

AN ROIINN OIDEACHAIS AGUS EOLAÍOCHTA

40513

JUNIOR CERTIFICATE EXAMINATION, 1999

MATHEMATICS - ORDINARY LEVEL

FRIDAY, 11 JUNE - MORNING, 9.30 to 12.00.

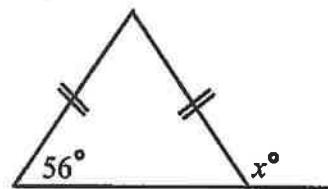
PAPER 2 (300 marks)

Attempt **QUESTION 1**(100 marks) and **FOUR** other questions (50 marks each).

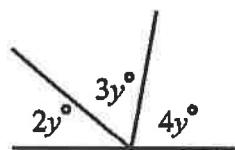
Marks may be lost if necessary work is not clearly shown.
Mathematics Tables may be obtained from the Superintendent.

1. (i) Subtract $21^\circ 31'$ from 30° .

- (ii) Calculate the value of x in the diagram.



- (iii) Calculate the value of y in the diagram.

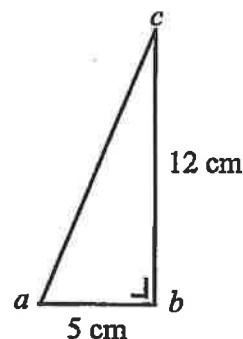


- (iv) Construct a triangle with sides of lengths 7 cm, 6 cm and 5 cm.

Using a protractor, measure the number of degrees in each of the three angles of the triangle.

- (v) In the triangle abc , $|\angle abc| = 90^\circ$, $|ab| = 5 \text{ cm}$ and $|bc| = 12 \text{ cm}$.

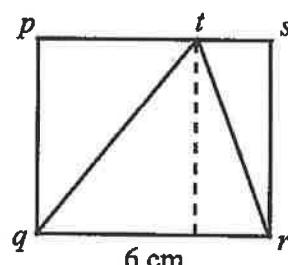
Calculate $|ac|$.



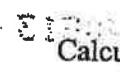
- (vi) $pqrs$ is a rectangle.

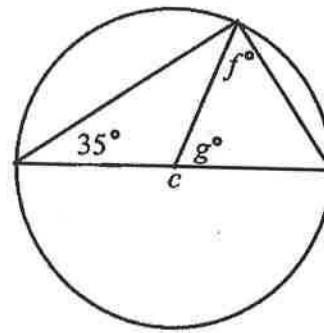
$|qr| = 6 \text{ cm}$ and the area of triangle tqr is 15 cm^2 .

Find $|pq|$.



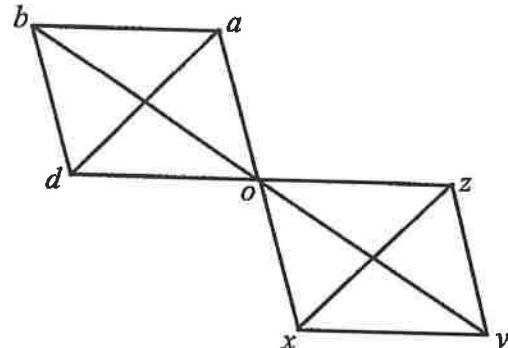
- (vii) The centre of the circle is c .

 Calculate the value of f and the value of g .



- (viii) Under the central symmetry in o , the image of the parallelogram $abdo$ is $zoxy$.

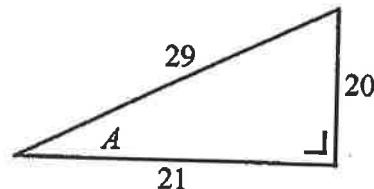
Name the image of the triangle abd under the central symmetry in o .



- (ix) Find the distance between the points $(-1, 3)$ and $(2, 7)$.

[Distance formula: $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.]

- (x) Use the diagram to write down, as fractions, the value of $\sin A$ and the value of $\tan A$.

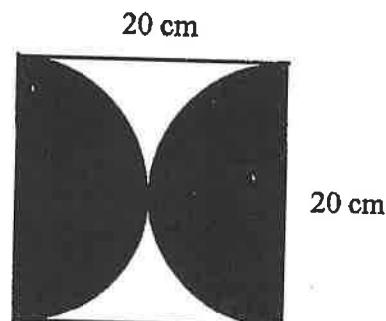


2. (a) Divide IR£270 in the ratio $4 : 5$.

- (b) On the first day of term 550 students were asked how they had travelled to school that day. It was found that 45% had cycled, 25% had travelled by bus, 10% had travelled by car and the remainder had walked.
Calculate the number of students who walked to school that day.

- (c) A piece of cardboard is in the shape of a square with side of length 20 cm. Calculate its area.

Two semi-circular pieces, each with diameter of length 20 cm, are cut from the piece of cardboard as shown in the diagram.

