24 Area

FUNDAMENTAL CONCEPTS

I. Results on Triangles:

1. Sum of the angles of a triangle is 180°.
2. The sum of any two sides of a triangle is greater than the third side.
3. **Pythagoras' Theorem:** In a right-angled triangle,

$$(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Height})^2$$

4. The line joining the mid-point of a side of a triangle to the opposite vertex is called the **median.**
5. The point where the three medians of a triangle meet, is called **centroid.** The centroid divides each of the medians in the ratio 2 : 1.
6. In an isosceles triangle, the altitude from the vertex bisects the base.
7. The median of a triangle divides it into two triangles of the same area.
8. The line joining the mid-points of any two sides of a triangle is parallel to the third side and equal to half of it.
9. The four triangles formed by joining the mid-points of the sides of a given triangle are equal in area, each equal to one-fourth of the given triangle.
10. The ratio of the areas of two similar triangles is equal to the ratio of the squares of their
    (i) corresponding sides (ii) corresponding altitudes

II. Results on Quadrilaterals:

1. The diagonals of a parallelogram bisect each other.
2. Each diagonal of a parallelogram divides it into two triangles of the same area.
3. The diagonals of a rectangle are equal and bisect each other.
4. The diagonals of a square are equal and bisect each other at right angles.
5. The diagonals of a rhombus are unequal and bisect each other at right angles.
6. A parallelogram and a rectangle on the same base and between the same parallels are equal in area.
7. Of all the parallelograms of given sides, the parallelogram which is a rectangle has the greatest area.
8. The line joining the mid-points of the non-parallel sides of a trapezium is parallel to each of the parallel sides and equal to half of their sum.
9. The line joining the mid-points of the diagonals of a trapezium is parallel to each of the parallel sides and equal to half of their difference.

IMPORTANT FORMULAE

I. 1. Area of a rectangle = (Length × Breadth).

$\therefore$ Length = $\left(\dfrac{\text{Area}}{\text{Breadth}}\right)$ and Breath = $\left(\dfrac{\text{Area}}{\text{Lengdth}}\right)$

2. Perimeter of a rectangle = 2 (Length + Breadth).

II. Area of a square = $(\text{side})^2 = \dfrac{1}{2}(\text{diagonal})^2$.

III. Area of 4 walls of a room = 2 (Length + Breadth) × Height.

IV. 1. Area of a triangle = $\dfrac{1}{2} \times \text{Base} \times \text{Height}$.

2. Area of a triangle = $\sqrt{s(s-a)(s-b)(s-c)}$,

where a, b, c are the sides of the triangle and s = $\frac{1}{2}(a+b+c)$

3. Area of an equilateral triangle = $\frac{\sqrt{3}}{4}\times(\text{side})^2$.

4. Area of a triangle = $\frac{1}{2}ab\sin\theta$, where a and b are the lengths of any two sides of the triangle and θ is the angle between them.

5. Radius of incircle of an equilateral triangle of side a = $\frac{a}{2\sqrt{3}}$.

6. Radius of circumcircle of an equilateral triangle of side a = $\frac{a}{\sqrt{3}}$.

7. Radius of incircle of a triangle of area Δ and semi-perimeter s = $\frac{\Delta}{s}$.

8. Radius of circumcircle of a triangle = $\frac{\text{Product of sides}}{4\Delta}$.

V. 1. Area of a parallelogram = (Base × Height).

2. Area of a rhombus = $\frac{1}{2}\times(\text{Product of diagonals})$.

3. Area of a trapezium = $\frac{1}{2}\times(\text{sum of parallel sides})\times(\text{distance between them})$

VI. 1. Area of a circle = πR^2, where R is the radius

2. Circumference of a circle = $2\pi R$

3. Length of an arc = $\frac{2\pi R\theta}{360}$, where θ is the central angle

4. Area of a sector = $\frac{1}{2}(\text{arc length}\times R)=\frac{\pi R^2\theta}{360}$.

VII. 1. Area of a semi-circle = $\frac{\pi R^2}{2}$.

2. Circumference of semi-circle = πR.

3. Perimeter of a semi-circle = $\pi R + 2R$.

VIII. 1. Area of a regular polygon of N sides, with a as the length of each side = $\frac{a^2 N}{4\tan\left(\frac{180}{N}\right)}$.

2. Area of a regular hexagon of side a = $\frac{3\sqrt{3}}{2}a^2$.

3. Area of a regular pentagon of side a = 1.72 a^2.

4. The area enclosed between the circumcircle and incircle of a regular polygon of side a = $\frac{\pi a^2}{4}$.

SOLVED EXAMPLES

Ex. 1. ***Find the maximum distance between two points on the perimeter of a rectangular garden whose length and breadth are 100 m and 50 m.*** **(Hotel Management, 2007)**

Sol. Clearly, the two points which are maximum distance apart are the end-points of a diagonal.

∴ Reqd. distance = Length of the diagonal = $\sqrt{(100)^2+(50)^2}$ m

$= \sqrt{1000+2500}\text{ m} = \sqrt{12500}\text{ m}$

$= 50\sqrt{5}\text{ m} = (50\times 2.236) = 111.8\text{ m}.$

Ex. 2. ***One side of a rectangular field is 15 m and one of its diagonals is 17 m. Find the area of the field.***

Sol. Other side $= \sqrt{(17)^2 - (15)^2} = \sqrt{289 - 225} = \sqrt{64} = 8$ m.

$\therefore$ Area = (15 × 8) m^2 = 120 m^2.

Ex. 3. ***A lawn is in the form of a rectangle having its sides in the ratio 2 : 3. The area of the lawn is $\frac{1}{6}$ hectares. Find the length and breadth of the lawn.***

Sol. Let length = $2x$ metres and breadth = $3x$ metres.

$$\text{Now, area} = \left(\frac{1}{6} \times 1000\right) \text{m}^2 = \left(\frac{5000}{3}\right) \text{m}^2.$$

$$\text{So, } 2x \times 3x = \frac{5000}{3} \Leftrightarrow x^2 = \frac{2500}{9} \Leftrightarrow x = \left(\frac{50}{3}\right).$$

$$\therefore \text{ Length } = 2x = \frac{100}{3} \text{ m} = 33\frac{1}{3} \text{ m and Breadth} = 3x = \left(3 \times \frac{50}{3}\right) \text{m} = 50 \text{ m}.$$

Ex. 4. ***Find the cost of carpeting a room 13 m long and 9 m broad with a carpet 75 cm wide at the rate of ₹ 12.40 per square metre.*** **(M.B.A., 2011)**

Sol. Area of the carpet = Area of the room = (13 × 9) m^2 = 117 m^2.

$$\text{Length of the carpet} = \left(\frac{\text{Area}}{\text{Width}}\right) = \left(117 \times \frac{4}{3}\right) \text{m} = 156 \text{ m}.$$

$\therefore$ Cost of carpeting = ₹ (156 × 12.40) = ₹ 1934.40.

Ex. 5. ***The length of a rectangle is twice its breadth. If its length is decreased by 5 cm and breadth is increased by 5 cm, the area of the rectangle is increased by 75 sq. cm. Find the length of the rectangle.***

Sol. Let breadth = x. Then, length = $2x$. Then,

$(2x - 5)(x + 5) - 2x \times x = 75 \Leftrightarrow 5x - 25 = 75 \Leftrightarrow x = 20.$

$\therefore$ Length of the rectangle = 20 cm.

Ex. 6. ***A rectangular carpet has an area of 120 sq. metres and a perimeter of 46 metres. Find the length of its diagonal.*** **(L.I.C. A.A.O., 2007)**

Sol. Let the length and breadth of the rectangle be l and b metres respectively.

Then, $2(l + b) = 46 \Rightarrow l + b = 23 \Rightarrow b = (23 - l)$.

And, $lb = 120 \Rightarrow l(23 - l) = 120 \Rightarrow 23l - l^2 = 120 \Rightarrow l^2 - 23l + 120 = 0$

$\Rightarrow l^2 - 15l - 8l + 120 = 0$

$\Rightarrow l(l - 15) - 8(l - 15) = 0$

$\Rightarrow (l - 15)(l - 8) = 0 \Rightarrow l = 15.$

So, $l = 15$ and $b = 8$.

$$\therefore \text{ Length of diagonal} = \sqrt{l^2 + b^2} = \sqrt{(15)^2 + 8^2} \text{ m} = \sqrt{289} \text{ m} = 17 \text{ m}.$$

Ex. 7. ***The length of a rectangle is increased by 30%. By what percent would the breadth have to be decreased to maintain the same area?*** **(M.B.A., 2008)**

Sol. Let the length and breadth of the rectangle be l and b units respectively.

Then, area of rectangle = (lb) sq. units.

$$\text{New length} = 160\% \text{ of } l = \frac{8l}{5} \text{ units}.$$

$$\text{Desired breadth} = \frac{\text{Area}}{\text{New length}} = \frac{lb}{\left(\frac{8l}{5}\right)} = \frac{5b}{8} \text{ units}.$$

$$\text{Decrease in breadth} = \left(b - \frac{5b}{8}\right) \text{units} = \frac{3b}{8} \text{ units}.$$

$$\therefore \text{ Decrease\%} = \left(\frac{3b}{8} \times \frac{1}{b} \times 100\right)\% = \frac{75}{2}\% = 37.5\%.$$

Ex. 8. ***In measuring the sides of a rectangular plot, one side is taken 5% in excess and the other 6% in deficit. Find the error percent in area calculated, of the plot.*** **(M.A.T., 2010)**

Sol. Let the length and breadth of the rectangle be l and b units respectively.

Then, correct area = (lb) sq. units.

Calculated area = $\left(\frac{105\,l}{100} \times \frac{94\,b}{100}\right) = \left(\frac{987\,lb}{1000}\right)$ sq. units.

Error in measurement = $\left(lb - \frac{987}{1000}\,lb\right)$ sq. units $= \left(\frac{13lb}{1000}\right)$ sq.units.

$\therefore$ Error% = $\left(\frac{13lb}{1000} \times \frac{1}{lb} \times 100\right)\% = 1.3\%.$

Ex. 9. ***Instead of walking along two adjacent sides of a rectangular field, a boy took a shor-cut along the diagonal of the field and saved a distance equal to half of the longer side. Find the ratio of the shorter side of the rectangle to the longer side.*** **(M.B.A., 2011)**

Sol. Let the length of the longer side of the field be l and that of the shorter side be b.

Then, diagonal = $\sqrt{l^2 + b^2}$.

$\therefore \quad (l + b) - \sqrt{l^2 + b^2} = \frac{1}{2} l \Rightarrow \sqrt{l^2 + b^2} = \frac{l}{2} + b$

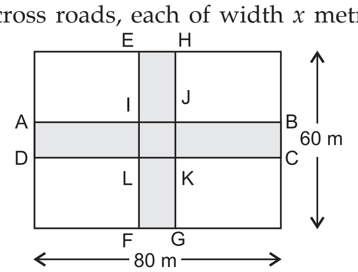
$\Rightarrow 2\sqrt{l^2 + b^2} = l + 2b \Rightarrow 4(l^2 + b^2) = l^2 + 4b^2 + 4lb$

$\Rightarrow 3l^2 = 4lb \Rightarrow 3l = 4b \Rightarrow \frac{b}{l} = \frac{3}{4}.$

Hence, required ratio = 3 : 4.

Ex. 10. ***Two perpendicular cross roads of equal width run through the middle of a rectangular field of length 80 m and breadth 60 m. If the area of the cross roads is 675 m^2, find the width of the roads.***

Sol. Let $ABCD$ and $EFGH$ denote the cross roads, each of width x metres.



Then, area of the cross-roads

= area of rectangle $ABCD$ + area of rectangle $EFGH$ – area of square $IJKL$

= $(80x + 60x - x^2) = 140x - x^2$.

$\therefore \quad 140x - x^2 = 675 \Rightarrow x^2 - 140x + 675 = 0$

$\Rightarrow x^2 - 135x + 5x - 675 = 0 \Rightarrow x(x - 135) - 5(x - 135) = 0$

$\Rightarrow (x - 135)(x - 5) = 0 \Rightarrow x = 5.$ $[\because x \neq 135]$

So, width of road = 5m.

Ex. 11. ***A rectangular grassy plot 110 m by 65 m has a gravel path 2.5 m wide all round it on the inside. Find the cost of gravelling the path at 80 paise per sq. metre.***

Sol. Area of the plot = (110×65) m^2 = 7150 m^2.

Area of the plot excluding the path = $[(110 - 5) \times (65 - 5)]$ m^2 = 6300 m^2.

$\therefore$ Area of the path = $(7150 - 6300)$ m^2 = 850 m^2.

Cost of gravelling the path = ₹ $\left(850 \times \frac{80}{100}\right)$ = ₹ 680.

Ex. 12. ***The diagonal of a rectangular field is 15 m and its area is 108 sq. m. What will be the total expenditure in fencing the field at the rate of ₹ 5 per metre?***

Sol. Let the length and breadth of the rectangle be l and b metres respectively.

Then, $\sqrt{l^2 + b^2} = 15$ and $lb = 108 \Rightarrow l^2 + b^2 = 225$ and $lb = 108$

$\Rightarrow (l + b)^2 = (l^2 + b^2) + 2lb = 225 + 216 = 441$

$\Rightarrow l + b = \sqrt{441} = 21.$

$\therefore$ Perimeter of the field = $2(l + b) = (2 \times 21)$ m = 42 m.

Hence, cost of fencing = ₹ (42 × 5) = ₹ 210.

Ex. 13. ***The perimeters of two squares are 40 cm and 32 cm. Find the perimeter of a third square whose area is equal to the difference of the areas of the two squares.***

Sol. Side of first square = $\left(\frac{40}{4}\right)\text{cm} = 10$ cm; Side of second square = $\left(\frac{32}{4}\right)\text{cm} = 8$ cm.

Area of third square = $[(10)^2 - (8)^2]$ cm^2 = $(100 - 64)$ cm^2 = 36 cm^2.

Side of third square = $\sqrt{36}$ cm = 6 cm.

$\therefore$ Required perimeter = (6 × 4) cm = 24 cm.

Ex. 14. ***The length of a rectangle R is 10% more than the side of a square S. The width of the rectangle R is 10% less than the side of the square S. What is the ratio of the area of R to that of S?***

Sol. Let each side of the square S be x units.

Then, length of rectangle R = 110% of $x = \left(\frac{11x}{10}\right)$ units.

And, width of rectangle R = 90% of $x = \left(\frac{9x}{10}\right)$ units.

$\therefore$ Ratio of areas of R and S = $\left(\frac{11x}{10} \times \frac{9x}{10}\right) : x^2 = \frac{99x^2}{100} : x^2 = 99 : 100.$

Ex. 15. ***Find the largest size of a bamboo that can be placed in a square of area 100 sq. m.*** **(P.C.S., 2009)**

Sol. Side of the square = $\sqrt{100}$ m = 10 m.

Largest size of bamboo = Length of diagonal of the square

= $10\sqrt{2}$ m. = (10 × 1.414) m = 14.14 m.

Ex. 16. ***A rectangular courtyard, 3.78 m long and 5.25 m broad, is to be paved exactly with square tiles, all of the same size. Find the least number of square tiles covered.*** **(M.A.T., 2007)**

Sol. Area of the room = (378 × 525) cm^2.

Size of largest square tile = H.C.F. of 378 cm and 525 cm = 21 cm.

Area of 1 tile = (21 × 21) cm^2.

$\therefore$ Number of tiles required = $\left(\frac{378 \times 525}{21 \times 21}\right) = 450.$

Ex. 17. ***Find the area of a square, one of whose diagonals is 3.8 m long.***

Sol. Area of the square = $\frac{1}{2} \times (\text{diagonal})^2 = \left(\frac{1}{2} \times 3.8 \times 3.8\right)\text{m}^2 = 7.22 \text{ m}^2.$

Ex. 18. ***The diagonals of two squares are in the ratio of 2 : 5. Find the ratio of their areas.*** **(Section Officers', 2003)**

Sol. Let the diagonals of the squares be $2x$ and $5x$ respectively.

$\therefore$ Ratio of their areas = $\frac{1}{2} \times (2x)^2 : \frac{1}{2} \times (5x)^2 = 4x^2 : 25x^2 = 4 : 25.$

Ex. 19. ***If each side of a square is increased by 25%, find the percentage change in its area.***

Sol. Let each side of the square be a. Then, area = a^2.

New side = $\frac{125a}{100} = \frac{5a}{4}$. New area = $\left(\frac{5a}{4}\right)^2 = \frac{25a^2}{16}.$

Increase in area = $\left(\frac{25a^2}{16} - a^2\right) = \frac{9a^2}{16}$.

$\therefore$ Increase% = $\left(\frac{9a^2}{16} \times \frac{1}{a^2} \times 100\right)\% = 56.25\%$.

Ex. 20. ***If the diagonal of a square is decreased by 15%, find the percentage decrease in its area.***

Sol. Let the length of the diagonal of the square be x. Then, area = $\frac{x^2}{2}$.

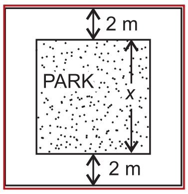
New diagonal = 85% of x = $\frac{17x}{20}$.

New area = $\frac{1}{2} \times \left(\frac{17x}{20}\right)^2 = \frac{289x^2}{800}$.

Decrease in area = $\left(\frac{x^2}{2} - \frac{289x^2}{800}\right) = \frac{111x^2}{800}$.

$\therefore$ Decrease% = $\left(\frac{111x^2}{800} \times \frac{2}{x^2} \times 100\right)\% = 27.75\%$.

Ex. 21. ***A square park is surrounded by a path of uniform width 2 metres all around it. The area of the path is 288 sq. metres. Find the perimeter of the park.*** **(R.R.B., 2009)**



Sol. Let the length of each side of the square park be x metres.

Then, area of the path = $[(x + 4)^2 - x^2]$ m^2 = $(16 + 8x)$ m^2.

$16 + 8x = 288 \Rightarrow 8x = 272 \Rightarrow x = 34$ m.

$\therefore$ Perimeter of the park = (4×34) m = 136 m.

Ex. 22. ***If the side of a square is increased by 8 cm, its area increases by 120 sq. cm. Find the side of the square.***

Sol. Let the length of a side of the square be x cm. Then,

$(x + 8)^2 - x^2 = 120 \Rightarrow 64 + 16x = 120 \Rightarrow 16x = 56 \Rightarrow x = \frac{56}{16} = \frac{7}{2} = 3.5$ cm.

Hence, side of square = 3.5 cm.

Ex. 23. ***If the length of a certain rectangle is decreased by 4 cm and the width is increased by 3 cm, a square with the same area as the original rectangle would result. Find the perimeter of the original rectangle.***

Sol. Let x and y be the length and breadth of the rectangle respectively.

Then, $x - 4 = y + 3$ or $x - y = 7$ ...(*i*)

Area of the rectangle = xy; Area of the square = $(x - 4)(y + 3)$

$\therefore (x - 4)(y + 3) = xy \iff 3x - 4y = 12$ ...(*ii*)

Solving (*i*) and (*ii*), we get $x = 16$ and $y = 9$.

$\therefore$ Perimeter of the rectangle = $2(x + y)$ = [2 (16 + 9)] cm = 50 cm.

Ex. 24. ***The dimensions of a room are 12.5 metres by 9 metres by 7 metres. There are 2 doors and 4 windows in the room; each door measures 2.5 metres by 1.2 metres and each window 1.5 metres by 1 metre. Find the cost of painting the walls at ₹ 36.50 per square metre.*** **(M.A.T., 2006)**

Sol. Area of 4 walls = $2(l + b) \times h = 2[(12.5 + 9) \times 7]$ m^2 = 301 m^2.

Area of 2 doors and 4 windows = $[2(2.5 \times 1.2) + 4(1.5 \times 1)]$ m^2 = 12 m^2.

Area to be painted = (301 − 12) m^2 = 289 m^2.

$\therefore$ Cost of painting = ₹ (289 × 36.50) = ₹ 10548.50.

Ex. 25. ***A room is half as long again as it is broad. The cost of carpeting the room at ₹ 5 per sq. m is ₹ 270 and the cost of papering the four walls at ₹ 10 per m² is ₹ 1720. If a door and 2 windows occupy 8 sq. m, find the dimensions of the room.***

Sol. Let breadth = x metres, length = $\frac{3x}{2}$ metres, height = H metres.

Area of the floor = $\left(\frac{\text{Total cost of carpeting}}{\text{Rate/m}^2}\right)\text{m}^2 = \left(\frac{270}{5}\right)\text{m}^2 = 54\text{ m}^2$.

$\therefore\ x \times \frac{3x}{2} = 54 \iff x^2 = \left(54 \times \frac{2}{3}\right) = 36 \iff x = 6.$

So, breadth = 6 m and length = $\left(\frac{3}{2} \times 6\right)\text{m} = 9\text{ m}.$

Now, papered area = $\left(\frac{1720}{10}\right)\text{m}^2 = 172\text{ m}^2$.

Area of 1 door and 2 windows = 8 m^2.
Total area of 4 walls = (172 + 8) m^2 = 180 m^2.

$\therefore$ 2 (9 + 6) × H = 180 ⇔ $H = \left(\frac{180}{30}\right) = 6$ m.

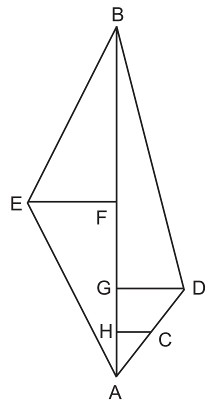
Ex. 26. ***The readings in a field book are as given below:***

To B (in metres)

	96	
24 to E	***48***	
	24	***12 to D***
	12	***6 to C***

From A

Calculate the area.



Sol. The field may be drawn as shown in the adjoining figure.

We have:

AB = 96 m, AF = BF = 48 m, AG = 24 m,
AH = 12 m, CH = 6 m,
DG = 12 m, EF = 24 m.

Area of the field = ar (ΔBFE) + ar (ΔAFE) + ar (ΔAHC) + ar (ΔBGD) + ar (trap. $CDGH$)

$$= \frac{1}{2} \times BF \times EF + \frac{1}{2} \times AF \times EF \times \frac{1}{2} \times AH \times CH + \frac{1}{2} \times BG \times GD + \frac{1}{2} \times (GD + CH) \times GH$$

$$= \left[\frac{1}{2} \times 48 \times 24 + \frac{1}{2} \times 48 \times 24 + \frac{1}{2} \times 12 \times 6 + \frac{1}{2} \times 72 \times 12 + \frac{1}{2} \times (12+6) \times 12\right]\text{m}^2$$

= (576 + 576 + 36 + 432 + 108) m^2 = 1728 m^2.

Ex. 27. ***Find the area of a triangle whose sides measure 15 cm, 16 cm and 17 cm.***

Sol. Let a = 15 cm, b = 16 cm and c = 17 cm. Then, $s = \frac{1}{2}(a+b+c) = 24.$

$\therefore$ $(s - a)$ = 9 cm, $(s - b)$ = 8 cm and $(s - c)$ = 7 cm.

Area = $\sqrt{s\,(s-a)\,(s-b)\,(s-c)} = \sqrt{24 \times 9 \times 8 \times 7}\ \text{cm}^2 = 24\sqrt{21}\ \text{cm}^2$.

Ex. 28. ***Find the area of a right–angled triangle with hypotenuse 65 cm and one side 25 cm.***

Sol. Other side = $\sqrt{(65)^2 - (25)^2}\ \text{cm} = \sqrt{3600}\ \text{cm} = 60\text{ cm}.$

$\therefore$ Area of the triangle = $\frac{1}{2} \times$ product of sides containing the right angle

$$= \left(\frac{1}{2} \times 60 \times 25\right)\text{cm}^2 = 750\text{ cm}.$$

Ex. 29. ***The base of a triangular field is three times its altitude. If the cost of cultivating the field at ₹ 24.68 per hectare be ₹ 333.18, find its base and height.***

Sol. Area of the field = $\frac{\text{Total cost}}{\text{Rate}} = \left(\frac{333.18}{24.68}\right)$ hectares = 13.5 hectares

$= (13.5 \times 10000)\ m^2 = 135000\ m^2.$

Let altitude = x metres and base = $3x$ metres.

Then, $\frac{1}{2} \times 3x \times x = 135000 \Leftrightarrow x^2 = 90000 \Leftrightarrow x = 300.$

$\therefore$ Base = 900 m and Altitude = 300 m.

Ex. 30. ***The cost of fencing an equilateral triangular park and a square park is the same. If the area of the triangular park is $16\sqrt{3}\ m^2$, find the length of the diagonal of the diagonal of the square park.*** **(Hotel Management, 2010)**

Sol. Let the length of each side of the triangular park be a cm.

Then, $\frac{\sqrt{3}}{4}a^2 = 16\sqrt{3} \Rightarrow a^2 = 64 \Rightarrow a = 8$ m.

Perimeter of the square park = Perimeter of the triangular park = (3×8) m = 24 m.

Side of the square park = $\left(\frac{24}{4}\right)$cm = 6 m.

$\therefore$ Length of diagonal of the square park = $6\sqrt{2}$ m.

Ex. 31. ***The altitude drawn to the base of an isosceles triangle is 8 cm and the perimeter is 32 cm. Find the area of the triangle.***

Sol. Let ABC be the isosceles triangle and AD be the altitude.

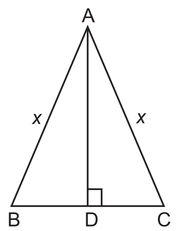
Let AB = $AC = x$. Then, $BC = (32 - 2x)$.

Since, in an isosceles triangle, the altitude bisects the base, so $BD = DC = (16 - x)$.

In ΔADC, $AC^2 = AD^2 + DC^2 \Rightarrow x^2 = (8)^2 + (16 - x)^2 \Rightarrow 32x = 320 \Rightarrow x = 10.$

$\therefore$ BC = $(32 - 2x) = (32 - 20)$ cm = 12 cm.

Hence, required area = $\left(\frac{1}{2} \times BC \times AD\right) = \left(\frac{1}{2} \times 12 \times 10\right) cm^2 = 60\ cm^2.$



Ex. 32. ***Find the length of the altitude of an equilateral triangle of side $3\sqrt{3}$ cm.***

Sol. Area of the triangle = $\frac{\sqrt{3}}{4} \times (3\sqrt{3})^2 = \frac{27\sqrt{3}}{4}$. Let the height be h.

Then, $\frac{1}{2} \times 3\sqrt{3} \times h = \frac{27\sqrt{3}}{4} \Leftrightarrow h = \frac{27\sqrt{3}}{4} \times \frac{2}{3\sqrt{3}} = \frac{9}{2} = 4.5$ cm.

Ex. 33. ***The base and altitude of a right angled triangle are 12 cm and 5 cm respectively. Find the perpendicular distance of its hypotenuse from the opposite vertex.*** **(S.S.C., 2006)**

Sol. Area of the triangle = $\left(\frac{1}{2} \times 12 \times 5\right) cm^2 = 30\ cm^2.$

Hypotenuse = $\sqrt{(12)^2 + 5^2}$ cm = $\sqrt{169}$ cm = 13 cm.

Let the perpendicular distance of the hypotenuse from the opposite vertex be h cm.

Then, $\frac{1}{2} \times 13 \times h = 30 \Rightarrow h = \frac{60}{13} = 4\frac{8}{13}$ cm.

Ex. 34. ***In two triangles, the ratio of the areas is 4 : 3 and the ratio of their heights is 3 : 4. Find the ratio of their bases.***

Sol. Let the bases of the two triangles be x and y and their heights be $3h$ and $4h$ respectively.

Then, $\frac{\frac{1}{2} \times x \times 3h}{\frac{1}{2} \times y \times 4h} = \frac{4}{3} \Leftrightarrow \frac{x}{y} = \left(\frac{4}{3} \times \frac{4}{3}\right) = \frac{16}{9}.$

$\therefore$ Required ratio = 16 : 9.

Ex. 35. ***If the height of a triangle is increased by 30% and its base is decreased by 20%, what will be the effect on its area?***

Sol. Let the base and height of the triangle be x and y units respectively.

