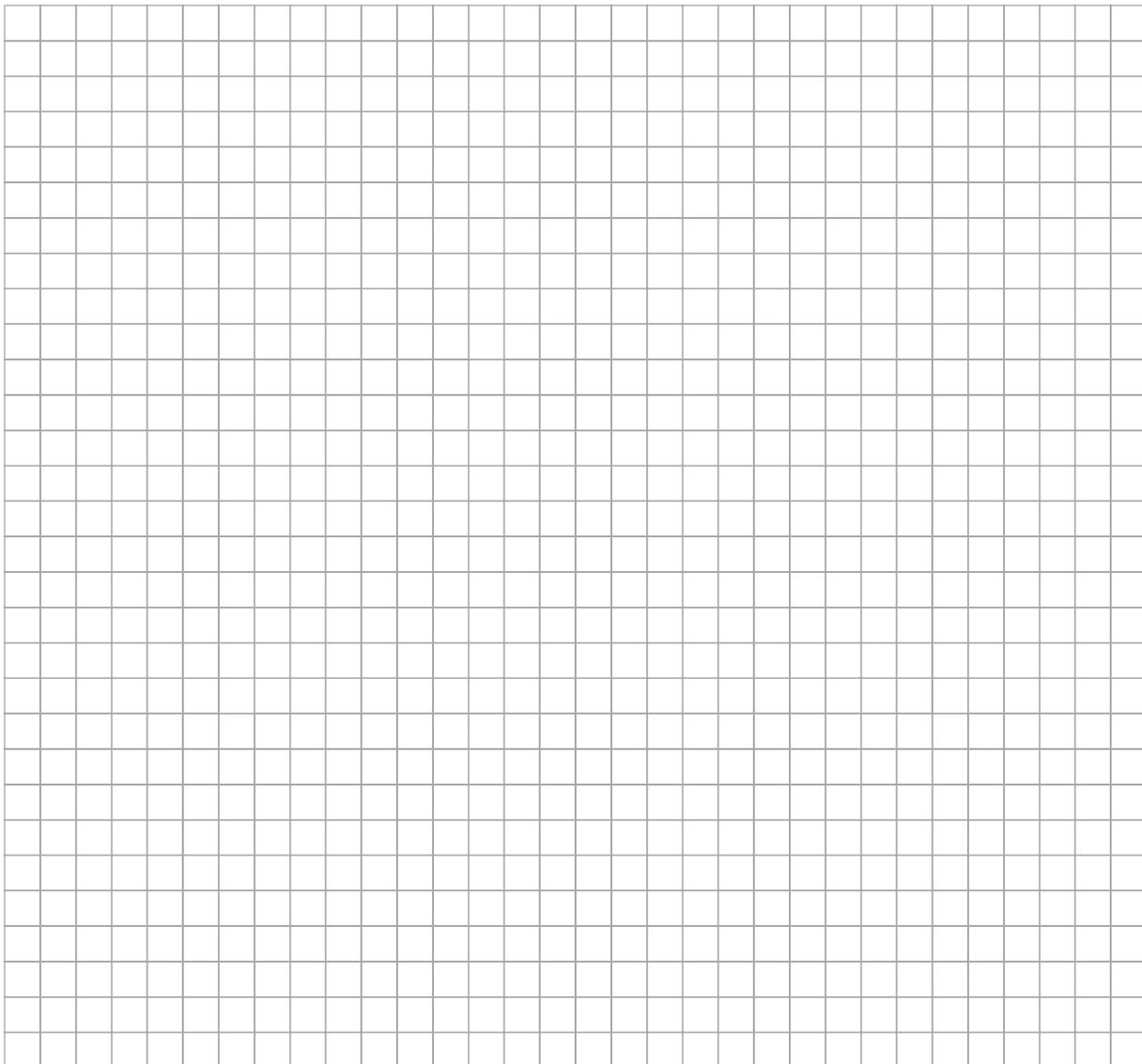
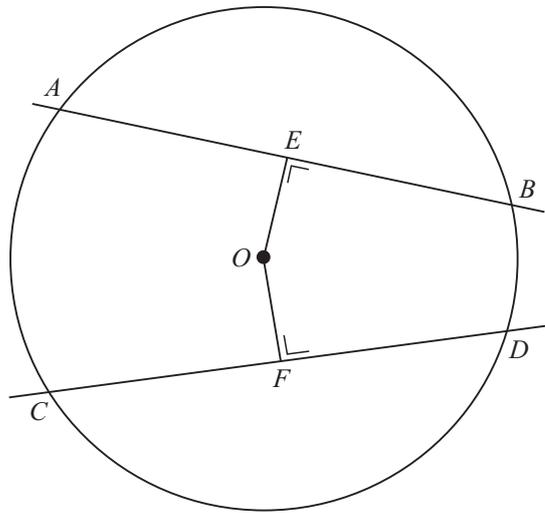


