

## AN ROINN OIDEACHAIS AGUS EOLAÍOCHTA

## JUNIOR CERTIFICATE EXAMINATION, 2000

## MATHEMATICS - ORDINARY LEVEL

FRIDAY, 9 JUNE - MORNING, 9.30 to 12.00

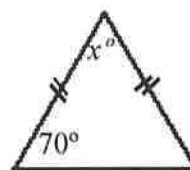
## PAPER 2 (300 marks)

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

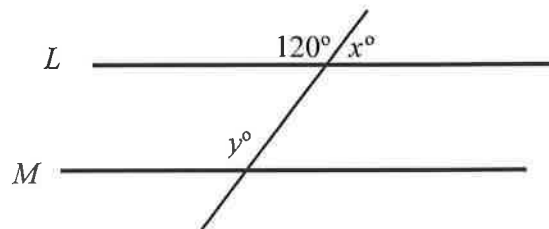
Marks may be lost if necessary work is not clearly shown.  
 Mathematics Tables may be obtained from the Superintendent.

1. (i) Add  $70^\circ 50'$  to  $50^\circ 30'$ .

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

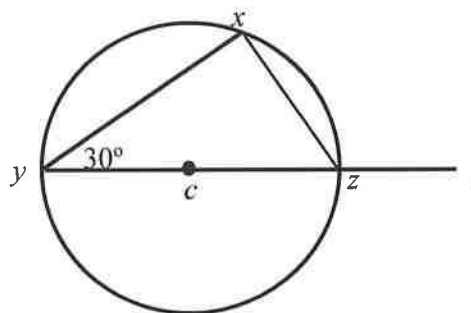


- (iii)  $L$  and  $M$  are parallel lines.  
 Calculate the value of  $x$   
 and the value of  $y$ .

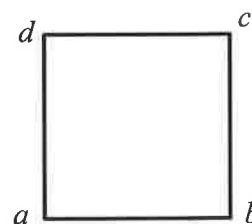


- (iv) Construct accurately the parallelogram  $abcd$  in which  
 $|ab| = 5\text{cm}$ ,  $|ad| = 3.5\text{cm}$  and  $|\angle dab| = 60^\circ$ .  
 Measure  $|bd|$ , giving your answer in centimetres.

- (v)  $c$  is the centre of the circle  
 and  $|\angle xyz| = 30^\circ$ .  
 Calculate  $|\angle xzt|$ .

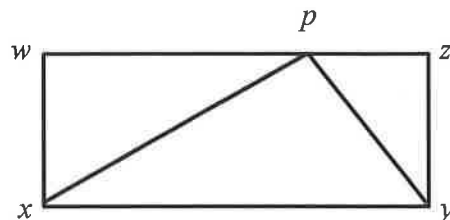


- (vi)  $abcd$  is a square.  
 Copy the diagram into your answer book  
 and construct its image under an axial symmetry in  $ab$ .

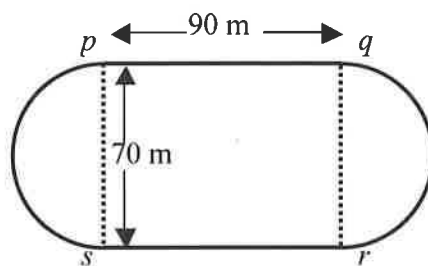


OVER →

- (vii) The area of the  $\Delta pxy$  is  $24 \text{ cm}^2$ .  
Find the area of the rectangle  $wxyz$ .



- (viii)  $y + 3x = 2$  is the equation of a line. What is the slope of this line?  
(The equation of a line with slope  $m$  is  $y = mx + c$ .)
- (ix) Find the image of the point  $(2, -3)$  under the translation  $(1, -5) \rightarrow (2, 6)$ .
- (x) Use the book of Tables to show that  $\cos 10^\circ + \cos 50^\circ$  is not equal to  $\cos 60^\circ$ .
2. (a) A schoolbook costs IR£20.  
How much does the schoolbook cost in euro if IR£1 = € 1.27?
- (b) 150 people attended a concert. Each person paid IR£12 to attend the concert.  
The cost of organising the concert was IR£1250.
- (i) Find the profit made by the organisers.
- (ii) Express this profit as a percentage of the organisers' costs.
- (c) A running track has two equal parallel sides  $[pq]$  and  $[sr]$   
and two equal semi-circular ends with diameters  $[ps]$  and  $[qr]$ .  
 $|pq| = |sr| = 90$  metres, and  $|ps| = |qr| = 70$  metres.

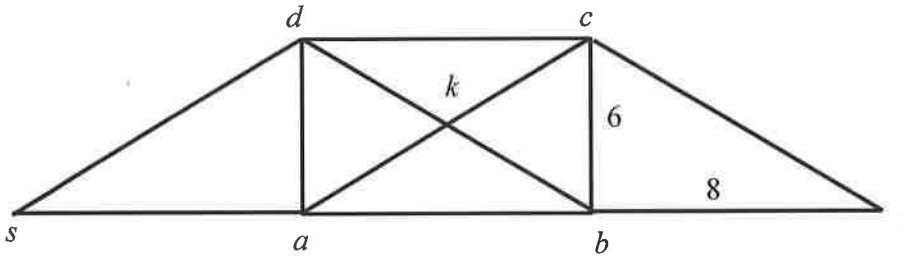


- (i) Calculate the total length of one lap of the track. (Use  $\pi = \frac{22}{7}$ .)
- (ii) How many laps of the track would an athlete have to complete in a 10,000 metres race?
- (iii) If the athlete runs 10,000 metres in 30 minutes, find the athlete's average speed in kilometres per hour.

