Areas of Parallelograms and Triangles

IIT Foundation Material

(d) 72°

SECTION - I

Straight Objective Type

This section contains multiple choice questions. Each question has Four choices (a), (b), (c), (d), out of which ONLY ONE is correct.

1. The lines XY and MN intersect at O. If $\angle POY = 90^{\circ}$ and a : b = 2 : 3 Then the value C



2. In fig. If $PQ \parallel RS \angle MXQ = 135^{\circ}$ and $\angle MYR = 40^{\circ}$ than $\angle XMY$ is

(a) 68°





3. In fig. if $QT \parallel PR$, $\angle TQR = 40^{\circ}$ and $\angle SPR = 30^{\circ}$. Then the value of x + y is



(a) 120° (b) 100° (c) 130° (d) 140° **4.** In the given figure, line RT is draw in parallel to SQ. If $\angle SPR = 100^{\circ}, \angle PQS = 40^{\circ}, \angle PSR = 85^{\circ}$ and $\angle QRS = 70^{\circ}$ then $\angle QRT$ is



(a) 45° (b) 65° (c) 85° (d) 90° **5.** The internal bisectors of $\angle Q$ and $\angle R$ of $\triangle PQR$ meet at C. If $\angle P = 70^{\circ}$. The $\angle QCR$ is

(a) 110° (b) 120° (c) 130° (d) 140° **6.** If in a triangle XYZ, P, Q are points on XY, YZ respectively such that XP = 2 PY, XQ = 2QZ, then the ratio, area of DXPQ : area

of DXYZ is

(a) 4 : 9 (b) 2 : 3 (c) 3 : 2 (d) 9 : 4

7. ABC is an isosceles triangle with AB = AC = 5 and BC = 6. If G is the centroid of $\triangle ABC$ then AG is equal to

(a)
$$\frac{1}{3}$$
 (b) $\frac{2}{3}$ (c) $\frac{4}{3}$ (d) $\frac{8}{3}$

8. Two chords of lengths 16cm and 17cm are drawn perpendicular to each other in a circle of radius 10cm. The distance of their point of intersection from the centre is approximately.

(a) 6.5 cm (b) 7.2 cm (c) 7.6 cm (d) 6 cm

9. In the given figure, if C is the centre of the circle $\angle PQC = 25^{\circ}$ and $\angle PRC = 15^{\circ}$ then $\angle QCR$ is equal to



⁽a) $\pi/2$ (b) π (c) $3\pi/2$ (d) 2π

4

15. Two beams of length l_1 and l_2 are leading on opposite sides of a thin vertical wall meeting at the same point on the wall and making angles 30° and 60° with respectively. Then l_2 is equal to

(a)
$$\frac{l_1}{2}$$
 (b) $2l_1$ (c) $l_1\sqrt{2}$ (d) $l_1\sqrt{3}$

16. A rectangle ABCD is inscribed in a circle with centre O. If AC in the diagonal and $\angle BAC = 30^\circ$. Then the radiusd of the circle will be equal to

(a)
$$\sqrt{3}/2 BC$$
 (b) B C (c) $\sqrt{3}BC$ (d) 2 BC

17. In $\Delta LMN PQ \parallel MN$ such that LP = 2 cm and PM = 6 cm also MN = 20 cm then $\frac{\text{area of Trapezium PQNM}}{\text{area}(\Delta LPQ)}$



18. The diagonals of a parallelogram ABCD intersect at O. OE is drawn parallel to AD and meets CD at E the value of area (Δ CEO)

area (parallelogram ABCD)

(a) 10



(a) 0.3 (b) 0.5 (c) 0.05 (d) None of these**19.** A chored PQ, 24 cm in length, is at a distance of 5 cm from the centre O. Then the radius of the circle is

(a) 12 cm (b) 13 cm (c) 36 cm (d) 8 cm**20.** ABC is an isosceles triangle inscribed in a circle such that AB = AC = 17 cm and BC = 16 cm then the radius of the circle is



(a) $\sqrt{89} \, cm$ (b) $8\frac{5}{6}$ (c) 4 cm (d) 8.5 cm

21. In the given figure, O is the centre of the circle, and $\angle OAB = 35^{\circ}$ then $\angle AOC$ is



- **24.** ABCD is a rectangle with AB = 16 units and BC = 12 units. *F* is a point on \overline{AB} and E is a point on \overline{CD} such that PACE is a rhombus. Then the value of measure is (a) 25 (b) 15 (c) 10 (d) 8
- **25.** Triangle ABC the altitude through A has length h, is right angled at 1 + 1 + 1 + 1 = 1



- **26.** A rectangle contains three circles as in the diagram, all tangent to the rectangle and to one another. If the height of the rectangle is 4, then width of the rectangle is
- (a) $3+2\sqrt{2}$ (b) $2\sqrt{2}$ (c) $3-2\sqrt{2}$ (d) $2+\sqrt{2}$ **27.** The radii of circles $C_1, C_2, \dots, C_{2004}$ are respectively $r_1, r_2, \dots, r_{2004}$. If $r_1 = 1, r_i = 2_{n+1}$ for i = 1, 2, 3, 2004 then r_{2004} is (a) 2004 (b) 2003 (c) 1002 (d) 0

Section - II

Assertion - Reason Questions

This section contains 10 questions. Each question contains STATEMENT-1 (Assertion) and STATEMENT-2 (Reason). Each question has 4 choices (a), (b), (c) and (d) out of which ONLY ONE is correct.

