

SECTION A (100 marks)

1. $(\frac{1}{2} \div \frac{1}{3}) + \frac{1}{4} =$

- (a) $\frac{5}{12}$ (b) $\frac{5}{16}$ (c) $\frac{11}{12}$ (d) $\frac{7}{12}$

2. 63% of 9% is

- (a) 567% (b) 56.7% (c) 5.67% (d) 0.567%

3. If the L.C.M. of x and 24 is 120, then the least value that x can have is

- (a) 5 (b) 10 (c) 15 (d) 20

4. The surface area of solid hemisphere with radius of length 10 cm is

- (a) $25\pi \text{ cm}^2$ (b) $50\pi \text{ cm}^2$ (c) $200\pi \text{ cm}^2$ (d) $300\pi \text{ cm}^2$

5. 0.00516 correct to 2 significant figures is

- (a) 0.0052 (b) 0.01 (c) 0.00 (d) 0.52

6. $(e, g) \uparrow (g, h)$ and $(e, g) \uparrow (r, s) \Rightarrow$

- (a) $\vec{eh} = \vec{rs}$ (b) $\vec{eh} = 2\vec{rs}$ (c) $(e, h) \uparrow (r, s)$ (d) $(g, h) \uparrow (e, s)$

7. $P \parallel Q$ and $P \perp C$ $S_Q \circ S_P =$

- (a) \vec{xy} (b) \vec{yx} (c) $2\vec{xy}$ (d) $2\vec{yx}$

8. g is a point. $S_g \circ S_g$ is

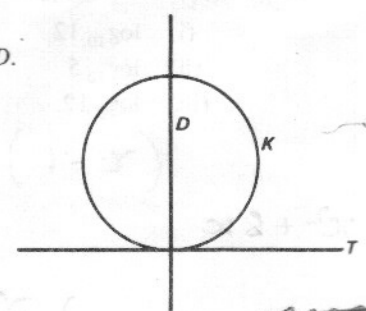
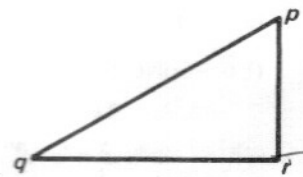
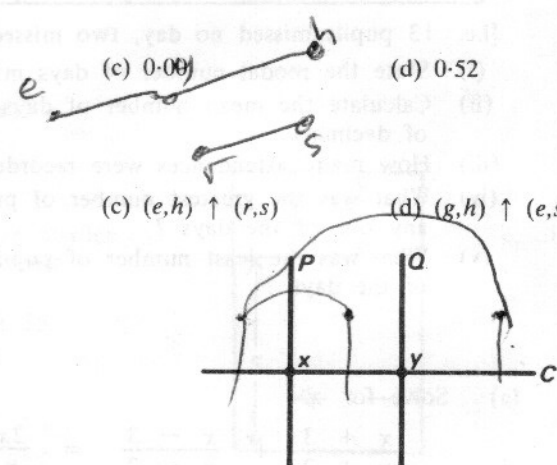
- (a) a point (b) a translation (c) a couple (d) 1_π

9. $\vec{pr} \circ \vec{qr} \circ \vec{pq}$

- (a) 1_π (b) \vec{pr} (c) $2\vec{pr}$ (d) $2\vec{rp}$

10. D is a diameter of the circle K . T is a tangent perpendicular to D . Which one of the following is not true?

- (a) $S_D(D) = D$ (b) $S_D(K) = K$
 (c) $S_T(D) = D$ (d) $S_T(K) = K$



$4\pi R^2$

$2\pi R^2$

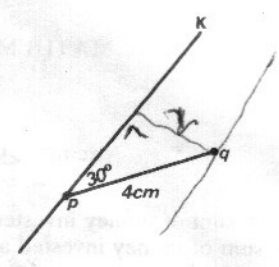
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200TB

27R

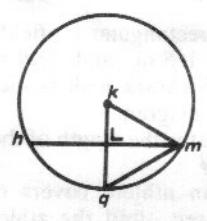
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11. K makes an angle of 30° with pq and $|pq| = 4$ cm.
The image of $[pq]$ under the projection on a line L where the projection is taken parallel to K is $[rs]$.
The minimum value of $|rs|$ is



