INTERMEDIATE CERTIFICATE EXAMINATION, 1991

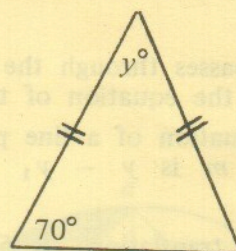### MATHEMATICS – SYLLABUS B – PAPER 2 (300 marks)

FRIDAY, 7 JUNE, MORNING – 9.30 to 12.00

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

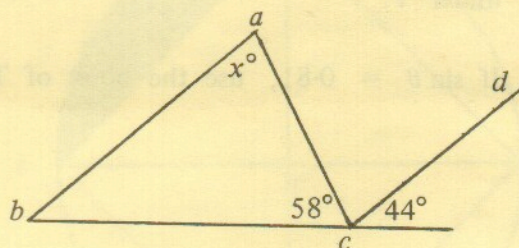**Marks may be lost if all your work is not clearly shown.**

Mathematics tables may be obtained from the Superintendent.

1. (i)   Two angles of a triangle sum to $78°\,34'$.
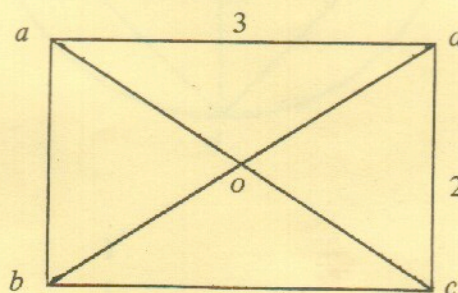   Calculate the measure of the third angle.

    (ii) Calculate the value of y .

    (iii) $ba \parallel cd$.
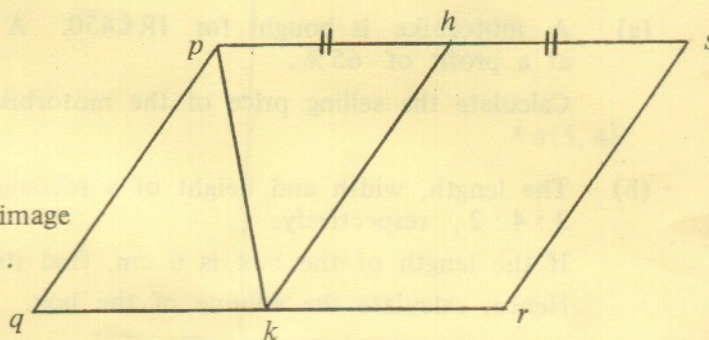   Calculate the value of x .

    (iv) Calculate

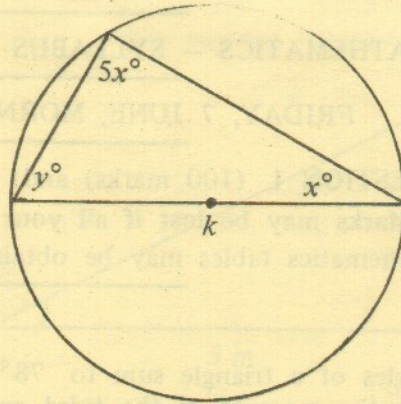$$\frac{\text{area } \triangle\, aob}{\text{area rectangle } abcd}$$

    (v) $pqrs$ is a parallelogram
          and $hk \parallel pq$.
          Find the image of $\triangle pqk$ and the image
   of (q, h) under the translation $\overrightarrow{hs}$.

    (vi) Construct accurately $\triangle abc$ with
          $|bc| = 4$ cm, $|ca| = 3$ cm and $|\angle bca| = 90°$.
          Measure $|\angle cab|$ and give your answer to the nearest degree.

OVER →

(vii) k is the centre of the circle.
Calculate the value of x and
then the value of y.

(viii) A line passes through the point $(2, -1)$ and has slope 3.
What is the equation of this line ?

[The equation of a line passing through the point (x_1, y_1) and with
slope m is $y - y_1 = m(x - x_1)$].

(ix) t is the translation $(1, 5) \rightarrow (0, 7)$. Find the image of the point $(3, 2)$
under t.

(x) If $\sin \theta = 0.81$, use the book of Tables to find the value of $\cos \theta$.
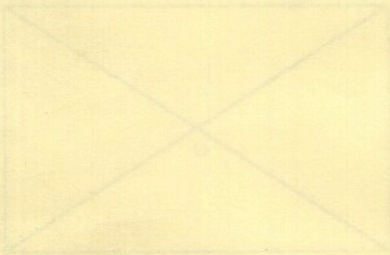
2. (a) A motorbike is bought for IR£450. A few weeks later it is sold
at a profit of 65%.

Calculate the selling price of the motorbike.

(b) The length, width and height of a rectangular box are in the ratio
$3 : 4 : 2$, respectively.

If the length of the box is 6 cm, find its width and height.

Hence, calculate the volume of the box.

3. The diagram consists of parallelogram *abcd* and right-angled triangle *adh*.

Let $|ab| = 3$, $|ah| = 2$ and $|dh| = 1$.

(i) Name two triangles equal in area.

(ii) Name two angles equal in measure to $|\angle adh|$.

(iii) Calculate $|ac|$.

(iv) Calculate the area of the figure *abch*.

