

FOR THE EXAMINER

EXAM. NUMBER:

Total
Marks:


Coimisiún na Scrúduithe Stáit State Examinations Commission

JUNIOR CERTIFICATE EXAMINATION, 2005

MATHEMATICS - ORDINARY LEVEL - PAPER 2 (300 marks)

MONDAY, JUNE 13 - MORNING, 9:30 to 11:30

Time: 2 hours

Attempt **ALL** questions. Each question carries 50 marks.

Answers and supporting work should be written into the boxes provided.

Extra paper and graph paper can be obtained from the Superintendent, if needed.

The symbol indicates that supporting work must be shown to obtain full marks.

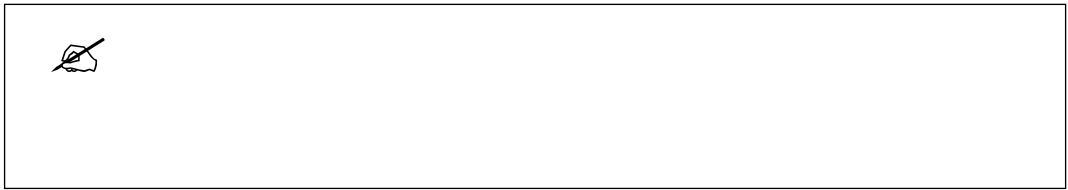
Make and model of calculator used:

For Superintendent/Examiner use only:

Centre Stamp

Question	Mark
1	
2	
3	
4	
5	
6	
Total	
Grade	

1. (a) Subtract 500 g from 5640 g, and give your answer in kg.

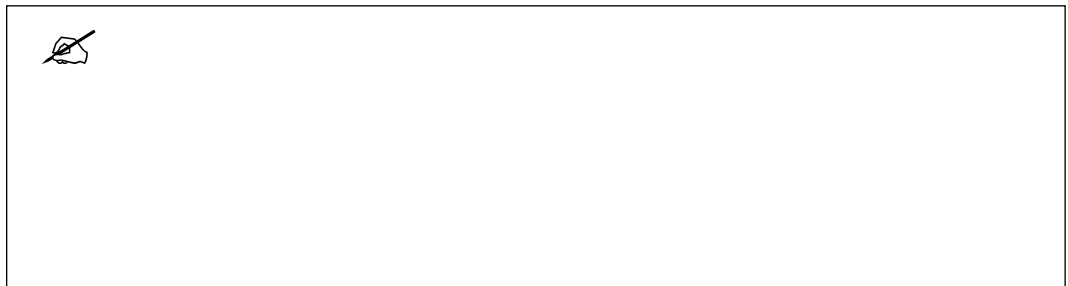
A rectangular box for writing the answer to question 1(a). In the top-left corner, there is a small icon of a hand holding a pencil, indicating where to start writing.

- 1(b) Cormac went by car from Limerick to Cork, a journey of 100 km.
He travelled at an average speed of 80 km/h.

- (i) How many hours and minutes did it take Cormac to complete the journey?

A rectangular box for writing the answer to question 1(b)(i). In the top-left corner, there is a small icon of a hand holding a pencil, indicating where to start writing.

- (ii) Cormac left Limerick at 11:15. At what time did he arrive in Cork?

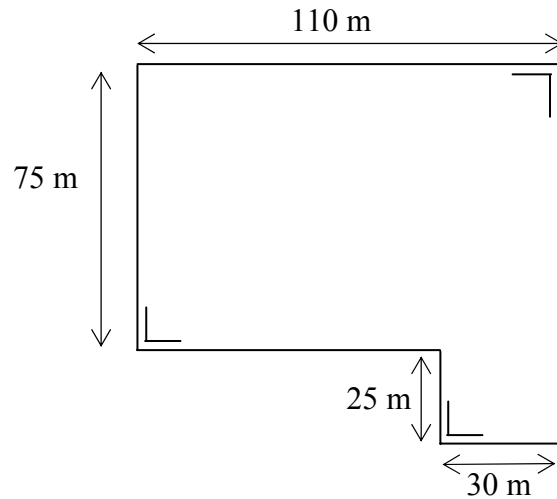
A rectangular box for writing the answer to question 1(b)(ii). In the top-left corner, there is a small icon of a hand holding a pencil, indicating where to start writing.