28. STATEMENT-1: The diagonals of aparallelogram are biset each other.

because

STATEMENT-2: The diagonals of a Rhombus are perpendiculars

to each other.



(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(c) Statement-1 True, Statement-2 is False

(d) Statement-1 is False, Statement-2 is True

29. STATEMENT-1: In $\triangle ABC, DE$ and F are the mid points of $\overline{AB}, \overline{BC}$ are \overline{CA} respectively. If AB = 8 cm, BC = 15 cm and AC = 12 cm then DF = 7.5 cm

Because

STATEMENT-2: A straight line drawn through the mid-point of one side and parallel to another side of a triangle bisects the third side.

(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(c) Statement-1 True, Statement-2 is False

(d) Statement-1 is False. Statement-2 is True

30. STATEMENT-1: In a trapezium, the segment joining the mid points of its non parallel sides is parallel to its parallel sides and half the sum of the parallel sides.

because

STATEMENT-2: The figure formed by joining the mid-points of the sides of a rectangle in order is a rhombus.

(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT

a correct explanation for Statement-1

(c) Statement-1 True, Statement-2 is False

(d) Statement-1 is False, Statement-2 is True

31. STATEMENT-1 : In Δ, \overline{BC} , $\angle ABC = 90^{\circ}$. O is the mid point of \overline{AC} then $OA = OB = OC = \frac{AC}{2}$

because

STATEMENT-2: The figure formed by joining the mid-points of the sides of a square in order another square.



(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(c) Statement-1 True, Statement-2 is False

(d) Statement-1 is False, Statement-2 is True

32. STATEMENT-1: The area of a parallelogram is the product of any of its side and corresponding altitudes.

because

STATEMENT-2: Area of a triangle is half the product of any of its sides and the corresponding altitudes.

(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(c) Statement-1 True, Statement-2 is False

(d) Statement-1 is False, Statement-2 is True

33. STATEMENT-1: $\frac{AC}{2}$ is a median and E is the piod-point of \overline{AD} .

Then area of $(\Delta AEB) = \frac{1}{4}$ (area of ΔABC)

because

STATEMENT-2: The median divides triangles in two triangles which are equal in area.

(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(c) Statement-1 True, Statement-2 is False

- (d) Statement-1 is False, Statement-2 is True
- **34.** STATEMENT-1: The angle subtended by an arc of a circle at the centre is double the angle subtended by the arc at a point on the remaining circle.

because

STATEMENT-2: Angles in the same segment of a circle are equal.



(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(c) Statement-1 True, Statement-2 is False

(d) Statement-1 is False, Statement-2 is True

35. STATEMENT-1: An angle in a semi circle is a right angle.

because

STATEMENT-2: In equal circles if two arcs are equal. They subtend equal angles at their corresponding centres.



(a) Statement-1 is True, Statement-2 is True; Statement-2 i» a correct explanation for Statement-1

(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(c) Statement-1 True, Statement-2 is False

(d) Statement-1 is False, Statement-2 is True

36. STATEMENT-1: An angle in a semi-circle is a right angle.

because

STATEMENT-2: In equal circles if two arcs are equal. They subtend equal angles at their corresponding centres.

(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

- (c) Statement-1 True, Statement-2 is False
- (d) Statement-1 is False, Statement-2 is True

SECTION - III

Linked Comprehension Type

This section contains 6 paragraphs. Based upon each paragraph 3 multiple choice questions have to be answered. Each question has 4 choices (a), (b), (c) and (d), out of which ONLY ONE is correct.

Paragraph for Question Nos. 37 to 39

In the adjacent $\triangle ABC$, D, E, F are the midpoint of AB, AC, BC respectively. If DE = 3, DF = 3.5, EF = 4 the





Paragraph for Question Nos. 40 to 42

In the figure $\overline{AD} \parallel \overline{BE} \parallel \overline{CF}$ and B is the mid point of $\overline{AC} \cdot \overline{CD}$ intersets \overline{BE} and x then



40. DE is equal to

(a) EF	(b) $\frac{1}{2}AD$	(c) $\frac{1}{2}CF$	(d) 2 BE

41. BX is equal to
(a) EF (b)
$$\frac{1}{2}AD$$
 (c) $\frac{1}{2}CF$ (d) 2 BE

42. AD + CF is equal to

(a) EF (b)
$$\frac{1}{2}AD$$
 (c) $\frac{1}{2}CF$ (d) 2 BE

Paragraph for Question Nos. 43 to 46

In figure $\overline{AD}, \overline{BE}$ and \overline{CF} are the medians of $\triangle ABC, G$ is the centroid.