Then, area of the triangle = $\left(\frac{1}{2}xy\right)$ sq. units.

New, area = $\left[\frac{1}{2}(80\% \text{ of } x)(130\% \text{ of } y)\right]$ sq. units.

$= \left(\frac{1}{2} \times \frac{4x}{5} \times \frac{13y}{10}\right)$ sq.units $= \left(\frac{13xy}{25}\right)$ sq.units.

Increase in area = $\left(\frac{13xy}{25} - \frac{xy}{2}\right)$ sq.units $= \left(\frac{xy}{50}\right)$ sq.units.

$\therefore$ Increase% = $\left(\frac{xy}{50} \times \frac{2}{xy} \times 100\right)\% = 4\%$.

Ex. 36. ***The base of a parallelogram is twice its height. If the area of the parallelogram is 72 sq. cm, find its height.***

Sol. Let the height of the parallelogram be x cm. Then, base = $(2x)$ cm.

$\therefore$ $2x \times x = 72 \Leftrightarrow 2x^2 = 72 \Leftrightarrow x^2 = 36 \Leftrightarrow x = 6$.

Hence, height of the parallelogram = 6 cm.

Ex. 37. ***Find the area of a rhombus one side of which measures 20 cm and one diagonal 24 cm.***

Sol. Let other diagonal = $2x$ cm.

Since diagonals of a rhombus bisect each other at right angles, we have :

$(20)^2 = (12)^2 + x^2 \Leftrightarrow x = \sqrt{(20)^2 - (12)^2} = \sqrt{256} = 16$ cm.

So, other diagonal = 32 cm.

$\therefore$ Area of rhombus = $\frac{1}{2} \times$ (Product of diagonals) $= \left(\frac{1}{2} \times 24 \times 32\right)$ cm^2 = 384 cm^2.

Ex. 38. ***The length of one side of a rhombus is 6.5 cm and its altitude is 10 cm. If the length of one of its diagonals is 26 cm, find the length of the other diagonal.*** **(S.S.C., 2005)**

Sol. Area of rhombus = (6.5×10) cm^2 = 65 cm^2.

Let the length of the other diagonal be x cm.

Then, $\frac{1}{2} \times 26 \times x = 65$ or $x = 5$ cm.

Hence, length of the other diagonal = 5 cm.

Ex. 39. ***The difference between two para lel sides of a trapezium is 4 cm. The perpendicular distance between them is 19 cm. If the area of the trapezium is 475 cm², find the lengths of the parallel sides.*** **(R.R.B., 2002)**

Sol. Let the two parallel sides of the trapezium be a cm and b cm.

Then, $a - b = 4$ ...(*i*)

And, $\frac{1}{2} \times (a+b) \times 19 = 475 \Leftrightarrow (a+b) = \left(\frac{475 \times 2}{19}\right) \Leftrightarrow a + b = 50$ ...(*ii*)

Solving (*i*) and (*ii*), we get : $a = 27$, $b = 23$.

So, the two parallel sides are 27 cm and 23 cm.

Ex. 40. ***Find the length of a rope by which a cow must be tethered in order that it may be able to graze an area of 9856 sq. metres.*** **(M.B.A. 2009)**

Sol. Clearly, the cow will graze a circular field of area 9856 sq. metres and radius equal to the length of the rope.

Let the length of the rope be R metres.

Then, $\pi R^2 = 9856 \Leftrightarrow R^2 = \left(9856 \times \frac{7}{22}\right) = 3136 \Leftrightarrow R = 56$.

$\therefore$ Length of the rope = 56 m.

Ex. 41. *The area of a circular field is 13.86 hectares. Find the cost of fencing it at the rate of ₹ 4.40 per metre.* (**A.A.O. Exam, 2010**)

Sol. Area = $(13.86 \times 10000)\ m^2 = 138600\ m^2$.

$\pi R^2 = 138600 \Leftrightarrow R^2 = \left(138600 \times \frac{7}{22}\right) \Leftrightarrow R = 210$ m.

Circumference $= 2\pi R = \left(2 \times \frac{22}{7} \times 210\right) m = 1320$ m.

$\therefore$ Cost of fencing = ₹ (1320×4.40) = ₹ 5808.

Ex. 42. *The ratio of the circumferences of two circles is 2 : 3. What is the ratio of their areas?* (**J.M.E.T., 2004**)

Sol. Let the radius of the circles be r and R respectively.

Then, $\frac{2\pi r}{2\pi R} = \frac{2}{3} \Rightarrow \frac{r}{R} = \frac{2}{3} \Rightarrow \frac{r^2}{R^2} = \left(\frac{2}{3}\right)^2 \Rightarrow \frac{\pi r^2}{\pi R^2} = \frac{4}{9}$.

Hence, ratio of areas = 4 : 9.

Ex. 43. *If a wire of 440 metres length is moulded in the form of a circle and a square turn by turn, find the ratio of the area of the circle to that of the square.*

Sol. Let the radius of the circle be r metres and the side of the square be a metres.

Then, $2\pi r = 440 \Rightarrow r = \left(\frac{440 \times 7}{2 \times 22}\right) = 70$ m. And, $4a = 440 \Rightarrow a = \left(\frac{440}{4}\right) = 110$ m.

$\therefore$ Required ratio $= \pi r^2 : a^2 = \left(\frac{22}{7} \times 70 \times 70\right) : (110)^2 = 15400 : 12100 = 14 : 11$.

Ex. 44. *A circular wire of diameter 42 cm is bent in the form of a rectangle whose sides are in the ratio 6 : 5. Find the area of the rectangle.* (**S.S.C., 2007**)

Sol. We have: $r = 21$ cm.

Perimeter of the rectangle = Circumference of the circle

$= \left(2 \times \frac{22}{7} \times 21\right) cm = 132$ cm.

Let the sides of the rectangle be $6x$ and $5x$.

Then, $2(6x + 5x) = 132 \Rightarrow 11x = 66 \Rightarrow x = 6$.

So, the sides of the rectangle are 36 cm and 30 cm.

$\therefore$ Area of the rectangle $= (36 \times 30)\ cm^2 = 1080\ cm^2$.

Ex. 45. *The diameter of the driving wheel of a bus is 140 cm. How many revolutions per minute must the wheel make in order to keep a speed of 66 kmph?*

Sol. Distance to be covered in 1 min. $= \left(\frac{66 \times 1000}{60}\right) m = 1100$ m.

Circumference of the wheel $= \left(2 \times \frac{22}{7} \times 0.70\right) m = 4.4$ m.

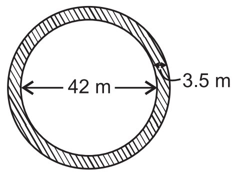
$\therefore$ Number of revolutions per min. $= \left(\frac{1100}{4.4}\right) = 250$.

Ex. 46. *A wheel makes 1000 revolutions in covering a distance of 88 km. Find the radius of the wheel.*

Sol. Distance covered in one revolution $= \left(\frac{88 \times 1000}{1000}\right) m = 88$ m.

$\therefore\ 2\pi R = 88 \Leftrightarrow 2 \times \frac{22}{7} \times R = 88 \Leftrightarrow R = \left(88 \times \frac{7}{44}\right) = 14$ m.

Ex. 47. *A circular grassy plot of land, 42 m in diameter, has a path 3.5 m wide running round it outside. Find the cost of gravelling the path at ₹ 4 per square metre.* **(M.A.T., 2005)**



Sol. Radius of plot, $r = \left(\frac{42}{2}\right) \text{m} = 21 \text{ m}.$

Radius of (plot + path), $R = (21 + 3.5)$ m = 24.5 m.

Area of path = $\pi(R^2 - r^2) = \pi[(24.5)^2 - (21)^2]$

$$= \frac{22}{7} \times (24.5 + 21)(24.5 - 21) = \left(\frac{22}{7} \times 45.5 \times 3.5\right) \text{m}^2 = 500.5 \text{ m}^2.$$

∴ Cost of gravelling = ₹ (500.5 × 4) = ₹ 2002.

Ex. 48. *The inner circumference of a circular race track, 14 m wide, is 440 m. Find the radius of the outer circle.*

Sol. Let inner radius be r metres.

Then, $2\pi r = 440 \Rightarrow r = \left(440 \times \frac{7}{44}\right) = 70$ m.

∴ Radius of outer circle = (70 + 14) m = 84 m.

Ex. 49. *Two concentric circles form a ring. The inner and outer circumferences of the ring ar* $50\frac{2}{7}$ *m and* $75\frac{3}{7}$ *m respectively. Find the width of the ring.*

Sol. Let the inner and outer radii be r and R metres.

Then, $2\pi r = \frac{352}{7} \Rightarrow r = \left(\frac{352}{7} \times \frac{7}{22} \times \frac{1}{2}\right) = 8$ m.

$2\pi R = \frac{528}{7} \Rightarrow R = \left(\frac{528}{7} \times \frac{7}{22} \times \frac{1}{2}\right) = 12$ m.

∴ Width of the ring = $(R - r)$ = (12 – 8) m = 4 m.

Ex. 50. *If the cost of gardening is ₹ 85 per square metre then what will be the cost of gardening 1.4 metre wide strip inside around a circular field having an area of 1386 square metres?* **(Bank P.O., 2007)**

Sol. Let the radius of the circular field be R metres.

Then, $\pi R^2 = 1386 \Rightarrow R^2 = \frac{1386 \times 7}{22} = 441 \Rightarrow R = \sqrt{441} = 21$ m.

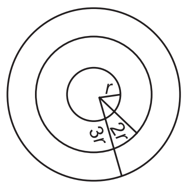
Radius of field excluding strip, r = (21 – 1.4) m = 19.6 m.

Area of strip = $\pi(R^2 - r^2) = \pi[(21)^2 - (19.6)^2]$

$$= \left[\frac{22}{7}(441 - 384.16)\right] \text{m}^2 = \left(\frac{22}{7} \times 56.84\right) \text{m}^2 = 178.64 \text{ m}^2.$$

∴ Cost of gardening = ₹ (178.64 × 85) = ₹ 15184.40.

Ex. 51. *The radii of three concentric circles are in the ratio 1 : 2 : 3. Find the ratio of the area between the two inner circles to that between the two outer circles.* **(S.S.C., 2008)**



Sol. Let the radii of the three concentric circles be r, $2r$ and $3r$ respectively.

∴ Required ratio = $\pi[(2r)^2 - r^2] : \pi[(3r)^2 - (2r)^2]$

$= 3\pi r^2 : 5\pi r^2 = 3 : 5.$

Ex. 52. *In a circle of radius 28 cm, an arc subtends an angle of 72° at the centre. Find the length of the arc and the area of the sector so formed.* **(S.S.C., 2008)**

Sol. $r = 28$ cm, $\theta = 72°$.

∴ Length of arc = $\left(2 \times \frac{22}{7} \times 28 \times \frac{72}{360}\right)$ cm = 35.2 cm.

Area of the sector = $\left(\frac{22}{7} \times 28 \times 28 \times \frac{72}{360}\right) \text{cm}^2 = 492.8 \text{ cm}^2.$

Ex. 53. *The minute hand of a clock is 1.5 cm long. What is the distance travelled by its tip during an interval of 40 minutes? (Take π = 3.14)*

Sol. Angle traced in 40 min = $\left(\frac{360}{60}\times 40\right)^\circ = 240°$.

∴ Distance travelled by the tip of the hand

= Length of arc of a circle with radius 1.5 cm and central angle 240°

$= \left(2\times 3.14\times 1.5\times\frac{240}{360}\right)\text{cm}^2 = 6.28\text{ cm}^2.$

Ex. 54. *A sector of 120°, cut out from a circle, has an area of $9\frac{3}{7}$ sq. cm. Find the radius of the circle.*

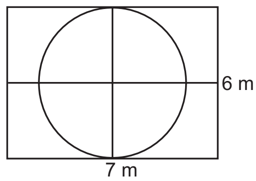
Sol. Let the radius of the circle be r cm. Then,

$$\frac{\pi r^2\theta}{360}=\frac{66}{7} \Leftrightarrow \frac{22}{7}\times r^2\times\frac{120}{360}=\frac{66}{7} \Leftrightarrow r^2=\left(\frac{66}{7}\times\frac{7}{22}\times 3\right)=9 \Leftrightarrow r=3.$$

Hence, radius = 3 cm.

Ex. 55. *Find the area of the largest circle that can be drawn inside a rectangle with sides 7 m by 6 m.*

Sol. Radius of the required circle = $\left(\frac{1}{2}\times 6\right)\text{m} = 3\text{ m}.$

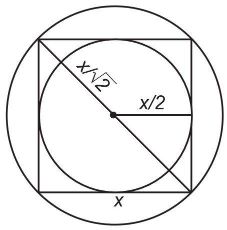


∴ Area of the circle = $\left(\frac{22}{7}\times 3\times 3\right)\text{m}^2$

$= \left(\frac{198}{7}\right)\text{m}^2 = 28\frac{2}{7}\text{ m}^2.$

Ex. 56. *Find the ratio of the areas of the incircle and circumcircle of a square.*

Sol. Let the side of the square be x. Then, its diagonal = $\sqrt{2}\,x$.

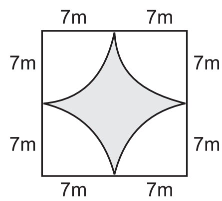


Radius of incircle = $\frac{x}{2}$ and radius of circumcircle = $\frac{\sqrt{2}\,x}{2}=\frac{x}{\sqrt{2}}$.

∴ Required ratio = $\left(\frac{\pi x^2}{4}:\frac{\pi x^2}{2}\right)=\frac{1}{4}:\frac{1}{2}=1:2.$

Ex. 57. *Four horses are tied on the four corners of a square field of length 14 m so that each horse can just touch the other two horses. They were able to graze in the area accessible to them for 11 days. For how many days is the ungrazed area sufficient for them?* **(M.A.T., 2006)**

Sol. Area of the square field = (14 × 14) m^2 = 196 m^2.



Area accessible to the horses for grazing

= 4 × Area of a quadrant with r = 7 m

= Area of a circle with r = 7 m = $\left(\frac{22}{7}\times 7\times 7\right)\text{m}^2 = 154\text{ m}^2.$

Ungrazed area = (196 – 154) m^2 = 42 m^2.

154 m^2 area feeds the horses for 11 days.

∴ 42 m^2 area will feed the horses for $\left(\frac{11}{154}\times 42\right)$ days = 3 days.

Ex. 58. *If the radius of a circle is decreased by 50%, find the percentage decrease in its area.* **(M.A.T., 2008)**

Sol. Let original radius = R. New radius = $\frac{50}{100}R=\frac{R}{2}$.

Original area = πR^2 and New area = $\pi\left(\frac{R}{2}\right)^2=\frac{\pi R^2}{4}$.

∴ Decrease in area = $\left(\frac{3\pi R^2}{4}\times\frac{1}{\pi R^2}\times 100\right)\% = 75\%.$

Ex. 59. *If the radius of a circle is increased by 20% then by how much will its area be increased?* **(M.B.A. 2011)**

Sol. Let original radius = R. New radius = $\frac{120}{100}R = \frac{6R}{5}$.

Original area = πR^2 and New area = $\pi\left(\frac{6R}{5}\right)^2 = \frac{36\pi R^2}{25}$.

Increase in area = $\left(\frac{36\pi R^2}{25} - \pi R^2\right) = \frac{11\pi R^2}{25}$.

$\therefore$ Increase% = $\left(\frac{11\pi R^2}{25} \times \frac{1}{\pi R^2} \times 100\right)\% = 44\%$.

Ex. 60. *The radius of a cricle is so increased that its circumference increased by 5%. Find the percentage increase in its area.* **(SNAP, 2010)**

Sol. Let the original radius of the circle be r. Then, original circumference = $2\pi r$.

New circumference = 105% of $(2\pi r)$ = $\left(\frac{105}{100} \times 2\pi r\right) = 2\pi\left(\frac{21}{20}r\right)$.

$\therefore$ New radius = $\frac{21}{20}r$.

New area = $\pi \times \left(\frac{21}{20}r\right)^2 = \frac{441}{400}\pi r^2$.

Increase in area = $\left(\frac{441}{400}\pi r^2 - \pi r^2\right) = \frac{41}{400}\pi r^2$.

Increase % in area = $\left(\frac{41}{400}\pi r^2 \times \frac{1}{\pi r^2} \times 100\right)\% = 10.25\%$.

Ex. 61. *The area of a circle whose radius is 6 cm, is trisected by two concentric circles. Find the radius of the smallest circle.* **(C.P.O., 2008)**

Sol. Let the radius of the smallest circle be r and that of the middle circle be R.

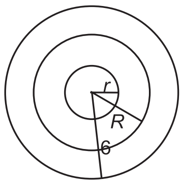
Then, $\pi[6^2 - R^2] = \pi[R^2 - r^2] \Rightarrow 6^2 - R^2 = R^2 - r^2 \Rightarrow 2R^2 = 36 + r^2$

$\Rightarrow R^2 = \frac{36 + r^2}{2}$ ...(*i*)

And, $\pi[R^2 - r^2] = \pi r^2 \Rightarrow R^2 - r^2 = r^2 \Rightarrow R^2 = 2r^2$

$\Rightarrow \frac{36 + r^2}{2} = 2r^2 \Rightarrow 3r^2 = 36$

$\Rightarrow r^2 = 12 \Rightarrow r = \sqrt{12} = 2\sqrt{3}$ cm.



Hence, radius of the smallest circle = $2\sqrt{3}$ cm.

EXERCISE – A
(OBJECTIVE TYPE QUESTIONS)

Directions: *Mark (✓) against the correct answer:*

1. If a rectangle has length L and the width is one-half of the length, then the area of the rectangle is **(M.B.A., 2006)**

(*a*) L (*b*) L^2
(*c*) $\frac{1}{2}L^2$ (*d*) $\frac{1}{4}L^2$
(*e*) $2L$

2. The length of a room is 5.5 m and width is 3.75 m. Find the cost of paving the floor by slabs at the rate of ₹ 800 per sq. metre. **(B.Ed Entrance, 2008)**

(*a*) ₹ 15,000 (*b*) ₹ 15,550
(*c*) ₹ 15,600 (*d*) ₹ 16,500

3. The area of a rectangular field is 2100 sq. metres. If the field is 60 metres long, what is its perimeter? **(Bank Recruitment, 2007)**

(*a*) 180 m (*b*) 210 m
(*c*) 240 m (*d*) Cannot be determined
(*e*) None of these

4. The length of a rectangle is 18 cm and its breadth is 10 cm. When the length is increased to 25 cm, what will be the breadth of the rectangle if the area remains the same?

(*a*) 7 cm (*b*) 7.1 cm
(*c*) 7.2 cm (*d*) 7.3 cm

5. A rectangular plot measuring 90 metres by 50 metres is to be enclosed by wire fencing. If the poles of the fence are kept 5 metres apart, how many poles will be needed?

(*a*) 55 (*b*) 56
(*c*) 57 (*d*) 58

6. The length of a rectangular plot is 60% more than its breadth. If the difference between the length and the breadth of that rectangle is 24 cm, what is the area of that rectangle?

(*a*) 2400 sq. cm (*b*) 2480 sq. cm
(*c*) 2560 sq. cm (*d*) Data inadequate
(*e*) None of these

7. A rectangular parking space is marked out by painting three of its sides. If the length of the unpainted side is 9 feet, and the sum of the lengths of the painted sides is 37 feet, then what is the area of the parking space in square feet?

(*a*) 46 (*b*) 81
(*c*) 126 (*d*) 252

8. The difference between the length and breadth of a rectangle is 23 m. If its perimeter is 206 m, then its area is **(Section Officers', 2003)**

(*a*) 1520 m^2 (*b*) 2420 m^2
(*c*) 2480 m^2 (*d*) 2520 m^2

9. The total cost of flooring a room at ₹ 8.50 per square metre is ₹ 510. If the length of the room is 8 m, its breadth is **(R.R.B. 2006)**

(*a*) 7.5 m (*b*) 8.5 m
(*c*) 10.5 m (*d*) 12.5 m

10. The length of a rectangular plot is thrice its breadth. If the area of the rectangular plot is 7803 sq. metres, What is the breadth of the rectangular plot? **(Bank P.O. 2009)**

(*a*) 51 m (*b*) 88 m
(*c*) 104 m (*d*) 153 m
(*e*) None of these

11. The perimeter of a rectangle is 60 metres. If its length is twice its breadth, then its area is **(R.R.B. 2008)**

(*a*) 160 m^2 (*b*) 180 m^2
(*c*) 200 m^2 (*d*) 220 m^2

12. A man is walking in a rectangular field whose perimeter is 6 km. If the area of the rectangular field be 2 sq. km, then what is the difference between the length and breadth of the rectangle? **(R.R.B. 2006; P.C.S. 2009)**

(*a*) $\frac{1}{2}$ km (*b*) 1 km
(*c*) $1\frac{1}{2}$ km (*d*) 2 km

13. The area of a rectangle is 252 cm^2 and its length and breadth are in the ratio of 9 : 7 respectively. What is its perimeter? **(Bank. P.O., 2009)**

(*a*) 64 cm (*b*) 68 cm
(*c*) 96 cm (*d*) 128 cm

14. The length of a rectangular plot is 20 metres more than its breadth. If the cost of fencing the plot @ ₹ 26.50 per metre is ₹ 5300, what is the length of the plot in metres?

(*a*) 40 (*b*) 50
(*c*) 120 (*d*) Data inadequate
(*e*) None of these

15. A carpenter is designing a table. The table will be in the form of a rectangle whose length is 4 feet more than its width. How long should the table be if the carpenter wants the area of the table to be 45 sq ft? **(J.M.E.T., 2010)**

(*a*) 6 ft (*b*) 9 ft
(*c*) 11 ft (*d*) 13 ft

16. The perimeter of a rectangular field is 480 metres and the ratio between the length and the breadth is 5 : 3. The area is **(M.A.T., 2008)**

(*a*) 1350 sq. m (*b*) 1550 sq. m
(*c*) 13500 sq. m (*d*) 15500 sq. m

17. A rectangular farm has to be fenced on one long side, one short side and the diagonal. If the cost of fencing is ₹ 100 per m, the area of the farm is 1200 m^2 and the short side is 30 m long, how much would the job cost? **(M.A.T., 2009)**

(*a*) ₹ 7000 (*b*) ₹ 12000
(*c*) ₹ 14000 (*d*) ₹ 15000

18. The breadth of a rectangular field is 60% of its length. If the perimeter of the field is 800 m, what is the area of the field?

(*a*) 18750 sq. m (*b*) 37500 sq. m
(*c*) 40000 sq. m (*d*) 48000 sq. m

19. The ratio between the length and the perimeter of a rectangular plot is 1 : 3. What is the ratio between the length and breadth of the plot?

(*a*) 1 : 2 (*b*) 2 : 1
(*c*) 3 : 2 (*d*) Data inadequate

20. The ratio between the length and the breadth of a rectangular park is 3 : 2. If a man cycling along the boundary of the park at the speed of 12 km / hr completes one round in 8 minutes, then the area of the park (in sq. m) is

(*a*) 15360 sq. m (*b*) 153600 sq. m
(*c*) 30720 sq. m (*d*) 307200 sq. m

21. The area of a rectangle is 460 square metres. If the length is 15% more than the breadth, what is the breadth of the rectangular field?

(*a*) 15 metres (*b*) 26 metres
(*c*) 34.5 metres (*d*) Cannot be determined
(*e*) None of these

22. The area of a rectangular field is 52000 m^2. This rectangular area has been drawn on a map to the scale 1 cm to 100 m. The length is shown as 3.25 cm on the map. The breadth of the rectangular field is **(M.B.A. 2006)**

(*a*) 150 m (*b*) 160 m
(*c*) 200.5 m (*d*) 300.5 m

23. A rectangular field is to be fenced on three sides leaving a side of 20 feet uncovered. If the area of the field is 680 sq. feet, how many feet of fencing will be required?

(*a*) 34 (*b*) 40
(*c*) 68 (*d*) 88

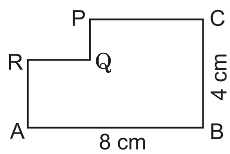
24. A farmer wishes to start a 100 sq. m rectangular vegetable garden. Since he has only 30 m barbed wire, he fences three sides of the garden letting his house compound wall act as the fourth side fencing. The dimension of the garden is:

(*a*) 15 m × 6.67 m (*b*) 20 m × 5 m
(*c*) 30 m × 3.33 m (*d*) 40 m × 2.5 m

25. The ratio of length and breadth of a rectangle is 3 : 2 respectively. The respective ratio of its perimeter and area is 5 : 9. What is the breadth of the rectangle in metres? **(Bank Recruitment, 2007)**

(*a*) 6 m (*b*) 8 m
(*c*) 9 m (*d*) 13 m
(*e*) None of these

26. A rectangle of certain dimensions is chopped off from one corner of a larger rectangle as shown. AB = 8 cm and BC = 4 cm. The perimeter of the figure $ABCPQRA$ (in cm) is



(*a*) 24 (*b*) 28
(*c*) 36 (*d*) 48

27. A large field of 700 hectares is divided into two parts. The difference of the areas of the two parts is one-fifth of the average of the two areas. What is the area of the smaller part in hectares?

(*a*) 225 (*b*) 280
(*c*) 300 (*d*) 315

28. A rectangular paper, when folded into two congruent parts had a perimeter of 34 cm for each part folded along one set of sides and the same is 38 cm when folded along the other set of sides. What is the area of the paper?

(*a*) 140 cm^2 (*b*) 240 cm^2
(*c*) 560 cm^2 (*d*) None of these

29. A rectangular plot is half as long again as it is broad and its area is $\frac{2}{3}$ hectares. Then, its length is

(*a*) 100 m (*b*) 33.33 m
(*c*) 66.66 m (*d*) $\frac{100\sqrt{3}}{3}$ m

30. An artist has completed one-fourth of a rectangular oil painting. When he will paint another 100 square centimetres of the painting, he would complete three-quarters of the painting. If the height of the oil painting is 10 cm, determine the length (in cm) of the oil painting. **(J.M.E.T., 2008)**

(*a*) 10 (*b*) 15
(*c*) 20 (*d*) 25

31. A courtyard 25 m long and 16 m broad is to be paved with bricks of dimensions 20 cm by 10 cm. The total number of bricks required is

(*a*) 18000 (*b*) 20000
(*c*) 25000 (*d*) None of these

32. How many metres of carpet 63 cm wide will be required to cover the floor of a room 14 m by 9 m? **(R.R.B. ,2008)**

(*a*) 185 m (*b*) 200 m
(*c*) 210 m (*d*) 220 m

33. The cost of carpeting a room 18 m long with a carpet 75 cm wide at ₹ 4.50 per metre is ₹ 810. The breadth of the room is

(*a*) 7 m (*b*) 7.5 m
(*c*) 8 m (*d*) 8.5 m

34. The diagonal of the floor of a rectangular closet is $7\frac{1}{2}$ feet. The shorter side of the closet is $4\frac{1}{2}$ feet. What is the area of the closet in square feet?