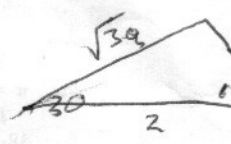
- (a) 1 cm (b) 2 cm
(c) 3 cm (d) 4 cm

12. k is the centre of the circle of radius of length 5.
If $|hm| = 8$, then $|mq|$ is

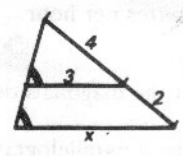


- (a) $\sqrt{20}$ (b) $\sqrt{12}$
(c) $\sqrt{5}$ (d) 2

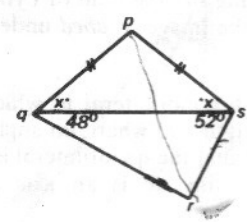
13. $|x| =$



- (a) $1\frac{1}{2}$ (b) $2\frac{1}{2}$
(c) $4\frac{1}{2}$ (d) 5



14. In the quadrilateral $pqrs$, the value of x is



- (a) 40° (b) 45°
(c) 50° (d) 52°

15. The angle made by the line $2y - 2x - 1 = 0$ with the positive sense of the X-axis is

- (a) $63^\circ 32'$ (b) $63^\circ 26'$ (c) 45° (d) 47°

16. The translation $(-3\frac{1}{2}, 2\frac{1}{2}) \rightarrow (3, -2)$ is the same as the translation

- (a) $(1, 1) \rightarrow (-2\frac{1}{2}, -3\frac{1}{2})$ (b) $(1, 1) \rightarrow (4, -1)$
(c) $(1, 1) \rightarrow (7\frac{1}{2}, -3\frac{1}{2})$ (d) $(1, 1) \rightarrow (7\frac{1}{2}, 1\frac{1}{2})$

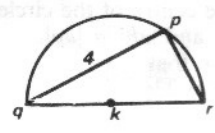
17. The mid-point of the line segment $[pq]$ where $p(1, 3)$ and $q(4, -3)$ is

- (a) $(2\frac{1}{2}, 3)$ (b) $(-1\frac{1}{2}, 3)$ (c) $(5, 0)$ (d) $(2\frac{1}{2}, 0)$

18. L represents the line $y = x$. The image of the X-axis under the axial symmetry in L is

- (a) $y = x$ (b) $y = -x$ (c) $y = 0$ (d) $x = 0$

19. k is the centre of the circle of radius of length 3.
 $\cos \angle pqr =$



- (a) $\frac{\sqrt{20}}{6}$ (b) $\frac{4}{5}$ (c) $\frac{2}{3}$ (d) $\frac{1}{2}$

20. If the $\tan Q = \frac{1}{\sqrt{3}}$, then $\sin Q$ is

- (a) $\frac{\sqrt{3}}{2}$ (b) $\frac{1}{2}$ (c) $\frac{2}{\sqrt{3}}$ (d) 2

$\frac{O}{A}$ $\frac{O}{H}$

INTERMEDIATE CERTIFICATE EXAMINATION, 1987

 MATHEMATICS – HIGHER COURSE – PAPER I (300 marks)

 THURSDAY, 11 JUNE – MORNING, 9.30 to 12.00

SECTION B (200 marks)

 Attempt QUESTION 1 and THREE other questions (50 marks each)

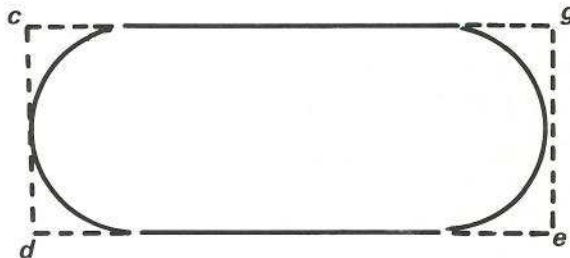
 Marks may be lost if all your work is not clearly shown

1. (a) A sum of money invested at 6% compound interest earned IR£225 interest in the first year. Find the sum of money invested and the interest earned in the second year.

