AN ROINN OIDEACHAIS M.45(a)

INTERMEDIATE CERTIFICATE EXAMINATION, 1986

MATHEMATICS – LOWER COURSE – PAPER I (150 marks)

THURSDAY, 12 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. $\frac{3}{4} \div 1\frac{1}{3}$ is

(a) $\frac{9}{16}$ (b) 1 (c) $\frac{1}{4}$ (d) $1\frac{7}{9}$

2. The radius of a sphere is 2. The surface area is

(a) 4π (b) 8π (c) 16π (d) 64π

3. An article is priced at IR£25. During a sale 15% discount is allowed. The discount in IR£ is

(a) 10 (b) 21·25 (c) 3·75 (d) 28·75

4. The price of cheese is IR£2·80 per kg. A section of mass 200 grammes costs

(a) IR£2 (b) 5·6 p (c) 28 p (d) 56 p

5. Which one is greater than 0·5 ?

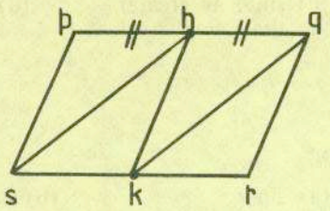
(a) $(0{\cdot}5)^2$ (b) 0·05 (c) $\sqrt{0{\cdot}5}$ (d) 5×10^{-1}

6. If $(p, q) \uparrow (r, s)$, where p, q, r, s are four points, which one of the following is not true ?

(a) $(q, p) \uparrow (s, r)$ (b) $(r, s) \uparrow (p, q)$ (c) $(p, r) \uparrow (q, s)$ (d) $(p, s) \uparrow (r, q)$

7. $pqrs$ is a parallelogram. The translation $\overrightarrow{ph}$ maps the Δphs to

(a) Δhsk (b) itself
(c) Δhkq (d) Δqkr

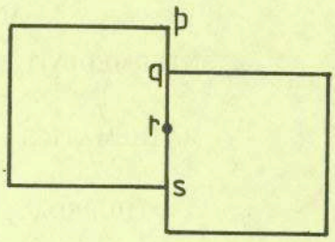


8. The image of the point (2, 3) under the axial symmetry in the x-axis is the point

(a) (2, −3) (b) (−2, −3) (c) (−2, 3) (d) (2, 0)

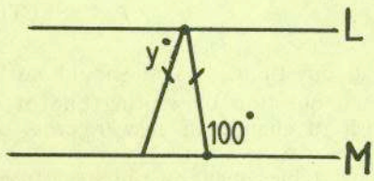
OVER →

9. One square is the image of the other under the central symmetry in



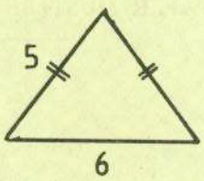
☐ (a) p (b) q
(c) r (d) s

10. $L \parallel M$. The value of y is



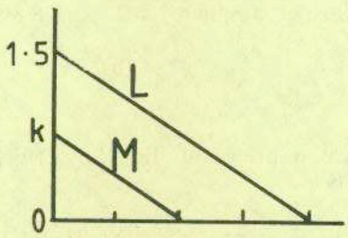
☐ (a) 100 (b) 80
(c) 50 (d) 20

11. The area of the triangle is



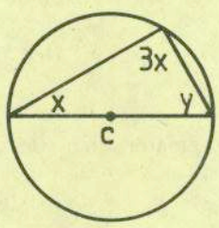
☐ (a) 30 (b) 15
(c) 24 (d) 12

12. If $L \parallel M$, then k is



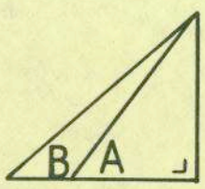
☐ (a) 3 (b) 0·5
(c) 0·75 (d) 0·375

13. c is the centre of the circle. The value of y is



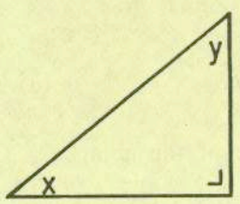
☐ (a) 30° (b) 45°
(c) 60° (d) 75°

14.



☐ (a) $\sin A = \sin B$ (b) $\sin A$ is less than $\sin B$
(c) $\sin A$ is greater than $\sin B$ (d) $\sin A - \sin B = 0$

15. $\text{Sin}\, x$ =



☐ (a) $\sin y$ (b) $\cos y$
(c) $\tan y$ (d) x

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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 sum of (35% of 35) and (9·25 × 9).

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

   $$\frac{1000}{\sqrt{77{\cdot}88}}.$$

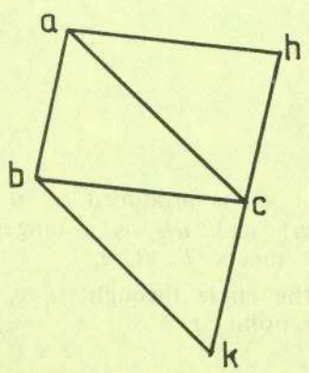
   (c) A computer game costs £96 sterling. If IR£ is worth 80p sterling, calculate the cost of the computer game in IR£.

