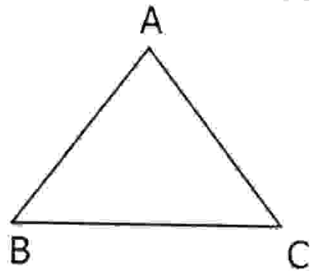
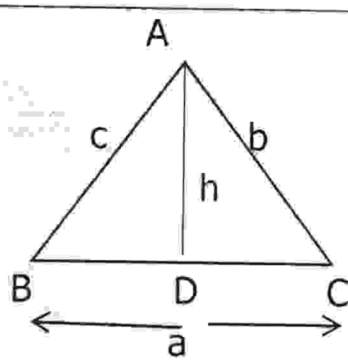
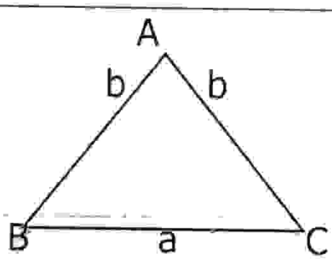
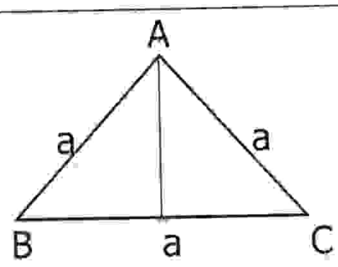
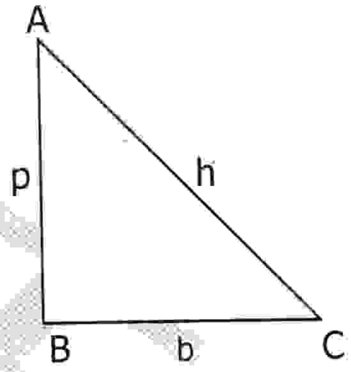
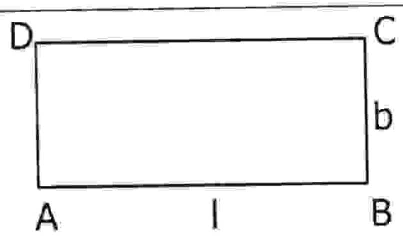
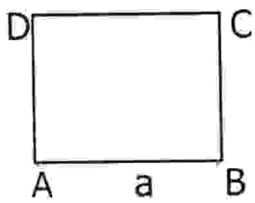
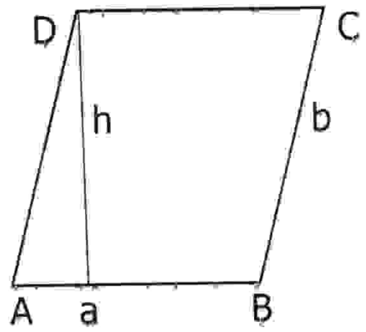
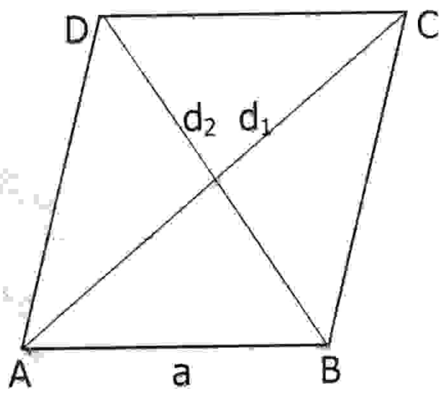
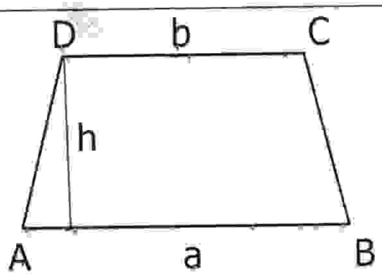
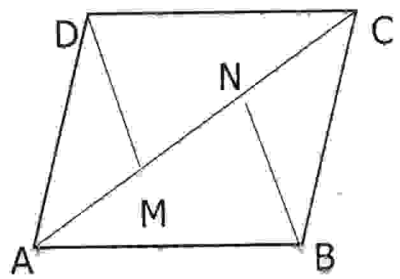
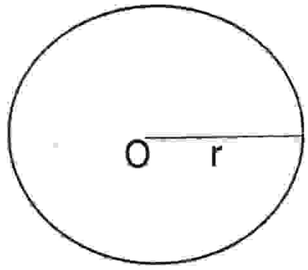
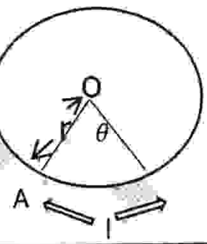
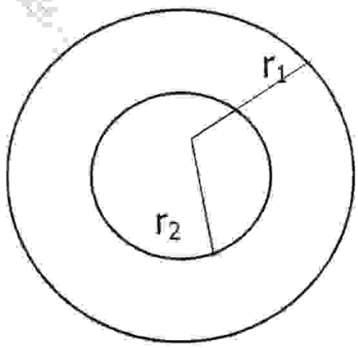
BALABHADRA SKILL DEVELOPMENT ACADEMY
MATHS FORMULA - 17
MENSURATION