**Question 6**

**(25 marks)**

$O$  is the centre of the circle.  $[AB]$  and  $[CD]$  are two chords with  $|OE| = |OF|$ . Lines  $OE$  and  $OF$  are perpendicular to chords  $AB$  and  $CD$  respectively.

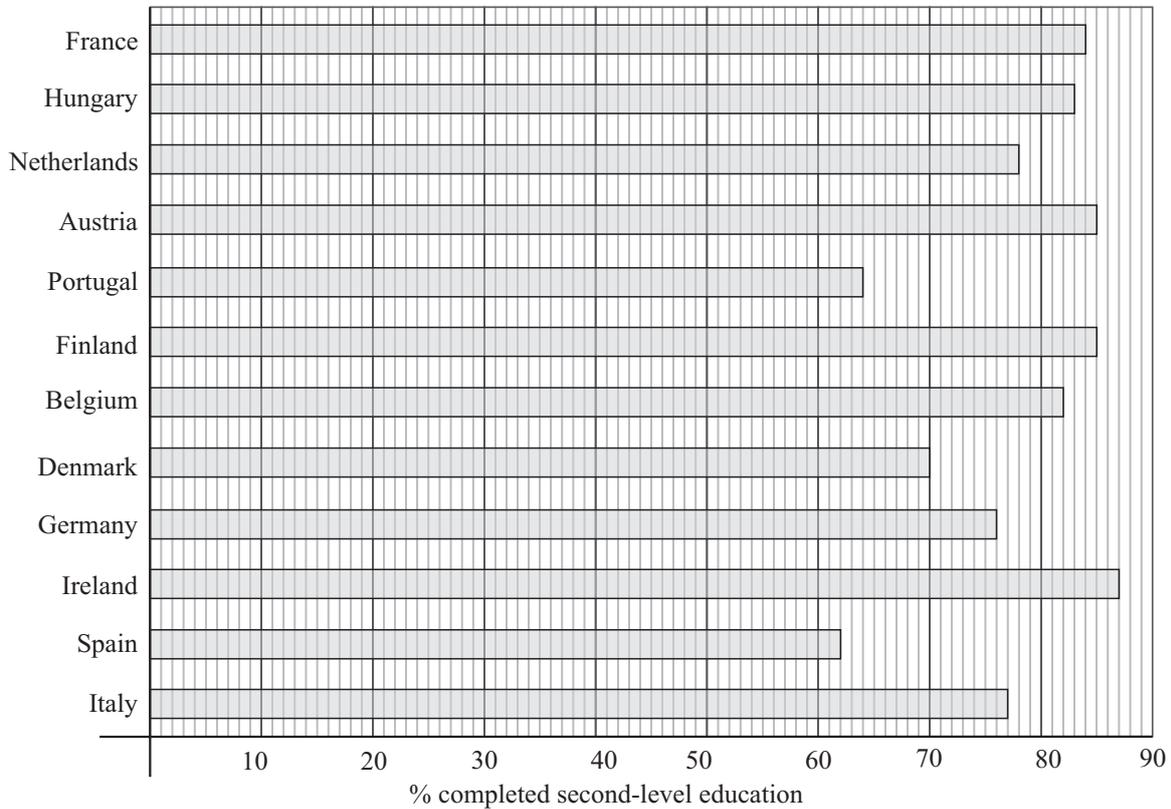
If the radius of the circle is 8 cm and  $|OF| = 2$  cm, find  $|AB|$ . Show  $|AB| = |CD|$ .



Answer Question 7, Question 8, and Question 9.

**Question 7****(75 marks)**

- (a) The bar chart below shows the percentage of 20–24-year-olds in 12 European countries that had completed second-level education when surveyed in 2011.



- (i) What country had the highest percentage of students who completed second-level education?

