AN ROINN OIDEACHAIS   M.45(a)

INTERMEDIATE CERTIFICATE EXAMINATION, 1989

MATHEMATICS – LOWER COURSE – PAPER I (150 marks)

THURSDAY, 8 JUNE – MORNING – 9.30 to 12.00

Examination Number

SECTION A (45 marks)

Attempt all questions.   You should not spend more than 45 minutes on this section.
Answer each question by writing one of (a), (b), (c), (d) in the box under each question number.
If you wish to change an answer, cross out your first choice and write your new answer near the box.
Mathematical tables may be obtained from the Superintendent.

THIS PAPER MUST BE ENCLOSED IN YOUR ANSWER BOOK

1. $\dfrac{2136}{100}$ =

    (a) 0·2136   (b) 2·136   (c) 21·36   (d) 213·6

2. The area of a circle is 49π.   The radius is of length

    (a) 98   (b) 49   (c) 14   (d) 7

3. $1\cdot26 \times 0\cdot02$ =

    (a) 25·2   (b) 2·52   (c) 0·252   (d) 0·0252

4. In a school of 320 girls, 25% play netball.   The number of girls who play netball is

    (a) 295   (b) 240   (c) 80   (d) 25

5. A family uses 4 litres of milk every day.   If milk costs 50p per litre, the cost of milk for 7 days is
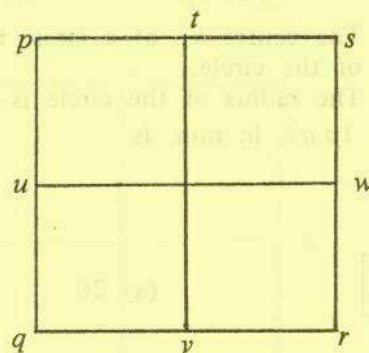
    (a) IR£14   (b) IR£11   (c) IR£3·50   (d) IR£2

6. The points u, v, w, t are the mid-points of the sides of the square $p\,q\,r\,s$, as in diagram.
    The image of the couple (p, t) under the translation $\overrightarrow{vr}$ is

    (a) (v, r) (b) (q, v)
    (c) (p, t) (d) (t, s)

7. The image of the point (2, 4) under the axial symmetry in the Y-axis is

    (a) (2, −4)   (b) (−2, 4)   (c) (−2, −4)   (d) (2, 4)