(*a*) $5\frac{1}{4}$ (*b*) $13\frac{1}{2}$
(*c*) 27 (*d*) 37

35. The length of a rectangle is three times of its width. If the length of the diagonal is $8\sqrt{10}$ cm, then the perimeter of the rectangle is

(*a*) $15\sqrt{10}$ cm (*b*) $16\sqrt{10}$ cm
(*c*) $24\sqrt{10}$ cm (*d*) 64 cm

36. The diagonal of a rectangle is thrice its smaller side. The ratio of the length to the breadth of the rectangle is

(*a*) 3 : 1 (*b*) $\sqrt{3}:1$
(*c*) $\sqrt{2}:1$ (*d*) $2\sqrt{2}:1$

37. The diagonal of a rectangle is 10 cms and is twice the length of one of the sides. What is the area of the rectangle in sq. cm? **(R.R.B. 2006)**

(*a*) $10\sqrt{3}$ (*b*) 25
(*c*) $25\sqrt{3}$ (*d*) 100

38. The diagonal of a rectangular field is 15 metres and the difference between its length and width is 3 metres. The area of the rectangular field is **(M.A.T., 2007)**

(*a*) 9 m^2 (*b*) 12 m^2
(*c*) 21 m^2 (*d*) 108 m^2

39. A rectangular carpet has an area of 120 sq. metres and a perimeter of 46 metres. The length of its diagonal is

(*a*) 15 m (*b*) 16 m
(*c*) 17 m (*d*) 20 m

40. The diagonal of a rectangle is $\sqrt{41}$ cm and its area is 20 sq. cm. The perimeter of the rectangle must be **(Hotel Management, 2002)**

(*a*) 9 cm (*b*) 18 cm
(*c*) 20 cm (*d*) 41 cm

41. If the area of a rectangle is $\sqrt{3}\,d^2$, where $2d$ is the length of its diagonal, then its perimeter is equal to

(*a*) $4\sqrt{3}\,d$ (*b*) $2\sqrt{3}\,d$
(*c*) $4(\sqrt{3}+1)\,d$ (*d*) $2(\sqrt{3}+1)\,d$

42. If the diagonal and the area of a rectangle are 25 m and 168 m^2, what is the length of the rectangle?

(*a*) 12 m (*b*) 17 m
(*c*) 24 m (*d*) 31 m

43. A took 15 seconds to cross a rectangular field diagonally walking at the rate of 52 m / min and B took the same time to cross the same field along its sides walking at the rate of 68 m / min. The area of the field is

(*a*) 30 m^2 (*b*) 40 m^2
(*c*) 50 m^2 (*d*) 60 m^2

44. A rectangular carpet has an area of 60 sq. m. If its diagonal and longer side together equal 5 times the shorter side, the length of the carpet is

(*a*) 5 m (*b*) 12 m
(*c*) 13 m (*d*) 14.5 m

45. The ratio between the length and the breadth of a rectangular field is 3 : 2. If only the length is increased by 5 metres, the new area of the field will be 2600 sq. metres. What is the breadth of the rectangular field?

(*a*) 40 metres (*b*) 60 metres
(*c*) 65 metres (*d*) Cannot be determined
(*e*) None of these

46. The cost of carpeting a room is ₹ 120. If the width had been 4 metres less, the cost of the carpet would have been ₹ 20 less. The width of the room is

(*a*) 18.5 m (*b*) 20 m
(*c*) 24 m (*d*) 25 m

47. The length of a rectangular blackboard is 8 m more than its breadth. If its length is increased by 7m and its breath is decreased by 4 m, its area remains unchanged. The length and breadth of the rectangular blackboard is **(M.A.T. 2009)**

(*a*) 24 m, 16 m (*b*) 20 m, 24 m
(*c*) 28 m, 16 m (*d*) 28 m, 20 m

48. The area of a grassy plot is 480 sq. m. If each side had been 5 m longer, the area would have been increased by 245 sq. m. Find the length of the fence to surround it. **(M.B.A. 2007)**

(*a*) 87 m (*b*) 88 m
(*c*) 90 m (*d*) None of these

49. The area of a rectangle gets reduced by 9 m^2 if its length is reduced by 5 m and breadth is increased by 3 m. If we increase the length by 3 m and breadth by 2 m, the area is increased by 67 m^2. The length of the rectangle is

(*a*) 9 m (*b*) 15.6 m
(*c*) 17 m (*d*) 18.5 m

50. If each side of a rectangle is increased by 50%, its area will increase by **(R.R.B. 2005; P.C.S., 2008)**

(*a*) 50% (*b*) 125%
(*c*) 150% (*d*) 200%

51. An order was placed for supply of carpet of breadth 3 metre, the length of carpet was 1.44 times of breadth. Subsequently the breadth and length were increased by 25 and 40 percent respectively. At the rate of 45 per square metre, what would be the increase in the cost of the carpet? **(Bank P.O., 2009)**

(*a*) ₹ 398.80 (*b*) ₹ 437.40
(*c*) ₹ 583.20 (*d*) ₹ 1020.60
(*e*) None of these

52. If the length of a rectangle is increased by 10% and its breadth is decreased by 10%, the change in its area will be **(S.S.C. 2007, 2010; P.C.S. 2009; Hotel Managment, 2010)**

(*a*) 1% increase (*b*) 1% decrease
(*c*) 10% increase (*d*) No change

53. Two sides of a rectangle were measured. One of the sides (length) was measured 10% more than its actual length and the other side (width) was measured 5% less than its actual length. The percentage error in measure obtained for the area of the rectangle is **(P.C.S. 2009)**

(*a*) 4.5% (*b*) 5%
(*c*) 7.56% (*d*) 15%

54. If the length of a rectangle is increased by 50% and breadth is decreased by 25%, what is the percentage change in its area? **(Campus Recruitment, 2010)**

(*a*) 12.5% increase (*b*) 10% increase
(*c*) 25% increase (*d*) 20% decrease

55. A towel, when bleached, was found to have lost 20% of its length and 10% of its breadth. The percentage of decrease in area is **(R.R.B. 2008)**

(*a*) 10% (*b*) 10.08%
(*c*) 20% (*d*) 28%

56. The length of a rectangle is halved, while its breadth is tripled. What is the percentage change in area?

(*a*) 25% increase (*b*) 50% increase
(*c*) 50% decrease (*d*) 75% decrease

57. The length of a rectangle is decreased by r%, and the breadth is increased by $(r + 5)$%. Find r, if the area of the rectangle is unaltered. **(SCMHRD, 2002)**

(*a*) 5 (*b*) 8
(*c*) 10 (*d*) 15
(*e*) 20

58. The length of a rectangle is increased by 60%. By what percent would the width have to be decreased so as to maintain the same area? **(M.B.A., 2006)**

(*a*) $37\frac{1}{2}$% (*b*) 60%
(*c*) 75% (*d*) 120%

59. If the area of a rectangular plot increases by 30% while its breadth remains the same, what will be the ratio of the areas of new and old figures?

(*a*) 1 : 3 (*b*) 3 : 1
(*c*) 4 : 7 (*d*) 10 : 13
(*e*) None of these

60. If the breadth of a rectangle is decreased by 50%, then to double the area, its length is required to be increased by

(*a*) 150% (*b*) 200%
(*c*) 300% (*d*) 400%

61. If the length and breadth of a rectangular field are increased, the area increases by 50%. If the increase in length was 20%, by what percentage was the breadth increased? **(Bank Recruitment, 2007)**

(*a*) 20% (*b*) 25%
(*c*) 30% (*d*) Date inadequate
(*e*) None of these

62. The length of a rectangle is reduced by 20% and breadth is kept constant, and the new figure that is formed is a square.

Consider the following statements:

1. The area of square is 25% less than the area of rectangle.
2. The perimeter of square is approximately 11% less than the perimeter of rectangle.
3. The diagonal of square is approximately 12% less than the diagonal of rectangle.

Which of the statements given above is/are correct?

(*a*) 1 only (*b*) 1 and 2
(*c*) 2 and 3 (*d*) 1, 2 and 3

63. A typist uses a paper 30 cm by 15 cm. He leaves a margin of 2.5 cm at the top and bottom and 1.25 cm on either side. What percentage of paper area is approximately available for typing? **(R.R.B., 2006)**

(*a*) 60% (*b*) 65%
(*c*) 70% (*d*) 80%

64. A room 5 m × 8 m is to be carpeted leaving a margin of 10 cm from each wall. If the cost of the carpet is ₹ 18 per Sq. metre, the cost of carpeting the room will be **(M.A.T., 2007)**

(*a*) ₹ 673.92 (*b*) ₹ 682.46
(*c*) ₹ 691.80 (*d*) ₹ 702.60

65. A lawn is in the shape of a rectangle of 80 m length and 50 m width. Outside the lawn there is a footpath of uniform 1 m width bordering the lawn. The area of the footpath is

(*a*) 264 m^2 (*b*) 284 m^2
(*c*) 4000 m^2 (*d*) 4264 m^2

66. The breadth of a rectangular field is $\frac{3}{4}$ of its length and its area is 300 sq. metres. What will be the area (in sq. metres) of the garden of breadth 1.5 metres developed around the field? **(Bank P.O., 2008)**

(*a*) 96 (*b*) 105
(*c*) 114 (*d*) Cannot be determined
(*e*) None of these

67. What will be the cost of gardening 1 metre broad boundary around a rectangular plot having perimeter of 340 metres at the rate of ₹ 10 per square metre?

(*a*) ₹ 1700 (*b*) ₹ 3400
(*c*) ₹ 3440 (*d*) Cannot be determined
(*e*) None of these

68. 2 metres broad pathway is to be constructed around a rectangular plot on the inside. The area of the plot is 96 sq. m. The rate of construction is ₹ 50 per square metre. Find the total cost of the construction.

(*a*) ₹ 2400 (*b*) ₹ 4000
(*c*) ₹ 4800 (*d*) Data inadequate
(*e*) None of these

69. A path of uniform width runs round the inside of a rectangular field 38 m long and 32 m wide. If the path occupies 600 m^2, then the width of the path is **(S.S.C., 2007)**

(*a*) 5 m (*b*) 10 m
(*c*) 18.75 m (*d*) 30 m

70. Within a rectangular garden 10 m wide and 20 m long, we wish to pave a walk around the borders of uniform width so as to leave an area of 96 m^2 for flowers. How wide should the walk be?

(*a*) 1 m (*b*) 2 m
(*c*) 2.1 m (*d*) 2.5 m

71. A rectangular garden (60 m × 40 m) is surrounded by a road of width 2 m, the road is covered by tiles and the garden is fenced. If the total expenditure is ₹ 51600 and rate of fencing is ₹ 50 per metre, then the cost of covering 1 sq. m of road by tiles is **(Hotel Management, 2007)**

(*a*) ₹ 10 (*b*) ₹ 50
(*c*) ₹ 100 (*d*) ₹ 150

72. A rectangular lawn 80 metres by 60 metres has two roads each 10 m wide running in the middle of it, one parallel to the length and the other parallel to the breadth. Find the cost of gravelling them at ₹ 30 per square metre. **(M.A.T., 2005)**

(*a*) ₹ 3600 (*b*) ₹ 3900
(*c*) ₹ 36000 (*d*) ₹ 39000

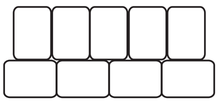
73. A rectangular field has dimensions 25 m by 15 m. Two mutually perpendicular passages, 2 m wide have been left in its central part and grass has been grown in rest of the field. The area (in sq. metres) under the grass is **(G.B.O., 2007)**

(*a*) 295 (*b*) 299
(*c*) 300 (*d*) 375

74. A rectangular park 60 m long and 40 m wide has two concrete crossroads running in the middle of the park and rest of the park has been used as a lawn. If the area of the lawn is 2109 sq. m, then what is the width of the road?

(*a*) 2.91 m (*b*) 3 m
(*c*) 5.82 m (*d*) None of these

75. Nine playing cards are set up to form a rectangle as shown in the adjoining figure. If the area of the rectangle so formed is 180 square inches, what is its perimeter?



(*a*) 48 inches (*b*) 56 inches
(*c*) 58 inches (*d*) 60 inches

76. A garden is 24 m long and 14 m wide. There is a path 1 m wide outside the garden along its sides. If the path is to be constructed with square marble tiles 20 cm × 20 cm, the number of tiles required to cover the path is **(M.A.T., 2007)**

(*a*) 200 (*b*) 1800
(*c*) 2000 (*d*) 2150

77. The dimensions of a rectangle are 51 m and 49 m respectively while side of a square is 50 m. Which of the following statements is correct?

(*a*) Diagonals of the square and the rectangle are equal.
(*b*) Diagonals of both the geometrical figures intersect at right angles.
(*c*) The perimeters of both the geometrical figures are equal.
(*d*) Both the geometrical figures are of the same area.

78. A housing society has been allotted a square piece of land measuring 2550.25 sq. m. What is the side of the plot?

(*a*) 50.25 m (*b*) 50.5 m
(*c*) 50.65 m (*d*) None of these

79. The area of a square with perimeter 48 cm is **(P.C.S., 2007)**

(*a*) 144 sq. cm (*b*) 156 sq. cm
(*c*) 170 sq. cm (*d*) 175 sq. cm

80. The length of the side of a square whose area is four times the area of a square with side 25 m is

(*a*) 12.5 m (*b*) 50 m
(*c*) 100 m (*d*) 125 m

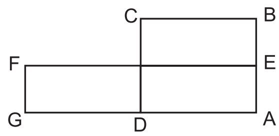
81. The area of a square is three-fifths the area of a rectangle. The length of the rectangle is 25 cm and its breadth is 10 cm less than its length. What is the perimeter of the square? **(Bank Recruitment, 2010)**

(*a*) 44 cm (*b*) 60 cm
(*c*) 80 cm (*d*) Cannot be determined
(*e*) None of these

82. The area of a square is 1024 sq. cm. What is the ratio of the length to the breadth of a rectangle whose length is twice the side of the square and breadth is 12 cm less than the side of this square? **(Bank P.O., 2010)**

(*a*) 5 : 18 (*b*) 16 : 7
(*c*) 14 : 5 (*d*) 32 : 5
(*e*) None of these

83. *ABCD* is a square and *AEFG* is a rectangle. Area of each of them is 36 sq. m. *E* is the mid-point of *AB*. The perimeter of the rectangle *AEFG* is **(Hotel Management, 2007)**



(*a*) 12 m (*b*) 18 m
(*c*) 30 m (*d*) 36 m

84. The cost of cultivating a square field at the rate of ₹ 685 per hectare is ₹ 6165. The cost of putting a fence around it at the rate of ₹ 48.75 per metre would be

(*a*) ₹ 23400 (*b*) ₹ 52650
(*c*) ₹ 58500 (*d*) ₹ 117000

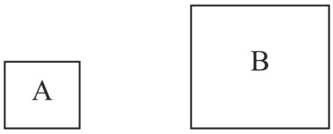
85. The perimeter of a square and a rectangle is the same. If the rectangle is 12 cm by 10 cm, then by what percentage is the area of the square more than that of the rectangle?

(*a*) $\frac{2}{3}$ (*b*) 1

(*c*) $1\frac{1}{3}$ (*d*) $1\frac{1}{6}$

(*e*) None of these

86. The following squares represent the monthly incomes of two families



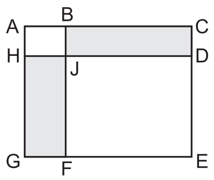
2 3 **(P.C.S., 2008)**

If the monthly income of family A is ₹ 40000, the monthly income of family B is

(*a*) ₹ 50000 (*b*) ₹ 60000

(*c*) ₹ 90000 (*d*) ₹ 120000

87. *ABJH*, *JDEF*, *ACEG* are squares.



$\frac{BC}{AB} = 3. \quad \frac{\text{Area BCDJ}}{\text{Area HJFG}} = ?$

(*a*) $\frac{1}{9}$ (*b*) $\frac{1}{3}$

(*c*) 1 (*d*) 3

88. The perimeters of five squares are 24 cm, 32 cm, 40 cm, 76 cm and 80 cm respectively. The perimeter of another square equal in area to the sum of the areas of these squares is

(*a*) 31 cm (*b*) 62 cm

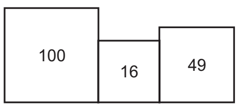
(*c*) 124 cm (*d*) 961 cm

89. Total area of 64 small squares of a chessboard is 400 sq. cm. There is 3 cm wide border around the chess board. What is the length of the side of the chessboard? **(M.A.T., 2006; R.R.B., 2006)**

(*a*) 17 cm (*b*) 20 cm

(*c*) 23 cm (*d*) 26 cm

90. The adjoining figure contains three squares with areas of 100, 16 and 49 lying side by side as shown. By how much should the area of the middle square be reduced in order that the total length *PQ* of the resulting three squares is 19?



(*a*) $\sqrt{2}$ (*b*) 2

(*c*) 4 (*d*) 12

91. A coaching institute wants to execute tiling work for one of its teaching halls 60 m long and 40 m wide with a square tile of 0.4 m side. If each tile costs ₹ 5, the total cost of tiles would be **(M.B.A. 2007, 2005)**

(*a*) ₹ 60000 (*b*) ₹ 65000

(*c*) ₹ 70000 (*d*) ₹ 75000

92. The number of marble slabs of size 20 cm × 30 cm required to pave the floor of a square room of side 3 metres is

(*a*) 100 (*b*) 150

(*c*) 225 (*d*) 250

93. 50 square stone slabs of equal size were needed to cover a floor area of 72 sq. m. The length of each stone slab is

(*a*) 102 cm (*b*) 120 cm

(*c*) 201 cm (*d*) 210 cm

94. How many squares with side $\frac{1}{2}$ inch long are needed to cover a rectangle that is 4 feet long and 6 feet wide? **(Campus Recruitment, 2010)**

(*a*) 24 (*b*) 96

(*c*) 3456 (*d*) 13824

(*e*) 14266

95. The length and breadth of the floor of the room are 20 feet and 10 feet respectively. Square tiles of 2 feet length of different colours are to be laid on the floor. Black tiles are laid in the first row on all sides. If white tiles are laid in the one-third of the remaining and blue tiles in the rest, how many blue tiles will be there?

(*a*) 16 (*b*) 24

(*c*) 32 (*d*) 48

(*e*) None of these

96. A big rectangular plot of area 4320 m^2 is divided into 3 square-shaped smaller plots by fencing parallel to the smaller side of the plot. However some area of land was still left as a square could not be formed. So, 3 more square-shaped plots were formed by fencing parallel to the longer side of the original plot such that no area of the plot was left surplus. What are the dimensions of the original plot? **(I.A.S., 2005)**

(*a*) 160 m × 27 m (*b*) 240 m × 18 m

(*c*) 120 m × 36 m (*d*) 135 m × 32 m

97. Three plots having areas 110, 130 and 190 square metres are to be subdivided into flower beds of equal size. If the breadth of a bed is 2 metre, the maximum length of a bed can be **(P.C.S., 2008)**

(*a*) 5 m (*b*) 11 m

(*c*) 13 m (*d*) 19 m

98. A room is $12\frac{1}{4}$ m long and 7 m wide. The maximum length of a square tile to fill the floor of the room with whole number of tiles should be **(R.R.B., 2008)**

(*a*) 125 cm (*b*) 150 cm
(*c*) 175 cm (*d*) 200 cm

99. What is the minimum number of identical square tiles required to tile a floor of length 6 m 24 cm and width 4 m 80 cm? **(M.B.A., 2011)**

(*a*) 122 (*b*) 130
(*c*) 148 (*d*) 165
(*e*) None of these

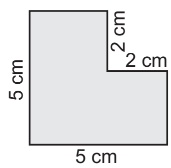
100. A rectangular room can be partitioned into two equal square rooms by a partition 7 metres long. What is the area of the rectangular room in square metres?

(*a*) 49 (*b*) 147
(*c*) 196 (*d*) None of these

101. Perimeter of a rectangular field is 160 metres and the difference between its two adjacent sides is 48 metres. The side of a square field, having the same area as that of the rectangle, is **(S.S.C. 2005)**

(*a*) 4 m (*b*) 8 m
(*c*) 16 m (*d*) 32 m

102. The area of the shaded portion is



(*a*) 10 sq cm
(*b*) 14 sq cm
(*c*) 21 sq cm
(*d*) 25 sq cm

103. The perimeter of a square is 48 cm. The area of a rectangle is 4 cm^2 less than the area of the square. If the length of the rectangle is 14 cm, then its perimeter is

(*a*) 24 cm (*b*) 48 cm
(*c*) 50 cm (*d*) 54 cm

104. The area of a rectangle is thrice that of a square. If the length of the rectangle is 40 cm and its breadth is $\frac{3}{2}$ times that of the side of the square, then the side of the square is

(*a*) 15 cm (*b*) 20 cm
(*c*) 30 cm (*d*) 60 cm

105. The perimeter of a rectangle and a square are 160 m each. The area of the rectangle is less than that of the square by 100 sq. m. The length of the rectangle is

(*a*) 30 m (*b*) 40 m
(*c*) 50 m (*d*) 60 m

106. The area of a rectangle is four times the area of a square. The length of the rectangle is 90 cm and the breadth of the rectangle is $\frac{2}{3}$rd the side of the square. What is the side of the square? **(Bank Recruitment, 2008)**

(*a*) 9 cm (*b*) 10 cm
(*c*) 20 cm (*d*) Cannot be determined
(*e*) None of these

107. The cost of fencing a square field @ ₹ 20 per metre is ₹ 10,080. How much will it cost to lay a three metre wide pavement along the fencing inside the field @ ₹ 50 per sq. metre?

(*a*) ₹ 37,350 (*b*) ₹ 73,800
(*c*) ₹ 77,400 (*d*) None of these

108. A park square in shape has a 3 metre wide road inside it running along its sides. The area occupied by the road is 1764 square metres. What is the perimeter along the outer edge of the road?

(*a*) 576 metres (*b*) 600 metres
(*c*) 640 metres (*d*) Data inadequate
(*e*) None of these

109. A man walked diagonally across a square lot. Approximately, what was the percent saved by not walking along the edges?

(*a*) 20 (*b*) 24
(*c*) 30 (*d*) 33

110. If the length of diagonal AC of a square ABCD is 5.2 cm, then the area of the square is **(L.I.C.A.D.O., 2008)**

(*a*) 10.52 sq.cm (*b*) 11.52 sq.cm
(*c*) 12.52 sq.cm (*d*) 13.52 sq.cm

111. A man walking at the speed of 4 kmph crosses a square field diagonally in 3 minutes. The area of the field is

(*a*) 18000 m^2 (*b*) 19000 m^2
(*c*) 20000 m^2 (*d*) 25000 m^2

112. If the length of the diagonal of a square is 20 cm, then its perimeter must be

(*a*) $10\sqrt{2}$ cm (*b*) 40 cm
(*c*) $40\sqrt{2}$ cm (*d*) 200 cm

113. The area of a square field is 69696 cm^2. Its diagonal will be equal to

(*a*) 313.296 m (*b*) 353.296 m
(*c*) 373.296 m (*d*) 393.296 m

114. What will be the length of the diagonal of that square plot whose area is equal to the area of a rectangular plot of length 45 metres and breadth 40 metres?

(*a*) 42.5 metres (*b*) 60 metres
(*c*) 75 metres (*d*) Data inadequate
(*e*) None of these

115. The area of a square field is 0.5 hectare. Its diagonal would be

(*a*) 50 m (*b*) $50\sqrt{2}$ m
(*c*) 100 m (*d*) 250 m

116. Area of a square natural lake is 50 sq. kms. A diver wishing to cross the lake diagonally, will have to swim a distance of **(SNAP, 2007)**

(*a*) 10 miles (*b*) 12 miles
(*c*) 15 miles (*d*) None of these

117. The length of a rectangle is 20% more than its breadth. What will be the ratio of the area of a rectangle to that of a square whose side is equal to the breadth of the rectangle?

(*a*) 2 : 1 (*b*) 5 : 6
(*c*) 6 : 5 (*d*) Data inadequate
(*e*) None of these

118. A square and a rectangle have equal areas. If their perimeters are p_1 and p_2 respectively, then

(*a*) $p_1 < p_2$ (*b*) $p_1 = p_2$
(*c*) $p_1 > p_2$ (*d*) None of these

119. If the perimeters of a square and a rectangle are the same, then the areas A and B enclosed by them would satisfy the condition

(*a*) A < B (*b*) A ≤ B
(*c*) A > B (*d*) A ≥ B

120. The diagonal of a square is $4\sqrt{2}$ cm. The diagonal of another square whose area is double that of the first square, is **(SNAP, 2010; S.S.C., 2005; B.Ed., 2007)**

(*a*) 8 cm (*b*) $8\sqrt{2}$ cm
(*c*) $4\sqrt{2}$ cm (*d*) 16 cm

121. The ratio of the area of a square to that of the square drawn on its diagonal, is **(Campus Recruitment, 2008, 2010; Hotel Management, 2010; I.A.M., 2009)**

(*a*) 1 : 1 (*b*) 1 : $\sqrt{2}$
(*c*) 1 : 2 (*d*) 1 : 4

122. A square S_1 encloses another square S_2 in such a manner that each corner of S_2 is at the mid-point of the side of S_1. If A_1 is the area of S_1 and A_2 is the area of S_2, then

(*a*) $A_1 = 4\ A_2$ (*b*) $A_1 = 2\ A_2$
(*c*) $A_2 = 2\ A_1$ (*d*) $A_1 = A_2$

123. If a square of area $\frac{A}{2}$ is cut off from a given square of area A, then the ratio of diagonal of the cut off square to that of the given square is

(*a*) 1 : 5 (*b*) 1 : $2\sqrt{5}$
(*c*) 1 : $\sqrt{5}$ (*d*) 1 : $\sqrt{2}$

124. The ratio of the areas of two squares, one having its diagonal double than the other, is

(*a*) 2 : 1 (*b*) 2 : 3
(*c*) 3 : 1 (*d*) 4 : 1

125. If the ratio of areas of two squares is 225 : 256, then the ratio of their perimeters is

(*a*) 225 : 256 (*b*) 256 : 225
(*c*) 15 : 16 (*d*) 16 : 15

126. Of the two square fields, the area of one is 1 hectare while the other one is broader by 1%. The difference in their areas is **(M.A.T., 2006)**

(*a*) 100 m^2 (*b*) 101 m^2
(*c*) 200 m^2 (*d*) 201 m^2

127. If each side of a square is increased by 10%, its area will be increased by **(S.S.C. 2010; J.M.E.T., 2004)**

(*a*) 10% (*b*) 21%
(*c*) 44% (*d*) 100%

128. If each side of a square is increased by 50%, the ratio of the area of the resulting square to that of the given square is **(M.B.A. 2005; 2007)**

(*a*) 4 : 5 (*b*) 5 : 4
(*c*) 4 : 9 (*d*) 9 : 4

129. What happens to the area of a square when its side is halved? Its area will

(*a*) remain same (*b*) become half
(*c*) become one-fourth (*d*) become double

130. If the sides of a square be doubled find the increase of percentage in area. **(P.C.S., 2008)**

(*a*) 100% (*b*) 200%
(*c*) 300% (*d*) 400%

131. An error of 2% in excess is made while measuring the side of a square. The percentage of error in the calculated area of the square is

(*a*) 2% (*b*) 2.02%
(*c*) 4% (*d*) 4.04%

132. If the area of a square increases by 69%, then the side of the square increases by

(*a*) 13% (*b*) 30%
(*c*) 39% (*d*) 69%

133. If the diagonal of a square is made 1.5 times, then the ratio of the areas of two squares is

(*a*) 4 : 3 (*b*) 4 : 5
(*c*) 4 : 7 (*d*) 4 : 9

134. The length and breadth of a square are increased by 40% and 30% respectively. The area of the resulting rectangle exceeds the area of the square by **(M.B.A., 2004, 2006)**

(*a*) 35% (*b*) 42%
(*c*) 62% (*d*) 82%

135. The length of one pair of opposite sides of a square is increased by 5 cm on each side; the ratio of the length and the breadth of the newly formed rectangle becomes 3 : 2. What is the area of the original square?

(*a*) 25 sq. cm (*b*) 81 sq. cm
(*c*) 100 sq. cm (*d*) 225 sq. cm
(*e*) None of these

136. If the length of a certain rectangle is decreased by 4 cm and the width is increased by 3 cm, a square with the same area as the original rectangle would result. The perimeter of the original rectangle (in cm) is

(*a*) 44 (*b*) 46
(*c*) 48 (*d*) 50

137. A rectangle becomes a square when its length is reduced by 10 units and its breadth is increased by 5 units. But by this process the area of the rectangle is reduced by 210 sq. units. The area of the rectangle (*a*) in square units is **(M.A.T., 2006)**

(*a*) $2950 > A < 2900$ (*b*) $2900 > A > 2875$
(*c*) $2925 < A > 2875$ (*d*) $2925 > A > 2900$

138. If the side of a square is increased by 5 cm, the area increases by 165 sq. cm. The side of the square is

(*a*) 12 cm (*b*) 13 cm
(*c*) 14 cm (*d*) 15 cm

139. The difference of the areas of two squares drawn on two line segments of different lengths is 32 sq. cm. Find the length of the greater line segment if one is longer than the other by 2 cm.