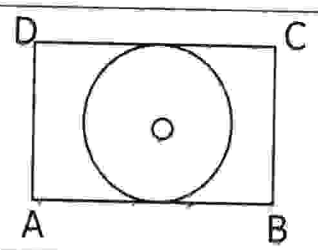
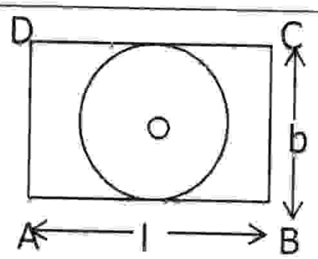
AREA AND PERIMETER

Sl	Situation	Formula	Diagram
1	A figure bounded by three straight lines is called a triangle. A triangle has	Three vertices A, B and C Three angles $<A, <B$ and $<C$. Three sides AB, BC and CA	
2	Scalene triangle: Let the sides of a triangle be a, b and c and h be the corresponding height to side a, then Area of triangle	$\sqrt{s(s-a)(s-b)(s-c)}$ $=\frac{1}{2}\times a\times h$ where, $s=\frac{a+b+c}{2}$	
	Perimeter of triangle=Sum of lengths of all sides	a +b+ c	
3	Isosceles Triangle: Let the sides of an isosceles triangle be a, b and b, then Perimeter	a+b+b=a+2b	
	Area	$(s-b)\sqrt{s(s-a)}$	

4	Equilateral Triangle: Let each side of an equilateral triangle be a, then Height (altitude) (h)	$h = \frac{\sqrt{3}}{2}a$	
	Area	$\frac{\sqrt{3}}{4}a^2 = \frac{1}{\sqrt{3}}(\text{Height})^2$	
	Perimeter	3a	
5	Right Angled Triangle: Let perpendicular, base and hypotenuse of a right angled triangle be p,b and h respectively, then Perimeter	p+b+h	
	Area	$\frac{1}{2} \times Base \times Altitude$ $= \frac{1}{2} \times b \times p$	
6	Rectangle: Let l and b be the length and breadth of a rectangle, then Perimeter	$2(l + b)$	
	Area	$l \times b$	
	Diagonal	$\sqrt{l^2 + b^2}$	
7	Square: Let each side of a square be a, then Perimeter	$4 \times a$	
	Diagonal (d)	$a\sqrt{2}$	
	Area	$a^2 = \frac{1}{2}d^2$	

8	Parallelogram: Let the adjacent sides of a parallelogram be a and b and h be the corresponding altitude to side a, then Perimeter	$2(a+b)$	
	Area	$\text{Base} \times \text{Altitude} = a \times h$	
9	Rhombus: Let length of each side of a rhombus be a and length of both diagonals are d_1 and d_2, then Area	$\frac{1}{2} \times d_1 \times d_2$	
	Side	$\frac{1}{2} \times \sqrt{d_1^2 + d_2^2}$ $(4a^2 = d_1^2 + d_2^2)$	
	Perimeter	$4 \times a$	
10	Trapezium: Let lengths of parallel sides of a trapezium be a and b and distance between them be h, then Area	$\frac{1}{2} \times (\text{Sum of parallel sides}) \times \text{Height} = \frac{1}{2} \times (a+b) \times h$	
11	Quadrilateral: If in a quadrilateral ABCD, BN and DM are perpendiculars on diagonal AC from the two vertices B and D, then Area	$\frac{1}{2} \times AC \times (DM + BN)$	