8. If $(p, q) \uparrow (r, s) \uparrow (u, v)$, which one of the following is false ?

(a) $(p, r) \uparrow (q, s)$

(b) $(p, u) \uparrow (q, v)$

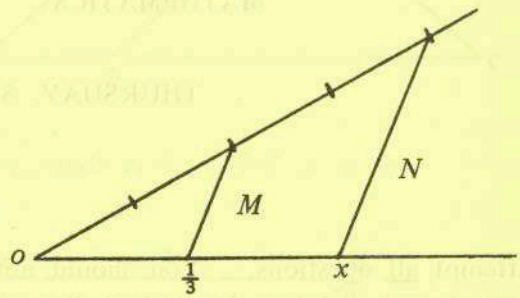(c) $(p, s) \uparrow (u, q)$

(d) $(r, u) \uparrow (s, v)$

9. If $M \parallel N$, then x is

(a) $\frac{1}{6}$

(b) $\frac{1}{3}$

(c) $\frac{1}{2}$

(d) $\frac{4}{6}$

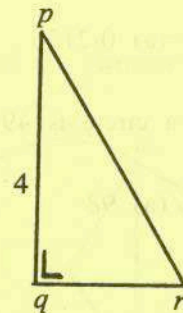10. The value of x is

(a) $36°$

(b) $72°$

(c) $108°$

(d) $144°$
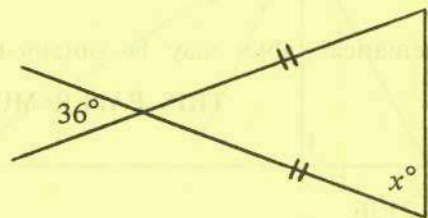
11. If the area of $\triangle pqr = 6$, then $|qr|$ is
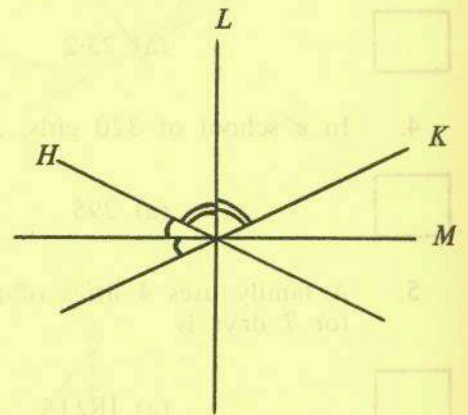
(a) 5

(b) 3

(c) 1·5

(d) $\sqrt{7}$

12. Angles of equal measure are indicated in the diagram. The set of all points equidistant from both H and K is given by

(a) L only
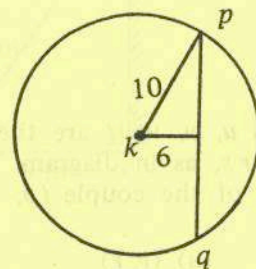
(b) M only

(c) $L \cup M$

(d) $L \cap M$

13. The centre k of a circle is 6 mm from the chord $[pq]$ of the circle.
The radius of the circle is of length 10 mm.
$|pq|$, in mm, is

(a) 20

(b) 16

(c) 12

(d) 8

14. If $\sin Q = 0·9096$, then Q is

(a) $65°27'$

(b) $42°17'$

(c) $24°40'$

(d) $24°33'$

15. If $\sin A = \cos A$ and $0° \leqslant A \leqslant 90°$, then A is

(a) $0°$

(b) $30°$

(c) $45°$

(d) $90°$

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MATHEMATICS – LOWER COURSE – PAPER I (150 marks)

THURSDAY, 8 JUNE, MORNING – 9.30 to 12.00

SECTION B (105 marks)
Attempt **QUESTION 1** (30 marks) and **THREE** other questions (25 marks each)
Marks may be lost if all your work is not clearly shown

1. (a) Calculate the value of $(2 \cdot 4 \times 3) - (5 \cdot 4 \div \frac{3}{2})$.

    (b) Using your tables (p.20 – p.27), or otherwise, find the value of

    $$\{\sqrt{7 \cdot 18} + (3 \cdot 65)^2\} \times \frac{1}{1 \cdot 6}$$

    (c) In a holiday camp consisting of Irish, Spanish and French students,

    45% are Irish students,
    15% are Spanish students
    and 336 are French students.

    How many students are there in the holiday camp ?

2. A square tile, with side of length 14 cm, consists of black shaded parts surrounding a yellow circle with diameter also of length 14 cm.

    Calculate the area of the yellow circle. Take π to be $\frac{22}{7}$.
   What is the area of the black shaded parts of the tile ?
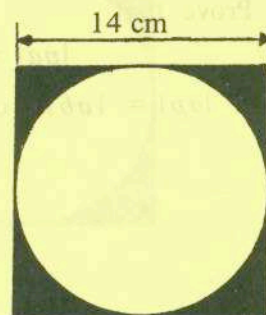
    A rectangular floor of length 4·2 m and width 2·8 m is to be covered completely by these tiles.
    What is the area of this floor in cm² ?
    How many tiles are required to cover the floor ?

    What percentage of the floor area is covered black ?
    Give your answer correct to the nearest integer.

3. o is the centre of the circle.
    $[hc]$ is a diameter of the circle.
    $(a, b) \uparrow (h, o) \uparrow (e, d)$.

    (i)   Name three couples equipollent to (b, c).

    (ii) Write down two parallelograms each of which has h as a vertex.

    (iii) What is the image of $\triangle a\,h\,o$ under the central symmetry in the point o ?