- (iii) Cormac's car used 1 litre of petrol for every 16 km travelled. On that day petrol cost 99 cent per litre. Find the cost of the petrol used on Cormac's journey from Limerick to Cork. Give your answer to the nearest euro.


A rectangular box for writing the answer to question 1(b)(iii). In the top-left corner, there is a small icon of a hand holding a pencil, indicating where to start writing.

1 (c)

A field has shape and measurements as shown in the diagram.




(i) Find, in metres, the length of the perimeter of the field.



A large empty rectangular box for writing the answer to question (i).

(ii) Find, in m^2 , the area of the field.



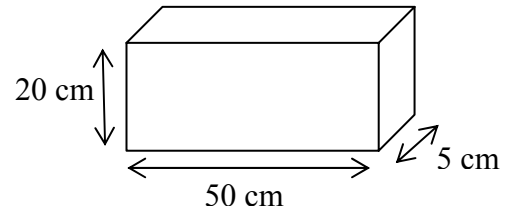
A large empty rectangular box for writing the answer to question (ii).

(iii) Mary bought the field at a cost of €20 000 per hectare.
How much did Mary pay for the field?




A large empty rectangular box for writing the answer to question (iii).

2. (a) A rectangular box has measurements as shown.



Find the volume of the box in cm^3 .



- 2(b) The front wheel of a bicycle has a diameter of 56 cm.

- (i) Calculate, in cm, the length of the radius of the wheel.



- (ii) Calculate, in cm, the length of the circumference of the wheel.

Take π as $\frac{22}{7}$.

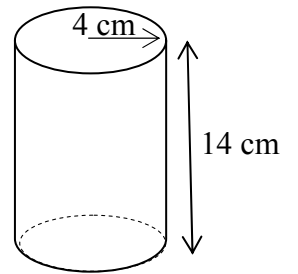


- (iii) How far does the bicycle travel when the wheel makes 250 complete turns?
Give your answer in metres.




2(c)

A solid cylinder has radius 4 cm and height 14 cm.



(i) Find the volume of the cylinder in terms of π .



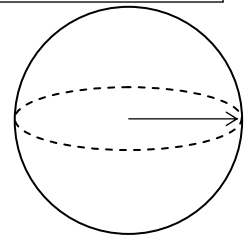
(ii) Find the curved surface area of the cylinder in terms of π .



(iii) Find the total surface area of the cylinder in terms of π .



(iv) A sphere has the same surface area as the total surface area of the above cylinder. Find, in cm, the radius of this sphere.