- (b) A rectangular field, of dimensions $|cg| = 168$ m and $|cd| = 56$ m, contains an athletics track with semicircular ends as shown in the diagram.

What is the length of the athletics track? Take $\pi = \frac{22}{7}$

If an athlete covers one lap in a time of 48.48 sec., find the athlete's average speed in kilometres per hour.



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

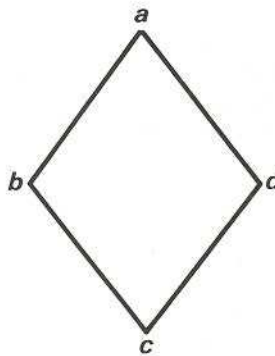
Construct a parallelogram $abcd$ having $|ab| = 7.5$ cm, $|ac| = 12$ cm and $|bd| = 9$ cm.

By using the theorem of Pythagoras, or otherwise, prove that $ac \perp bd$.

Find the image of $abcd$ under the composition of axial symmetries $S_{bd} \circ S_{ac}$.

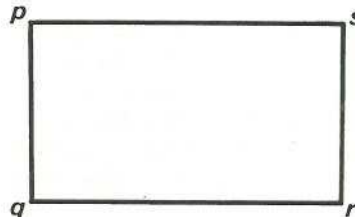
3. $abcd$ is a quadrilateral in which each side has the same length and where no angle is a right angle.

Prove that the quadrilateral is a parallelogram and that the line ac is an axis of symmetry of the parallelogram.



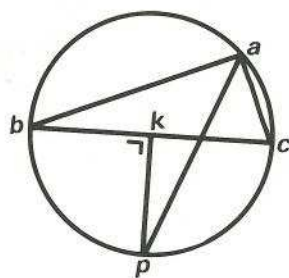
$pqrs$ is a rectangle in which $|ps| > |pq|$.

Prove that the line pr is not an axis of symmetry of the rectangle.



4. Prove that the measure of the angle at the centre of a circle is twice the measure of an angle at the circle standing on the same arc.

k is the centre of the circle.
 $kp \perp bc$ and $|ab| = |ap|$.
 Prove that
 $|\angle abc| = 22\frac{1}{2}^\circ$



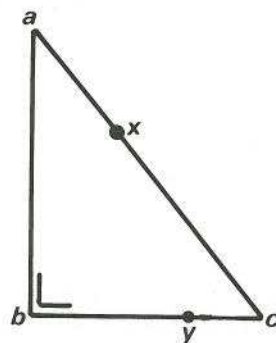
5. Prove that two sides of a triangle are divided proportionally by a line drawn parallel to the third side.

abc is a right angled triangle and

$$|ax| : |xc| = 1 : 2 = |cy| : |yb|.$$

Prove that

$$|xb| = |xy|$$



6. Find the coordinates of the points p and q where the line $5x - 3y = 15$ cuts the X-axis and Y-axis, respectively.

Find the equation of the line K through p perpendicular to $5x - 3y = 15$.

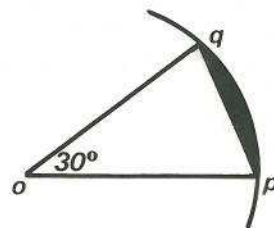
Verify that K contains the point $r(-2, 3)$.

The point $t(0, y)$, where $y > 0$, is such that
 area of $\triangle prq =$ area of $\triangle tqp$.

Find the value of y .

7. (a) Construct a triangle deg such that $|eg| = 6$ cm, $|\angle dge| = 90^\circ$ and $\tan \angle deg = \frac{3}{4}$

- (b) opq is a sector of a circle of radius of length 10. Calculate the area of the shaded portion.
 Take $\pi = 3.14$.



- (c) $[kn]$ is a wall on level ground rsn . $[kr]$ and $[ks]$ are two supporting beams on the same side of the wall where $|kr| = 10$ m and $|\angle krn| = 53^\circ 54'$.
 If the two supporting beams are 2 m apart on the ground, find the length of the beam $[ks]$, as accurately as the tables allow.

