

AN ROINN OIDEACHAIS

M.45(a)

INTERMEDIATE CERTIFICATE EXAMINATION, 1983

MATHEMATICS - LOWER COURSE - PAPER I (150 marks)

FRIDAY, 10 JUNE - MORNING - 9.30 to 12.00

SECTION A (45 marks)

Examination Number

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. $\frac{1}{2} - (\frac{1}{4} - \frac{1}{2}) =$

(a) $-\frac{1}{4}$ (b) $-\frac{3}{4}$ (c) $\frac{1}{4}$ (d) $\frac{3}{4}$

2. $0.025 \times 0.05 =$

(a) 0.0125

(b) 0.00125

(c) 0.000125

(d) 0.125

3. A person has to pay tax at the rate of 40% on a profit of IR£90. The tax in IR£ is

(a) 36

(b) 40

(c) 50

(d) 22.5

4. The volume of a cube is 8 cm^3 . The area of one face of the cube in cm^2 is

(a) 2

(b) 4

(c) 6

(d) 24

5. A motorist travels 80 km in $1\frac{1}{4}$ hours. In 1 hour he would travel

(a) 64 km

(b) 60 km

(c) 100 km

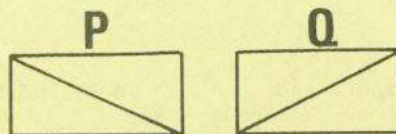
(d) $56\frac{1}{4}$ km6. Q is the image of P under

(a) a central symmetry

(b) a translation

(c) an axial symmetry

(d) a projection



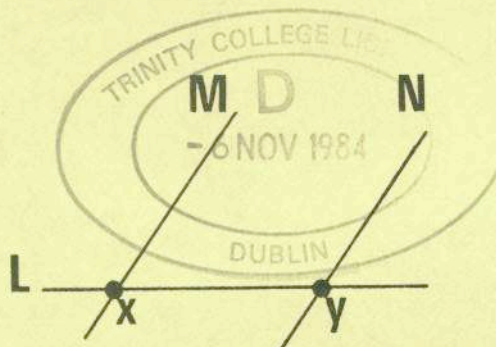
7. Which one of the following is not its own image under a central symmetry ?

(a) line segment

(b) square

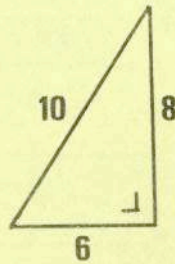
(c) circle

(d) equilateral triangle

8. If $M \parallel N$, then the image of N on L under the projection parallel to M is
(a) L (b) x (c) M (d) y 

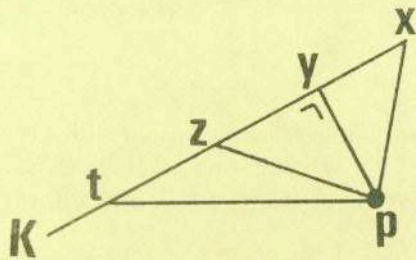
9. The area of the triangle is

- (a) 60 (b) 30
(c) 48 (d) 24



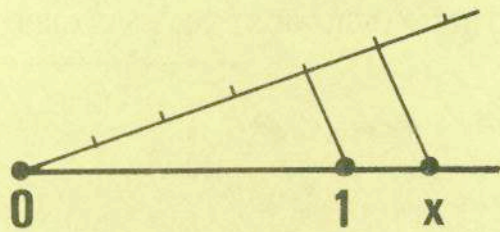
10. The distance of the point p from the line K is

- (a) $|px|$ (b) $|py|$
(c) $|pz|$ (d) $|pt|$



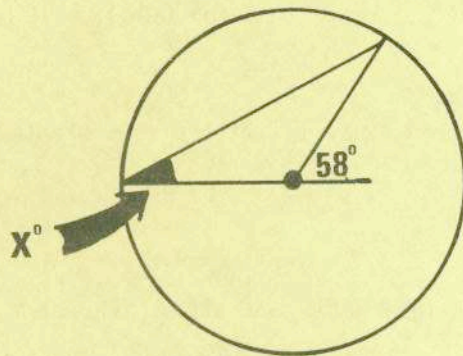
11. x is

- (a) 1.15 (b) 1.2
(c) 1.25 (d) 1.4



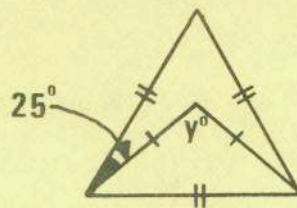
12. The value of x is

- (a) 29 (b) 31
(c) 61 (d) 122



13. The value of y is

- (a) 100 (b) 110
(c) 115 (d) 125

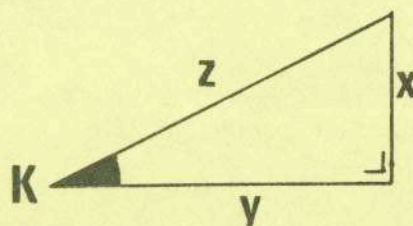


14. An angle measures $48^\circ 15'$. This is the same as

- (a) $(48.15)^\circ$ (b) $(48.25)^\circ$ (c) $(48.45)^\circ$ (d) $(48.75)^\circ$