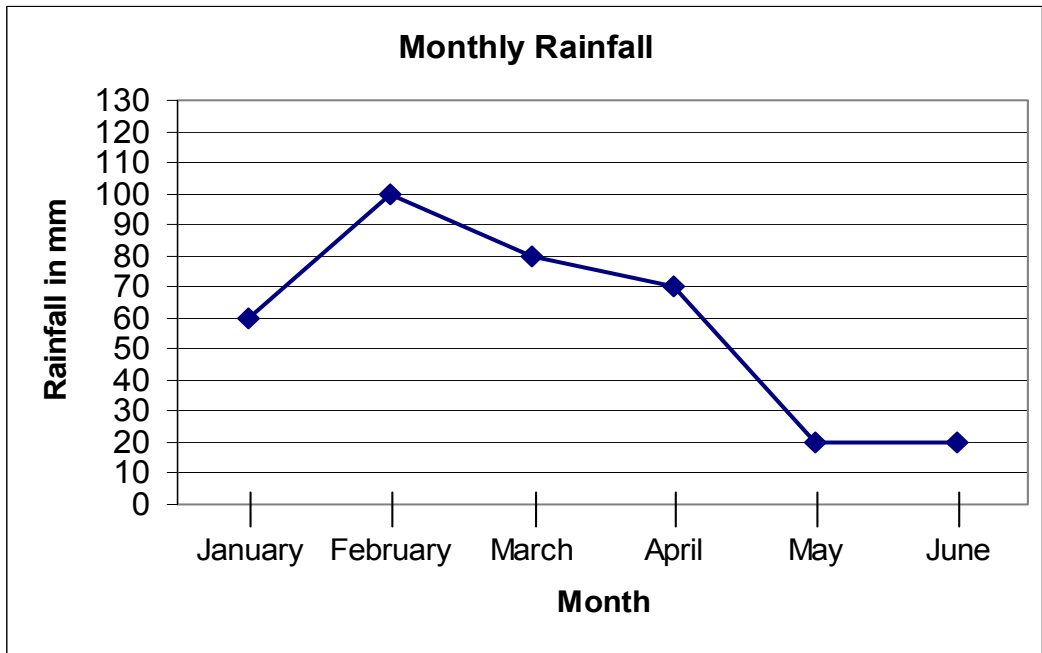




3. (a) Find the mean of the numbers: 4, 6, 7, 12, 16.



- 3(b) The trend graph below shows the rainfall in mm for the first six months of last year.




Use the trend graph to answer the following questions.

- (i) Which of the given months had the highest rainfall?

- (ii) What was the total rainfall, in mm, for the given six months?



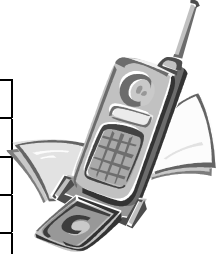
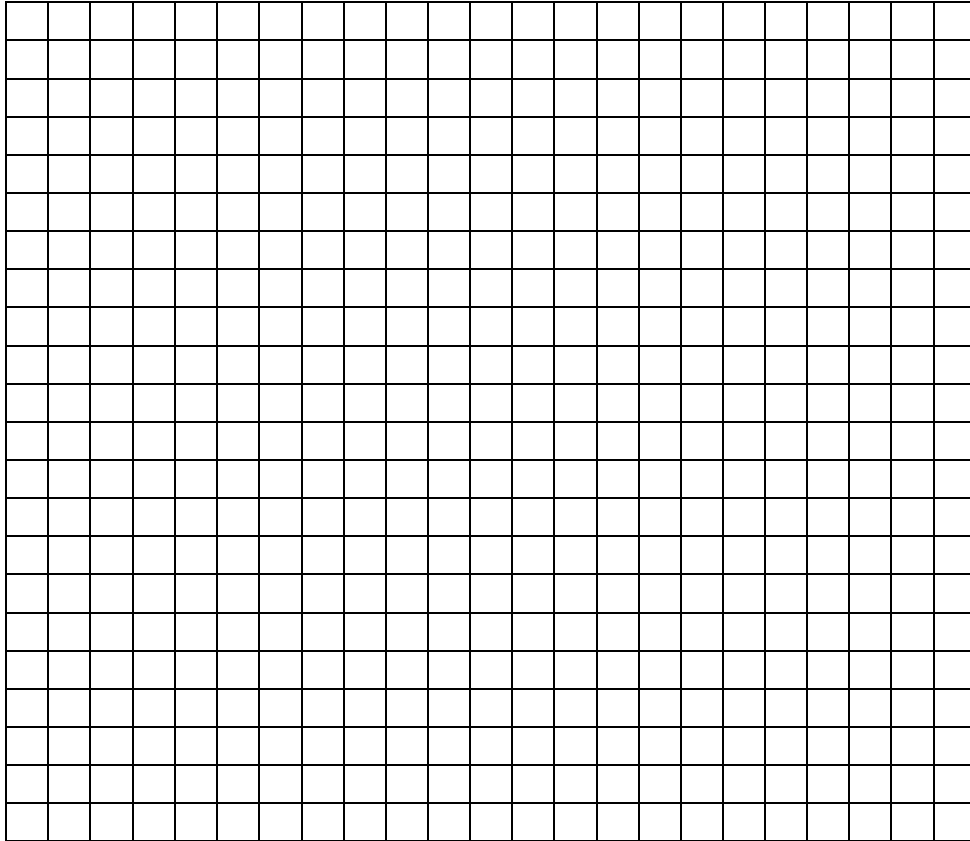
- (iii) What percentage of the total rainfall for the given six months fell in the month of April?



3(c) A survey was taken of 40 students, who owned mobile phones, to find out the number of text messages that they sent on a particular day. The table shows the results of the survey.

Number of text messages	0	1	2	3	4	5
Number of students	3	5	7	5	14	6

(i) Draw a bar chart of the data.