2. A crayon in the shape of cylinder has a radius of 0·4 cm and a height of 8·4 cm. Calculate the volume of the crayon, taking π to be $\frac{22}{7}$.

   Five crayons are to fit into a rectangular box of height 8·4 cm. Find the capacity (internal volume) of the smallest box that will hold the crayons.

   What is the differences in cm^3 between this capacity and the volume of the five crayons ?

3. $abch$ and $abkc$ are parallelograms.



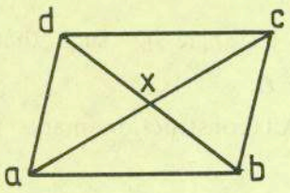
   (i) Name two couples equipollent to (a, b).

   (ii) Name the translation which maps
   $\Delta ahc \rightarrow \Delta bck$.

   (iii) What is the image of Δbck under the projection on ab where the projection is parallel to ac ?

   (iv) If $|hk| = 8$ and the area of $abkh$ is 36, find the distance of c from ab.

4. Prove that the diagonals of a parallelogram bisect each other.



   Prove that

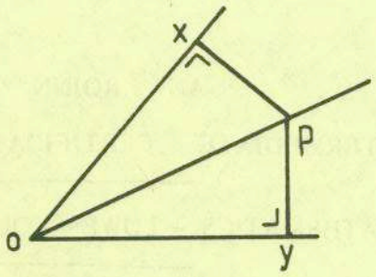
   area of Δxab = area of Δxbc

   and calculate the area of $abcd$ when the area of Δxab is 25.

   If $|\angle cab| = 21°$, $|\angle adb| = 73°$, $|\angle abc| = 115°$, calculate $|\angle cxb|$.

OVER →

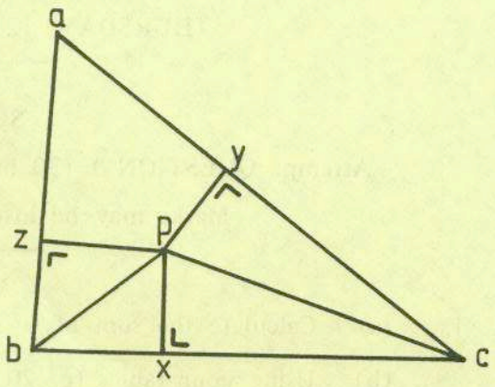
5. op is the bisector of $\angle xoy$.
Prove $|px| = |py|$.



pb and pc bisect the angles shown.
Prove that

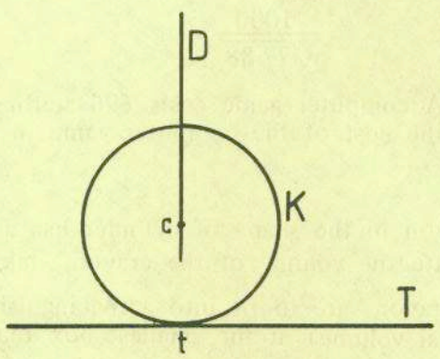
$$|px| = |py| = |pz|.$$

If p is joined to a, prove that pa bisects the $\angle bac$.



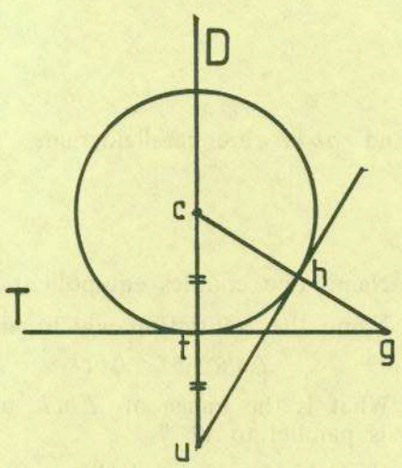
6. T is the tangent to the circle K at t and c is the centre of K.
Write out the meaning of the statement

$$\{t\} = K \cap T.$$



Write down (i) the image of K (ii) the image of T under the axial symmetry in D where $D \perp T$ and hence say why D must contain t.

The diagonal D is produced to u so that $|ct| = |tu|$ and uh is a tangent to the circle. ch meets T at g.
Prove that the circle through u, g, h also contains the point t.



7. (a) Construct an angle Q such that

$$\tan Q = 1{\cdot}2.$$

(Note: All construction marks must be clearly shown)

(b) A kite is flying at the end of a piece of string of length 25 m, the other end being tied to a point on the ground. The angle of elevation of the string with the horizontal can vary from 30° to 50°. If h_2 is the kite's greatest height and h_1 its least height above the ground, show that

h_2 is greater that $\frac{3}{2} h_1$.