COUNTRY: \_\_\_\_\_

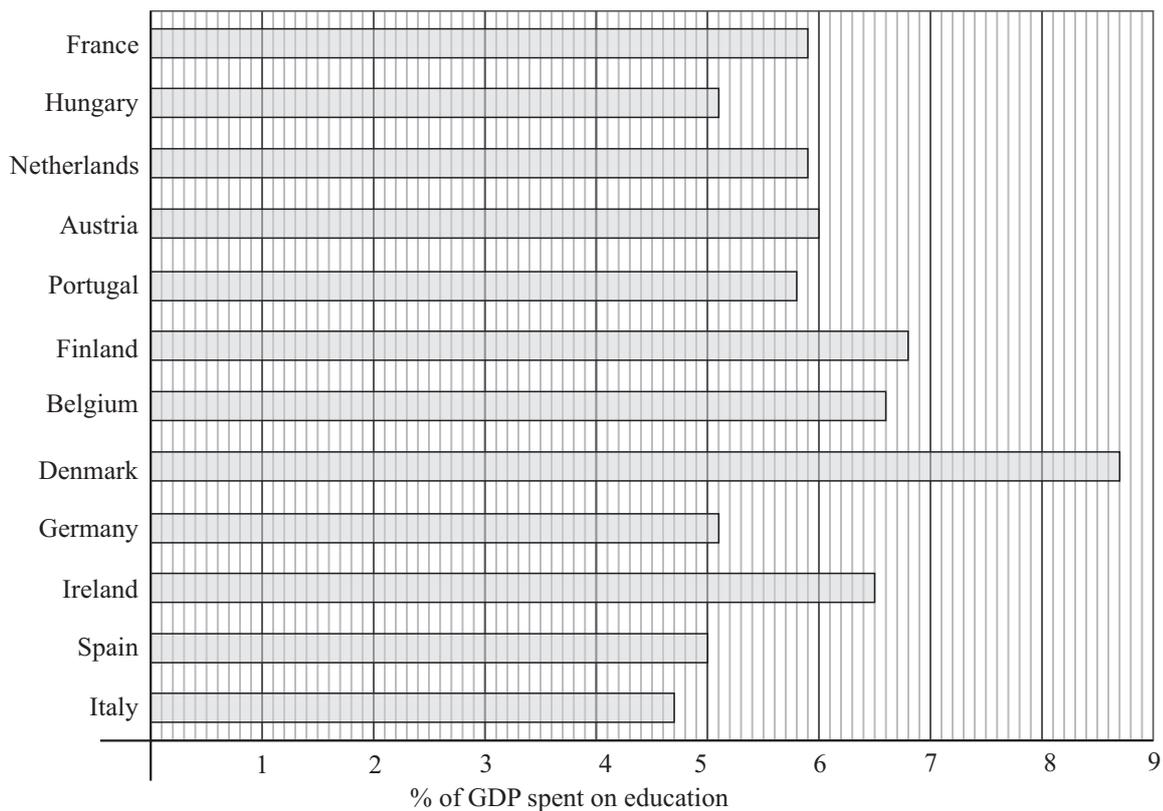
- (ii) What country had the lowest percentage of students who completed second-level education?

COUNTRY: \_\_\_\_\_

- (iii) What was Ireland's percentage completion rate?

COMPLETION RATE: \_\_\_\_\_

**(b)** The bar chart below shows the average spending on education, as a percentage of Gross Domestic Product (GDP), in the same 12 countries.