12	Circle: Let the radius of a circle be r, then Diameter	$d = 2r$	
	Circumference	$\pi \times d = 2\pi r$	
	Area	πr^2	
	Length of arc, l (where, θ is the central angle measured in degrees)	$l = \frac{\pi r \theta}{180°}$	
	Area of Sector	$A = \frac{\pi r^2 \theta}{360°} = \frac{1}{2} \times (r \times l)$	
13	Circular Ring: Let radius of external and internal circles of a circular ring be r_1 and r_2, then Area	$\pi(r_1^2 - r_2^2)$	
	Difference of circumferences	$2\pi(r_1 - r_2)$	
14	Regular Polygon: In regular polygons, all the sides and all interior angles are equal. A polygon is called pentagon, hexagon, heptagon, octagon, nanogon or decagon accordingly as it has 5,6,7,8,9 or 10 sides, respectively. Let a be the side of a regular polygon,	$\frac{5\sqrt{3}a^2}{4}$	--

	Then Area of regular pentagon		
	Area of regular hexagon	$\frac{3\sqrt{3}a^2}{2}$	
	Each exterior angle	$\frac{360°}{n}$ where, n is the number of sides in the polygon	
	Interior angle+ Exterior angle	180°	
	Area of regular octagon	$2(\sqrt{2}+1)a^2$	
	Number of diagonals	$\frac{n(n-3)}{2}$ where, n= number of sides	
	Sum of interior angles	$(n-2)\pi$	
15	Radius and area of in-circle of an equilaterial triangle of side a	r=$\frac{a}{2\sqrt{3}}$ $A=\frac{\pi a^2}{12}$	--
16	Radius and area of circumcircle of an equilateral triangle of side a	r=$\frac{a}{\sqrt{3}}$ $A=\frac{\pi a^2}{3}$	--
17	The area of a circle of maximum radius that can be inscribed in a square of side a is	$\frac{\pi a^2}{4}$	
18	The length and breadth of a rectangle are l and b, then the area of circle of maximum radius inscribed in that rectangle is	$\frac{\pi b^2}{4}$	

19	If the ratio of area of two squares is $A_1:A_2$, then ratio of their perimeter is	$\sqrt{A_1}:\sqrt{A_2}$	--
20	If the length of a rectangle is increased (or decreased) by x%, then breadth of rectangle must be decreased (or increased) by ______, so that the area of rectangle remains unaltered.	$\frac{x \times 100}{100 \pm x}\%$	--
21	The length and breadth of a rectangle are increased (or decreased) by r_1% and r_2% respectively, then change in area will be	$\left(\pm r_1 \pm r_2 + \frac{(\pm r_1)(\pm r_2)}{100}\right)\%$	--
22	If a side of a figure becomes m times and another side becomes n times, then the change in area will be	$(mn - 1) \times 100\%$	--
23	If side of a square is increased by x%, then per cent change in area will be	$\left(2x + \frac{x^2}{100}\right)\%$	--

24	If three horses are tethered at three corners of a triangular plot of land having sides a,b and c, each with a rope of length r m, then the area of the region of this plot grazed by the horses is	$\frac{\pi r^2}{2}$	--
25	If the radius of circle (side of a square) is increased (or decreased) by r% then per cent change in area will be	$\left(2r + \frac{r^2}{100}\right)\%$	--
26	The area of the largest triangle that can be inscribed in a semi-circle of radius r is equal to	r^2	--
27	If the length and breadth of a room are l and b respectively, then the least number of square tiles required to cover the floor	$\frac{l \times b}{HCF(l, b)}$	--
	Size of largest tile	$HCF(l, b)$	