AN ROINN OIDEACHAIS

INTERMEDIATE CERTIFICATE EXAMINATION, 1990

MATHEMATICS – SYLLABUS B – PAPER 2 (300 marks)
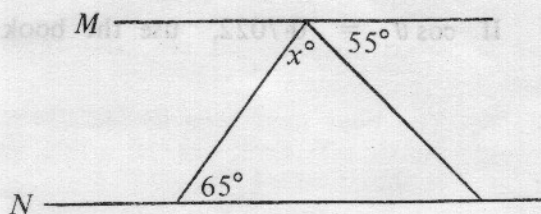
FRIDAY, 8 JUNE, MORNING – 9.30 to 12.00

Attempt **QUESTION 1** (100 marks) and **FOUR** other questions (50 marks each).
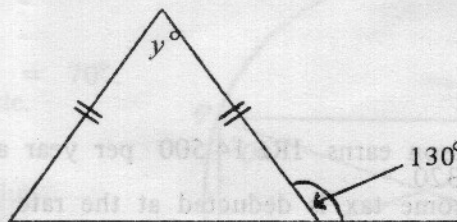**Marks may be lost if all your work is not clearly shown.**
Mathematics Tables may be obtained from the Superintendent.

1. (i) Two angles of a triangle measure 52° 30′ and 73° 40′.
        Calculate the measure of the third angle.
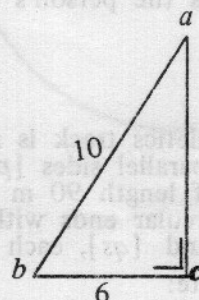
    (ii) M and N are parallel lines.
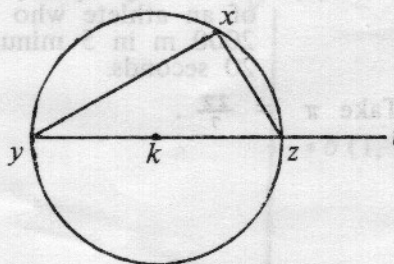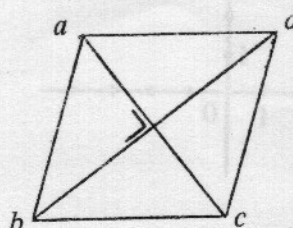   Calculate the value of x.

    (iii) Calculate the value of y.

    (iv) Find the area of $\triangle abc$ if $|ab| = 10$ and
        $|bc| = 6$.

    (v) k is the centre of the circle.
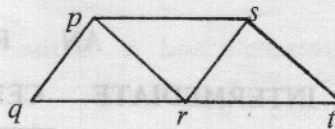   If $|\angle xyz| = 30°$, calculate $|\angle xzt|$.

    (vi) $abcd$ is a parallelogram.
        If $|ab| = 5$ cm and $|ac| = 6$ cm,
        calculate $|bd|$.

OVER →

(vii) *pqrs* and *prts* are parallelograms.

Under the translation $\overrightarrow{rt}$, write down the image of

    (i)   [pq]
    (ii) (q, r)

(viii) The equation of a line is $x + 2y + 2 = 0$.

What is the slope of this line ?

[The equation of a line with slope m is of the form $y = mx + c$].

(ix) Find the image of the point $(-2, 6)$ under the central symmetry in the point $(1, 4)$.

(x) If $\cos \theta = 0.7022$, use the book of Tables to find the value of $\sin \theta$.

2.   (a)   A person earns IR£ 14 500 per year and has tax-free allowances of IR£8320.

If income tax is deducted at the rate of 35p in the IR£ , how much tax does the person pay ?

What is the person's income after paying tax ?

   (b)   An athletics track is made up of two equal parallel sides [pq] and [rs], each of length 90 m and two equal semi-circular ends with diameters [pr] and [qs], each of length 70 m.

Calculate:

    (i)   the length of the athletics track
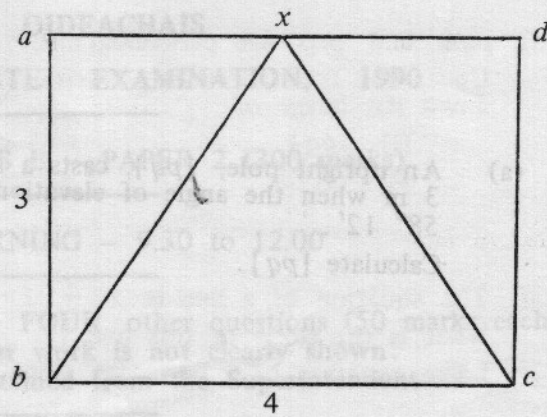   (ii)   the average speed, in m/s, of an athlete who runs 2000 m in 5 minutes 20 seconds.
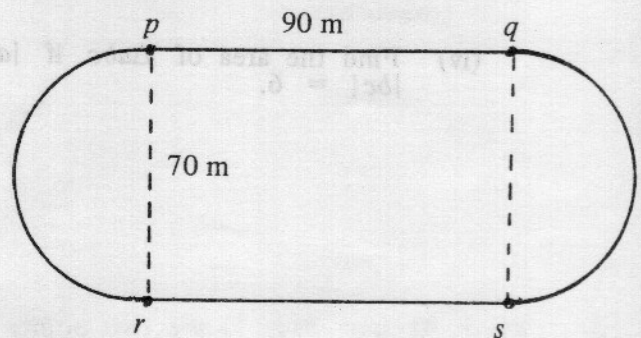
Take $\pi = \frac{22}{7}$.
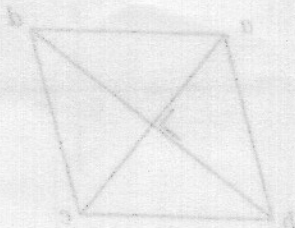
3. *abcd* is a rectangle and *x* is the mid-point of [*ad*].
|*ab*| = 3 and |*bc*| = 4.