**(i)** What country has the highest spending as a percentage of GDP?

COUNTRY: \_\_\_\_\_

**(ii)** What country has the lowest spending as a percentage of GDP?

COUNTRY: \_\_\_\_\_

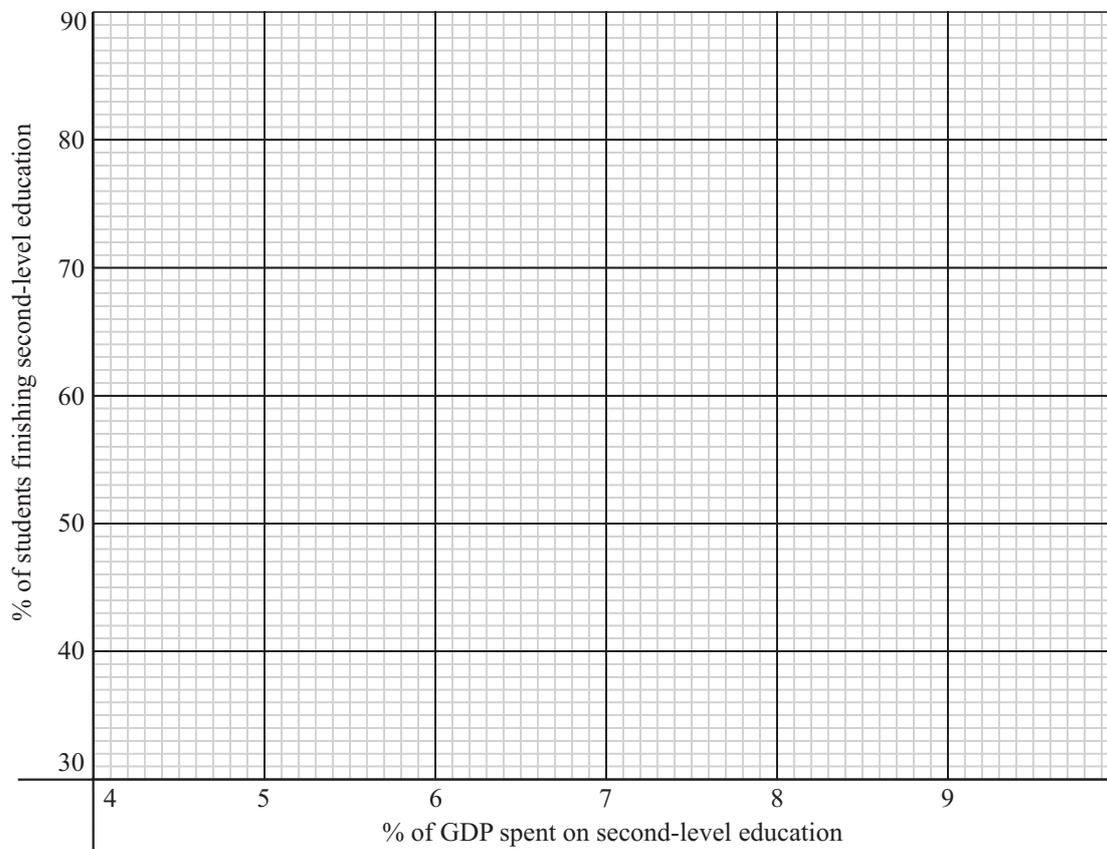
**(iii)** What is Ireland's spending as a percentage of GDP?

SPENDING AS A PERCENTAGE OF GDP: \_\_\_\_\_

- (c) Draw up a table of the spending as a percentage of GDP and the percentage of the population who finished second-level education.

Country	% of GDP spent on second-level education	% who finished second-level education
Austria		
Belgium		
Denmark		
France		
Finland		
Germany		
Hungary		
Ireland		
Italy		
Netherlands		
Portugal		
Spain		

- (d) Graph the scatter plot in the grid below.

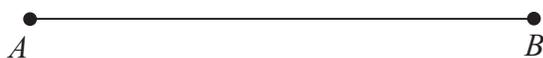




**Question 8**

**(50 marks)**

- (a) (i) The line segment shown  $[AB]$  is one side of an equilateral triangle  $ABC$ . Using a compass and straight-edged ruler, draw the equilateral triangle  $ABC$ .



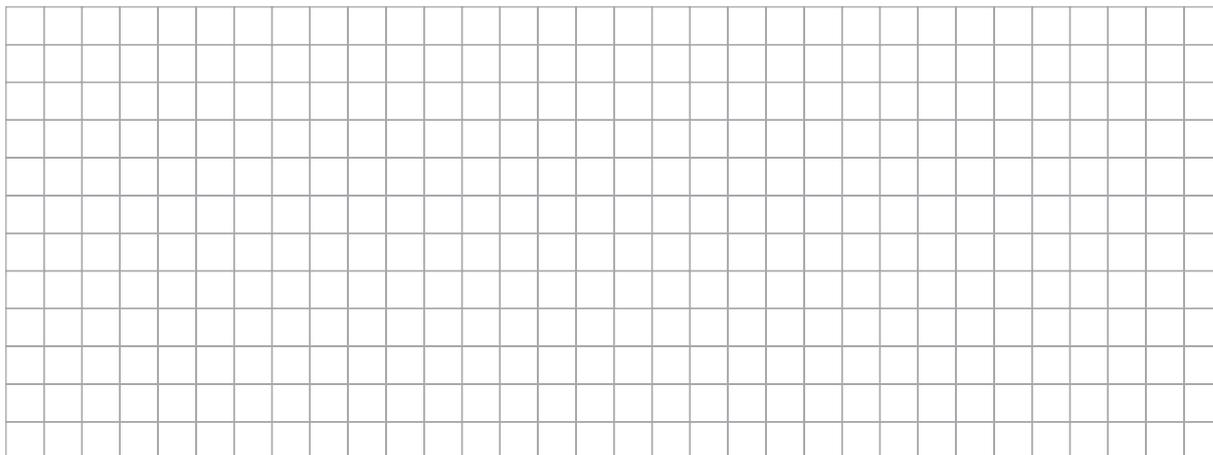
- (ii) The incentre  $O$  of a circle is the intersection of the angle bisectors. Using your compass and straight-edged ruler, draw the bisectors of the angles  $\angle CAB$  and  $\angle CBA$ . Hence, draw the incircle.
- (iii) The three sides of the triangle touch the incircle at one point only. What name is given to a line which touches a circle at one point only?