(ii) What was the modal number of text messages sent on that day?

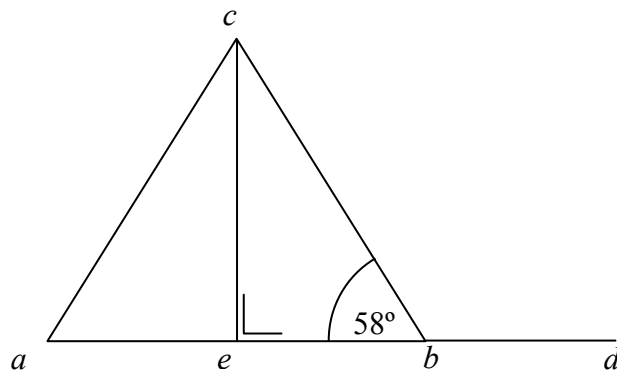
(iii) Calculate the mean number of text messages sent on that day.



4. (a) Construct a triangle pqr with $|pq| = 8$, $|qr| = 10$ and $|\angle pqr| = 30^\circ$.
Label your diagram clearly.



- 4(b) abc is an isosceles triangle with $|ca| = |cb|$.
The side $[ab]$ is extended to d and $ce \perp ab$.



- (i) Name an angle equal in measure to $\angle abc$.
Give a reason for your answer.

<p>Name of angle:</p> <p>Reason:</p>

- (ii) Given that $|\angle abc| = 58^\circ$, find $|\angle cbd|$ and give a reason for your answer.

$$|\angle cbd| =$$

Reason:

- (iii) Given that $|ab| = 10$ cm and $|ce| = 8$ cm, find the area of Δabc .

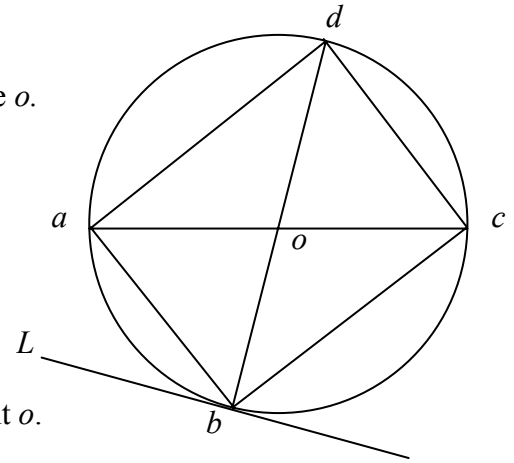


- (iv) ce is the bisector of $\angle acb$.
Show that Δace and Δbce are congruent.

Reasons:

Part (c) on next page

- 4(c) $[ac]$ and $[bd]$ are diameters of a circle with centre o .
 L is a line touching the circle at the point b only.



- (i) Name the image of the Δaod
under S_o , the central symmetry in the point o .

- (ii) What is the name given to a line, such as the line L , that touches the circle at one point only?

- (iii) Write down $|\angle abc|$, and give a reason for your answer.

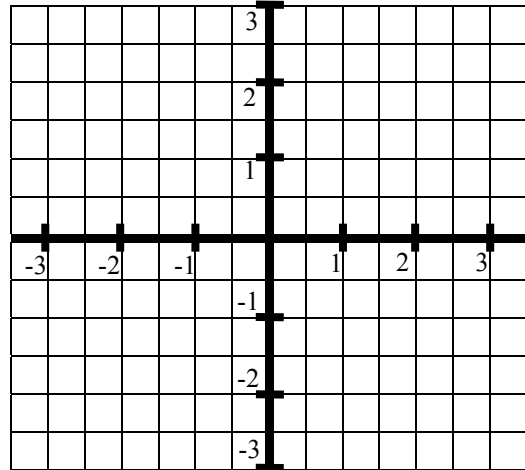
$$|\angle abc| =$$

Reason:


- (iv) Given that $|ad| = 4$, $|dc| = 3$, use the Theorem of Pythagoras to find $|ac|$.


5. Note: Coordinate Geometry Formulae are given on Page 13.


- (a) a is the point $(1, 2)$.
 b is the point $(-3, -2)$.
Plot the points a and b .