(*a*) 7 cm (*b*) 9 cm
(*c*) 11 cm (*d*) 16 cm

140. The areas of a square and a rectangle are equal. The length of the rectangle is greater than the length of any side of the square by 5 cm and the breadth is less by 3 cm. Find the perimeter of the rectangle. **(S.S.C. 2005)**

(*a*) 17 cm (*b*) 26 cm
(*c*) 30 cm (*d*) 34 cm

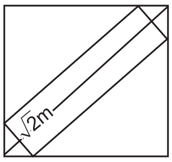
141. The area of a square is twice that of a rectangle. The perimeter of the rectangle is 10 cm. If its length and breadth each is increased by 1 cm, the area of the rectangle becomes equal to the area of the square. The length of side of the square is **(Hotel Management, 2007)**

(*a*) $2\sqrt{3}$ cm (*b*) $3\sqrt{2}$ cm
(*c*) $4\sqrt{3}$ cm (*d*) 12 cm

142. Twenty-nine times the area of a square is one square metre less than six times the area of the second square and nine times its side exceeds the perimeter of other square by 1 metre. The difference in the sides of these squares is **(M.A.T., 2010)**

(*a*) 5 m (*b*) $\frac{54}{11}$ m
(*c*) 6 m (*d*) 11 m

143. A rectangular plank $\sqrt{2}$ metre wide is placed symmetrically on the diagonal of a square of side 8 metres as shown in the figure. The area of the plank is



(*a*) $7\sqrt{2}$ sq. m (*b*) 14 sq. m
(*c*) 98 sq. m (*d*) $(16\sqrt{2} - 3)$ sq. m

144. What will be the area of 4 metre high wall on all four sides of a rectangular hall having perimeter 64 m? **(Bank P.O., 2008)**

(*a*) 256 m^2 (*b*) 328 m^2
(*c*) 384 m^2 (*d*) Cannot be determined
(*d*) None of these

145. The area of the four walls of a room is 120 m^2 and the length is twice the breadth. If the height of the room is 4 m, then the area of the floor is **(M.A.T., 2007)**

(*a*) 48 m^2 (*b*) 49 m^2
(*c*) 50 m^2 (*d*) 52 m^2

146. A tank is 25 m long, 12 m wide and 6 m deep. The cost of plastering its walls and bottom at 75 paise per sq. m, is

(*a*) ₹ 456 (*b*) ₹ 458
(*c*) ₹ 558 (*d*) ₹ 568

147. The length of a room is double its breadth. The cost of colouring the ceiling at ₹ 25 per sq. m is ₹ 5000 and the cost of painting the four walls at ₹ 240 per sq. m is ₹ 64800. Find the height of the room. **(M.A.T., 2005)**

(*a*) 3.5 m (*b*) 4 m
(*c*) 4.5 m (*d*) 5 m

148. The dimensions of a room are 12.5 metres by 9 metres by 7 metres. There are 2 doors and 4 windows in the room; each door measures 2.5 metres by 1.2 metres and each window 1.5 metres by 1 metre. Find the cost of painting the walls at ₹ 3.50 per square metre.

(*a*) ₹ 1050.50 (*b*) ₹ 1011.50
(*c*) ₹ 1101.50 (*d*) Cannot be determined

149. A hall, whose length is 16 m and the breadth is twice its height, takes 168 m of paper with 2 m as its width to cover its four walls. The area of the floor is

(*a*) 96 m^2 (*b*) 190 m^2
(*c*) 192 m^2 (*d*) 216 m^2

150. The cost of papering the four walls of a room is ₹ 475. Each one of the length, breadth and height of another room is double that of this room. The cost of papering the walls of this new room is (M.B.A., 2006)

(a) ₹ 712.50 (b) ₹ 950
(c) ₹ 1425 (d) ₹ 1900

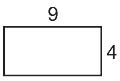
151. The ratio of the height of a room to its semi-perimeter is 2 : 5. It costs ₹ 260 to paper the walls of the room with paper 50 cm wide at ₹ 2 per metre allowing an area of 15 sq. m for doors and windows. The height of the room is

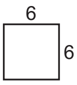
(a) 2.6 m (b) 3.9 m
(c) 4 m (d) 4.2 m

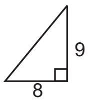
152. The length, breadth and height of the room are in the ratio 3 : 2 : 1. The breadth and height of the room are halved and length of the room is doubled. The area of the four walls of the room will (SNAP, 2010)

(a) decrease by 13.64% (b) decrease by 15%
(c) decrease by 18.75% (d) decrease by 30%

153. Consider the following:

I. 

II. 

III. 

Which one of the following conclusions can be drawn form these figures?

(a) The areas of the three figures are all different.
(b) The areas of all the three figures are equal.
(c) The perimeters of the three figures are equal.
(d) The perimeters of figures I and II are equal.

154. The base of a triangle is 15 cm and height is 12 cm. The height of another triangle of double the area having the base 20 cm is

(a) 8 cm (b) 9 cm
(c) 12.5 cm (d) 18 cm

155. The area of a right-angled triangle is 40 times its base. What is its height?

(a) 45 cm (b) 60 cm
(c) 80 cm (d) Data inadequate
(e) None of these

156. The area of a triangle is p sq. cm and its base is x cm. What is the height of the triangle (in cm)? (M.C.A., 2005)

(a) $\frac{2p}{x}$ (b) $\frac{x}{2p}$
(c) $\frac{p}{2x}$ (d) $\frac{2x}{p}$

157. The area of an equilateral triangle whose side is 8 cm is

(a) $32\sqrt{3}$ cm^2 (b) $\frac{16}{3}$ cm^2
(c) $16\sqrt{3}$ cm^2 (d) 16 cm^2

158. The ratio of the areas of a square of side 6 cm and an equilateral triangle of side 6 cm is (S.S.C., 2007)

(a) $3 : \sqrt{3}$ (b) $8 : \sqrt{3}$
(c) $6 : \sqrt{3}$ (d) $4 : \sqrt{3}$

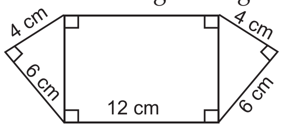
159. $ABCD$ is a rectangle and ABE is a triangle whose vertex E lies on CD. If AB = 5 cm and the area of the triangle is 10 sq. cm, then the perimeter of the rectangle is

(a) 14 cm (b) 15 cm
(c) 18 cm (d) 20 cm

160. The area of a triangle is equal to the area of a square whose each side is 60 metres. The height of the triangle is 90 metres. The base of the triangle will be (R.R.B., 2006)

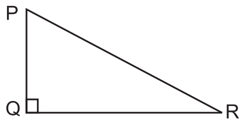
(a) 65 m (b) 75 m
(c) 80 m (d) 85 m

161. What is the area of the given figure? (R.R.B., 2006)



(a) 98.8 cm^2 (b) 110.4 cm^2
(c) 120 cm^2 (d) 132.6 cm^2

162. In ΔPQR, side PQ = 32 cm and side PR = 25 cm. What is the measure of side QR ? (M.B.A., 2011)



(a) $4\sqrt{154}$ cm (b) $2\sqrt{308}$ cm
(c) $4\sqrt{308}$ cm (d) Cannot be determined
(e) None of these

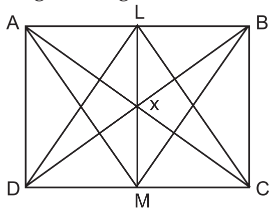
163. What is the area of ΔPQR, shown in Q. 162? (M.B.A., 2011)

(a) $2\sqrt{154}$ sq. cm (b) $3\sqrt{154}$ sq. cm
(c) $4\sqrt{308}$ sq. cm (d) Cannot be determined
(e) None of these

164. Out of a square of side 8 cm, a triangle is drawn with base as one side of the square and third vertex at any point on the opposite side of the square. What is the area of the remaining portion of the square if the triangle is taken out?

(a) 16 sq. cm (b) 32 sq. cm
(c) 64 sq. cm (d) Cannot be determined
(e) None of these

165. Consider the given figure.



If the areas of the triangles *LDC*, *BMC* and *AMC* are denoted by x, y and z respectively, then

(*a*) $x = y = z$ (*b*) $x = 2y = 2z$
(*c*) $y = 2x = 2z$ (*d*) $z = 2x = 2y$

166. If the area of a triangle is 1176 cm^2 and base : corresponding altitude is 3 : 4, then the altitude of the triangle is

(*a*) 42 cm (*b*) 52 cm
(*c*) 54 cm (*d*) 56 cm

167. The area of a triangle whose sides are of lengths 3 cm, 4 cm and 5 cm is **(P.C.S., 2008; E.S.I.C., 2007; R.R.B., 2009)**

(*a*) 8 cm^2 (*b*) 6 cm^2
(*c*) 10 cm^2 (*d*) None of these

168. The three sides of a triangular field are 20 metres, 21 metres and 29 metres long respectively. The area of the field is **(I.I.F.T., 2005)**

(*a*) 210 sq. m (*b*) 215 sq. m
(*c*) 230 sq. m (*d*) None of these

169. The perimeter of an isosceles triangle is equal to 14 cm and the lateral side is to the base in the ratio 5 : 4. The area of the triangle is **(M.B.A., 2008)**

(*a*) 21 cm^2 (*b*) $0.5\sqrt{21}$ cm^2
(*c*) $1.5\sqrt{21}$ cm^2 (*d*) $2\sqrt{21}$ cm^2

170. The sides of a triangle are in the ratio of $\frac{1}{2}:\frac{1}{3}:\frac{1}{4}$. If the perimeter is 52 cm, then the length of the smallest side is **(M.A.T., 2005)**

(*a*) 9 cm (*b*) 10 cm
(*c*) 11 cm (*d*) 12 cm

171. The sides of a triangle are consecutive integers. The perimeter of the triangle is 120 cm. Find the length of the greatest side. **(M.C.A., 2007)**

(*a*) 39 cm (*b*) 40 cm
(*c*) 41 cm (*d*) 42 cm

172. The area of a triangle is 216 cm^2 and its sides are in the ratio 3 : 4 : 5. The perimeter of the triangle is **(S.S.C., 2004)**

(*a*) 6 cm (*b*) 12 cm
(*c*) 36 cm (*d*) 72 cm

173. If three sides of a triangle are 6 cm, 8 cm and 10 cm, then the altitude of the triangle, using the largest side as its base, will be

(*a*) 4.4 cm (*b*) 4.8 cm
(*c*) 6 cm (*d*) 8 cm

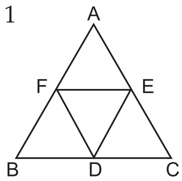
174. The sides of a triangle are 3 cm, 4 cm and 5 cm. The area (in cm^2) of the triangle formed by joining the mid-points of the sides of this triangle is

(*a*) $\frac{3}{4}$ (*b*) $\frac{3}{2}$
(*c*) 3 (*d*) 6

175. If *D*, *E* and *F* are the mid-points of the sides of a ΔABC, the ratio of the areas of the triangles *DEF* and *DCE* is

(*a*) 1.1 : 1 (*b*) 1 : 1.1
(*c*) 1 : 1 (*d*) 0.9 : 1

176. The sides of a triangle are 5 cm, 6 cm, and 7 cm. One more triangle is formed by joining the mid-points of the sides. The perimeter of the second triangle in cm is



(*a*) 6 (*b*) 9
(*c*) 12 (*d*) 18
(*e*) None of these

177. In a triangle *ABC*, a line *XY* is drawn parallel to *BC* meeting *AB* in *X* and *AC* in *Y*. The area of the triangle *AXY* is half of the area of the triangle *ABC*. *XY* divides AB in the ratio of **(Campus Recruitment, 2009)**

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

178. The areas of two similar triangles are 12 cm^2 and 48 cm^2. If the height of the smaller one is 2.1 cm, then the corresponding height of the bigger one is **(M.B.A., 2006)**

(*a*) 0.525 cm (*b*) 4.2 cm
(*c*) 4.41 cm (*d*) 8.4 cm

179. A triangle of area 9 y cm^2 has been drawn such that its area is equal to the area of an equilateral triangle of side 6 cm. The value of y would be **(M.B.A. 2005, 2007)**

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

180. The hypotenuse of a right-angled isosceles triangle is 5 cm. The area of the triangle is

(*a*) 5 cm^2 (*b*) 6.25 cm^2
(*c*) 6.5 cm^2 (*d*) 12.5 cm^2

181. One side of a right-angled triangle is twice the other, and the hypotenuse is 10 cm. The area of the triangle is

(*a*) 20 cm^2 (*b*) $33\frac{1}{3}$ cm^2
(*c*) 40 cm^2 (*d*) 50 cm^2

182. The area of a right-angled triangle is 20 sq. cm and one of the sides containing the right angle is 4 cm. The altitude on the hypotenuse is (R.R.B., 2006)

(a) $\frac{41}{\sqrt{34}}$ cm (b) $\sqrt{\frac{41}{40}}$ cm

(c) $\frac{29}{\sqrt{20}}$ cm (d) $\frac{20}{\sqrt{29}}$ cm

183. The base and altitude of a right-angled triangle are 12 cm and 5 cm respectively. The perpendicular distance of its hypotenuse from the opposite vertex is (S.S.C., 2007)

(a) $4\frac{4}{13}$ cm (b) $4\frac{8}{13}$ cm

(c) 5 cm (d) 7 cm

184. If the hypotenuse of a right-angled triangle is 41 cm and the area of the triangle is 180 sq. cm, then the difference between the lengths of the legs of the triangle must be

(a) 22 cm (b) 25 cm

(c) 27 cm (d) 31 cm

185. The perimeter of a right-angled triangle is 60 cm. Its hypotenuse is 26 cm. The area of the triangle is

(a) 120 cm^2 (b) 240 cm^2

(c) 390 cm^2 (d) 780 cm^2

186. If the perimeter of a right-angled isosceles triangle is $(4\sqrt{2}+4)$ cm, the length of the hypotenuse is (C.P.O., 2007)

(a) 4 cm (b) 6 cm

(c) 8 cm (d) 10 cm

187. If the perimeter of an isosceles right triangle is $(6+3\sqrt{2})$ m, then the area of the triangle is

(a) 4.5 m^2 (b) 5.4 m^2

(c) 9 m^2 (d) 81 m^2

188. The perimeter of an isosceles right-angled triangle having an area of 162 cm^2 is

(a) 40 cm (b) 56.5 cm

(c) 61.38 cm (d) 68.2 cm

189. In an isosceles triangle, the measure of each of the equal sides is 10 cm and the angle between them is 45°. The area of the triangle is (C.P.O., 2006)

(a) 25 cm^2 (b) $\frac{25}{2}\sqrt{2}$ cm^2

(c) $25\sqrt{2}$ cm^2 (d) $25\sqrt{3}$ cm^2

190. The perimeter of a triangle is 30 cm and its area is 30 cm^2. If the largest side measures 13 cm, then what is the length of the smallest side of the triangle?

(a) 3 cm (b) 4 cm

(c) 5 cm (d) 6 cm

191. If the area of an equilateral triangle is $24\sqrt{3}$ sq. cm, then its perimeter is

(a) $2\sqrt{6}$ cm (b) $4\sqrt{6}$ cm

(c) $12\sqrt{6}$ cm (d) 96 cm

192. The altitude of an equilateral triangle of side $2\sqrt{3}$ cm is (M.B.A., 2005, 2008)

(a) $\frac{1}{2}$ cm (b) $\frac{\sqrt{3}}{4}$ cm

(c) $\frac{\sqrt{3}}{2}$ cm (d) 3 cm

193. The height of an equilateral triangle is 10 cm. Its area is

(a) $\frac{100}{3}$ cm^2 (b) 30 cm^2

(c) 100 cm^2 (d) $\frac{100}{\sqrt{3}}$ cm^2

194. The areas of two equilateral triangles are in the ratio 25 : 36. Their altitudes will be in the ratio (C.P.O., 2007)

(a) 25 : 36 (b) 36 : 25

(c) 5 : 6 (d) $\sqrt{5} : \sqrt{6}$

195. From a point within an equilateral triangle, perpendiculars drawn to the three sides are 6 cm, 7 cm, and 8 cm respectively. The length of the side of the triangle is

(a) 7 cm (b) 10.5 cm

(c) $14\sqrt{3}$ cm (d) $\frac{14\sqrt{3}}{3}$ cm

196. If x is the length of a median of an equilateral triangle, then its area is

(a) x^2 (b) $\frac{1}{2}x^2$

(c) $\frac{\sqrt{3}}{2}x^2$ (d) $\frac{\sqrt{3}}{3}x^2$

197. *ABCD* is a square. *E* is the mid-point of *BC* and *F* is the mid--point of *CD*. The ratio of the area of triangle *AEF* to the area of the square *ABCD* is (Campus Recruitment, 2009)

(a) 1 : 2 (b) 1 : 3

(c) 1 : 4 (d) 3 : 8

198. If the area of a square with side a is equal to the area of a triangle with base a, then the altitude of the triangle is

(a) $\frac{a}{2}$ (b) a

(c) $2a$ (d) $4a$

199. An equilateral triangle is described on the diagonal of a square. What is the ratio of the area of the triangle to that of the square?

(*a*) $2 : \sqrt{3}$ (*b*) $4 : \sqrt{3}$

(*c*) $\sqrt{3} : 2$ (*d*) $\sqrt{3} : 4$

200. What will be the ratio between the area of a rectangle and the area of a triangle with one of the sides of the rectangle as base and a vertex on the opposite side of the rectangle?

(*a*) 1 : 2 (*b*) 2 : 1

(*c*) 3 : 1 (*d*) Data inadequate

(*e*) None of these

201. If an equilateral triangle of area X and a square of area Y have the same perimeter, then X is **(C.D.S., 2003)**

(*a*) equal to Y (*b*) greater than Y

(*c*) less than Y (*d*) less than or equal to Y

202. A square and an equilateral triangle have equal perimeters. If the diagonal of the square is $12\sqrt{2}$ cm, then the area of the triangle is

(*a*) $24\sqrt{2}$ cm^2 (*b*) $24\sqrt{3}$ cm^2

(*c*) $48\sqrt{3}$ cm^2 (*d*) $64\sqrt{3}$ cm^2

203. The ratio of bases of two triangles is $x : y$ and that of their areas is $a : b$. Then the ratio of their corresponding altitudes will be **(S.S.C. 2004)**

(*a*) $ax : by$ (*b*) $\frac{a}{x} : \frac{b}{y}$

(*c*) $ay : bx$ (*d*) $\frac{x}{a} : \frac{b}{y}$

204. If the sides of a triangle be in the ratio 2 : 3 : 4, the ratio of the corresponding altitudes is

(*a*) 6 : 5 : 3 (*b*) 4 : 5 : 6

(*c*) 5 : 4 : 3 (*d*) 6 : 4 : 3

205. If the side of an equilateral triangle is decreased by 20%, its area is decreased by

(*a*) 36% (*b*) 40%

(*c*) 60% (*d*) 64%

206. If the height of a triangle is decreased by 40% and its base is increased by 40%, what will be the effect on its area?

(*a*) No change (*b*) 8% decrease

(*c*) 16% increase (*d*) 16 % decrease

207. If every side of a triangle is doubled, the area of the new triangle is K times the area of the old one. K is equal to **(R.R.B., 2003)**

(*a*) $\sqrt{2}$ (*b*) 2

(*c*) 3 (*d*) 4

208. Two isosceles triangles have equal vertical angles and their corresponding sides are in the ratio 3 : 5. What is the ratio of their areas?

(*a*) 3 : 5 (*b*) 6 : 10

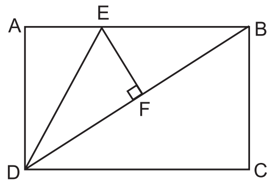
(*c*) 9 : 25 (*d*) None of these

209. If an angle of a triangle remains unchanged but each of its two including sides is doubled, then by what factor does the area get multiplied?

(*a*) 2 (*b*) 3

(*c*) 4 (*d*) 6

210. In the given figure, $ABCD$ is a rectangle with AD = 4 units and $AE = EB$. EF is perpendicular to DB and is half of DF. If the area of the triangle DEF is 5 sq. units, then what is the area of $ABCD$?



(*a*) $18\sqrt{3}$ sq. units (*b*) 20 sq. units

(*c*) 24 sq. units (*d*) 28 sq. units

211. Four equilateral triangles are described on the four sides of a rectangle with perimeter 12 cm. If the sum of the areas of the four triangles is $10\sqrt{3}$ cm^2, what is the area of the rectangle?

(*a*) 5 cm^2 (*b*) 8 cm^2

(*c*) 9 cm^2 (*d*) 6.75 cm^2

212. The dimensions of the field shown in the given figure are

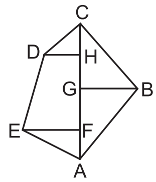
AC = 150 m, AH = 120 m,

AG = 80 m, AF = 50 m,

EF = 30 m, GB = 50 m,

HD = 20 m

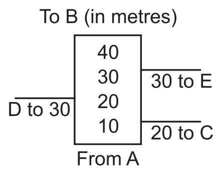
The area of this field is



(*a*) 6500 m^2 (*b*) 6550 m^2

(*c*) 6600 m^2 (*d*) 6650 m^2

213. The readings in a field book are:

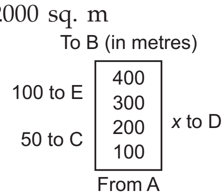


It is subsequently realised that the distances to C and D had been interchanged by mistake. The are of the actual field would be

(*a*) 1300 sq. m (*b*) 1500 sq. m

(*c*) 1800 sq. m (*d*) 2000 sq. m

214. The measurements of a field are as shown



If the total area of the field is 27500 sq. m, then the value of x is equal to

(*a*) 25 m (*b*) 30 m

(*c*) 50 m (*d*) 75 m

215. A field in the form of a parallelogram has one side 150 metres and its distance from the opposite side is 80 metres. The cost of watering the field at the rate of 50 paise per square metre is **(R.R.B., 2006)**

(*a*) ₹ 3500 (*b*) ₹ 5000
(*c*) ₹ 6000 (*d*) ₹ 7000

216. Let *ABCD* be a parallelogram and *ABEF* be a rectangle with *EF* lying along the line *CD*. If *AB* = 7 cm and BE = 6.5 cm, then the area of the parallelogram is

(*a*) 11.375 cm^2 (*b*) 22.75 cm^2
(*c*) 45 cm^2 (*d*) 45.5 cm^2

217. A rectangle and a parallelogram are drawn between the same parallel lines on a common base of 10 cm. If the perimeter of the rectangle is 36 cm, then the area of the parallelogram is

(*a*) 60 cm^2 (*b*) 80 cm^2
(*c*) 81 cm^2 (*d*) 100 cm^2

218. A rectangle and a parallelogram have equal areas. If the sides of the rectangle are 10 m and 12 m and the base of the parallelogram is 20 m, then the altitude of the parallelogram is

(*a*) 3 m (*b*) 5 m
(*c*) 6 m (*d*) 7 m

219. A parallelogram has sides 30 m and 14 m and one of its diagonals is 40 m long. Then, its area is

(*a*) 168 m^2 (*b*) 336 m^2
(*c*) 372 m^2 (*d*) 480 m^2

220. One diagonal of a parallelogram is 70 cm and the perpendicular distance of this diagonal from either of the outlying vertices is 27 cm. The area of the parallelogram (in sq. cm) is

(*a*) 1800 (*b*) 1836
(*c*) 1890 (*d*) 1980

221. A triangle and a parallelogram are constructed on the same base such that their areas are equal. If the altitude of the parallelogram is 100 m, then the altitude of the triangle is

(*a*) $10\sqrt{2}$ m (*b*) 100 m
(*c*) $100\sqrt{2}$ m (*d*) 200 m

222. Two equilateral triangles of side $2\sqrt{3}$ cm are joined to form a quadrilateral. The altitude of the quadrilateral, thus formed, is equal to

(*a*) 3 cm (*b*) 4 cm
(*c*) 6 cm (*d*) 8 cm

223. If a parallelogram with area *P*, a rectangle with area *R* and a triangle with area *T* are all constructed on the same base and all have the same altitude, then which of the following statements is false?

(*a*) $P = R$ (*b*) $P + T = 2R$
(*c*) $P = 2T$ (*d*) $T = \frac{1}{2}R$

224. The area of a rhombus is 150 cm^2. The length of one of its diagonals is 10 cm. The length of the other diagonal is

(*a*) 25 cm (*b*) 30 cm
(*c*) 35 cm (*d*) 40 cm

225. One of the diagonals of a rhombus is double the other diagonal. Its area is 25 sq. cm. The sum of the diagonals is

(*a*) 10 cm (*b*) 12 cm
(*c*) 15 cm (*d*) 16 cm

226. The perimeter of a rhombus is 56 m and its height is 5 m. Its area is

(*a*) 64 sq. m (*b*) 70 sq. m
(*c*) 78 sq. m (*d*) 84 sq. m

227. If the diagonals of a rhombus are 24 cm and 10 cm, the area and the perimeter of the rhombus are respectively **(S.S.C., 2005)**

(*a*) 120 cm^2, 52 cm (*b*) 120 cm^2, 64 cm
(*c*) 240 cm^2, 52 cm (*d*) 240 cm^2, 64 cm

228. Each side of a rhombus is 26 cm and one of its diagonals is 48 cm long. The area of the rhombus is

(*a*) 2400 cm^2 (*b*) 3000 cm^2
(*c*) 3600 cm^2 (*d*) 4800 cm^2

229. A diagonal of a rhombus is 6 cm. If its area is 24 cm^2 then the length of each side of the rhombus is

(*a*) 5 cm (*b*) 6 cm
(*c*) 7 cm (*d*) 8 cm

230. If each side of a rhombus is 20 metres and its shorter diagonal is three-fourths of its longer diagonal, then the area of this rhombus must be

(*a*) 375 sq. m (*b*) 380 sq. m
(*c*) 384 sq. m (*d*) 395 sq. m

231. The length of one diagonal of a rhombus is 80% of the other diagonal. The area of the rhombus is how many times the square of the length of the other diagonal?

(*a*) $\frac{4}{5}$ (*b*) $\frac{2}{5}$
(*c*) $\frac{3}{4}$ (*d*) $\frac{1}{4}$

232. If a square and a rhombus stand on the same base, then the ratio of the areas of the square and the rhombus is

(*a*) greater than 1 (*b*) equal to 1
(*c*) equal to $\frac{1}{2}$ (*d*) equal to $\frac{1}{4}$

233. The two parallel sides of a trapezium are 1.5 m and 2.5 m respectively. If the perpendicular distance between them is 6.5 metres, the area of the trapezium is

(*a*) 10 m^2 (*b*) 13 m^2
(*c*) 20 m^2 (*d*) 26 m^2

234. If the area of the trapezium whose parallel sides are 6 cm and 10 cm is 32 sq. cm, then the distance between the parallel sides is

(*a*) 2 cm (*b*) 4 cm
(*c*) 5 cm (*d*) 8 cm

235. The distance between the parallel sides of a trapezium = The distance between the mid-points of the slant sides = 4 cm. What is the area of the trapezium?

