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40513

JUNIOR CERTIFICATE EXAMINATION, 1999

MATHEMATICS - ORDINARY LEVEL

FRIDAY, 11 JUNE - MORNING, 9.30 to 12.00.

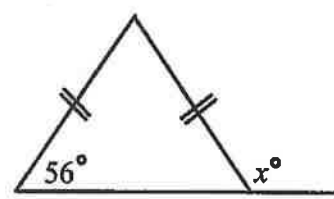
PAPER 2 (300 marks)

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

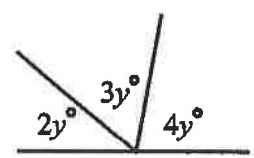
Marks may be lost if necessary work is not clearly shown.
 Mathematics Tables may be obtained from the Superintendent.

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

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



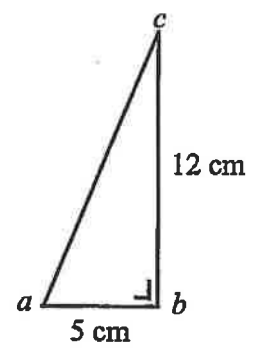
(iii) Calculate the value of y in the diagram.



(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 , $|\angle abc| = 90^{\circ}$, $|ab| = 5$ cm
 and $|bc| = 12$ cm.

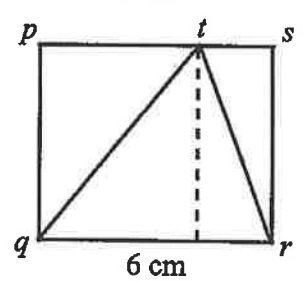
Calculate $|ac|$.



(vi) $pqrs$ is a rectangle.

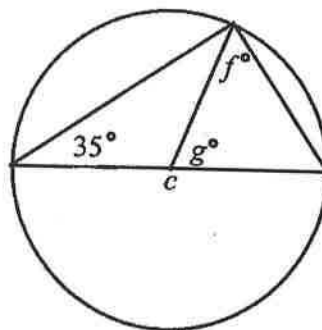
$|qr| = 6$ cm and the area of triangle tqr
 is 15 cm².

Find $|pq|$.



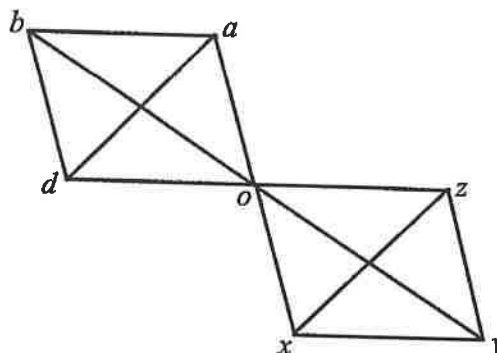
(vii) The centre of the circle is c .

Calculate the value of f and the value of g .



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

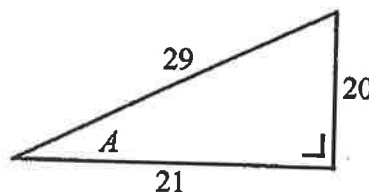
Name the image of the triangle abd under the central symmetry in o .



(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 $\tan A$.

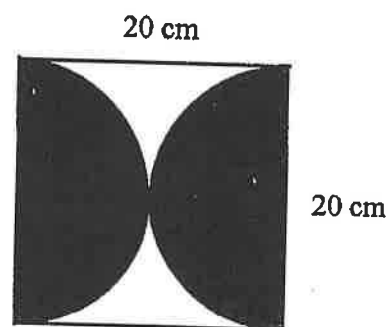


2. (a) Divide IR£270 in the ratio 4 : 5.

(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.

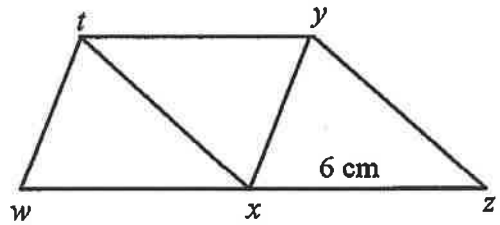


Taking $\pi = 3.14$, calculate

- (i) the area of the two pieces which are cut out
- (ii) the percentage of the area of the square that remains.

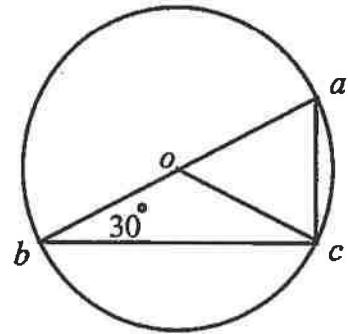
3. $twxy$ and $txzy$ are two parallelograms.

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



- (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 .

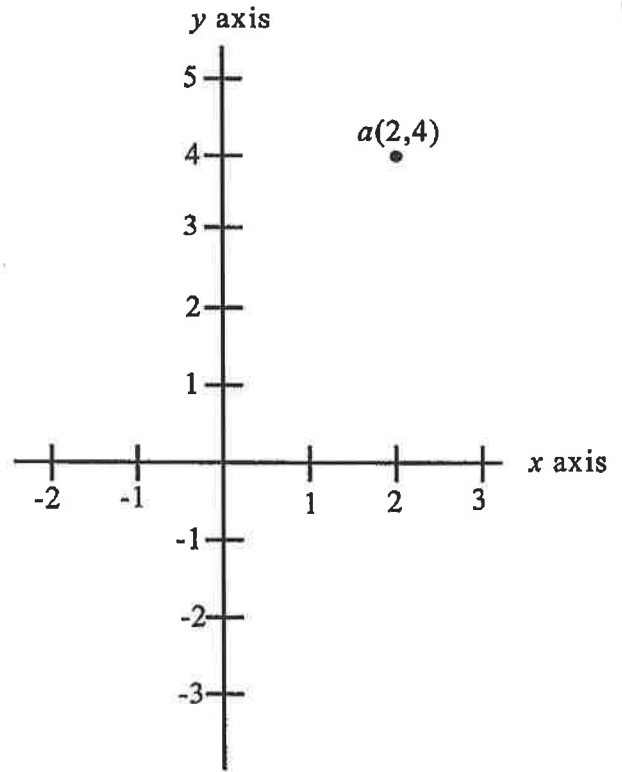
4. $[ab]$ is a diameter of the circle with centre o and c is a point on the circle.



- (i) Name the angle in the diagram which measures 90° .
- (ii) Write down the measure of $\angle aoc$, given that $|\angle ocb| = 30^\circ$.
- (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.

- (i) Copy the diagram and on it plot the point $b(1, -2)$.
- (ii) Find the midpoint of $[ab]$.
- (iii) Find the slope of ab .
- (iv) Find the equation of ab .
- (v) Use your equation to find the coordinates of the point at which the line ab intersects the y axis.
- (vi) 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 $y = mx + c$.

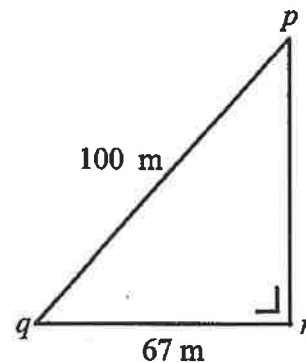
6. (a) Use the book of Tables to find

- (i) $\cos 40^\circ$
- (ii) $\cos 47^\circ 56'$.

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

Find the measure of

- (i) $\angle pqr$
- (ii) $\angle qpr$.



(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

- (i) $|ad|$
- (ii) the measure of $\angle acd$.