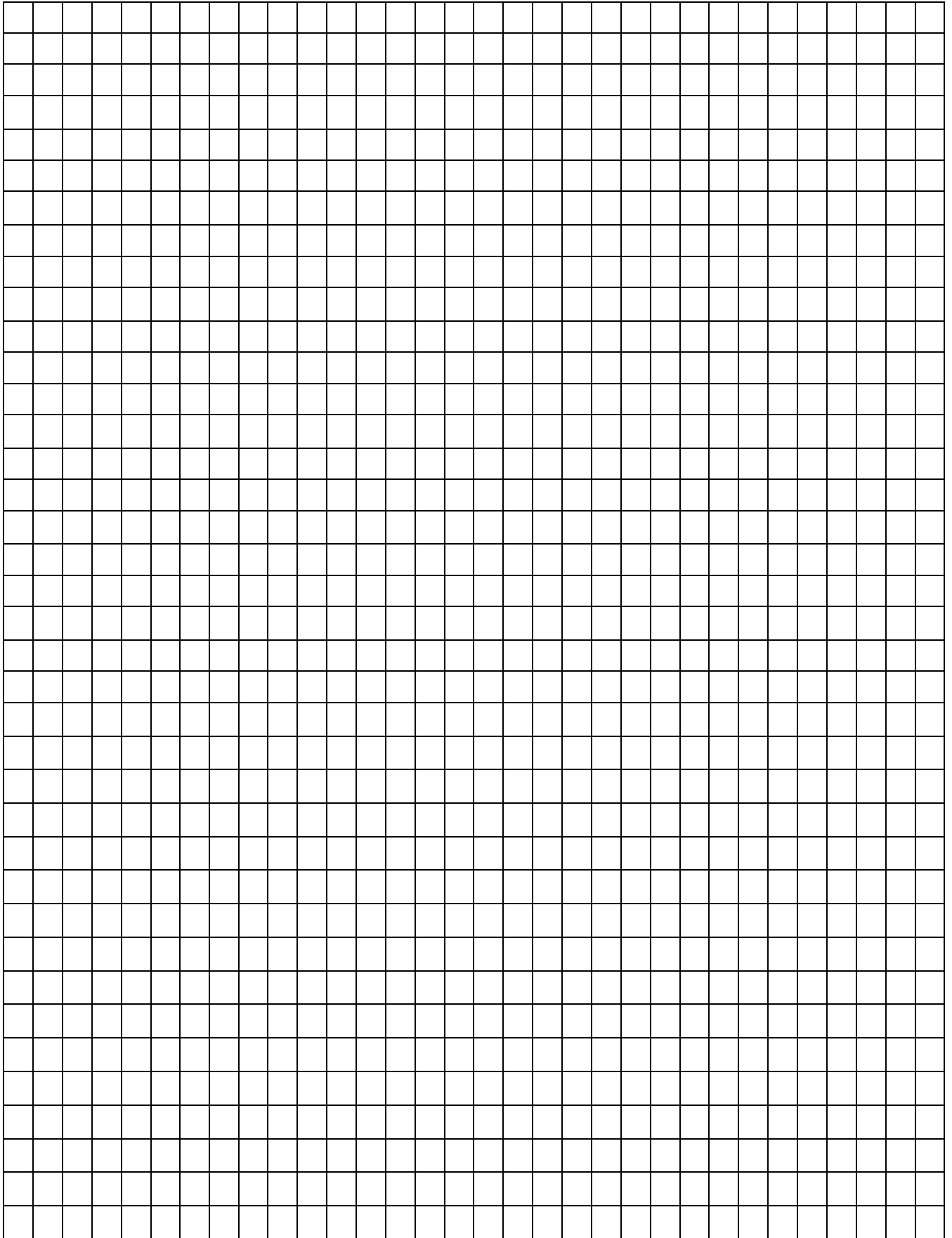
5(b) p is the point $(2, 1)$ and q is the point $(4, 3)$. Find each of the following:

 (i) the length of $[pq]$


 (ii) the slope of pq

 (iii) the equation of the line pq .


If you wish to draw a diagram, use the next page



- 5(c) (i)** L is the line $2x + 3y - 10 = 0$.
 L cuts the x - axis at the point c .
By letting $y = 0$, find the co-ordinates of the point c .