(*a*) 4 cm^2 (*b*) 8 cm^2
(*c*) 16 cm^2 (*d*) 20 cm^2

236. *ABCD* is a rectangle and *E* and *F* are the mid-points of *AD* and *DC* respectively. Then the ratio of the areas of *EDF* and *AEFC* would be

(*a*) 1 : 2 (*b*) 1 : 3
(*c*) 1 : 4 (*d*) 2 : 3

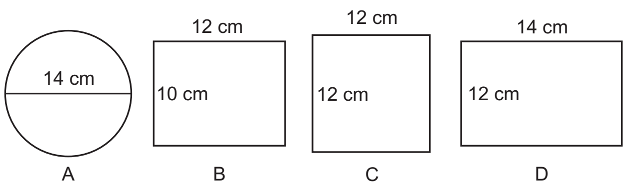
237. The area of a field in the shape of a trapezium measures 1440 m^2. The perpendicular distance between its parallel sides is 24 m. If the ratio of the parallel sides is 5 : 3, the length of the longer parallel side is

(*a*) 45 m (*b*) 60 m
(*c*) 75 m (*d*) 120 m

238. The cross-section of a canal is trapezium in shape. The canal is 12 m wide at the top and 8 m wide at the bottom. If the area of the cross-section is 840 sq. m, the depth of the canal is

(*a*) 8.75 m (*b*) 42 m
(*c*) 63 m (*d*) 84 m

239. Which two figure have an equal area?



(*a*) *A* and *B* (*b*) *B* and *D*
(*c*) *A* and *C* (*d*) *A* and *D*

240. Which of the following figures has the longest perimeter? **(P.C.S., 2009; R.R.B., 2006)**

(*a*) A square of side 10 cm
(*b*) A rectangle of sides 12 cm and 9 cm
(*c*) A circle of radius 7 cm
(*d*) A rhombus of side 9 cm

241. Which one of the following has a greater perimeter than the rest?

(*a*) A square with an area of 36 sq. cm
(*b*) An equilateral triangle with a side of 9 cm
(*c*) A rectangle with 10 cm as length and 40 sq. cm as area
(*d*) A circle with a radius of 4 cm

242. The diameter of a circle is 3.5 cm. What is the circumference of the circle? **(Bank Recruitment, 2010)**

(*a*) 11 cm (*b*) 22 cm
(*c*) 38.5 cm (*d*) 45.2 cm
(*e*) None of these

243. Area of a rectangle is equal to the area of a circle whose radius is 14 cm. If the breadth of the rectangle is 22 cm, what is its length?

(*a*) 24 cm (*b*) 26 cm
(*c*) 28 cm (*d*) Cannot be determined
(*d*) None of these

244. The area of a circle of radius 5 is numerically what percent of its circumference?

(*a*) 200 (*b*) 225
(*c*) 240 (*d*) 250

245. A man runs round a circular field of radius 50 m at the speed of 12 km/hr. What is the time taken by the man to take twenty rounds of the field?

(*a*) 30 min. (*b*) 32 min.
(*c*) 34 min. (*d*) None of these

246. From a circular sheet of paper with radius 20 cm, four circles of radius 5 cm each are cut out. What is the ratio of the uncut to the cut portion?

(*a*) 1 : 3 (*b*) 3 : 1
(*c*) 4 : 1 (*d*) 4 : 3

247. A cow is tethered in the middle of a field with a 14 feet long rope. If the cow grazes 100 sq. ft. per day, then approximately what time will be taken by the cow to graze the whole field?

(*a*) 2 days (*b*) 6 days
(*c*) 18 days (*d*) 24 days
(*e*) None of these

248. A circle and a rectangle have the same perimeter. The sides of the rectangle are 18 cm and 26 cm. What is the area of the circle? **(M.A.T., 2005)**

(*a*) 88 cm^2 (*b*) 154 cm^2
(*c*) 1250 cm^2 (*d*) Cannot be determined
(*e*) None of these

249. The area of a circular field is equal to the area of a rectangular field. The ratio of the length and the breadth of the rectangular field is 14 : 11 respectively and perimeter is 100 metres. What is the diameter of the circular field?

(*a*) 14 m (*b*) 22 m
(*c*) 24 m (*d*) 28 m
(*e*) None of these

250. The circumference of a circle, whose area is 24.64 m^2, is **(Bank P.O., 2009)**
(*a*) 14.64 m (*b*) 16.36 m
(*c*) 17.60 m (*d*) 18.40 m

251. What will be the cost of building a fence around a circular field with area equal to 18634 sq. metres if the cost of building the fence per metre is ₹ 365?
(*a*) ₹ 1,76,660 (*b*) ₹ 2,43,250
(*c*) ₹ 56,60,220 (*d*) ₹ 68,01,410
(*e*) None of these

252. The circumference of a circular plot is 396 metres. what is the area of the circular plot?
(*a*) 9446 sq. m (*b*) 9856 sq. m
(*c*) 12474 sq. m (*d*) 18634 sq. m
(*e*) None of these

253. What is the area of a circle whose circumference is 1047.2 metres?
(*a*) 69843.23 sq. m (*b*) 78621.47 sq. m
(*c*) 79943.82 sq. m (*d*) 85142.28 sq. m
(*e*) 87231.76 sq. m

254. The circumferences of two circles are 132 metres and 176 metres respectively. What is the difference between the area of the larger circle and the smaller circle?
(*a*) 1048 sq. m (*b*) 1076 sq. m
(*c*) 1078 sq. m (*d*) 1090 sq. m
(*e*) None of these

255. Cost of fencing a circular plot at the rate of ₹ 15 per metre is ₹ 3300. What will be the cost of flooring the plot at the rate of ₹ 100 per square metre? **(Bank P.O., 2010)**
(*a*) ₹ 2,20,000 (*b*) ₹ 3,50,000
(*c*) ₹ 3,85,000 (*d*) Cannot be determined
(*e*) None of these

256. If the circumference and the area of a circle are numerically equal, then the diameter is equal to
(*a*) $\frac{\pi}{2}$ (*b*) 2π
(*c*) 2 (*d*) 4

257. The magnitude of the area of a circle is seven times that of its circumference. What is the circumference (in units) of the circle? **(Bank P.O., 2006)**
(*a*) 88 (*b*) 132
(*c*) 616 (*d*) Cannot be determined
(*e*) None of these

258. The difference between the circumference and the radius of a circle is 37 cm. The area of the circle is
(*a*) 111 cm^2 (*b*) 148 cm^2
(*c*) 154 cm^2 (*d*) 259 cm^2

259. Two small circular parks of diameters 16 m and 12 m are to be replaced by a Bigger circular park. What would be the radius of this new park, If the new park has to occupy the same space as the two small parks? **(M.A.T., 2008)**
(*a*) 10 m (*b*) 15 m
(*c*) 20 m (*d*) 25 m

260. The sum of areas of two circles *A* and *B* is equal to the area of a third circle *C* whose diameter is 30 cm. If the diameter of circle A is 18 cm, then the radius of circle B is
(*a*) 10 cm (*b*) 12 cm
(*c*) 15 cm (*d*) 18 cm

261. The sum of radii of two circles is 140 cm and the difference of their circumferences is 88 cm. The diameters of the circles are
(*a*) 77 cm, 63 cm (*b*) 150 cm, 120 cm
(*c*) 154 cm, 126 cm (*d*) 160 cm, 120 cm

262. The radius of a circle is 20% more than the height of a right-angled triangle. The base of the triangle is 36 cm. If the area of triangle and circle be equal, what will be the area of circle? **(Bank P.O., 2007)**
(*a*) 72 cm^2 (*b*) 128 cm^2
(*c*) 144 cm^2 (*d*) 216 cm^2
(*e*) Cannot be determined

263. A circular pond has area equal to 616 m^2. A circular stage is made at the centre of the pond whose radius is equal to half the radius of the pond. What is the area where water is present? **(R.R.B., 2008)**
(*a*) 454 sq. m (*b*) 462 sq. m
(*c*) 532 sq. m (*d*) 564 sq. m

264. Between a square of perimeter 44 cm and a circle of circumference 44 cm, which figure has larger area and by how much?
(*a*) Both have equal area (*b*) Square, 33 cm^2
(*c*) Circle, 33 cm^2 (*d*) Square, 495 cm^2

265. The perimeter of a circular field and a square field are equal. If the area of the square field is 12100 m^2, the area of the circular field will be **(R.R.B., 2006)**
(*a*) 15200 m^2 (*b*) 15300 m^2
(*c*) 15400 m^2 (*d*) 15500 m^2

266. If the perimeter of a square is equal to the radius of a circle whose area is 39424 sq. m. What is the are area of the square? **(Bank P.O., 2009)**
(*a*) 441 sq.m (*b*) 784 sq.m
(*c*) 1225 sq.m (*d*) Cannot be determined
(*e*) None of these

267. A wire can be bent in the form of a circle of radius 56 cm. If it is bent in the form of a square, then its area will be **(R.R.B., 2002)**
(*a*) 3520 cm^2 (*b*) 6400 cm^2
(*c*) 7744 cm^2 (*d*) 8800 cm^2

268. The circumference of a circle is equal to the side of a square whose area measures 407044 sq. cm. What is the area of the circle? **(Bank P.O., 2010)**
(*a*) 22583.2 sq. cm (*b*) 32378.5 sq. cm
(*c*) 39483.4 sq. cm (*d*) 41263.5 sq. cm
(*e*) Cannot be determined

269. A wire when bent in the form of a square encloses an area of 484 sq. cm. What will be the enclosed area when the same wire is bent into the form of a circle?
(*a*) 462 sq. cm (*b*) 539 sq. cm
(*c*) 616 sq. cm (*d*) 693 sq. cm

270. A circular wire of diameter 42 cm is bent in the form of a rectangle whose sides are in the ratio 6 : 5. The area of the rectangle is
(*a*) 540 cm^2 (*b*) 1080 cm^2
(*c*) 2160 cm^2 (*d*) 4320 cm^2

271. A square lawn with side 100 m long has a circular flower bed in the centre. If the area of the lawn, excluding the flower bed, is 8614 m^2, the radius of the circular flower bed is
(*a*) 21 m (*b*) 31 m
(*c*) 41 m (*d*) None of these

272. There is a rectangular tank of length 180 m and breadth 120 m in a circular field. If the area of the land portion of the field is 40000 m^2, what is the radius of the field?
(*a*) 130 m (*b*) 135 m
(*c*) 140 m (*d*) 145 m

273. If the ratio between the areas of two circles is 4 : 1 then the ratio between their radii will be **(P.C.S., 2008)**
(*a*) 1 : 2 (*b*) 2 : 1
(*c*) 1 : 3 (*d*) 4 : 1

274. The areas of two circular fields are in the ratio 16 : 49. If the radius of the latter is 14 m, then what is the radius of the former? **(IGNOU, 2003)**
(*a*) 4 m (*b*) 8 m
(*c*) 18 m (*d*) 32 m

275. The ratio of the radii of two circles is 3 : 2. What is the ratio of their circumferences? **(S.S.C., 2010)**
(*a*) 2 : 3 (*b*) 3 : 2
(*c*) 4 : 9 (*d*) None of these

276. The ratio of the radii of two circles is 1 : 3. Then the ratio of their areas is **(B.Ed Entrance, 2010)**
(*a*) 1 : 3 (*b*) 1 : 6
(*c*) 1 : 9 (*d*) None of these

277. The ratio of the circumferences of two circles is 2 : 3. What is the ratio of their areas? **(M.B.A., 2008)**
(*a*) 2 : 3 (*b*) 4 : 9
(*c*) 9 : 4 (*d*) None of these

278. The perimeter of a circle is equal to the perimeter of a square. Then, their areas are in the ratio
(*a*) 4 : 1 (*b*) 11 : 7
(*c*) 14 : 11 (*d*) 22 : 7

279. A circle and a square have the same area. The ratio of the side of the square and the radius of the circle is
(*a*) $\sqrt{22} : \sqrt{7}$ (*b*) $\sqrt{\pi} : 1$
(*c*) 1 : π (*d*) $\sqrt{7} : \sqrt{22}$

280. If the areas of a circle and a square are equal then the ratio of their perimeters is
(*a*) 1 : 1 (*b*) 2 : π
(*c*) π : 2 (*d*) $\sqrt{\pi} : 2$

281. The diameter of a wheel is 1.26 m. How far will it travel in 500 revolutions?
(*a*) 1492 m (*b*) 1980 m
(*c*) 2530 m (*d*) 2880 m

282. The number of revolutions made by a wheel of diameter 56 cm in covering a distance of 1.1 km is:
(*a*) 31.25 (*b*) 56.25
(*c*) 62.5 (*d*) 625

283. The diameter of the driving wheel of a bus is 140 cm. How many revolutions per minute must the wheel make in order to keep a speed of 66 km per hour?
(*a*) 200 (*b*) 250
(*c*) 300 (*d*) 350

284. If the wheel of the engine of a train $4\frac{2}{7}$ metres in circumference makes 7 revolutions in 4 seconds, then the speed (in km/hr) of the train is **(G.B.O., 2007)**
(*a*) 27 (*b*) 28
(*c*) 29 (*d*) 30

285. The radius of the wheel of a vehicle is 70 cm. The wheel makes 10 revolutions in 5 seconds. The speed of the vehicle is **(M.B.A., 2008)**
(*a*) 29.46 km/hr (*b*) 31.68 km/hr
(*c*) 32.72 km/hr (*d*) 36.25 km/hr

286. The diameter of a cycle wheel is 70 cm. A cyclist takes 30 hours to reach a destination at the speed of 22 km/hr. How many revolutions will the wheel make during this journey?
(*a*) 3 lakh (*b*) 4 lakh
(*c*) 30 million (*d*) None of these

287. Wheels of diameters 7 cm and 14 cm start rolling simultaneously from *X* and *Y*, which are 1980 cm apart, towards each other in opposite directions. Both of them make the same number of revolutions per second. If both of them meet after 10 seconds, the speed of the smaller wheel is **(M.A.T., 2005)**
(*a*) 22 cm/sec (*b*) 44 cm/sec
(*c*) 66 cm/sec (*d*) 132 cm/sec

288. A toothed wheel of diameter 50 cm is attached to a smaller wheel of diameter 30 cm. How many revolutions will the smaller wheel make when the larger one makes 15 revolutions? **(M.B.A., 2005, 2007)**

(*a*) 18 (*b*) 20
(*c*) 25 (*d*) 30

289. A small ring of negligible thickness and radius 2 cm moves on a bigger rung of radius 10 cm. How many rotations will the small ring take on the bigger ring to make a complete round? **(Hotel Management, 2010)**

(*a*) 5 (*b*) 6
(*c*) 7 (*d*) 10

290. Find the diameter of a wheel that makes 113 revolutions to go 2 km 26 decameters.

(*a*) $4\frac{4}{13}$ m (*b*) $6\frac{4}{11}$ m
(*c*) $12\frac{4}{11}$ m (*d*) $12\frac{8}{11}$ m

291. The circumference of the front wheel of a cart is 40 ft long and that of the back wheel is 48 ft long. What is the distance travelled by the cart, when the front wheel has done five more revolutions than the rear wheel? **(M.B.A., 2011)**

(*a*) 850 ft (*b*) 950 ft
(*c*) 1200 ft (*d*) 1450 ft

292. The radii of the front wheel and the rear wheel of a bike are 14 cm and 21 cm respectively. Rahul puts a red mark on the point of contact of each of the wheels with the ground when the bike is stationary. Once the bike starts moving, then after what distance will the two red marks touch the ground again simultaneously?

(*a*) 42 cm (*b*) 84 cm
(*c*) 264 cm (*d*) 294 cm

293. The circumferences of the front and rear wheels of a bicycle are 3.5 m and 3 m respectively. If the vehicle is moving at a speed of 15 m/sec, the shortest time in which both the wheels will make a whole number of turns is **(R.R.B., 2008)**

(*a*) 1.4 seconds (*b*) 2.1 seconds
(*c*) 4 seconds (*d*) 6.4 seconds

294. The circumference of the back-sided wheel of a vehicle is 1 m greater than that of front side wheel. To travel 600 m, the front wheel rotates 30 times more than the back wheel. The circumference of the front wheel is **(Hotel Management, 2007)**

(*a*) 2 m (*b*) 4 m
(*c*) 5 m (*d*) None of these

295. Two boys are running on two different circular paths with same centre. If their radii are 5 m and 10 m, the maximum possible distance between them is **(I.A.M., 2007)**

(*a*) 5 m (*b*) 10 m
(*c*) 15 m (*d*) 20 m

296. A circular ground whose diameter is 35 metres, has a 1.4 m broad garden around it. What is the area of the garden in square meters?

(*a*) 160.16 (*b*) 176.16
(*c*) 196.16 (*d*) Data inadequate
(*e*) None of these

297. A circular grassy plot of land, 42 cm in diameter, has a path 3.5 m wide running around it outside. The cost of gravelling the path at ₹ 4 per square metre is **(M.A.T., 2007)**

(*a*) ₹ 1002 (*b*) ₹ 1802
(*c*) ₹ 2002 (*d*) ₹ 3002

298. A circle of radius 5 cm is drawn and another circle of 3 cm radius is cut out of this circle. What is the radius of a circle which has the same area as the area of the bigger circle excluding the cut one?

(*a*) 2 cm (*b*) 3 cm
(*c*) 4 cm (*d*) 4.5 cm

299. The circumference of a circular ground is 88 metres. A strip of land, 3 metres wide, inside and along the circumference of the ground is to be levelled. What is the budgeted expenditure if the levelling costs ₹ 7 per square metre? **(M.A.T., 2006)**

(*a*) ₹ 1050 (*b*) ₹ 1125
(*c*) ₹ 1325 (*d*) ₹ 1650

300. The areas of two concentric circles forming a ring are 154 sq. cm and 616 sq. cm. The breadth of the ring is

(*a*) 7 cm (*b*) 14 cm
(*c*) 21 cm (*d*) 28 cm

301. A circular road runs around a circular garden. If the difference between the circumference of the outer circle and the inner circle is 44 m, the width of the road is **(M.A.T., 2007)**

(*a*) 3.5 m (*b*) 4 m
(*c*) 7 m (*d*) 7.5 m

302. A small disc of radius r is cut out from a disc of radius R. The weight of the disc which now has a hole in it, is reduced to $\frac{24}{25}$ of the original weight. If $R = xr$, what is the value of x?

(*a*) 4 (*b*) 4.5
(*c*) 24 (*d*) 25
(*e*) None of these

303. A circular swimming pool is surrounded by a concrete wall 4 ft. wide. If the area of the concrete wall surrounding the pool is $\frac{11}{25}$ that of the pool, then the radius of the pool is

(*a*) 8 ft (*b*) 16 ft
(*c*) 20 ft (*d*) 30 ft

304. The ratio of the outer and the inner perimeters of a circular path is 23 : 22. If the path is 5 metres wide, the diameter of the inner circle is **(S.S.C., 2004)**

(*a*) 55 m (*b*) 110 m
(*c*) 220 m (*d*) 230 m

305. If a region bounded by a circle *C* is to be divided into three regions of equal areas by drawing two circles concentric with *C*, then the ratio of the radii of the two circles must be

(*a*) 1 : 3 (*b*) $1 : \sqrt{3}$
(*c*) 1 : 2 (*d*) $1 : \sqrt{2}$

306. The area of a circle is increased by 22 sq. cm if its radius is increased by 1 cm. The original radius of the circle is **(S.S.C., 2007)**

(*a*) 3 cm (*b*) 3.2 cm
(*c*) 3.5 cm (*d*) 6 cm

307. The perimeter of a square is equal to twice the perimeter of a rectangle of length 8 cm and breadth 7 cm. What is the circumference of a semi-circle whose diameter is equal to the side of the square? (rounded off to two decimal places) **(Bank P.O., 2010)**

(*a*) 23.57 cm (*b*) 38.57 cm
(*c*) 42.46 cm (*d*) 47.47 cm
(*e*) None of these

308. What will be the area of a semi-circle of 14 m diameter?

(*a*) 22 m^2 (*b*) 77 m^2
(*c*) 154 m^2 (*d*) 308 m^2
(*e*) None of these

309. A semi-circular shaped window has diameter of 63 cm. Its perimeter equals

(*a*) 126 cm (*b*) 162 cm
(*c*) 198 cm (*d*) 251 cm

310. A vertical rod of height 33 metres is bent to form a semi-circular shape so that the top touches the ground. The distance between the top head and the base on the ground is **(I.A.M., 2007)**

(*a*) 10.5 m (*b*) 12 m
(*c*) 21 m (*d*) 33 m

311. What will be the area of a semi-circle whose perimeter is 36 cm? **(R.R.B., 2009)**

(*a*) 154 cm^2 (*b*) 168 cm^2
(*c*) 308 cm^2 (*d*) Data inadequate
(*e*) None of these

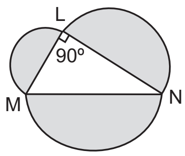
312. If the area of a semi-circular plot is 11088 m^2, then its perimeter is

(*a*) 264 m (*b*) 348 m
(*c*) 432 m (*d*) 452 m

313. If a wire is bent into the shape of a square, then the area of the square is 81 sq. cm. When the wire is bent into a semi-circular shape, then the area of the semi-circle will be

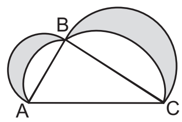
(*a*) 22 cm^2 (*b*) 44 cm^2
(*c*) 77 cm^2 (*d*) 154 cm^2

314. If $MN = x$, then what is the area of the shaded region?



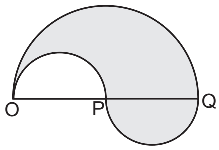
(*a*) πx^2 (*b*) $\frac{\pi x^2}{2}$
(*c*) $\frac{\pi x^2}{2}$ (*d*) $\frac{\pi x^2}{4}$

315. In the given figure, *ABC* is a right-angled triangle with *B* as the right angle. Three semi-circles are drawn with *AB*, *BC* and *AC* as diameters. What is the area of the shaded portion if the area of the triangle *ABC* is 12 square units?



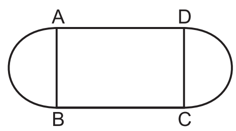
(*a*) 6 square units
(*b*) 12 square units
(*c*) 24 square units
(*d*) Cannot be determined as the data is insufficient

316. If in the given figure $OP = OQ = 14$ cm and *OP*, *PQ* and *OQ* are all joined by semi-circles, then the perimeter of the shaded are a is equal to



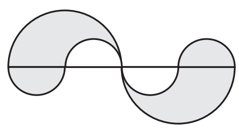
(*a*) 88 cm (*b*) 176 cm
(*c*) 264 cm (*d*) 352 cm

317. In the given diagram, *ABCD* is a square and semi-circular regions have been added to it by drawing two semi-circles with *AB* and *CD* as diameters. If the total area of the three regions is 350 sq. cm, then the length of the side of the square is equal to



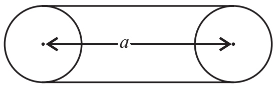
(*a*) $5\sqrt{7}$ cm (*b*) 7 cm
(*c*) 13 cm (*d*) 14 cm

318. If *r* and *R* and the respective radii of the smaller and the bigger semi-circles then the area of the shaded portion in the given figure is :



(*a*) πr^2 sq. units (*b*) $\pi R^2 - \pi r^2$ sq. units
(*c*) $\pi R^2 + \pi r^2$ sq. units (*d*) πR^2 sq. units

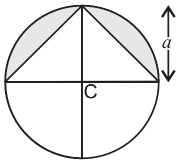
319. Two circular wheels of the same radius r have their central hubs at a distance of a from one another. The minimum length of a fan belt which will pass around both the wheels is



(*a*) $2(a + \pi r)$ (*b*) $a + \frac{\pi r}{2}$

(*c*) $2a + \pi r)$ (*d*) $\frac{a + \pi r}{2}$

320. The area of the shaded region in the adjoining figure is **(S.S.C., 2007)**



(*a*) $a^2(\pi - 1)$ sq. units (*b*) $a^2\left(\frac{\pi}{2} - 1\right)$ sq. units

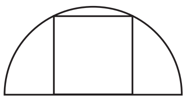
(*c*) $\frac{a^2}{2}(\pi - 1)$ sq. units (*d*) $\frac{a^2}{2}\left(\frac{\pi}{2} - 1\right)$ sq. units

321. An athletic track 14 m wide consists of two straight sections 120 m long joining semi-circular ends whose inner radius is 35 m. The area of the track is **(M.A.T., 2006)**

(*a*) 7026 m^2 (*b*) 7036 m^2

(*c*) 7046 m^2 (*d*) 7056 m^2

322. A square of area 40 sq. cm is inscribed in a circle as shown in the figure. The area (in sq.cm) of the semi-circle is **(A.A.O., 2009)**



(*a*) 20 π (*b*) 25 π

(*c*) 30 π (*d*) 40 π

323. A square is inscribed in a circle and another in a semi-circle of same radius. The ratio of the area of the first square to the area of the second square is **(Hotel Management, 2010)**

(*a*) 2 : 5 (*b*) 5 : 2

(*c*) 4 : 5 (*d*) 5 : 4

324. Semi-circular lawns are attached to the edges of a rectangular field measuring 42 m × 35 m. The area of the total field is

(*a*) 1358 m^2 (*b*) 3818.5 m^2

(*c*) 5813 m^2 (*d*) 8318 m^2

325. The area of a sector of a circle of radius 5 cm, formed by an arc of length 3.5 cm, is

(*a*) 7.5 cm^2 (*b*) 7.75 cm^2

(*c*) 8.5 cm^2 (*d*) 8.75 cm^2

326. In a circle of radius 7 cm, an arc subtends an angle of 108° at the centre. The area of the sector is

(*a*) 43.2 cm^2 (*b*) 44.2 cm^2

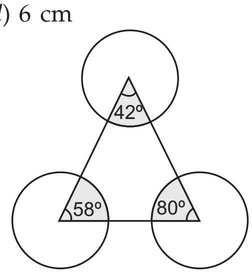
(*c*) 45.2 cm^2 (*d*) 46.2 cm^2

327. A sector of 56° has an area of 17.6 cm^2. The its radius will be

(*a*) 1.5 cm (*b*) 3 cm

(*c*) 4.2 cm (*d*) 6 cm

328. There are three circles each of radius $\sqrt{7}$ cm. A triangle is formed by joining their centres. The angles at the centre made by the triangle are shown in the figure. The area of the shaded portion is



(*a*) $\frac{4}{7}$ cm^2 (*b*) $\frac{11}{7}$ cm^2

(*c*) $\frac{22}{7}$ cm^2 (*d*) 11 cm^2

329. The minute hand of a clock is 7 cm long. Find the area of the sector made by the minute hand between 7 a.m. and 7.05 a.m. **(R.R.B., 2006)**

(*a*) 11.5 cm^2 (*b*) 12.8 cm^2

(*c*) 15.4 cm^2 (*d*) None of these

330. A horse is tied at the corner of a rectangular field whose length is 20 m and width is 16 m, with a rope whose length is 14 m. Find the area which the horse can graze: **(R.R.B., 2006)**

(*a*) 144 sq. m (*b*) 154 sq. m

(*c*) 156 sq. m (*d*) 164 sq. m

331. Area of the segment of a circle is

(*a*) $\frac{1}{2} l\, r$ (*b*) $\frac{\pi r \theta}{180°}$

(*c*) $r^2\left(\frac{\pi\theta}{360°} - \frac{1}{2}\sin\theta\right)$ (*d*) None of these

332. If in a circle of radius 21 cm, an arc subtends an angle of 56° at the centre, the length of the arc is

(*a*) 15.53 cm (*b*) 16.53 cm

(*c*) 18.53 cm (*d*) 20.53 cm

333. If the circumference of a circle is 100 units, then what will be the length of the arc described by an angle of 20 degrees? **(Campus Recruitment, 2010)**

(*a*) 5.55 units (*b*) 4.86 units

(*c*) 5.85 units (*d*) None of these

334. The area of the greatest circle which can be inscribed in a square whose perimeter is 120 cm, is **(S.S.C., 2004)**

(*a*) $\frac{22}{7} \times \left(\frac{7}{2}\right)^2$ cm^2 (*b*) $\frac{22}{7} \times \left(\frac{9}{2}\right)^2$ cm^2

(*c*) $\frac{22}{7} \times \left(\frac{15}{2}\right)^2$ cm^2 (*d*) $\frac{22}{7} \times (15)^2$ cm^2

335. The area of the largest circle, that can be drawn inside a rectangle with sides 18 cm by 14 cm, is (S.S.C., 2007)

(a) 49 cm^2 (b) 154 cm^2
(c) 378 cm^2 (d) 1078 cm^2

336. The sides of a rectangle are 8 cm and 6 cm. The corners of the rectangle lie on a circle. Find the are a of the circle without the rectangle. (S.S.C., 2007)