15. $\sin K =$

- (a) $\frac{y}{z}$ (b) $\frac{z}{y}$
(c) $\frac{x}{z}$ (d) $\frac{z}{x}$



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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. Use your Tables, page 20 to page 27, or otherwise, to evaluate

(i) $0.7246 + 17.354 - 0.0786$

(ii) $(2.857)^2$

(iii) $\sqrt{285.7}$

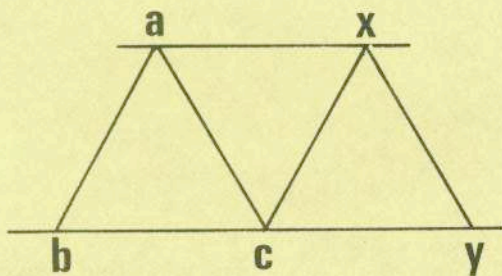
(iv) $\frac{1}{28.57}$

2. Taking $\pi = 3$, calculate in litres the volume of a solid sphere of diameter 20 cm.

This sphere is to fit into a cubical box. Calculate in litres the volume of the smallest possible box.

The sphere is put into this box. Calculate in litres the volume of air in the box not occupied by the sphere.

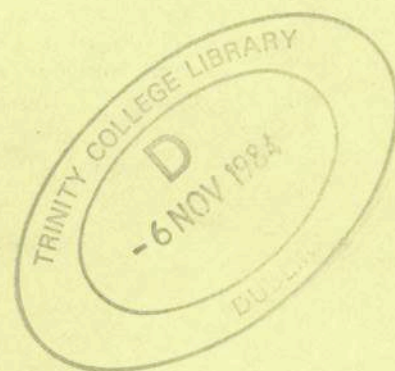
3.



abc and xcy are two equilateral triangles such that

$$(b, c) \uparrow (c, y) \uparrow (a, x).$$

- (i) Name two parallelograms.
- (ii) What is the image of the Δacx on by under the projection parallel to xy ?
- (iii) Name a translation which maps $\Delta abc \rightarrow \Delta xcy$.
- (iv) A rotation of centre c maps $\Delta xcy \rightarrow \Delta abc$. What is the size of the angle of this rotation?
- (v) Make a sketch of the diagram, above, and then construct the image $(bcpq)$ of $axyc$ under the central symmetry in c .
Prove that $bcpq$ is a parallelogram and deduce that $(a, x) \uparrow (q, p)$.

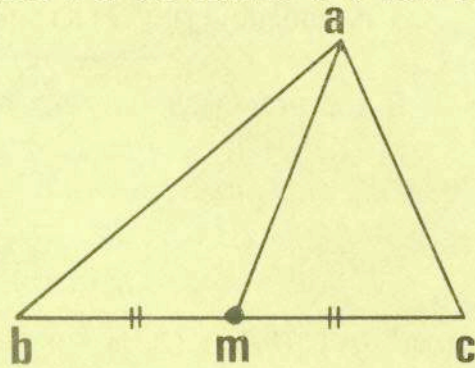


4. Prove that the area of a $\triangle abc$ is $\frac{1}{2}|bc| \cdot h$ where h is the distance of a from bc .

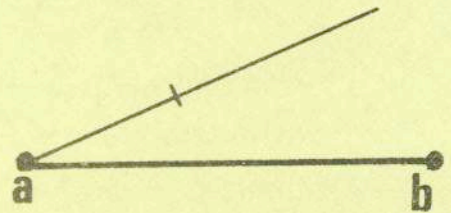
m is the midpoint of $[bc]$, as in diagram.
Prove

$$\text{area of } \triangle abm = \text{area of } \triangle acm.$$

If $|ab|$ is greater than $|ac|$, prove that the distance of m from ab is less than the distance of m from ac .



5. Beginning with this diagram state how to find the midpoint of $[ab]$.



Construct the $\triangle pqr$ given that

$$|qr| = 10 \text{ cm}, |qp| = 9 \text{ cm}, |rp| = 7 \text{ cm}.$$

Construct the midpoints of $[pq]$ and $[pr]$ and then use your protractor to construct the perpendicular bisectors of $[pq]$ and of $[pr]$.

Let these bisectors meet at s . With s as centre and $|sp|$ as radius draw a circle.

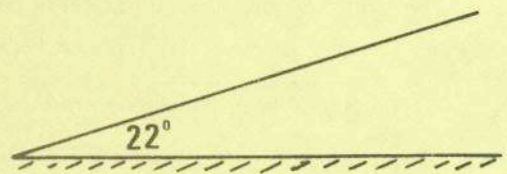
(Note carefully that all construction marks must be clearly shown.)

6. Prove that the diameter of a circle which is perpendicular to a chord of the circle bisects the chord.

$[ab]$ is a chord of a circle which is at a distance 5 from the centre of the circle and $|ab| = 24$. $[xy]$ is another chord of the circle and $|xy| = 10$. Calculate the distance of $[xy]$ from the centre of the circle.

7. (a) Use your protractor to draw an angle of 48° .
Without using your Tables, calculate, correct to one place of decimals, the value of $\sin 48^\circ$.

- (b) A light aeroplane takes off at an angle of 22° to the level ground and travels in a straight line for 30 seconds. The sun is directly overhead. The shadow of the aeroplane on the ground moves at a speed of 60 km per hour.



Calculate, in meters, the height of the aeroplane above the ground 30 seconds after take-off.