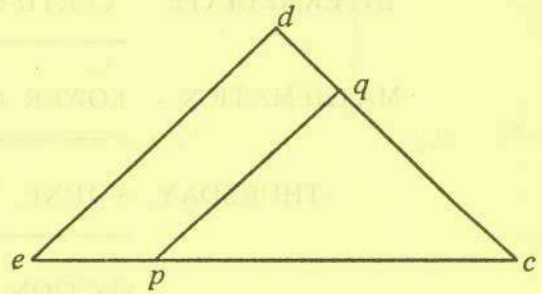   (iv) If $|\angle a\,h\,o| = 60°$, what is the value of $|\angle b\,c\,d|$?
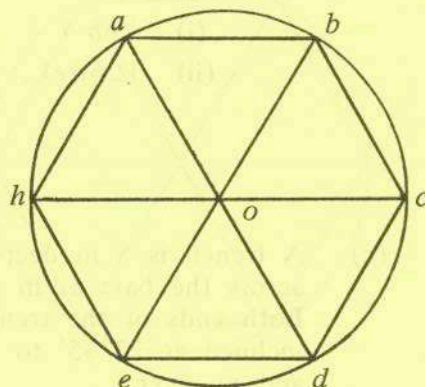
OVER →

4. Prove that if two sides of a triangle are equal in length, then the measure of the angles opposite these sides are also equal.

    $\triangle\,d\,e\,c$ is an isosceles triangle with

    $$|de| = |dc|.$$

    $p\,q$ is parallel to $e\,d$.

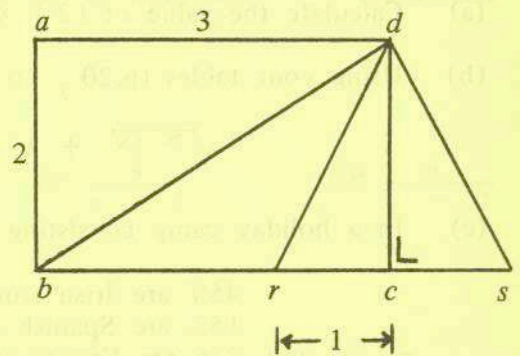   Prove that $\triangle\,qpc$ is an isosceles triangle.

5. Prove that the area of a triangle abc is $\frac{1}{2}\,|ab| \times h$, where h is the distance of c from ab.

    $abcd$ is a rectangle.

    $|rc| = |cs|$.

    Find

    (i) the area of the quadrilateral $absd$.
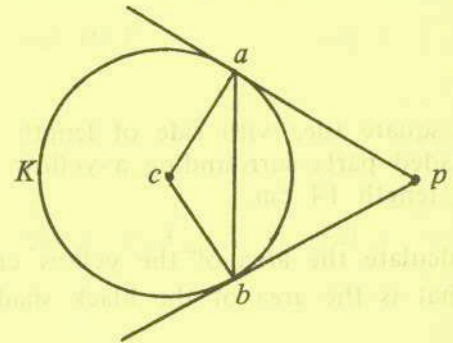
    (ii) the area of the $\triangle\,dbr$.

6. Show, with proof, how to construct a tangent to a circle through a point outside the circle.

    pa and pb are both tangents to circle K with centre c.

    Prove that

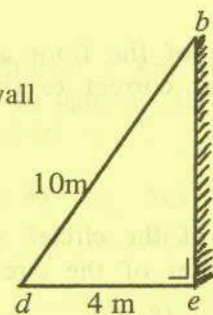 $$|pa| = |pb|.$$

    If $|ap| = |ab|$, calculate $|\angle acb|$.

7. (a) If $\cos X = 0\cdot4$, use your tables to find X.

    (b) A beam of wood, $[db]$, rests against a vertical wall as in diagram.

         Calculate

         (i) $|eb|$

         (ii) $|\angle bde|$.

    (c) A trench is 5 m deep and 9 m across the base as in the diagram. Both ends of the trench are inclined at $23°45'$ to the vertical and $xy \parallel st$.

         Calculate $|xy|$.