(a) 30.6 cm^2 (b) 39 cm^2
(c) 42.4 cm^2 (d) 65.3 cm^2

337. The area of the rectangle circumscribed by a circle is 32 cm^2 and the length of one side of the rectangle is 8 cm. The length of the diameter of the circle is

(a) 16 cm (b) 12 cm
(c) $5\sqrt{2}$ cm (d) $4\sqrt{5}$ cm

338. The area of a circle is 220 sq. cm. The area of a square inscribed in this circle will be

(a) 49 cm^2 (b) 70 cm^2
(c) 140 cm^2 (d) 150 cm^2

339. A square is inscribed in a circle whose radius is 4 cm. The area of the portion between the circle and the square is :

(a) $(8\pi - 16)$ (b) $(8\pi - 32)$
(c) $(16\pi - 16)$ (d) $(16\pi - 32)$

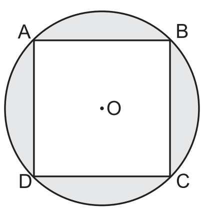
340. The circumference of a circle is 100 cm. The side of a square inscribed in the circle is

(a) $50\sqrt{2}$ cm^2 (b) $\frac{100}{\pi}$ cm^2
(c) $\frac{50\sqrt{2}}{\pi}$ cm^2 (d) $\frac{100\sqrt{2}}{\pi}$ cm^2

341. A circle is inscribed in a square of side 54 cms and another circle circumscribes the same square. Then the ratio of circumferences of the bigger circle to the smaller circle is

(a) $1 : \sqrt{2}$ (b) $\sqrt{2} : 1$
(c) $\sqrt{3} : 1$ (d) None of these

342. A circle is circumscribed around a square as shown in the figure. The area of one of the four shaded portions is equal to $\frac{4}{7}$. The radius of the circle is (R.R.B., 2006)



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

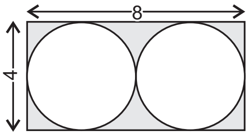
343. The ratio of the areas of the incircle and the circumcircle of a square is (S.S.C., 2008)

(a) 1 : 2 (b) $\sqrt{2} : 1$
(c) $1 : \sqrt{2}$ (d) 2 : 1

344. A square circumscribes a circle and another square is inscribed in this circle with one vertex at the point of contact. The ratio of the areas of the circumscribed and the inscribed squares is

(a) 1 (b) 2 : 1
(c) 3 (d) 4

345. What is the area of the shaded region?



(a) $32 - 4\pi$ sq. units (b) $32 - 8\pi$ sq. units
(c) $16 - 4\pi$ sq. units (d) $16 - 8\pi$ sq. units

346. Four equal sized maximum circular plates are cut off from a square paper sheet of area 784 cm^2. The circumference of each plate is

(a) 22 cm (b) 44 cm
(c) 66 cm (d) 88 cm

347. There are 4 semi-circular gardens on each side of a square-shaped pond with each side 21 m. The cost of fencing the entire plot at the rate of ₹ 12.50 per metre is

(a) ₹ 1560 (b) ₹ 1650
(c) ₹ 3120 (d) ₹ 3300

348. The circumradius of an equilateral triangle is 8 cm. The inradius of the triangle

(a) 3.25 cm (b) 4 cm
(c) 3.5 cm (d) 4.25 cm

349. The ratio of the areas of the incircle and circumcircle of an equilateral triangle is

(a) 1 : 2 (b) 1 : 3
(c) 1 : 4 (d) 1 : 9

350. The radius of the circumcircle of an equilateral triangle of side 12 cm is

(a) $\frac{4\sqrt{2}}{3}$ cm (b) $4\sqrt{2}$ cm
(c) $\frac{4\sqrt{3}}{3}$ cm (d) $4\sqrt{3}$ cm

351. The area of the incircle of an equilateral triangle of side 42 cm is

(a) $22\sqrt{3}$ cm^2 (b) 231 cm^2
(c) 462 cm^2 (d) 924 cm^2

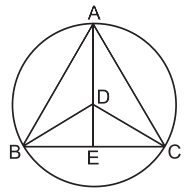
352. The area of a circle inscribed in an equilateral triangle is 154 cm^2. Find the perimeter of the triangle. (M.B.A., 2006)

(a) 71.5 cm (b) 71.7 cm
(c) 72.3 cm (d) 72.7 cm

353. A circle is inscribed in a square. An equilateral triangle of side $4\sqrt{3}$ cm is inscribed in that circle. The length of the diagonal of the square is

(*a*) $4\sqrt{2}$ cm (*b*) 8 cm
(*c*) $8\sqrt{2}$ cm (*d*) 16 cm

354. In the given figure, *ABC* is an equilateral triangle which is inscribed inside a circle and whose radius is *r*. Which of the following is the area of the triangle?



(S.B.I.P.O., 2005)

(*a*) $(r + DE)^{\frac{1}{2}} (r - DE)^{\frac{3}{2}}$ (*b*) $(r - DE)^{\frac{1}{2}} (r + DE)^{2}$
(*c*) $(r - DE)^{2} (r + DE)^{2}$ (*d*) $(r - DE)^{\frac{1}{2}} (r + DE)^{\frac{3}{2}}$

355. Three boys are standing on a circular boundary of a fountain. They are at equal distance from each other. If the radius of the boundary is 5 m, the shortest distance between any two boys is **(Hotel Management, 2010)**

(*a*) $\frac{5\sqrt{3}}{2}$ m (*b*) $5\sqrt{3}$ m
(*c*) $\frac{15\sqrt{3}}{2}$ m (*d*) $\frac{10\,\pi}{3}$ m

356. What is the area of an equilateral triangle inscribed in a circle of unit radius?

(*a*) $3\sqrt{3}$ sq. units (*b*) $\frac{3\sqrt{3}}{2}$ sq. units
(*c*) $\frac{3\sqrt{3}}{4}$ sq. units (*d*) $\frac{3\sqrt{3}}{16}$ sq. units

357. The sides of a triangle are 6 cm, 11 cm and 15 cm. The radius of its incircle is

(*a*) $3\sqrt{2}$ cm (*b*) $\frac{4\sqrt{2}}{5}$ cm
(*c*) $\frac{5\sqrt{2}}{4}$ cm (*d*) $6\sqrt{2}$ cm

358. The product of the lengths of three sides of a triangle is 196 and the radius of its circumscribe is 2.5 cm. The area of the triangle is

(*a*) 19.6 cm^2 (*b*) 39.2 cm^2
(*c*) 61.25 cm^2 (*d*) 122.5 cm^2

359. A triangle with sides 13 cm, 14 cm and 15 cm is inscribed in a circle. The radius of the circle is **(M.B.A., 2007)**

(*a*) 2 cm (*b*) 3 cm
(*c*) 4 cm (*d*) 8.125 cm

360. The perimeter of a triangle is 30 cm and the circumference of its incircle is 88 cm. The area of the triangle is

(*a*) 70 cm^2 (*b*) 140 cm^2
(*c*) 210 cm^2 (*d*) 420 cm^2

361. If in a triangle, the area is numerically equal to the perimeter, then the radius of the inscribed circle of the triangle is

(*a*) 1 (*b*) 1.5
(*c*) 2 (*d*) 3

362. An equilateral triangle, a square and a circle have equal perimeters. If T denotes the area of the triangle, S, the area of the square and C, the area of the circle, then

(*a*) S < T < C (*b*) T < C < S
(*c*) T < S < C (*d*) C < S < T

363. A circle, a square and an equilateral triangle have the same area. The correct increasing order of the perimeters will be

(*a*) triangle, square, circle
(*b*) triangle, circle, square
(*c*) circle, triangle, square
(*d*) circle, square, triangle

364. The area of the largest triangle that can be inscribed in a semi-circle of radius *r*, is **(B.Ed Entrance, 2011)**

(*a*) r^2 (*b*) $2r^2$
(*c*) r^3 (*d*) $2r^3$

365. *ABC* is a right-angled triangle with right angle at *B*. If the semi-circle on *AB* with *AB* as diameter encloses an area of 81 sq. cm and the semi-circle on *BC* with *BC* as diameter encloses an area of 36 sq. cm, then the area of the semi-circle on *AC* with *AC* as diameter will be

(*a*) 117 cm^2 (*b*) 121 cm^2
(*c*) 217 cm^2 (*d*) 221 cm^2

366. If the radius of a circle is increased by 75%, then its circumference will increase by

(*a*) 25% (*b*) 50%
(*c*) 75% (*d*) 100%

367. When the circumference of a toy balloon is increased from 20 cm to 25 cm, its radius is increased by

(*a*) $\frac{\pi}{5}$ (*b*) $\frac{5}{\pi}$
(*c*) 5 (*d*) $\frac{5}{2\pi}$

368. A can go round a circular path 8 times in 40 minutes. If the diameter of the circle is increased to 10 times the original diameter, then the time required by A to go round the new path once, travelling at the same speed as before, is

(*a*) 20 min. (*b*) 25 min.
(*c*) 50 min. (*d*) 100 min.

369. If the radius of a circle is increased by 6%, then the area is increased by
(*a*) 6% (*b*) 12%
(*c*) 12.36% (*d*) 16.64%

370. If the radius of a circle is increased by 200%, then its area will increase by **(P.C.S. 2009)**
(*a*) 200% (*b*) 400%
(*c*) 800% (*d*) 900%

371. If the radius of a circle is diminished by 10%, then its area is diminished by
(*a*) 10% (*b*) 19%
(*c*) 20% (*d*) 36%

372. If the radius of a circle is doubled, its area is increased by
(*a*) 100% (*b*) 200%
(*c*) 300% (*d*) 400%

373. If the radius of a circle is increased to 3 times, then how many times will its circumference be increased?
(*a*) $\frac{1}{3}$ times (*b*) 2 times
(*c*) 3 times (*d*) 9 times

374. If the circumference of a circle increases form 4π to 8π, what change occurs in its area?
(*a*) It is halved. (*b*) It doubles.
(*c*) it triples. (*d*) It quadruples.

375. If the circumference of a circle is increased by 20%, what will be the effect on the circle? **(Bank P.O., 2008)**
(*a*) 40% increase (*b*) 44% increase
(*c*) 48% increase (*d*) Cannot be determined
(*e*) None of these

376. If the circumference of a circle is decreased by 50% then the percentage of decrease in its area is **(S.S.C., 2010)**
(*a*) 25 (*b*) 50
(*c*) 60 (*d*) 75

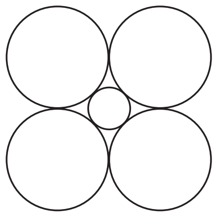
377. Three equal circles are described with vertices of the triangles as centres. If the radius of each circle is r, the sum of areas of the portions of the circles intercepted in a triangle is **(Campus Recuritment, 2010)**
(*a*) $2\pi r^2$ (*b*) $\frac{3}{2}\pi r^2$
(*c*) πr^2 (*d*) $\frac{1}{2}\pi r^2$

378. Three circles of radius 3.5 cm are placed in such a way that each circle touches the other two. The area of the portion enclosed by the circles is **(S.S.C., 2003)**
(*a*) 1.967 cm^2 (*b*) 1.975 cm^2
(*c*) 19.67 cm^2 (*d*) 21.21 cm^2

379. Four circles each of radius 'a' units touch one another. The area enclosed between them in square units is
(*a*) $\frac{a^2}{7}$ (*b*) $3a^2$
(*c*) $\frac{6a^2}{7}$ (*d*) $\frac{41a^2}{7}$

380. Four horses are tethered at four corners of a square plot of side 63 metres so that they just cannot reach one another. The area left ungrazed is
(*a*) 675.5 m^2 (*b*) 780.6 m^2
(*c*) 785.8 m^2 (*d*) 850.5 m^2

381. In the adjoining figure, if the radius of each of the four outer circles is r, what is the radius of the inner circle?



(*a*) $\frac{2}{\sqrt{2}+1}r$ (*b*) $\frac{1}{\sqrt{2}}r$
(*c*) $(\sqrt{2}-1)r$ (*d*) $\sqrt{2}\,r$

382. Four equal circles are described at the four corners of a square so that each touches two of the others. The area enclosed by the circumferences of the circles is $13\frac{5}{7}$ sq. cm. Find the radius of the circle.
(*a*) 2.5 cm (*b*) 4 cm
(*c*) 6 cm (*d*) 7.5 cm

383. In order to reach his office on time, Mr. Roy goes through the middle passage of a round fort which he takes 14 minutes to pass through. However, on a certain day, due to repairs, the straight road being blocked, he had to take the roundabout way as a result of which he reached his office late. How late was he?
(*a*) 6 min (*b* 8 min
(*c*) 12 min (*d*) $7\frac{1}{2}$ min

384. A kite-shaped quadrilateral of the largest possible area is cut from a circular sheet of paper. If the lengths of the sides of the kite are in the ratio 3 : 3 : 4 : 4, what percentage of the circular sheet is wasted?
(*a*) 34% (*b*) 39%
(*c*) 42% (*d*) 47%

Directions (Questions 385-386): ***These questions are based on the following in formation:***

A cow is tethered at point A by a rope. Neither the rope nor the cow is allowed to enter the triangle ABC. $\angle BAC = 30°$, $AB = AC = 10$ m.

385. What is the area that can be grazed by the cow if the length of the rope is 8?

(*a*) $\frac{133\,\pi}{6}$ sq. m (*b*) $121\,\pi$ sq. m

(*c*) $132\,\pi$ sq. m (*d*) $\frac{176\,\pi}{3}$ sq. m

386. What is the area that can be grazed by the cow if the length of the rope is 12 m ?

(*a*) $134\frac{1}{3}\pi$ sq. m (*b*) $121\,\pi$ sq.m

(*c*) $132\,\pi$ sq.m (*d*) $\frac{176\,\pi}{3}$ sq. m

387. Two identical circles intersect so that their centres, and the points at which they intersect, form a square of side 1 cm. The area (in sq. cm) of the portion that is common to the circles is

(*a*) $\frac{\pi}{4}$ (*b*) $\frac{\pi}{2}-1$

(*c*) $\frac{\pi}{5}$ (*d*) $\sqrt{2}-1$

388. A one-rupee coin is placed on a plain paper. How many coins of the same size can be placed round it so that each one touches the centre and adjacent coins? (R.R.B., 2006)

(*a*) 3 (*b*) 4

(*c*) 6 (*d*) 7

389. A skating champion moves along the circumference of a circle of radius 28 m in 44 sec. How many seconds will it take her to move along the perimeter of a hexagon of side 48 m? (M.B.A., 2011)

(*a*) 48 (*b*) 68

(*c*) 72 (*d*) 84

(*e*) 90

390. Each side of a regular hexagon is 1 cm. The area of the hexagon is

(*a*) $3\sqrt{2}\text{ cm}^2$ (*b*) $4\sqrt{3}\text{ cm}^2$

(*c*) $\frac{3\sqrt{3}}{4}\text{ cm}^2$ (*d*) $\frac{3\sqrt{3}}{2}\text{ cm}^2$

391. The difference between the areas of the circumcircle and the incircle of a regular polygon of n sides with each side of length $2a$, is

(*a*) πa^2 (*b*) $(2n + 1)\pi a^2$

(*c*) $\pi n a^2$ (*d*) $2\pi n a^2$

392. If a circle touching all the n sides of a polygon of perimeter $2p$ has radius r, then the area of the polygon is

(*a*) $(p - n)r$ (*b*) pr

(*c*) $(2p - n)r$ (*d*) $(p + n)r$

393. Two equal circles are drawn in square in such a way that a side of the square forms diameter of each circle. If the remaining area of the square is 42 cm^2. How much will the diameter of the circle measures? [IBPS—RRB Officers Gr. 'B' Exam, 2015]

(*a*) 3.5 cm (*b*) 4 cm

(*c*) 14 cm (*d*) 7.5 cm

394. If radius of a circle is 3cm, what is the area of the circle in sq. cm.? [Indian Railway Gr. 'D' Exam, 2014]

(*a*) 6π (*b*) 9π

(*c*) $\frac{3\pi}{2}$ (*d*) $9\pi^2$

395. A plate on square base made of brass is of length x c and width 1 mm. The plate weights 4725gm. If 1 cubic cm of brass weights 8.4 gram. then the value of x is [SSC—CHSL (10+2) Exam, 2015]

(*a*) 75 (*b*) 76

(*c*) 72 (*d*) 74

396. Area of a rectangle is 150 metre sq. When the breadth of the same rectangle is increased by 2 meter and the length decreased by 5 metre the area of the rectangle decreases by 30 metre square. What is the perimeter of the square whose side are equal to the length of the rectangle?

[RBI Officers Gr. 'B' (Phase I) Exam, 2015]

(*a*) 76 m (*b*) 72 m

(*c*) 120 m (*d*) 60 m

397. The area of a circle whose radius is the diagonal of a square whose area is 4 sq. units is

(*a*) 16π sq. units (*b*) 4π sq. units

(*c*) 6π sq. units (*d*) 8π sq. units

[SSC—CHSL (10+2) Exam, 2015]

398. The ratio of circumference and diameter of a circle is 22 : 7. If the circumference be $1\frac{4}{7}$m. then the radius of the circle is [SSC—CHSL (10+2) Exam, 2015]

(*a*) $\frac{1}{3}$m (*b*) $\frac{1}{2}$m

(*c*) $\frac{1}{4}$m (*d*) 1m

399. A rectangular carpet has an area of 120 m^2 and a perimeter of 46 metre. The length of its diagonal is

(*a*) 23 metre (*b*) 13 metre
(*c*) 17 metre (*d*) 21 metre

[SSC—CHSL (10+2) Exam, 2015]

400. The total surface area of a right circular cylinder with radius of the base 7 cm and height 20 cm is

[SSC—CHSL (10+2) Exam, 2015]

(*a*) 900 cm^2 (*b*) 140 cm^2
(*c*) 1000 cm^2 (*d*) 1188 cm^2

401. The height of a triangle is equal to the perimeter of a square whose diagonal is $8\sqrt{2}$ metre and the base of the same triangle is equal to the side of a square whose area is 729sq. metre. What is the area of the triangle? (In sq. metre)

[United India Insurance (UIICL) Assistant (Online) Exam, 2015]

(*a*) 378 (*b*) 206
(*c*) 472 (*d*) 432

402. A boundary wall around a rectangular plot is constructed at a total cost of ₹ 46000 at the rate of ₹ 200 per metre. What is the area of the plot if the respective ratio between the bradth and the length of the plot is 10 : 13? (in sq. metre)

[United India Insurance (UIICL) Assistant (Online) Exam, 2015]

(*a*) 3750 (*b*) 3250
(*c*) 3000 (*d*) 3900

403. Four circles having equal radii are drawn with centres at the four corners of a square. Each circle touches the other two adjacent circles. If the remaining area of the square is 168 cm^2, what is the size of the radius of the circle?(in centimeters)

[RBI Officers Gr. 'B' (Phase I) Exam, 2015]

(*a*) 14 (*b*) 1.4
(*c*) 35 (*d*) 21

404. A courtyard is 25m long and 16m broad is to be paved with bricks of dimensions 20cm by 10cm. What is the total number of bricks required?

[IBPS—RRB Office Assistant (Online) Exam, 2015]

(*a*) 16000 (*b*) 18000
(*c*) 20000 (*d*) 22000

405. The diameter of a circle is equal to the perimeter of a square whose area is 3136 cm^2. What is the circumference of the circle?

[IBPS—RRB Office Assistant (Online) Exam, 2015]

(*a*) 352 cm (*b*) 704 cm
(*c*) 39424 cm (*d*) 1024 cm

406. The base of triangle is 15 cm and height is 12 cm. the height of another triangle of double the area having base 20cm is

[IBPS—RRB Office Assistant (Online) Exam, 2015]

(*a*) 22 cm (*b*) 20 cm
(*c*) 18 cm (*d*) 10 cm

407. The base of an isosceles is 14 cm and its perimeter is 36 cm. Find its area.

(*a*) $42\sqrt{2}$ sq. cm. (*b*) 42 sq. cm
(*c*) 84 sq. cm (*d*) 48 sq. cm

[ESIC—UDC Exam, 2016]

408. What would be the area of a rectangle whose area is equal to the area of a circle of radius 7 cm?

[SBI Jr. Associates (Pre.) Exam, 2016]

(*a*) 77 cm^2 (*b*) 154 cm^2
(*c*) 184 cm^2 (*d*) 180 cm^2

409. If the total surface area of a cube is 864 square cm, find the volume of the cube:

(*a*) 1728 cm^3 (*b*) 1624 cm^3
(*c*) 144 cm^3 (*d*) 1684 cm^3

[DMRC—Train Operator/Station Controller Exam, 2016]

410. The circumference of a circle is 10% more than the perimeter of a square. If the difference between the area of the circle and that of the square is 216 cm^2, how much does the diagonal of the square measure? (in cm) **[CET—Maharashtra (MBA), 2016]**

(*a*) $14\sqrt{2}$ (*b*) 14
(*c*) 20 (*d*) $20\sqrt{2}$

411. A circular park, 42 m in diameter, has a path 3.5 m wide running around it on the outside. Find the cost of gravelling the path at ₹ 4 per sq. m.

[CLAT, 2016]

(*a*) ₹ 2048 (*b*) ₹ 1652
(*c*) ₹ 1672 (*d*) ₹ 2002

Direction: In the question below there is a question-statement and two statements numbered I and II. You have to decide whether the data given in the statements are sufficient to answer the questions. Read with the statements and given answer:

(*a*) If the data in statement I alone are sufficient to answer the question, while the data in statement II alone are not sufficient to answer the question.

(*b*) If the data in statement II alone are sufficient to answer the question, while the data in statement I alone are not sufficient to answer the question.

(*c*) If the data either in Statement I alone or statement II alone are sufficient to answer the question.

(*d*) If the data given in both Statements I and II together are not sufficient to answer the question.

(E) If the data in both Statements I and II together are necessary to answer the question.

412. What is the area of the circle?

I. Perimeter of the circle is 88 cm

II. Diameter of the circle is 28 cm

[IBPS—Bank Spl. Officer (Marketing) Exam, 2016]

413. The area of a rhombus with side 13 cm and one diagonal 10 cm will be **[CDS, 2016]**

(*a*) 140 cm^2 (*b*) 130 cm^2

(*c*) 120 cm^2 (*d*) 110 cm^2

414. A piece of wire when bent to form a circle will have a radius of 84cm. if the wrie is bent to form a square, the length of a side of the square is

[DMRC—Customer Relationship Assistant (CRA) Exam, 2016]

(*a*) 216 cm (*b*) 133 cm

(*c*) 132 cm (*d*) 168 cm

415. A hall 50m long and 45m broad is to be paved with square tiles. Find the largest tile as well as its number in the given options so that the tiles exactly fit in the hall.

[DMRC—Junior Engineer (Electrical) Exam, 2016]

(*a*) 36 sq. m and 80 tiles (*b*) 16 sq m and 80 tiles

(*c*) 25 sq. m and 90 tiles (*d*) 36 sq. m and 90 tiles

416. The perimeters of a square and a regular hexagon are equal. The ratio of the area of the hexagon to the area of the square is

[DMRC—Junior Engineer (Electrical) Exam, 2016]

(*a*) $2\sqrt{3}:1$ (*b*) $2\sqrt{3}:3$

(*c*) $3\sqrt{3}:2$ (*d*) $\sqrt{2}:3$

ANSWERS

1. (*c*)	**2.** (*d*)	**3.** (*e*)	**4.** (*c*)	**5.** (*b*)	**6.** (*c*)	**7.** (*c*)	**8.** (*d*)	**9.** (*a*)	**10.** (*a*)
11. (*c*)	**12.** (*b*)	**13.** (*a*)	**14.** (*e*)	**15.** (*b*)	**16.** (*c*)	**17.** (*b*)	**18.** (*b*)	**19.** (*b*)	**20.** (*b*)
21. (*e*)	**22.** (*b*)	**23.** (*d*)	**24.** (*b*)	**25.** (*a*)	**26.** (*a*)	**27.** (*d*)	**28.** (*a*)	**29.** (*a*)	**30.** (*c*)
31. (*b*)	**32.** (*b*)	**33.** (*b*)	**34.** (*c*)	**35.** (*d*)	**36.** (*d*)	**37.** (*c*)	**38.** (*d*)	**39.** (*c*)	**40.** (*b*)
41. (*d*)	**42.** (*c*)	**43.** (*d*)	**44.** (*b*)	**45.** (*a*)	**46.** (*c*)	**47.** (*d*)	**48.** (*b*)	**49.** (*c*)	**50.** (*b*)
51. (*b*)	**52.** (*b*)	**53.** (*a*)	**54.** (*a*)	**55.** (*d*)	**56.** (*b*)	**57.** (*e*)	**58.** (*a*)	**59.** (*e*)	**60.** (*c*)
61. (*b*)	**62.** (*c*)	**63.** (*c*)	**64.** (*a*)	**65.** (*a*)	**66.** (*c*)	**67.** (*c*)	**68.** (*d*)	**69.** (*a*)	**70.** (*b*)
71. (*c*)	**72.** (*d*)	**73.** (*b*)	**74.** (*b*)	**75.** (*c*)	**76.** (*c*)	**77.** (*c*)	**78.** (*b*)	**79.** (*a*)	**80.** (*b*)
81. (*b*)	**82.** (*e*)	**83.** (*c*)	**84.** (*c*)	**85.** (*e*)	**86.** (*c*)	**87.** (*c*)	**88.** (*c*)	**89.** (*d*)	**90.** (*d*)
91. (*d*)	**92.** (*d*)	**93.** (*b*)	**94.** (*d*)	**95.** (*a*)	**96.** (*c*)	**97.** (*a*)	**98.** (*c*)	**99.** (*b*)	**100.** (*d*)
101. (*d*)	**102.** (*c*)	**103.** (*b*)	**104.** (*b*)	**105.** (*a*)	**106.** (*e*)	**107.** (*b*)	**108.** (*b*)	**109.** (*c*)	**110.** (*d*)
111. (*c*)	**112.** (*c*)	**113.** (*c*)	**114.** (*b*)	**115.** (*c*)	**116.** (*d*)	**117.** (*c*)	**118.** (*a*)	**119.** (*c*)	**120.** (*a*)
121. (*c*)	**122.** (*b*)	**123.** (*d*)	**124.** (*d*)	**125.** (*c*)	**126.** (*d*)	**127.** (*b*)	**128.** (*d*)	**129.** (*c*)	**130.** (*c*)
131. (*d*)	**132.** (*b*)	**133.** (*d*)	**134.** (*d*)	**135.** (*d*)	**136.** (*d*)	**137.** (*d*)	**138.** (*c*)	**139.** (*b*)	**140.** (*d*)
141. (*a*)	**142.** (*c*)	**143.** (*b*)	**144.** (*a*)	**145.** (*c*)	**146.** (*c*)	**147.** (*c*)	**148.** (*b*)	**149.** (*c*)	**150.** (*d*)
151. (*c*)	**152.** (*d*)	**153.** (*b*)	**154.** (*d*)	**155.** (*c*)	**156.** (*a*)	**157.** (*c*)	**158.** (*d*)	**159.** (*c*)	**160.** (*c*)
161. (*b*)	**162.** (*e*)	**163.** (*b*)	**164.** (*b*)	**165.** (*b*)	**166.** (*d*)	**167.** (*b*)	**168.** (*a*)	**169.** (*d*)	**170.** (*d*)
171. (*c*)	**172.** (*d*)	**173.** (*b*)	**174.** (*b*)	**175.** (*c*)	**176.** (*b*)	**177.** (*c*)	**178.** (*b*)	**179.** (*b*)	**180.** (*b*)
181. (*a*)	**182.** (*d*)	**183.** (*b*)	**184.** (*d*)	**185.** (*a*)	**186.** (*a*)	**187.** (*a*)	**188.** (*c*)	**189.** (*c*)	**190.** (*c*)
191. (*c*)	**192.** (*d*)	**193.** (*d*)	**194.** (*c*)	**195.** (*c*)	**196.** (*d*)	**197.** (*d*)	**198.** (*c*)	**199.** (*c*)	**200.** (*b*)
201. (*c*)	**202.** (*d*)	**203.** (*c*)	**204.** (*d*)	**205.** (*a*)	**206.** (*e*)	**207.** (*d*)	**208.** (*c*)	**209.** (*c*)	**210.** (*c*)
211. (*b*)	**212.** (*b*)	**213.** (*a*)	**214.** (*a*)	**215.** (*c*)	**216.** (*d*)	**217.** (*b*)	**218.** (*c*)	**219.** (*b*)	**220.** (*c*)
221. (*d*)	**222.** (*a*)	**223.** (*b*)	**224.** (*b*)	**225.** (*c*)	**226.** (*b*)	**227.** (*a*)	**228.** (*a*)	**229.** (*a*)	**230.** (*c*)