(i) Name the isosceles triangle.

(ii) Name three other angles equal in value to |∠*xbc*|.

(iii) Calculate |*bx*|.

(iv) Find the area of △*xbc*.

(v) Calculate |∠*bxc*|, as accurately as the Tables allow.

4. *c* is the centre of the circle and |∠*cqt*| = 70°. [*qr*] and [*tp*] are diameters of the circle.

(i) Find |∠*qct*|.

(ii) Name two other angles equal in value to |∠*cqt*|.

(iii) Find the image of △*pqc* under the central symmetry in *c*.

(iv) Give a reason why ∠*tqp* is a right angle.

(v) Prove that the triangles *qtc* and *pcr* are congruent.
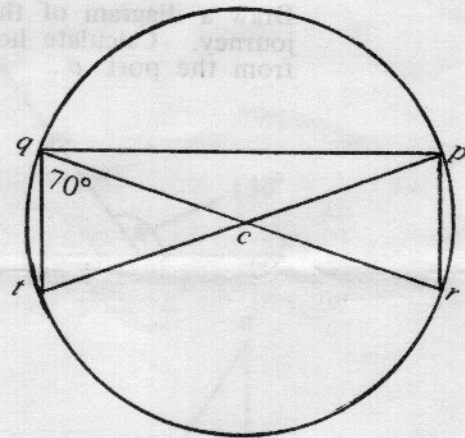
5. *a*(−3, 4) and *b*(1, 7) are two points as indicated in the diagram with 0 the origin.

Find the slope of *ab*.
Find the equation of the line *ab*.
Find where the line *ab* cuts the *Y* axis.

$$\left[\begin{array}{l} \text{Slope formula: } \dfrac{y_2 - y_1}{x_2 - x_1}. \\[2mm] \text{Equation of line: } y - y_1 = m(x - x_1) \\ \qquad \text{OR } y = mx + c. \end{array}\right]$$
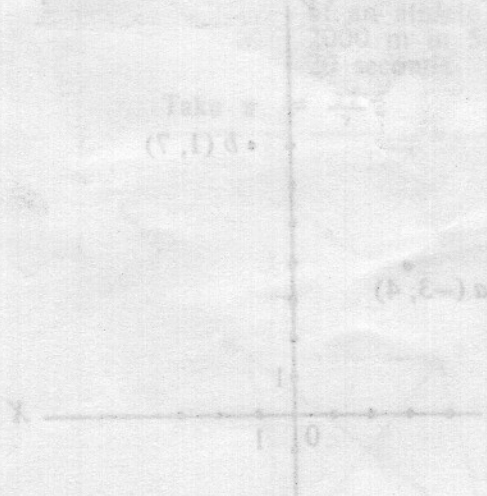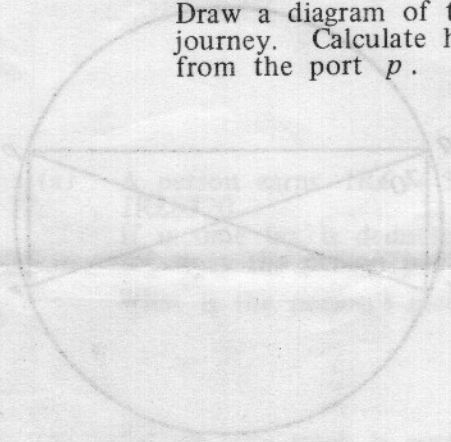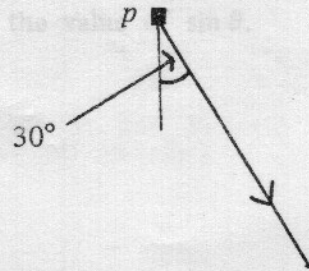
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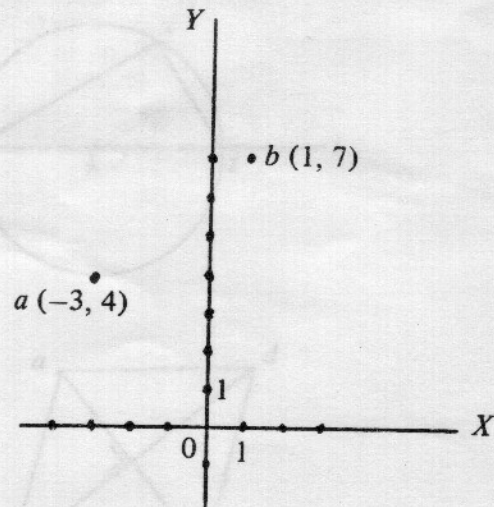
6. (a) An upright pole, [pq], casts a shadow of length
3 m when the angle of elevation of the sun is
58° 12'.
Calculate [pq].

58° 12'

3 m
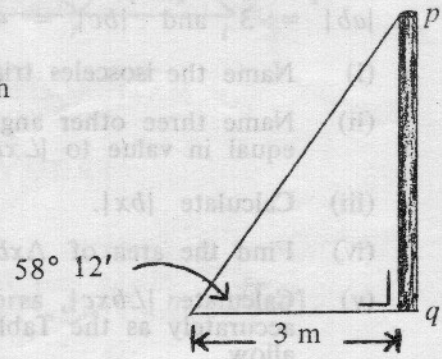
(b) On leaving a port p, a fishing boat sails
in the direction South 30° East for 2
hours at 10 km/h, as shown.
What distance has the boat then sailed ?

The boat next sails in the direction
North 60° East, at 10 km/h, until it
is due East of the port p.

Draw a diagram of the boat's
journey. Calculate how far the boat is
from the port p.

p

30°