NAME: \_\_\_\_\_

- (iv) Draw a radius from  $O$  to side  $AB$ . Call  $D$  the point of contact. What angle does  $OD$  make with side  $AB$ ?

ANGLE: \_\_\_\_\_

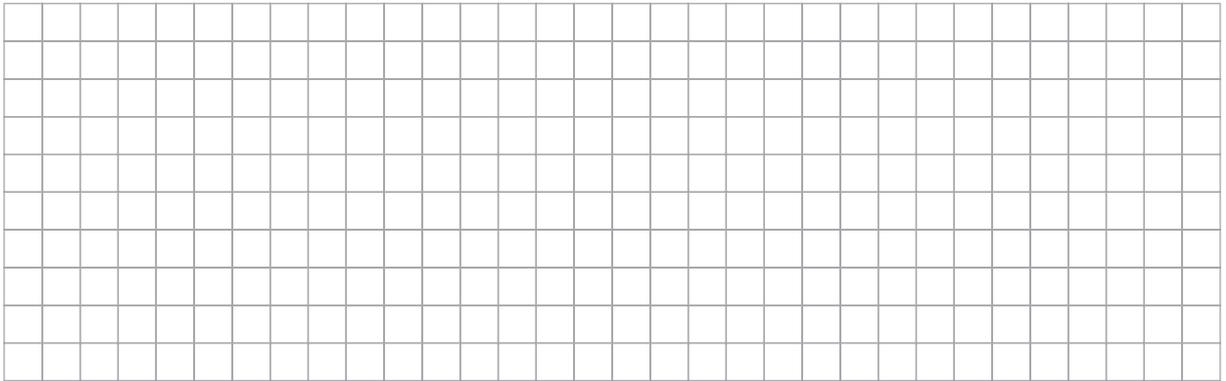
- (v) Prove that  $|AD| = |DB|$ .



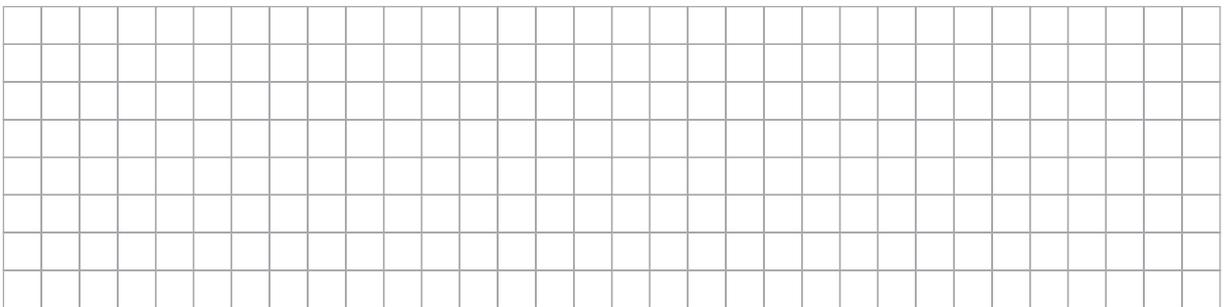


(iv) Using your compass, draw the circumcircle around the triangle  $ABC$ .

(v) Find a value for the radius  $r_2$ , the radius of the circumcircle. Leave your answer in surd form.