231. (*a*)	**232.** (*b*)	**233.** (*b*)	**234.** (*b*)	**235.** (*c*)	**236.** (*b*)	**237.** (*c*)	**238.** (*d*)	**239.** (*d*)	**240.** (*c*)
241. (*c*)	**242.** (*a*)	**243.** (*c*)	**244.** (*d*)	**245.** (*d*)	**246.** (*b*)	**247.** (*b*)	**248.** (*e*)	**249.** (*d*)	**250.** (*c*)
251. (*a*)	**252.** (*c*)	**253.** (*e*)	**254.** (*c*)	**255.** (*c*)	**256.** (*d*)	**257.** (*a*)	**258.** (*c*)	**259.** (*a*)	**260.** (*b*)
261. (*c*)	**262.** (*a*)	**263.** (*b*)	**264.** (*c*)	**265.** (*c*)	**266.** (*b*)	**267.** (*c*)	**268.** (*b*)	**269.** (*c*)	**270.** (*b*)
271. (*a*)	**272.** (*c*)	**273.** (*b*)	**274.** (*b*)	**275.** (*b*)	**276.** (*c*)	**277.** (*b*)	**278.** (*c*)	**279.** (*b*)	**280.** (*d*)
281. (*b*)	**282.** (*d*)	**283.** (*b*)	**284.** (*a*)	**285.** (*b*)	**286.** (*a*)	**287.** (*a*)	**288.** (*c*)	**289.** (*a*)	**290.** (*b*)
291. (*c*)	**292.** (*c*)	**293.** (*a*)	**294.** (*b*)	**295.** (*c*)	**296.** (*e*)	**297.** (*c*)	**298.** (*c*)	**299.** (*d*)	**300.** (*a*)
301. (*c*)	**302.** (*e*)	**303.** (*c*)	**304.** (*c*)	**305.** (*d*)	**306.** (*a*)	**307.** (*a*)	**308.** (*b*)	**309.** (*b*)	**310.** (*c*)
311. (*e*)	**312.** (*c*)	**313.** (*c*)	**314.** (*c*)	**315.** (*b*)	**316.** (*a*)	**317.** (*d*)	**318.** (*d*)	**319.** (*a*)	**320.** (*b*)
321. (*d*)	**322.** (*b*)	**323.** (*b*)	**324.** (*b*)	**325.** (*d*)	**326.** (*d*)	**327.** (*d*)	**328.** (*d*)	**329.** (*b*)	**330.** (*b*)
331. (*c*)	**332.** (*d*)	**333.** (*a*)	**334.** (*d*)	**335.** (*b*)	**336.** (*a*)	**337.** (*d*)	**338.** (*c*)	**339.** (*d*)	**340.** (*c*)
341. (*b*)	**342.** (*a*)	**343.** (*a*)	**344.** (*a*)	**345.** (*b*)	**346.** (*b*)	**347.** (*b*)	**348.** (*b*)	**349.** (*c*)	**350.** (*d*)
351. (*c*)	**352.** (*d*)	**353.** (*c*)	**354.** (*d*)	**355.** (*b*)	**356.** (*c*)	**357.** (*c*)	**358.** (*a*)	**359.** (*d*)	**360.** (*c*)
361. (*c*)	**362.** (*c*)	**363.** (*d*)	**364.** (*a*)	**365.** (*a*)	**366.** (*c*)	**367.** (*d*)	**368.** (*c*)	**369.** (*c*)	**370.** (*c*)
371. (*b*)	**372.** (*c*)	**373.** (*c*)	**374.** (*d*)	**375.** (*b*)	**376.** (*d*)	**377.** (*d*)	**378.** (*a*)	**379.** (*c*)	**380.** (*d*)
381. (*c*)	**382.** (*b*)	**383.** (*b*)	**384.** (*b*)	**385.** (*d*)	**386.** (*a*)	**387.** (*b*)	**388.** (*c*)	**389.** (*c*)	**390.** (*d*)
391. (*a*)	**392.** (*b*)	**393.** (*c*)	**394.** (*b*)	**395.** (*a*)	**396.** (*d*)	**397.** (*d*)	**398.** (*c*)	**399.** (*c*)	**400.** (*d*)
401. (*d*)	**402.** (*b*)	**403.** (*a*)	**404.** (*c*)	**405.** (*b*)	**406.** (*c*)	**407.** (*a*)	**408.** (*b*)	**409.** (*a*)	**410.** (*d*)
411. (*d*)	**412.** (*c*)	**413.** (*c*)	**414.** (*c*)	**415.** (*c*)	**416.** (*b*)				

SOLUTIONS

1. Length = L, Width = $\frac{L}{2}$. $\therefore$ Area = $L \times \frac{L}{2} = \frac{1}{2}L^2$.

2. Area of the floor = (5.5×3.75) m^2 = 20.625 m^2.

$\therefore$ Cost of paving = ₹ (800 × 20.625) = ₹ 16500.

3. Breadth = $\frac{\text{Area}}{\text{Length}} = \left(\frac{2100}{60}\right)$m = 35 m.

$\therefore$ Perimeter = 2(60 + 35) m = 190 m.

4. Let the breadth be b. Then,

$25 \times b = 18 \times 10 \Leftrightarrow b = \left(\frac{18 \times 10}{25}\right)$ cm = 7.2 cm.

5. Perimeter of the plot = 2(90 + 50) = 280 m.

$\therefore$ Number of poles = $\left(\frac{280}{5}\right) = 56$

6. Let breadth = x cm. Then, length = $\left(\frac{160}{100}x\right)$ cm $= \frac{8}{5}x$ cm.

So, $\frac{8}{5}x - x = 24 \Leftrightarrow \frac{3}{5}x = 24 \Leftrightarrow x = \left(\frac{24 \times 5}{3}\right) = 40.$

$\therefore$ Length = 64 cm, Breadth = 40 cm.

Area = (64 × 40) cm^2 = 2560 cm^2.

7. Clearly, we have : $l = 9$ and $l + 2b = 37$ or $b = 14$.

$\therefore$ Area = $(l \times b)$ = (9 × 14) sq. ft. = 126 sq. ft.

8. We have : $(l - b) = 23$ and $2(l + b) = 206$ or $(l + b) = 103$.

Solving the two equations, we get : $l = 63$ and $b = 40$.

$\therefore$ Area = $(l \times b)$ = (63 × 40) m^2 = 2520 m^2.

9. Area of the floor = $\left(\frac{510}{8.50}\right)$m^2 = 60 m^2.

$\therefore$ Breadth of the room = $\left(\frac{60}{8}\right)$ m = 7.5 m.

10. Let the breadth of the plot be x metres. Then, length of the plot = $(3x)$ meters.

$x \times 3x = 7803 \Rightarrow 3x^2 = 7803 \Rightarrow x^2 = 2601$

$\Rightarrow x = \sqrt{2601} = 51$ m.

11. Let the breadth of the rectangle be x metres. Then, length of the rectangle = $(2x)$ metres.

$2(2x + x) = 60 \Rightarrow 6x = 60 \Rightarrow x = 10.$

So, length = 20 m, breadth = 10 m.

$\therefore$ Area = (20 × 10) m^2 = 200 m^2.

12. Let the length and breadth of the field be l and b km respectively.

Then, $2(l + b) = 6$ or $l + b = 3$ and $lb = 2$.

$(l - b)^2 = (l + b)^2 - 4lb = 3^2 - 4 \times 2 = 1 \Rightarrow (l - b) = 1$ m

13. Let the length and breadth of the rectangle be $(9x)$ cm and $(7x)$ cm respectively.

Then, $9x \times 7x = 252 \Rightarrow 63x^2 = 252 \Rightarrow x^2 = 4 \Rightarrow x = 2.$

So, length = 18 cm, breadth = 14 cm.

$\therefore$ Perimeter = 2 (18 + 14) cm = 64 cm.

14. Let breadth = x metres. Then, length = $(x + 20)$ metres

Perimeter = $\left(\frac{5300}{26.50}\right)$ m = 200 m.

$\therefore 2[(x + 20) + x] = 200 \Leftrightarrow 2x + 20 = 100 \Leftrightarrow 2x = 80$

$\Leftrightarrow x = 40.$

Hence, length = $x + 20$ = 60 m.

15. Let the width of the table be x feet. Then, length of the table = $(x + 4)$ ft.

$\therefore x(x + 4) = 45 \Rightarrow x^2 + 4x - 45 = 0$

$\Rightarrow x^2 + 9x - 5x - 45 = 0$

$\Rightarrow x(x + 9) - 5(x - 9) = 0$

$\Rightarrow (x + 9)(x - 5) = 0 \Rightarrow x = 5.$

Hence, length of the table = (5 + 4) ft = 9 ft.

16. Let the length and breadth of the field be $(5x)$ metres and $(3x)$ metres respectively.

Then, $2(5x + 3x) = 480 \Rightarrow 8x = 240 \Rightarrow x = 30$.

So, length = 150 m, breadth = 90 m.

$\therefore$ Area of the field = (150×90) sq. m = 13500 sq. m.

17. Length = $\left(\frac{1200}{30}\right)$ m = 40 m.

Diagonal = $\sqrt{(40)^2 + (30)^2}$ m = 50 m.

Length to be fenced = $(40 + 30 + 50)$ m = 120 m.

$\therefore$ Cost of fencing = ₹ (120×100) = ₹ 12000.

18. Let length = x metres.

Then, breadth = $\left(\frac{60}{100}x\right)$ metres = $\left(\frac{3x}{5}\right)$ metres.

Perimeter = $\left[2\left(x + \frac{3x}{5}\right)\right]$ m = $\left(\frac{16x}{5}\right)$ m.

$\therefore \frac{16x}{5} = 800 \Leftrightarrow x = \left(\frac{800 \times 5}{16}\right) = 250$ m.

So, length = 250 m; breadth = 150 m.

$\therefore$ Area = (250×150) m^2 = 37500 m^2.

19. $\frac{l}{2(l+b)} = \frac{1}{3} \Rightarrow 3l = 2l + 2b \Rightarrow l = 2b \Rightarrow \frac{l}{b} = \frac{2}{1} = 2 : 1.$

20. Perimeter = Distance covered in 8 min.

$= \left(\frac{12000}{60} \times 8\right)$ m = 1600 m.

Let length = $3x$ metres and breadth = $2x$ metres.

Then, $2(3x + 2x) = 1600$ or $x = 160$.

Length = 480 m and Breadth = 320 m.

$\therefore$ Area = (480×320) m^2 = 153600 m^2.

21. Let breadth = x metres. Then, length = $\left(\frac{115x}{100}\right)$ metres.

$\therefore x \times \frac{115x}{100} = 460 \Leftrightarrow x^2 = \left(\frac{460 \times 100}{115}\right) = 400 \Leftrightarrow x = 20.$

22. Length of the field = (3.25×100) m = 325 m.

$\therefore$ Breadth of the field = $\left(\frac{52000}{325}\right)$ m = 160 m.

23. We have : l = 20 ft and lb = 680 sq. ft. So, b = 34 ft.

$\therefore$ Length of fencing = $(l + 2b) = (20 + 68)$ ft = 88 ft.

24. We have : $2b + l = 30 \Rightarrow l = 30 - 2b$.

Area = 100 m^2 $\Rightarrow l \times b = 100 \Rightarrow b(30 - 2b) = 100$

$\Rightarrow b^2 - 15b + 50 = 0$

$\Rightarrow (b - 10)(b - 5) = 0$

$\Rightarrow b = 10$ or $b = 5$.

When $b = 10$, $l = 10$ and when $b = 5$, $l = 20$.

Since the garden is rectangular, so its dimension is 20 m × 5 m.

25. Let the length and breadth of the rectangle be $3x$ and $2x$ respectively.

Then, perimeter = $2(3x + 2x) = 10x$.

And, area = $(3x \times 2x) = 6x^2$.

$\therefore \frac{10x}{6x^2} = \frac{5}{9} \Rightarrow 30x = 90 \Rightarrow x = 3.$

So, breadth = (2×3) m = 6 m.

26. Required perimeter = (AB + BC + CP + PQ + QR + RA)

= AB + BC + (CP + QR) + (PQ + RA) = AB + BC + AB + BC = 2 (AB + BC)

= [2 (8 + 4)] cm = 24 cm.

27. Let the areas of the two parts be x and $(700 - x)$ hectares respectively. Then,

$$[x - (700 - x)] = \frac{1}{5} \times \left[\frac{x + (700 - x)}{2}\right]$$

$\Leftrightarrow 2x - 700 = 70 \Leftrightarrow x = 385.$

So, area of smaller part = $(700 - 385)$ hectares = 315 hectares.

28. When folded along breadth, we have :

$2\left(\frac{l}{2} + b\right) = 34$ or $l + 2b = 34$ ...(*i*)

When folded along length, we have :

$2\left(l + \frac{b}{2}\right) = 38$ or $2l + b = 38$ ...(*ii*)

Solving (*i*) and (*ii*), we get : $l = 14$ and $b = 10$.

$\therefore$ Area of the paper = (14×10) cm^2 = 140 cm^2.

29. Let breadth = x metres.

Then, length = $\left(\frac{3}{2}x\right)$ metres. Area = $\left(\frac{2}{3} \times 10000\right)$ m^2.

$\therefore \frac{3}{2}x \times x = \frac{2}{3} \times 10000 \Leftrightarrow x^2 = \frac{4}{9} \times 10000 \Leftrightarrow x = \frac{2}{3} \times 100.$

$\therefore$ Length = $\frac{3}{2}x = \left(\frac{3}{2} \times \frac{2}{3} \times 100\right)$ m = 100 m.

30. Let the area of the whole painting be x cm^2.

Then, $\frac{1}{4}x + 100 = \frac{3}{4}x \Rightarrow \frac{1}{2}x = 100 \Rightarrow x = 200.$

$\therefore$ Area of painting = 200 cm^2. Height = 10 cm.

Length of painting = $\left(\frac{200}{10}\right)$ cm = 20 cm.

31. Number of bricks = $\left(\frac{\text{Area of courtyard}}{\text{Area of 1 brick}}\right)$

$= \left(\frac{2500 \times 1600}{20 \times 10}\right) = 20000.$

32. Area of the floor = (14×9) m^2 = 126 m^2.

$\therefore$ Length of the carpet = $\left(\frac{126}{63} \times 100\right)$ m = 200 m

33. Length of the carpet = $\left(\frac{\text{Total cost}}{\text{Rate/m}}\right) = \left(\frac{8100}{45}\right)$ m = 180 m.

Area of the room = Area of the carpet

$= \left(180 \times \frac{75}{100}\right)$ m^2 = 135 m^2.

$\therefore$ Breadth of the room = $\left(\frac{\text{Area}}{\text{Length}}\right) = \left(\frac{135}{18}\right)$ m = 7.5 m.

34. Other side

$= \sqrt{\left(\frac{15}{2}\right)^2 - \left(\frac{9}{2}\right)^2}$ ft $= \sqrt{\frac{225}{4} - \frac{81}{4}}$ ft $= \sqrt{\frac{144}{4}}$ ft = 6 ft.

$\therefore$ Area of the closet = (6×4.5) sq. ft = 27 sq. ft.

35. Let breadth = x cm. Then, length = $3x$ cm.

$x^2 + (3x)^2 = (8\sqrt{10})^2 \Rightarrow 10x^2 = 640 \Rightarrow x^2 = 64 \Rightarrow x = 8.$

So, length = 24 cm and breadth = 8 cm.

$\therefore$ Perimeter = [2 (24 + 8)] cm = 64 cm.

36. $\sqrt{l^2 + b^2} = 3b \Rightarrow l^2 + b^2 = 9b^2 \Rightarrow l^2 = 8b^2$

$\Rightarrow \frac{l^2}{b^2} = 8 \Rightarrow \frac{l}{b} = \sqrt{8} = 2\sqrt{2} = \sqrt{2}:1.$

37. Length of one side = $\frac{10}{2}$ cm = 5 cm.

Let the length of the other side be x cm.

Then, $x^2 + 5^2 = (10)^2 \Rightarrow x^2 = 75 \Rightarrow x = 5\sqrt{3}.$

$\therefore$ Area of the rectangle = $(5 \times 5\sqrt{3})\text{ cm}^2 = 25\sqrt{3}\text{ cm}^2$.

38. Let l and b be the length and breadth of the rectangle respectively.

Then, $\sqrt{l^2 + b^2} = 15 \Rightarrow (l^2 + b^2) = (15)^2 = 225.$

And, $l + b = 3 \Rightarrow (l - b)^2 = 9 \Rightarrow l^2 + b^2 - 2\,lb = 9$

$\Rightarrow 225 - 2lb = 9 \Rightarrow 2lb = 216 \Rightarrow lb = 108.$

Hence, area of the field = lb = 108 m^2.

39. $2\,(l + b) = 46$ or $l + b = 23$. Also, $lb = 120$.

$\therefore$ Diagonal = Diagonal = $\sqrt{l^2 + b^2} = \sqrt{(l+b)^2 - 2lb}$

$= \sqrt{(23)^2 - 240} = \sqrt{289} = 17$ m.

40. $\sqrt{l^2 + b^2} = \sqrt{41}$ or $l^2 + b^2 = 41$. Also, $lb = 20$.

$(l + b)^2 = (l^2 + b^2) + 2lb = 41 + 40 = 81 \Rightarrow (l + b) = 9.$

$\therefore$ Perimeter = $2\,(l + b)$ = 18 cm.

41. $\sqrt{l^2 + b^2} = 2d \Rightarrow l^2 + b^2 = 4d^2$. Also, $lb = \sqrt{3}\,d^2$.

$(l + b)^2 = (l^2 + b^2) + 2lb = 4d^2 + 2\sqrt{3}\,d^2$

$\Rightarrow (l + b) = \sqrt{(4 + 2\sqrt{3})d^2} = \sqrt{[(1)^2 + (\sqrt{3})^2 + 2\sqrt{3}]d^2}$

$= \sqrt{(\sqrt{3}+1)^2 d^2} = (\sqrt{3}+1)d.$

$\therefore$ Perimeter = $2(l + b) = 2(\sqrt{3}+1)\,d.$

42. Let the length of the rectangle be x metres. Then, breadth of the rectangle = $\left(\frac{168}{x}\right)$ m.

$\therefore \sqrt{x^2 + \left(\frac{168}{x}\right)^2} = 25 \Rightarrow \sqrt{x^2 + \frac{28224}{x^2}} = 25$

$\Rightarrow x^2 + \frac{28224}{x^2} = 625$

$\Rightarrow x^4 - 625x^2 + 28224 = 0$

$\Rightarrow x^4 - 576x^2 - 49x^2 + 28224 = 0$

$\Rightarrow x^2(x^2 - 576) - 49(x^2 - 576) = 0$

$\Rightarrow (x^2 - 576)\,(x^2 - 49) = 0$

$\Rightarrow x^2 = 576$ or $x^2 = 49 \Rightarrow x = 24$ or $x = 7$.

Hence, length = 24 m and breadth = 7 m.

43. Length of diagonal = $\left(52 \times \frac{15}{60}\right)$ m = 13 m.

Sum of length and breadth = $\left(68 \times \frac{15}{60}\right)$ m = 17 m.

$\therefore \sqrt{l^2 + b^2} = 13$ or $l^2 + b^2 = 169$ and $l + b = 17$.

Area $= lb = \frac{1}{2}(2\,lb)$

$= \frac{1}{2}[(l+b)^2 - (l^2 + b^2)] = \frac{1}{2}[(17)^2 - 169]$

$= \frac{1}{2}(289 - 169) = 60\text{ m}^2.$

44. We have : $lb = 60$ and $\sqrt{l^2 + b^2} + l = 5b$.

Now, $l^2 + b^2 = (5b - l)^2$

$\Rightarrow 24b^2 - 10lb = 0$

$\Rightarrow 24b^2 - 600 = 0$

$\Rightarrow b^2 = 25 \Rightarrow b = 5.$

$\therefore l = \left(\frac{60}{5}\right)$ m = 12 m. So, length of the carpet = 12 m.

45. Let length = $(3x)$ metres and breadth = $(2x)$ metres.

Then, $(3x + 5) \times 2x = 2600$

$\Leftrightarrow 6x^2 + 10x - 2600 = 0$

$\Leftrightarrow 3x^2 + 5x - 1300 = 0$

$\Leftrightarrow (3x + 65)\,(x - 20) = 0 \Leftrightarrow x = 20.$

$\therefore$ Breadth = $2x$ = 40 m.

46. Let the length and breadth of the carpet be l and b metres respectively and let the rate of carpeting be ₹ x per metre.

Then, $lbx = 120$ ...(*i*)

And, $l(b - 4)x = \Rightarrow lbx - 4lx = 100 \Rightarrow 4lx = 20$ ...(*ii*)

Dividing (*i*) by (*ii*), we get: $\frac{lbx}{4lx} = \frac{120}{20} \Rightarrow b = 24$ m.

47. Let breadth = x cm. Then, length = $(x + 8)$ m.

$\therefore (x + 8)\,x = (x + 15)\,(x - 4)$

$\Leftrightarrow x^2 + 8x = x^2 + 11\,x - 60$

$\Leftrightarrow x = 20.$

So, length = 28 m and breadth = 20 m.

48. Let the length and breadth of the plot be l and b metres respectively.

Then, $lb = 480$

And, $(l + 5)(b + 5) = 725 \Rightarrow lb + 5(l + b) + 25 = 725$

$\Rightarrow 5(l + b) + 505 = 725 \Rightarrow (l + b) = \frac{220}{5} = 44.$ [$\because lb = 480$]

$\therefore$ Length of the fence = $2(l + b) = (2 \times 44)$ m = 88 m.

49. Let the length and breadth of the rectangle be l and b metres respectively.

Then, area of the rectangle = lb.

$lb - (l - 5)\,(b + 3) = 9$

$\Rightarrow lb - (lb + 3l - 5b - 15) = 9$

$\Rightarrow lb - lb - 3l + 5b + 15 = 9$

$\Rightarrow 3l - 5b = 6$ ...(*i*)

And, $(l + 3)(b + 2) - lb = 67$

$\Rightarrow lb + 2l + 3b + 6 - lb = 67$

$\Rightarrow 2l + 3b = 61$ ...(*ii*)

Multiplying (*i*) by 2 and (*ii*) by 3 and subtracting, we get: $-19b = -171$ or $b = 9$.

Putting $b = 9$ in (*i*) we get: $3l = 51$ or $l = 17$ m.

50. Let original length = l metres and original breadth = b metres.

Original area = (lb) m^2.

New length = $\left(\frac{150}{100}l\right)$ m $= \left(\frac{3}{2}l\right)$m;

New breadth = $\left(\frac{150}{100}b\right)$m $= \left(\frac{3}{2}b\right)$m.

New area = $\left(\frac{3}{2}l \times \frac{3}{2}b\right)m^2 = \left(\frac{9}{4}lb\right)$m^2.

$\therefore$ Increase % = $\left(\frac{5}{4}lb \times \frac{1}{lb} \times 100\right)\% = 125\%$.

51. Original breadth = 3 m,

Original length = (1.44×3) m = 4.32 m.

New breadth = (125% of 3) m = $\left(\frac{125}{100} \times 3\right)$m = 3.75 m.

New length = (140% of 4.32) m = $\left(\frac{140}{100} \times 4.32\right)$m = 6.048 m.

Original area = (4.32×3) m^2 = 12.96 m^2.

New area = (6.048×3.75) m^2 = 22.68 m^2.

Increase in area = $(22.68 - 12.96)$ m^2 = 9.72 m^2.

$\therefore$ Increase in cost = ₹ (9.72×45) = ₹ 437.40.

52. Let the original length and breadth of the rectangle be l and b respectively.

Then, original area = lb.

New length = 110% of l = $\frac{11}{10}l$;

New breadth = 90% of b = $\frac{9}{10}b$.

New area = $\left(\frac{11}{10}l \times \frac{9}{10}b\right) = \frac{99}{100}lb$.

Decrease in area = $\left(lb - \frac{99}{100}lb\right) = \frac{lb}{100}$.

$\therefore$ Decrease % = $\left(\frac{lb}{100} \times \frac{1}{lb} \times 100\right)\% = 1\%$.

53. Let the actual length and width of the rectangle be l and b respectively.

Then, measured length = 110% of $l = \frac{11}{10}l$;

measured width = 95% of $b = \frac{19}{20}b$.

Actual area = lb.

Measured area = $\left(\frac{11}{10}l \times \frac{19}{20}b\right) = \frac{209}{200}lb$.

Error in measurement = $\left(\frac{209}{200}lb - lb\right) = \frac{9}{200}lb$.

$\therefore$ Error% = $\left(\frac{9}{200}lb \times \frac{1}{lb} \times 100\right)\% = 4.5\%$.

54. Let the original length and breadth of the rectangle be l and b respectively.

New length = 150% of l = $\frac{3}{2}l$;

New breadth = 75% of b = $\frac{3}{4}b$.

Original area = lb. New area = $\left(\frac{3}{2}l \times \frac{3}{4}b\right) = \frac{9}{8}lb$.

Increase in area = $\left(\frac{9}{8}lb - lb\right) = \frac{lb}{8}$.

$\therefore$ Increase % = $\left(\frac{lb}{8} \times \frac{1}{lb} \times 100\right)\% = 12.5\%$.

55. Let original length = x and original breadth = y.

Decrease in area = $xy - \left(\frac{80}{100}x \times \frac{90}{100}y\right)$

$= \left(xy - \frac{18}{25}xy\right) = \frac{7}{25}xy$.

$\therefore$ Decrease% = $\left(\frac{7}{25}xy \times \frac{1}{xy} \times 100\right)\%$ = 28%.

56. Let original length = x and original breadth = y. Then, original area = xy.

New length = $\frac{x}{2}$; New breadth = $3y$;

New area = $\left(\frac{x}{2} \times 3y\right) = \frac{3}{2}xy$.

$\therefore$ Increase% = $\left(\frac{1}{2}xy \times \frac{1}{xy} \times 100\right)\%$ = 50%.

57. Let original length = x and original breadth = y.

Then, original area = xy.

New area = $\left[\frac{(100-r)}{100} \times x\right]\left[\frac{(105+r)}{100} \times y\right]$

$= \left[\left(\frac{10500 - 5r - r^2}{10000}\right)xy\right]$

$\therefore \left(\frac{10500 - 5r - r^2}{10000}\right)xy = xy$

$\Leftrightarrow r^2 + 5r - 500 = 0 \Leftrightarrow (r + 25)(r - 20) = 0 \Leftrightarrow r = 20$.

58. Let original length = x and original breadth = y. Then original area = xy.

New length = $\frac{160x}{100} = \frac{8x}{5}$. Let new breadth = z.

Then, $\frac{8x}{5} \times z = xy \Rightarrow z = \frac{5y}{8}$.

$\therefore$ Decrease in breadth = $\left(\frac{3y}{8} \times \frac{1}{y} \times 100\right)\% = 37\frac{1}{2}\%$.

59. Let original length = x and original breadth = y. Then, original area = xy.

New length = $\frac{130}{100}x = \frac{13x}{10}$. New breadth = y.

New area $= \left(\frac{13x}{10} \times y\right) = \frac{13xy}{10}$.

$\therefore$ Required ratio $= \left(\frac{\frac{13xy}{10}}{xy}\right) = \frac{13}{10} = 13 : 10.$

60. Let the original length and breadth of the rectangle be l and b respectively

Then, original area $= lb$.