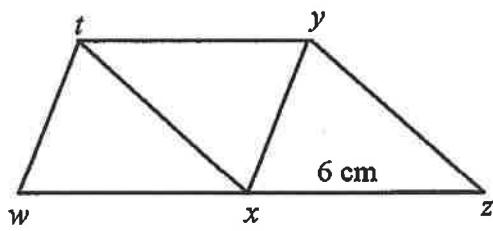


Taking $\pi = 3.14$, calculate

- the area of the two pieces which are cut out
- the percentage of the area of the square that remains.

3. $twxy$ and $txzy$ are two parallelograms.

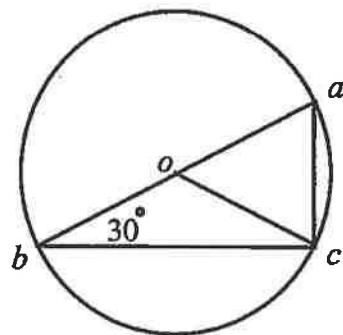
$$|xz| = 6 \text{ cm}.$$



- (i) Copy the diagram and draw a line segment to represent the perpendicular distance of y from $[xz]$.
- (ii) Name two line segments each of which is the same length as $[yt]$.
- (iii) Name two angles each of which has the same measure as $\angle xzy$.
- (iv) Name the image of the triangle yxz under the translation \vec{yt} .
- (v) Given that the area of the figure $twzy$ is 36 cm^2 , find the area of triangle yxz .
- (vi) Taking $[xz]$ as the base, calculate the perpendicular height of triangle yxz .

4. $[ab]$ is a diameter of the circle with centre o and c is a point on the circle.

- (i) Name the angle in the diagram which measures 90° .
- (ii) Write down the measure of $\angle aoc$, given that $|\angle obc| = 30^\circ$.
- (iii) Copy the diagram and draw the image of triangle abc under the central symmetry in o .
- (iv) On the diagram which you have drawn, shade two equilateral triangles.
- (v) Given that the radius of the circle is 4 cm , show that $|bc| = \sqrt{48} \text{ cm}$.
- (vi) Calculate the area of the triangle abc , correct to one place of decimals.



5. The point $a(2, 4)$ is shown in the diagram.

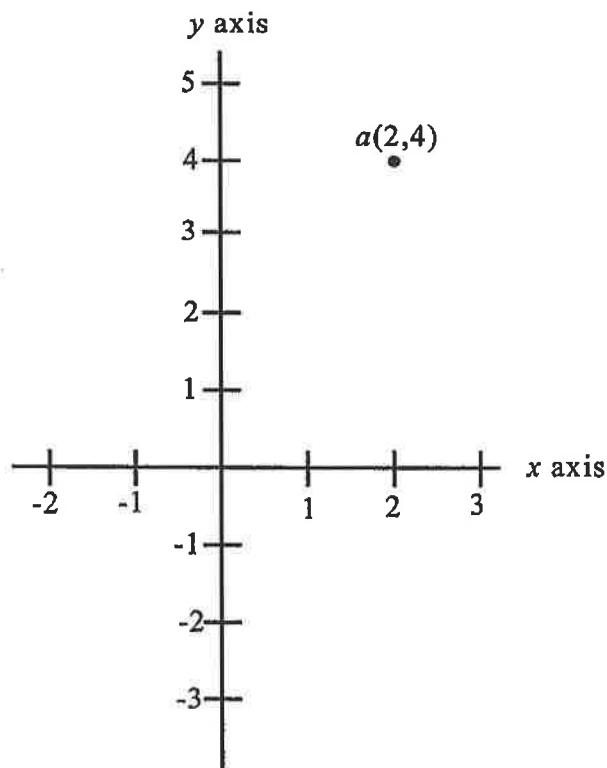
- Copy the diagram and on it plot the point $b(1, -2)$.
- Find the midpoint of $[ab]$.
- Find the slope of ab .
- Find the equation of ab .
- Use your equation to find the coordinates of the point at which the line ab intersects the y axis.
- If the line ab contains the point $(k, 10)$, find the value of k .

FORMULAE:

Midpoint of (x_1, y_1) and (x_2, y_2) is $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.

Slope formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$.

Equation of line: $y - y_1 = m(x - x_1)$ or $y = mx + c$.



6. (a) Use the book of Tables to find

- $\cos 40^\circ$
 - $\cos 47^\circ 56'$.
- (b) In the triangle pqr , $|\angle prq| = 90^\circ$, $|pq| = 100$ m and $|qr| = 67$ m.

Find the measure of

- $\angle pqr$
- $\angle qpr$.

- (c) $[ad]$ is a vertical mast standing on level ground. Wires join a to the ground at b and at c as in the diagram.

Given that $|ab| = 20$ m, $|dc| = 40$ m and $|\angle abd| = 60^\circ$, calculate

- $|ad|$
- the measure of $\angle acd$.

