AN ROINN OIDEACHAIS AGUS EOLAÍOCHTA

JUNIOR CERTIFICATE EXAMINATION, 1998

MATHEMATICS – ORDINARY LEVEL

FRIDAY, 12 JUNE – MORNING - 9.30 to 12.00
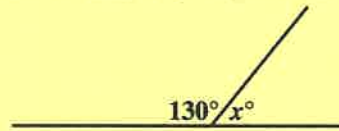
PAPER 2 (300 marks)

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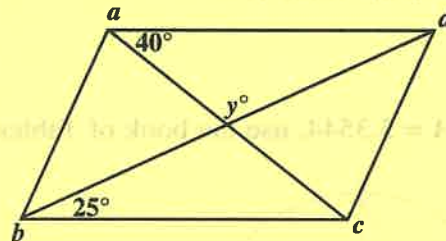**Marks may be lost if necessary work is not clearly shown.**
Mathematics Tables may be obtained from the Superintendent.

1. (i)   Two angles of a triangle measure 38° 30′ and 49° 30′.
          Calculate the measure of the third angle.
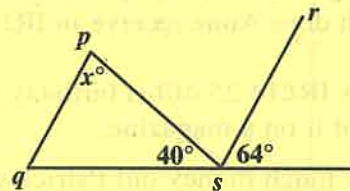
    (ii) Calculate the value of x in the diagram.
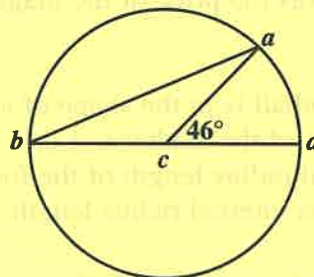
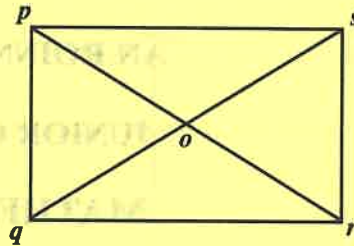   (iii) *abcd* is a parallelogram.
          Calculate the value of *y*.

    (iv) *pq* is parallel to *rs*.
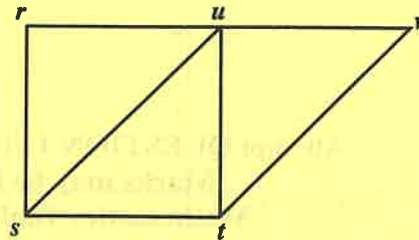   Calculate the value of *x*.

    (v)   The centre of the circle is *c*.
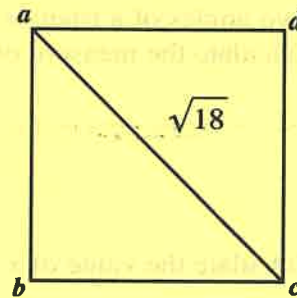   If $|\angle acd| = 46°$, find $|\angle bac|$.

(vi) *pqrs* is a rectangle whose diagonals intersect at *o*.
Find the image of triangle *pqo* under the central symmetry in the point *o*.

(vii) *rstu* is a square and *ustv* is a parallelogram.
Find the ratio

$$\frac{\text{area of triangle } rsu}{\text{area of the figure } rstv}.$$

(viii) *abcd* is a square and $|ac| = \sqrt{18}$.
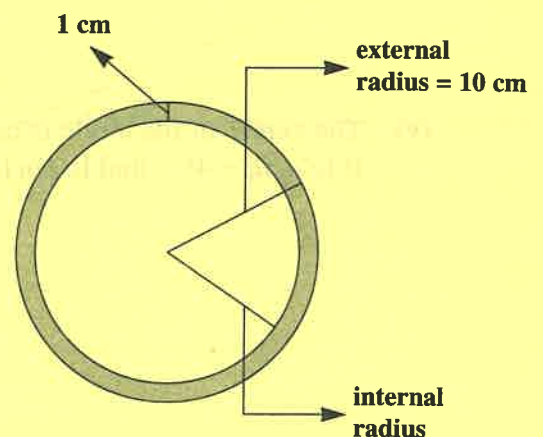Calculate the length of a side of the square.

(ix) (5,–2) is a point on the line $y = 3x + k$.
Calculate the value of *k*.

(x) If $\tan A = 3.3544$, use the book of Tables to find the value of *A*, where $A < 90°$.

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2. **(a)** Anne changes £200 Sterling into IR£. The exchange rate is £1 Sterling = IR£1.14.
How much does Anne receive in IR£?

(b) Patrick has IR£14.25 of his birthday money left after spending 10% of it on chocolate and 15% of it on a magazine.

    (i) How much money did Patrick get for his birthday?

    (ii) How much did he spend on chocolate?