43 .	If $BG = 6$ cm then $GE = ?$				
	(a) 3 cm	(b) 8 cm	(c) 2.5 cm	(d) 7 cm	
44.	If $FG = 4$ cm then $GC = ?$				
	(a) 3 cm	(b) 8 cm	(c) 2.5 cm	(d) 7 cm	
45.	If $AD = 7.5$ cm then $GD = ?$				
	(a) 3 cm	(b) 8 cm	(c) 2.5 cm	(d) 7 cm	

Paragraph for Question Nos. 46 to 48

In the figure ABC is a triangle AB = 8 cm. If the altitudes corresponding to \overline{AB} and \overline{BC} are 4 cm and 5 cm respectively then



46.	Area of $\triangle ABC$ is			
	(a) 16 <i>cm</i> ²	(b) $14 \ cm^2$	(c) $20 \ cm^2$	(d) $26 \ cm^2$
47.	The length of	BC is		

(a) 7 cm (b) 6.4 cm (c) 7.2 cm (d) 2.8 cm

48. The length of BE is (a) 10 cm (b) $\sqrt{39}$ cm (c) $\sqrt{24}$ cm (d) $\sqrt{35}$ cm

Paragraph for Question Nos. 49 to 51

 \overline{AB} is a diameter chords \overline{AP} and \overline{RB} when produced meet at Q. If $\angle A = 35^{\circ}$ and $\angle Q = 25^{\circ}$ then



49.	The measure of $\angle RPB$ is				
	(a) 30°	(b) 115°	(c) 35°	(d) 65°	
50 .	The measure of $\angle PBR$ is				
	(a) 30°	(b) 115°	(c) 35°	(d) 65°	
51.	The measure of $\angle BRP$ is				
	(a) 30°	(b) 115°	(c) 35°	(d) 65°	

Paragraph for Question Nos. 52 to 54

In $\triangle ABC, P$ is a point on $AB \cdot PR$ is drawn such that $\overline{PR} || \overline{BC}$ and PR = BC. PR interacts AC at Q. Then



52. Area of (ΔAQR) is (a) ar (ΔBPQ) (b) ar (ΔCAR)

	(c) ar (ΔAQR)	(d) ar (ΔPQB)
53.	Area of (ΔCPR) is	
	(a) ar (ΔBPQ)	(b) ar (ΔCAR)
	(c) ar (ΔAQR)	(d) ar (ΔPQB)
54.	Area of (ΔPQC) is	
	(a) ar (ΔBPQ)	(b) ar (ΔCAR)
	(c) ar (ΔAQR)	(d) ar (ΔPQB)

SECTION - IV Matrix - Match Type

This section contains 6 questions. Each question contains statement given in two columns, which have to be matched. Statements (A, B, C, D) in Column I have to be matched with statements (p, q, r, s) in Column II. The answers to these questions have to be appropriately bubbled as illustrated in the following example.

If the correct matches are A - p, A - s, B - q, B - r, C - p, C - q and D - s, then the correctly bubbled 4×4 matrix should be as follows :

	P	P	r	8
A	P	(9)	\odot	۲
B	P	•	\odot	3
С	$ \mathbf{P} $	•	\bigcirc	•
D	P	9	\bigcirc	

55. In a triangle

Column I

(A) The point equidistant from the vertices of a triangle

(B) The point equidistant from the sides of a triangle

(C) The point of concurrently of altitudes of triangle

Column II

- (p) Ortho Centre
- (q) Circum Centre
- (r) Centroid

(D) The point of concurrently of altitudes of triangle

56. The locus of Column I

(A) locus of the point equidistant from three non collinear points(B) locus of mid-points of the equal chords of a circle(C) The locus of mid-points of the parallel chords of a circle(D) The locus of a point equidistant from two given intersecting lines

57. The area of Column I

- (A) Triangle
- (B) Parallelogram
- (C) Trapezium
- (D) Rhombus
- 58. For a Cyclic Quadrilateral Column I

(A) The sum of opposite angles

(B) Sum of any pair of opposite angles

(C) exterior angle is equal to

(D) Diagonal are perpendicular to each other

(s) In centre

Column II

(p) only one point

- (q) diameter of the circle
- (r) radius

(s) pair of lines bisecting the angles formed by the given lines.

Column II

(p)
$$\frac{1}{2}bh(or)\sqrt{s(s-a)(s-b)(s-c)}$$

(q) $\frac{h}{2}(a+b)$
(r) bh
(s) $\frac{1}{2}d_1d_2$

Column II

- (p) 180°
- (q) 360
- (r) Opposite interior angle(s) The perpendicularthrough the points ofintersection of diagonals toone side, bisects theopposite side.

59. The figure formed by joining the mid points of sides of **Column I Column II**

- (A) equilateral triangle
- (B) Rectangle
- (C) Parallelogram
- (D) Quadrilateral

- (p) equilateral triangle
- (q) Rhombus
- (r) Parallelogram
- (s) Square