- (ii)** Show that the point $(8, -2)$ is on the line L .



- (iii)** The point $(k, 6)$ is on the line L . Find the value of k .



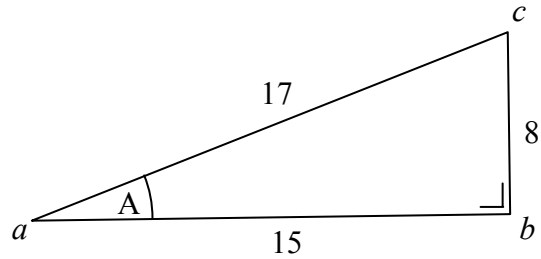
Formulae

Length of a line segment : $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Slope of a line: $m = \frac{y_2 - y_1}{x_2 - x_1}$

Equation of a line : $y - y_1 = m(x - x_1)$

6. (a) The right-angled triangle abc has measurements as shown.



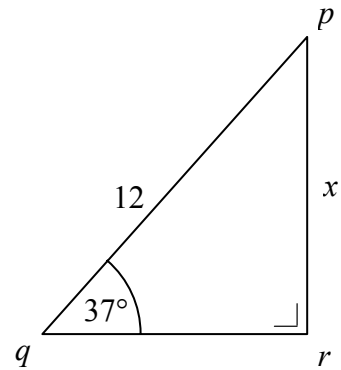
- (i) Write down the length of the side adjacent to the angle A .

Length of the side adjacent to the angle $A =$

- (ii) Write down the value of $\cos A$, as a fraction.

$\cos A =$

- 6(b) In the right-angled triangle pqr ,
 $|pq| = 12$ and $|\angle pqr| = 37^\circ$. Let $x = |pr|$.



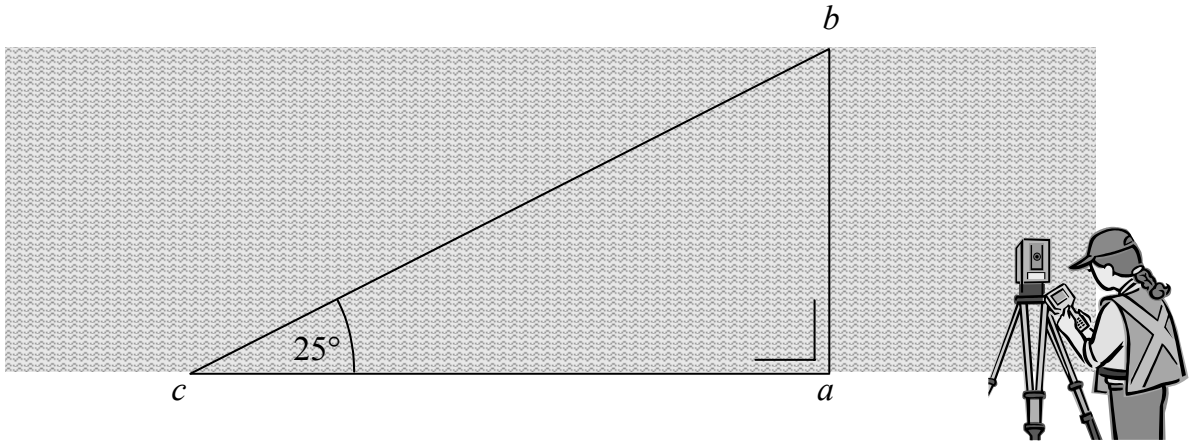
- (i) Using the diagram, write down the value of $\sin 37^\circ$, as a fraction.


- (ii) Using your calculator, write down the value of $\sin 37^\circ$, correct to one decimal place.


- (iii) Hence find x , the value of $|pr|$.



- 6 (c) Ciara wished to measure the width of a river. She was at a on the riverbank, directly opposite b on the other bank. Ciara walked from a to c , along the riverbank, at an average speed of 1.5 m/s. It took Ciara 30 seconds to reach c . She then measured $\angle acb$ and found it to be 25° .



 (i) Calculate $|ac|$, the distance walked by Ciara.

 (ii) Hence, calculate $|ab|$, the width of the river.
Give your answer correct to the nearest metre.

Space for extra work