(v) If $|\angle adh| = 63°26'$, prove that $|\angle abc| = 116°34'$.
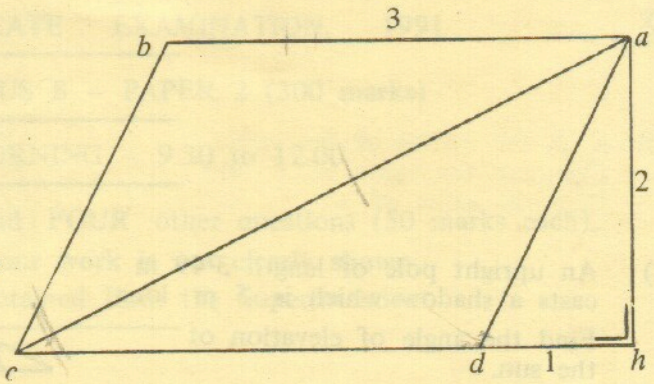
4. *c* is the centre of the circle. Diameters $[ad]$ and $[bq]$ intersect at right angles.

(i) Under the central symmetry in *c*, find the image of $\triangle abc$ and the image of (b, d).

(ii) Name two isosceles triangles which are not equal in area.

(iii) Find $|\angle abc|$.

(iv) If $|ab| = \sqrt{2}$, calculate $|bc|$.

(v) Using your result in (iv), calculate the area of the shaded region.

Take $\pi = \frac{22}{7}$.
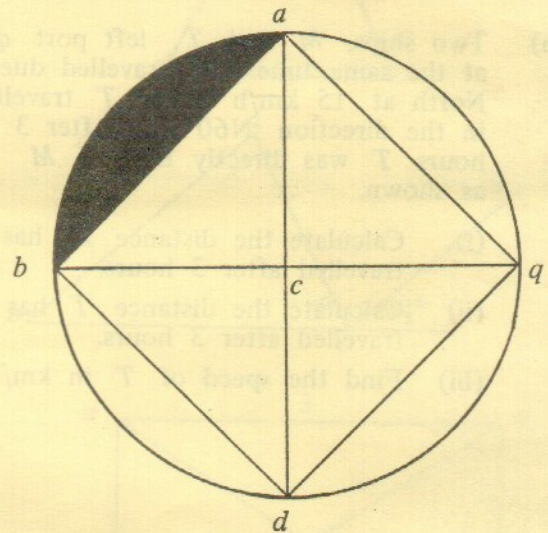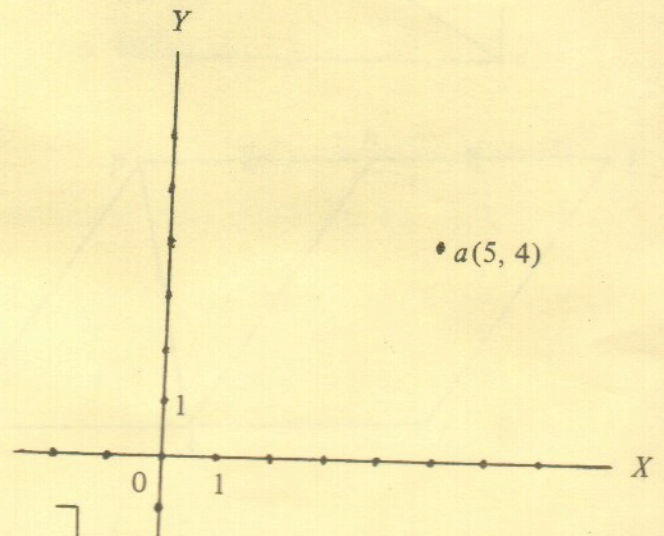
5. $a(5, 4)$ is a point as in diagram with 0 the origin.

Plot the point $b(1, 2)$ and find the slope of *ab*.

The line $y + 2x - 4 = 0$ passes through *b* and cuts the X axis at *c*.
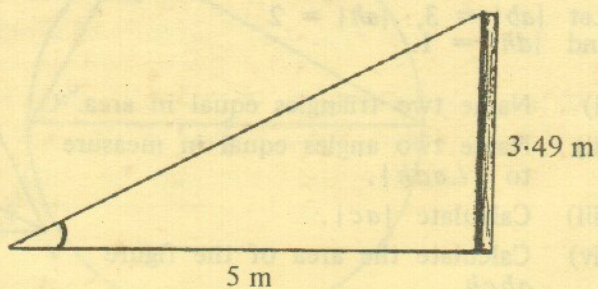
Find the coordinates of *c*.

Prove that $\triangle abc$ is a right-angled triangle.

Slope formula: $\dfrac{y_2 - y_1}{x_2 - x_1}$

Distance formula: $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ (if necessary)

OVER →

6. (a)   An upright pole of length 3·49 m
          casts a shadow which is 5 m long.
          Find the angle of elevation of
          the sun.

3·49 m

5 m

(b)   Two ships, M and T, left port q
      at the same time. M travelled due
      North at 15 km/h while T travelled
      in the direction N60°E. After 3
      hours T was directly East of M
      as shown.

      (i)   Calculate the distance M has
            travelled after 3 hours.
      (ii) Calculate the distance T has
            travelled after 3 hours.
      (iii) Find the speed of T in km/h.

M

T

60°

q