3.

$abcd$  is a rectangle having diagonals intersecting at  $k$ .  
 $sacd$  and  $bctd$  are parallelograms.

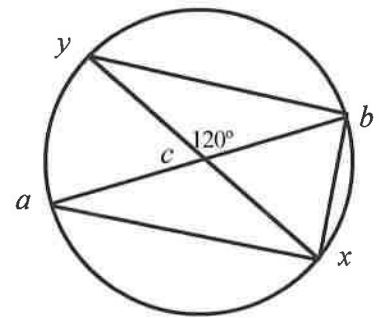
$|bt| = 8$  and  $|bc| = 6$ .



- (i) Name any two isosceles triangles that are equal in area.
- (ii) Find the image of the  $\Delta sdb$  under the translation  $\vec{ab}$ .
- (iii) Name two angles equal in measure to  $|\angle btc|$ .
- (iv) Say why triangles  $sad$  and  $tbc$  are congruent.
- (v) Calculate the area of the figure  $stcd$ .
- (vi) Calculate  $|kc|$ .

4.

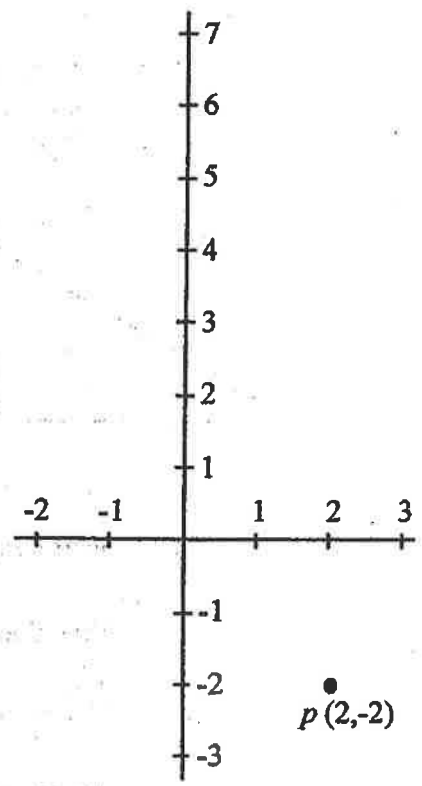
$c$  is the centre of the circle where  $|\angle bcy| = 120^\circ$   
 and  $|xb| = 9$ .



- (i) Say why  $|\angle axb| = 90^\circ$ .
- (ii) Find  $|\angle axc|$ .
- (iii) Name two angles equal in measure to  $|\angle acy|$ .
- (iv) Name the image of the  $\Delta abx$  under the central symmetry in  $c$ .
- (v) Calculate  $|ab|$ .
- (vi) Prove that  $ax$  is parallel to  $yb$ .

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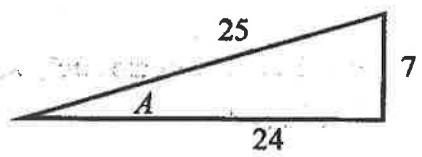
5. The point  $p(2, -2)$  is shown in the diagram.
- (i) Copy the diagram and plot on it the point  $q(-2, 6)$ .
  - (ii) Show that  $|pq| = \sqrt{80}$ .
  - (iii) Find the slope of  $pq$ .
  - (iv) Find the equation of  $pq$ .
  - (v) Use your equation to find the coordinates of the point at which the line  $pq$  intersects the  $x$  axis.
  - (vi) If the line  $pq$  contains the point  $(7, k)$ , find the value of  $k$ .



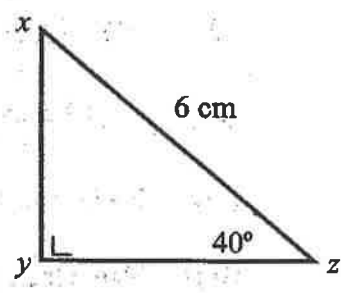
**Formulae:**

- Distance formula:  $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$   
 Equation of line:  $y - y_1 = m(x - x_1)$  or  $y = mx + c$   
 Slope formula:  $m = \frac{y_2 - y_1}{x_2 - x_1}$

6. (a) In the diagram  $\sin A = \frac{7}{25}$ .  
 Use the diagram to write down, as fractions, the value of  $\cos A$  and the value of  $\tan A$ .



- (b) Use the book of Tables to find  $\sin 40^\circ$ .  
 In the triangle  $xyz$ ,  $|\angle xyz| = 90^\circ$ ,  $|\angle xzy| = 40^\circ$ , and  $|xz| = 6$  cm.  
 Calculate  $|xy|$ , correct to one decimal place.



- (c) A ladder leans against a wall. Its foot is 2 m from the bottom of the wall. The top of the ladder reaches a point 5 m up from the ground.

- (i) Write  $\frac{5}{2}$  as a decimal.
- (ii) Find the measure of the angle that the ladder makes with the ground, correct to the nearest degree.