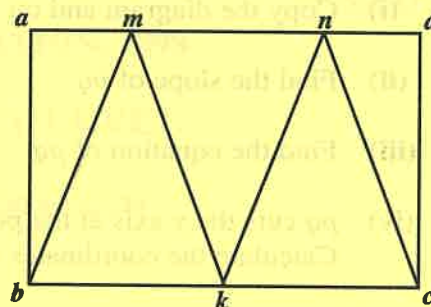   **(iii)** What was the price of the magazine?

(c) A leather football is in the shape of a sphere.
The thickness of the leather is 1 cm.
If the external radius length of the football is 10 cm, write down its internal radius length.

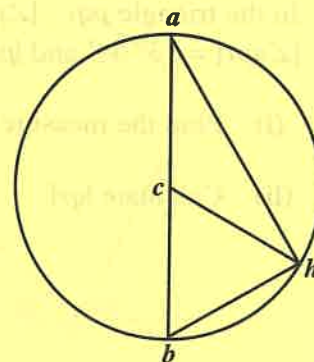Calculate, to the nearest cm³, the amount (volume) of leather in the football. Take $\pi = \frac{22}{7}$.

1 cm

external radius = 10 cm

internal radius

3. *abcd* is a rectangle. The midpoint of [*bc*] is *k*.
|*bk*| = |*mn*| and |*am*| = |*nd*|.

    (i) Find the image of triangle *mbk* under
the translation $\overrightarrow{bk}$.

    (ii) Name two parallelograms.

    (iii) Name two angles each having the same
measure as ∠*mbk*.

    (iv) If |*ab*| = 6.8 and |*mn*| = 5,
calculate the area of the figure *mbcn*.

    (v) If |∠*mbk*| = |∠*mkb*|, prove that |∠*bmk*| = 2|∠*abm*|.

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

    (i) Name two isosceles triangles.

    (ii) Say why ∠*ahb* is a right angle.

    (iii) The area of triangle *ahb* is $96\sqrt{3}$ square
units.
If |*hb*| = $8\sqrt{3}$ units, calculate |*ah*|.

    (iv) Prove that |∠*ahc*| + |∠*cbh*| = 90°.

    (v) If |*hb*| = |*bc*|, prove that |∠*cbh*| = 60°.
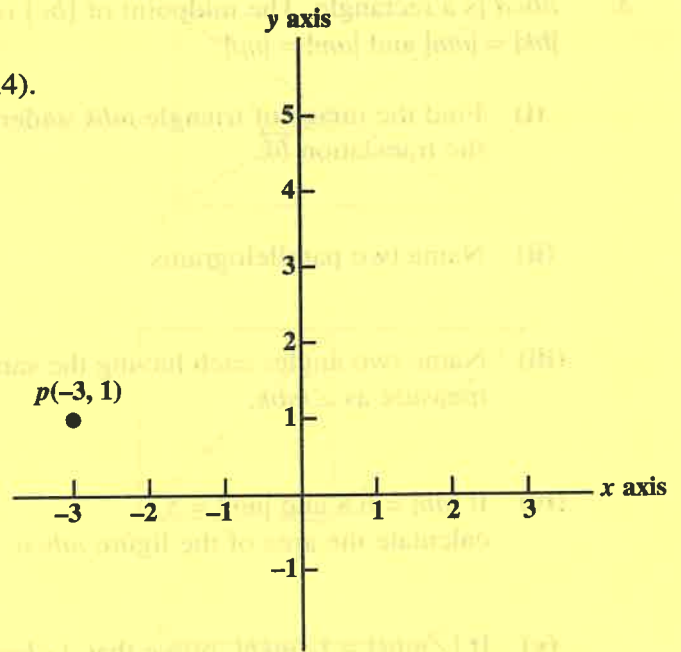
[Turn over

5. The point $p(-3,1)$ is shown in the diagram.

  (i) Copy the diagram and on it plot the point $q(1,4)$.

  (ii) Find the slope of pq.

  (iii) Find the equation of pq.

  (iv) pq cuts the y axis at the point k.
  Calculate the coordinates of the point k.

  (v) Calculate the ratio

  $$|pk| : |pq|.$$

  Give your answer as a fraction.

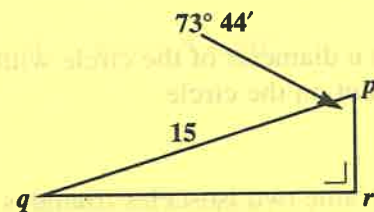[Slope formula: $m = \dfrac{y_2 - y_1}{x_2 - x_1}$.

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

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

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6. **(a)** Use the book of Tables to find sin 9° 30′.

(b) In the triangle pqr, $|\angle prq| = 90°$,
$|\angle qpr| = 73°\ 44'$ and $|pq| = 15$.

  (i) Find the measure of $\angle pqr$.

  (ii) Calculate $|qr|$.

(c) A plane takes off from a at an angle of 22° 20′
to the level ground ac.

After 35 seconds the plane is at b, 532 metres
above the level ground, as shown.

Calculate

  (i) $|ab|$

  (ii) the average speed of the plane in m/s along $[ab]$.