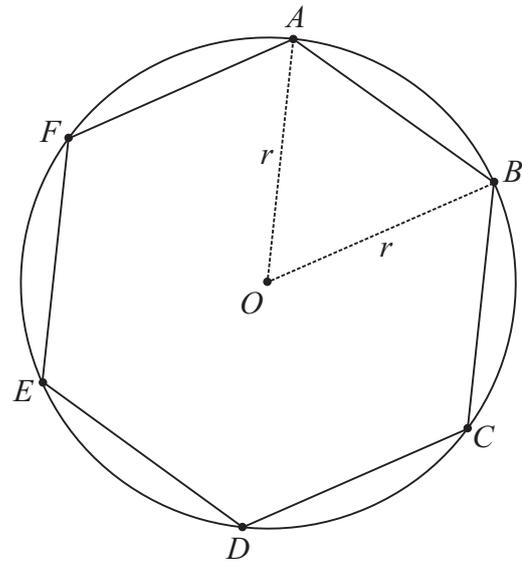
(vi) What is the ratio of the two radii  $r_1 : r_2$ ?



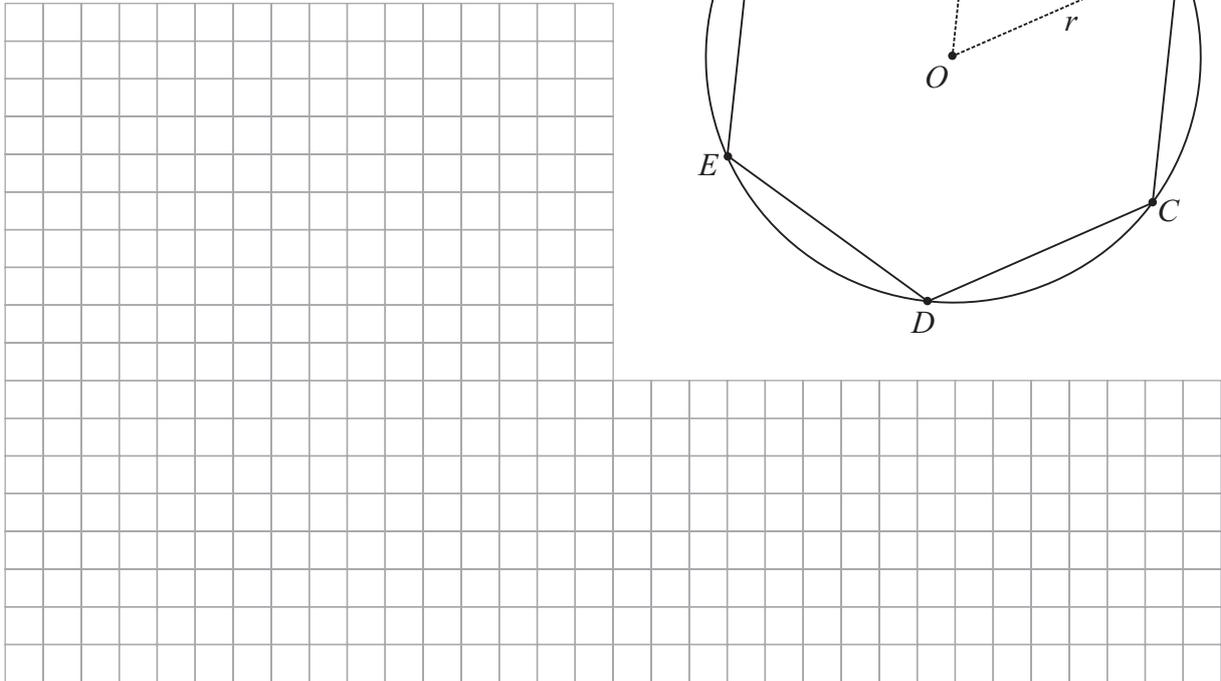
**Question 9**

**(25 marks)**

A regular hexagon is a six-sided shape where the lengths of all sides are equal and the sizes of all interior angles are equal. A circle is drawn around the hexagon. It can be shown that the sides of the hexagon have the same length as the radius  $r$ .



(a) Prove that  $|AB| = r$ .



(b) An axis of symmetry is a line where one side of the line is a mirror image of the other side. Name 3 axes of symmetry of the hexagon.

AXES OF SYMMETRY: \_\_\_\_\_

(c) Using the fact that the sides of the hexagon have the same length as the radius of a circle which circumscribes the hexagon, inscribe a regular hexagon inside the circle below, using a compass and straight-edged ruler. Show all construction lines clearly.