New area $= 2lb$.

New breadth $= 50\%$ of $b = \frac{b}{2}$. New length $= \frac{2lb}{\left(\frac{b}{2}\right)} = 4l$.

Increase in length $= (4l - l) = 3l$.

$\therefore$ Increase % $= \left(3l \times \frac{1}{l} \times 100\right)\% = 300\%$.

61. Let the original length and breadth of the rectangle be l and b respectively.

Then, original area $= lb$.

New length $= 120\%$ of $l = \frac{6}{5}l$. New area $= 150\%$ of $lb = \frac{3lb}{2}$.

New breadth $= \left(\frac{3lb}{2} \times \frac{5}{6l}\right) = \frac{5b}{4}$.

Increase in breadth $= \left(\frac{5b}{4} - b\right) = \frac{b}{4}$.

$\therefore$ Increase% $= \left(\frac{b}{4} \times \frac{1}{b} \times 100\right)\% = 25\%$

62. Let the length and breadth of the rectangle be l and b respectively.

Then, 80% of $l = b \Rightarrow b = \frac{4}{5}l$.

(1) Area of rectangle $= lb = \left(l \times \frac{4}{5}l\right) = \frac{4}{5}l^2$.

Area of square $= \left(\frac{4}{5}l\right)^2 = \frac{16}{25}l^2$.

Difference $= \left(\frac{4}{5}l^2 - \frac{16}{25}l^2\right) = \frac{4l^2}{25}$.

$\therefore$ Percentage difference $= \left(\frac{4l^2}{25} \times \frac{5}{4l^2} \times 100\right)\% = 20\%$.

(2) Perimeter of square $= 4 \times \frac{4}{5}l = \frac{16}{5}l$.

Perimeter of rectangle $= 2\left(l + \frac{4}{5}l\right) = \frac{18}{5}l$.

Difference $= \left(\frac{18}{5}l - \frac{16}{5}l\right) = \frac{2}{5}l$.

$\therefore$ Percentage difference $= \left(\frac{2}{5}l \times \frac{5}{18l} \times 100\right)\% = 11\frac{1}{9}\%$

(3) Diagonal of square $= \sqrt{\left(\frac{4}{5}l\right)^2 + \left(\frac{4}{5}l\right)^2} = \sqrt{\frac{32}{25}l^2} = \frac{4\sqrt{2}}{5}l$

$= \frac{4 \times 1.414}{5}l = 1.13l$.

Diagonal of rectangle $= \sqrt{l^2 + \left(\frac{4}{5}l\right)^2} = \sqrt{l^2 + \frac{16}{25}l^2}$

$= \sqrt{\frac{41}{25}l^2} = \frac{\sqrt{41}}{5}l = \frac{6.403}{5}l = 1.28\,l$.

Difference $= (1.28\,l - 1.13\,l) = 0.15\,l$.

Percentage difference $= \left(\frac{0.15\,l}{1.28\,l} \times 100\right)\% = 11.72\% \approx 12\%$.

63. Area of the sheet $= (30 \times 15)$ cm^2 $= 45$ cm^2.

Area used for typing $= [(30 - 5) \times (15 - 2.5)]$ cm^2 $= 312.5$ cm^2.

$\therefore$ Required percentage $= \left(\frac{312.5}{450} \times 100\right)\% = 69.4\% \approx 70\%$.

64. Area of the carpet $= [(5 - 0.20) \times (8 - 0.20)]$ m^2 $= (4.8 \times 7.8)$ m^2 $= 37.44$ m^2.

$\therefore$ Cost of carpeting $=$ ₹ $(37.44 \times 18) =$ ₹ 673.92.

65. Area of the footpath $= \left[\{(80 + 2) \times (50 + 2\} - (80 \times 50)\right]$m^2

$= [(82 \times 52) - (80 \times 50)]$ m^2 $= (4264 - 4000)$ m^2 $= 264$ m^2.

66. Let the length of the field be x metres. Then, breadth of the field $= \left(\frac{3}{4}x\right)$metres.

$x \times \frac{3}{4}x = 300 \Rightarrow x^2 = 300 \times \frac{4}{3} = 400 \Rightarrow x = 20.$

So. length $= 20$ m, breadth $= 15$ m.

$\therefore$ Area of the garden

$= [\{(20 + 3) \times (15 + 3)\} - (20 \times 15)]$ m^2

$= [(23 \times 18) - (20 \times 15)]$ m^2 $= (414 - 300)$ m^2 $= 114$ m^2.

67. $2(l + b) = 340$ (Given).

Area of the boundary

$= [(l + 2)(b + 2) - lb] = 2\,(l + b) + 4 = 344.$

$\therefore$ Cost of gardening $=$ ₹ $(344 \times 10) =$ ₹ 3440.

68. $lb = 96$ (Given)

Area of pathway $= [(l - 4)(b - 4) - lb] = 16 - 4(l + b)$, which cannot be determined.

So, data is inadequate.

69. Let the width of the path be x.

Then, $[(38 \times 32) - \{(38 - 2x)(32 - 2x)\}] = 600$

$\Rightarrow [1216 - (1216 - 140x + 4x^2)]$

$\Rightarrow 4x^2 - 140\,x + 600 = 0 \Rightarrow x^2 - 35x + 150 = 0$

$\Rightarrow x^2 - 30x - 5x + 150 = 0 \Rightarrow (x - 30)\,(x - 5) = 0$

$\Rightarrow x = 5$ m. $[\because x \neq 30]$

70. Let the width of walk be x metres. Then,

$(20 - 2x)\,(10 - 2x) = 96 \;\Leftrightarrow 4x^2 + 60x - 104 = 0$

$\Leftrightarrow x^2 + 15x - 26 = 0$

$\Leftrightarrow (x - 13)\,(x - 2) = 0 \quad \Leftrightarrow x = 2$ $[\because x \neq 13]$

71. Length of the fence $= 2(60 + 40)$ m $= 200$ m.

Cost of fencing $=$ ₹ $(200 \times 50) =$ ₹ 10000.

Area of the road $= [(64 \times 44) - (60 \times 40)]$ m^2

$= (2816 - 2400)$ m^2 $= 416$ m^2.

Let the cost of tiling the rood be ₹ x per sq. m.

$\therefore 416x + 10000 = 51600 \Rightarrow 416x = 41600 \Rightarrow x =$ ₹ 100.

72. Area of the roads = $(80 \times 10 + 60 \times 10 - 10 \times 10)$ m^2
= 1300 m^2.
$\therefore$ Cost of gravelling = ₹ (1300×30) = ₹ 39000.

73. Area of the field = (25×15) m^2 = 375 m^2.
Area of the passages = $(25 \times 2 + 15 \times 2 - 2 \times 2)$ m^2
= 76 m^2.
Area under grass = $(375 - 76)$ m^2 = 299 m^2.

74. Area of the park = (60×40) m^2 = 2400 m^2.
Area of the lawn = 2109 m^2.
$\therefore$ Area of the crossroads = $(2400 - 2109)$ m^2 = 291 m^2.
Let the width of the road be x metres. Then,
$60x + 40x - x^2 = 291 \Leftrightarrow x^2 - 100x + 291 = 0 \Leftrightarrow (x - 97)(x - 3) = 0 \Leftrightarrow x = 3$ $[\because x \neq 97]$.

75. Let the length and breadth of each card be l and b inches respectively.
Then, area of each card = (lb) sq.inches
Area of the rectangle = Sum of areas of 9 cards = $(9\ lb)$ sq. inches.
So, $9\ lb = 180 \Rightarrow lb = 20$ ...(*i*)
Length of rectangle = $(5b)$ inches. Breadth of rectangle = $(l + b)$ inches.
Area of rectangle = $5b(l + b)$ sq. inches
$\therefore$ $5b(l + b) = 180 \Rightarrow lb + b^2 = 36$
$\Rightarrow b^2 = 36 - 20 = 16 \Rightarrow b = 4.$
Putting $b = 4$ in (*i*), we get: $l = 5$.
So, length of rectangle = (5×4) inches = 20 inches.
Breadth of rectangle = $(5 + 4)$ inches = 9 inches.
Perimeter of rectangle = $2(20 + 9)$ inches = 58 inches.

76. Area of the path = $[(26 \times 16) - (24 \times 14)]$ m^2 = $(416 - 336)$ m^2 = 80 m^2.
$\therefore$ Number of tiles required to cover the path
$$= \frac{\text{Area of path}}{\text{Area of each tile}} = \left(\frac{80 \times 100 \times 100}{20 \times 20}\right) = 2000.$$

77. (*a*) Diagonal of the rectangle =
$\sqrt{(51)^2 + (49)^2}\ \text{m} = \sqrt{2601 + 2401}\ \text{m} = \sqrt{5002}\ \text{m}.$
Diagonal of the square = $50\sqrt{2}\ \text{m} = \sqrt{5000}\ \text{m}.$
(*b*) Diagonals of a square intersect at right angles but those of a rectangle do not.
(*c*) Perimeter of rectangle = $2(51 + 49)$ m = 200 m.
Perimeter of square = (4×50) m = 200 m.
(*d*) Area of rectangle = (50×50) m^2 = 2500 m^2.

78. $\text{Side} = \sqrt{2550.25} = \sqrt{\frac{255025}{100}} = \frac{505}{10} = 50.5\ \text{m}.$

79. Side of the square = $\left(\frac{48}{4}\right)\text{cm} = 12\ \text{cm}.$
Area of the square = (12×12) cm^2 = 144 cm^2.

80. Area of given square = (25×25) m^2 = 625 m^2.
Area of new square = (625×4) m^2 = 2500 m^2.
$\therefore$ Side of new square = $\sqrt{2500}\ \text{m} = 50\ \text{m}.$

81. Length of rectangle = 25 cm;
Breadth of rectangle = 15 cm.
Area of rectangle = (25×15) cm^2 = 375 cm^2.
$\therefore$ Area of square = $\left(\frac{3}{5} \times 375\right)\text{cm}^2 = 225\ \text{cm}^2$ Side of square
$= \sqrt{225}\ \text{cm} = 15\ \text{cm}.$
Perimeter of square = (4×15) cm = 60 cm.

82. Area of square = $\sqrt{1024}\ \text{cm} = 32\ \text{cm}.$
Length of rectangle = (2×32) cm = 64 cm. Breadth of rectangle = $(32 - 12)$ cm = 20 cm.
$\therefore$ Required ratio = 64 : 20 = 16 : 5.

83. Area of square $ABCD$ = 36 m^2. $AB = \sqrt{36}\ \text{m} = 6\ \text{m}.$
$AE = \frac{1}{2} \times AB = 3\ \text{m}.$
Area of rectangle $AEFG$ = 36 m^2.
$\therefore$ $AE \times EF = 36 \Rightarrow EF = \left(\frac{36}{3}\right) = 12\ \text{m}.$
Perimeter of rectangle $AEFG = 2(AE + EF)$
$= [2(3 + 12)]$ m = 30 m.

84. $\text{Area} = \frac{\text{Total cost}}{\text{Rate}} = \left(\frac{6165}{685}\right)\text{hectares} = (9 \times 10000)\ \text{m}^2.$
$\therefore$ Side of the square = $\sqrt{90000}\ \text{m} = 300\ \text{m}.$
Perimeter of the field = (300×4) m = 1200 m.
Cost of fencing = ₹ (1200×48.75) = ₹ 58500.

85. Perimeter of the square = Perimeter of the rectangle
$= 2(12 + 10)$ cm = 44 cm.
Side of the square = $\left(\frac{44}{4}\right)\text{cm} = 11\ \text{cm}.$
Area of the rectangle = (12×10) cm^2 = 120 cm^2.
Area of the square = (11×11) cm^2 = 121 cm^2.
$\therefore$ Required percentage = $\left(\frac{1}{120} \times 100\right)\% = \frac{5}{6}\%.$

86. $$\frac{\text{Monthly income of family A}}{\text{Monthly income of family B}} = \frac{\text{Area of square A}}{\text{Area of square B}}$$
$$\Rightarrow \frac{40000}{x} = \frac{2^2}{3^2} \Rightarrow x = \left(\frac{40000 \times 9}{4}\right) = 90000.$$

87. Let $AB = x$. Then $BC = 3x$.
$BJ = AB = x$, $HJ = AB = x$,
$HG = BC = 3x$.
$$\frac{\text{Area } BCDJ}{\text{Area } HJFG} = \frac{BC \times BJ}{HG \times HJ} = \frac{3x \times x}{3x \times x} = 1.$$

88. The sides of the five squares are
$\left(\frac{24}{4}\right), \left(\frac{32}{4}\right), \left(\frac{40}{4}\right), \left(\frac{76}{4}\right), \left(\frac{80}{4}\right)$
i.e., 6 cm, 8 cm, 10 cm, 19 cm, 20 cm.
$\therefore$ Area of the new square = $[6^2 + 8^2 + (10)^2 + (19)^2 + (20)^2]$
$= (36 + 64 + 100 + 361 + 400)$ cm^2 = 961 cm^2.
Side of the new square = $\sqrt{961}$ cm = 31 cm.
Perimeter of the new square = (4×31) cm = 124 cm.

89. Area of each small square $= \left(\frac{400}{64}\right)\text{cm}^2 = 6.25 \text{ cm}^2$.

Side of each small square $= \sqrt{6.25}$ cm $= 2.5$ cm.

Since there are 8 squares along each side of the chessboard, we have :

Side = [(8 × 2.5) + 6] cm = 26 cm.

90. PQ $= \sqrt{100} + \sqrt{16} + \sqrt{49} = (10 + 4 + 7) = 21$.

Side of middle square $= \sqrt{16} = 4$.

Reduction in PQ = (21 – 19) = 2.

New side of middle square = (4 – 2) = 2.

∴ Reduction in area of middle square = $(4^2 - 2^2) = 12$.

91. Number of tiles required

$$= \frac{\text{Area of hall}}{\text{Area of each tile}} = \left(\frac{60 \times 40}{0.4 \times 0.4}\right) = 15000.$$

∴ Total cost of tiles = ₹ (15000 × 5) ₹ 75000.

92. Number of marbles $= \left(\frac{300 \times 300}{20 \times 30}\right) = 150$.

93. Area of each slab $= \left(\frac{72}{50}\right)\text{m}^2 = 1.44 \text{ m}^2$.

∴ Length of each slab $= \sqrt{1.44}$ m $= 1.2$ m $= 120$ cm.

94. Length of rectangle = 4 ft = (4 × 12) inch = 48 inch.

Width of rectangle = 6 ft = (6 × 12) inch = 72 inch.

∴ Number of squares $= \dfrac{48 \times 72}{\frac{1}{2} \times \frac{1}{2}} = 13824$.

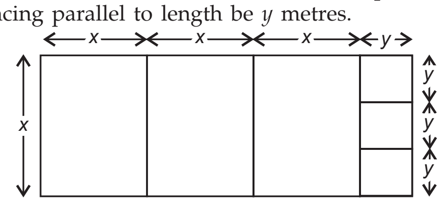
95. Area left after laying black tiles = [(20 – 4) × (10 – 4)] sq. ft = 96 sq. ft.

Area under white tiles $= \left(\frac{1}{3} \times 96\right)$ sq. ft = 32 sq. ft

Area under blue tiles = (96 – 32) sq. ft = 64 sq. ft.

Number of blue tiles $= \dfrac{64}{(2 \times 2)} = 16$.

96. Let the side of each square formed by fencing parallel to breadth be x metres and that of each square formed by fencing parallel to length be y metres.



Then, $3x^2 + 3y^2 = 4320 \Rightarrow x^2 + y^2 = 1440$ ...(*i*)

And, $x(3x + y) = 4320 \Rightarrow 3x^2 + xy = 3(x^2 + y^2)$

$\Rightarrow xy = 3y^2 \Rightarrow x = 3y$ ...(*ii*)

From (*i*) and (*ii*), we have: $(3y)^2 + y^2 = 1440 \Rightarrow 10y^2 = 1440 \Rightarrow y^2 = 144 \Rightarrow y = 12$

So, $x = 36$.

Length of rectangular plot = $3x + y$ = (3 × 36 + 12) m = 120 m.

Breadth of rectangular plot = x = 36 m.

97. Maximum possible size of a flower bed = (H.C.F of 110, 130, 190) sq. m = 10 sq. m

∴ Maximum possible length $= \left(\frac{10}{2}\right)$ m $= 5$ m.

98. Length of largest tile = H.C.F. of $12\frac{1}{4}$ m and 7 m = H.C.F. of 12.25 m and 7 m

= H.C.F. of 1225 cm and 700 cm = 175 cm.

99. Length of largest lile = H.C.F. of 624 cm and 480 cm = 48 cm.

Area of each tile = (48 × 48) cm^2.

∴ Required number of tiles $= \left(\frac{624 \times 480}{48 \times 48}\right) = 130$.

100. Length of the room = (7 + 7) m = 14 m. Breadth of the room = 7 m.

∴ Area of the room = (14 × 7) m^2 = 98 m^2.

101. Let the sides of the rectangle be x metres and (x + 48) metres.

Then, $2(x + x + 48) = 160 \Rightarrow 4x + 96 = 160 \Rightarrow 4x = 64 \Rightarrow x = 16$.

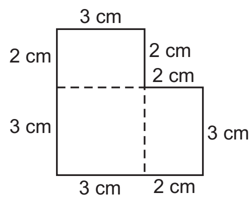
So, sides of the rectangle are 16 m and 64 m.

Area of the rectangle = (16 × 64) m^2 = 1024 m^2. Area of the square = 1024 m^2.

∴ Side of the square $= \sqrt{1024}$ m $= 32$ m.

102. Required area = [(2 × 3) + (3 × 3) + (2 × 3)] cm^2

= (6 + 9 + 6) cm^2 = 21 cm^2.



103. Side of the square = 12 cm

Area of rectangle = [(12 × 12) – 4] cm^2 = 140 cm^2.

∴ Breadth $= \dfrac{\text{Area}}{\text{Length}} = \dfrac{140}{14} = 10$ cm.

Hence, perimeter = $2(l + b)$ = 2 (14 + 10) cm = 48 cm.

104. Let the side of the square be x cm. Then, its area = x^2 cm^2.

Area of the rectangle = $(3x^2)$ cm^2.

∴ $40 \times \frac{3}{2} \times x = 3x^2 \Leftrightarrow x = 20$.

105. Perimeter of square = 160 m.

Side of square $= \left(\frac{160}{4}\right)$ m $= 40$ m.

Area of square = (40 × 40) m^2 = 1600 m^2

Area of rectangle = (1600 – 100) m^2 = 1500 m^2.

Let the length and breadth of the rectangle be l and b respectively.

Then, $2(l + b) = 160 \Rightarrow l + b = 80 \Rightarrow b = 80 - l$.

∴ $lb = 1500 \Rightarrow l(80 - l) = 1500 \Rightarrow 80l - l^2 = 1500$

$\Rightarrow l^2 - 80l + 1500 = 0 \Rightarrow (l - 50)(l - 30) = 0$

$\Rightarrow l = 50$.

Hence, length = 50 m, breadth = 30 m.

106. Let the side of the square be x cm. Then, breadth of the rectangle $=\left(\frac{2}{3}x\right)$ cm. $90\times\frac{2}{3}x=4x^2\Rightarrow 6x=90\Rightarrow x=15$ cm.

107. Perimeter $=\frac{\text{Total cost}}{\text{Cost per m}}=\frac{10080}{20}$ m $=504$ m.

Side of the square $=\frac{504}{4}$ m $=126$ m.

Breadth of the pavement = 3 m.

Side of inner square = (126 – 6) m = 120 m.

Area of the pavement = $[(126\times126)-(120\times120)]$ m^2

$= [(126+120)(126-120)]$ m^2

$= (246\times6)$ m^2.

$\therefore$ Cost of pavement = ₹ $(246\times6\times50)$ = ₹ 73800.

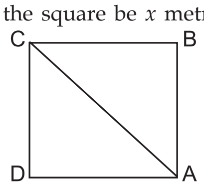
108. Let the length of the outer edge be x metres. Then, length of the inner edge = $(x-6)$ m.

$\therefore\ x^2-(x-6)^2=1764 \Leftrightarrow x^2-(x^2-12x+36)=1764$

$\Leftrightarrow 12x=1800 \Leftrightarrow x=150.$

$\therefore$ Required perimeter = $(4x)$ m = (4×150) m = 600 m.

109. Let the side of the square be x metres.



Then, $AB+BC=2x$ metres.

$AC=\sqrt{2}\,x=(1.41\,x)$ m

Saving on $2x$ metres = $(0.59x)$m.

Saving% $=\left(\frac{0.59x}{2x}\times100\right)\%$ = 30% (approx.).

110. Area of the square $=\left[\frac{1}{2}\times(5.2)^2\right]$ cm^2

$=\left(\frac{1}{2}\times27.04\right)cm^2=13.52$ cm^2.

111. Speed of the man $=\left(4\times\frac{5}{18}\right)$m/s $=\frac{10}{9}$ m/s.

Time taken = (3×60) sec = 180 sec.

Length of diagonal = (speed × time) $=\left(\frac{10}{9}\times180\right)$m $=200$ m.

Area of the field $=\frac{1}{2}\times(\text{diagonal})^2$

$=\left(\frac{1}{2}\times200\times200\right)m^2=20000$ m^2.

112. $d=\sqrt{2}\times l \Rightarrow l=\frac{20}{\sqrt{2}}.$

$\therefore$ Perimeter = $(4l)$ cm $=\left(\frac{4\times20}{\sqrt{2}}\times\frac{\sqrt{2}}{\sqrt{2}}\right)$cm $=40\sqrt{2}$ cm.

113. Side $=\sqrt{69696}$ cm = 264 cm.

$\therefore\ d=\sqrt{2}\times$ side $=(264\sqrt{2})$ cm $=(264\times1.414)$ cm $=373.296$ cm.

114. Area = (45×40) m^2 $\Leftrightarrow \frac{1}{2}\times(\text{diagonal})^2$

$=1800 \Leftrightarrow$ diagonal = 60 m.

115. Area = 0.5 hectare = (0.5×10000) m^2 = 5000 m^2.

$\therefore\ \frac{1}{2}(\text{diagonal})^2=5000\Rightarrow$ diagonal $=\sqrt{10000}=100$ m.

116. Let the length of the diagonal be x km.

Then, $\frac{1}{2}x^2=50 \Rightarrow x^2=100 \Rightarrow x=\sqrt{100}=10$ km

$=\left(\frac{10}{1.6}\right)$miles $=6.25$ miles [$\because$ 1 mile = 1.609 km]

117. Let breadth be x metres.

Then, length = 120% of $x=\left(\frac{120}{100}x\right)=\frac{6x}{5}$ m.

Required ratio $=\left(\frac{6x}{5}\times x\times\frac{1}{x\times x}\right)$ = 6 : 5.

118. A square and a rectangle with equal areas will satisfy the relation $p_1<p_2$.

119. Take a square of side 4 cm and a rectangle having l = 6 cm, b = 2 cm.

Then, perimeter of square = perimeter of rectangle.

Area of square = 16 cm^2, area of rectangle = 12 cm^2.

$\therefore$ A > B.

120. $d_1=4\sqrt{2}$ cm $\Rightarrow$ area $=\frac{1}{2}d_1^2=\frac{1}{2}\times(4\sqrt{2})^2$ = 16 cm^2.

Area of new square = (2×16) cm^2 = 32 cm^2.

$\therefore\ \frac{1}{2}d_2^2=32 \Rightarrow d_2^2=64 \Rightarrow d_2=8$ cm.

121. Required ratio $=\frac{a^2}{(\sqrt{2}\,a)^2}=\frac{a^2}{2a^2}=\frac{1}{2}=1:2.$

122. Let $ABCD$ be the square S_1 and $EFGH$ be the square S_2. Let the length of each side of S_1 be a.

Then, $AF=AG=\frac{a}{2}$.

So $FG=\sqrt{(AF)^2+(AG)^2}=\sqrt{\left(\frac{a}{2}\right)^2+\left(\frac{a}{2}\right)^2}=\sqrt{\frac{2a^2}{4}}=\frac{a}{\sqrt{2}}.$

Length of the side of $S_2=\frac{a}{\sqrt{2}}$.

$\therefore\ \frac{A_1}{A_2}=\frac{a^2}{\left(\frac{a}{\sqrt{2}}\right)^2}=2$ or $A_1=2A_2$.

123. Let the length of diagonal of the bigger square be x and that of the smaller square be y.

Then, $A=\frac{1}{2}x^2$ or $x=\sqrt{2A}$.

And, $\frac{A}{2}=\frac{1}{2}y^2$ or $y=\sqrt{A}$.

$\therefore$ Required ratio $=\frac{y}{x}=\frac{\sqrt{A}}{\sqrt{2A}}=1:\sqrt{2}.$

124. Let the diagonals be $2d$ and d.

Then, ratio of their areas $= \dfrac{\frac{1}{2}\times(2d)^2}{\frac{1}{2}\times d^2} = \dfrac{4d^2}{d^2} = \dfrac{4}{1} = 4 : 1.$

125. $\dfrac{a^2}{b^2} = \dfrac{225}{256} = \dfrac{(15)^2}{(16)^2} \Leftrightarrow \dfrac{a}{b} = \dfrac{15}{16} \Leftrightarrow \dfrac{4a}{4b} = \dfrac{4\times 15}{4\times 16} = \dfrac{15}{16}.$

$\therefore$ Ratio of perimeter = 15 : 16.

126. Area = 1 hect. = 10000 sq. m. $\Rightarrow$ side $= \sqrt{10000}$ m $= 100$ m.

Side of the other square = 101 m.

Difference in their areas $= [(101)^2 - (100)^2]$ m^2
$= [(101 + 100)(101 - 100)]$ m^2
$= 201$ m^2.

127. Let original length of side be x.

Then, new length $= (110\%$ of $x) = \dfrac{11x}{10}$.

Original area $= x^2$ New area $= \left(\dfrac{11x}{10}\right)^2 = \dfrac{121x^2}{100}$.

Increase in area $= \left(\dfrac{121x^2}{100} - x^2\right) = \dfrac{21x^2}{100}$.

$\therefore$ Increase% $= \left(\dfrac{21x^2}{100}\times\dfrac{1}{x^2}\times 100\right)\% = 21\%$.

128. Let the original length of each side be x.

Then, new length $= 150\%$ of $x = \left(\dfrac{150}{100}x\right) = \dfrac{3x}{2}$.

$\therefore$ Required ratio $= \dfrac{\left(\frac{3x}{2}\right)^2}{x^2} = \dfrac{9}{4} = 9 : 4.$

129. $A_1 = x^2$ and $A_2 = \left(\dfrac{1}{2}x\right)^2 = \dfrac{1}{4}x^2 = \dfrac{1}{4}A_1$.

130. $A_1 = x^2$ and A_2 $(2x)^2 = 4x^2$.

Increase in area $= (4x^2 - x^2) = 3x^2$.

Increase % $= \left(\dfrac{3x^2}{x^2}\times 100\right)\% = 300\%$.

131. 100 cm is read as 102 cm.

$\therefore A_1 = (100 \times 100)$ cm^2 and $A_2 = (102 \times 102)$ cm^2.

$(A_2 - A_1) = [(102)^2 - (100)^2] = (102 + 100)(102 - 100)$
$= 404$ cm^2.

$\therefore$ Percentage error $= \left(\dfrac{404}{100\times 100}\times 100\right)\% = 4.04\%$.

132. Let original area = 100 cm^2. Then, new area = 169 cm^2.

$\Rightarrow$ Original side = 10 cm,

New side = 13 cm. Increase on 10 cm = 3 cm.

Increase% $= \left(\dfrac{3}{10}\times 100\right)\% = 30\%$.

133. Given diagonal $= d$. New diagonal $= \dfrac{3}{2}d$.

Original area $= \dfrac{1}{2}d^2$, New area $= \dfrac{1}{2}\times\left(\dfrac{3}{2}d\right)^2 = \dfrac{9}{8}d^2$.

$\therefore$ Required ratio $= \dfrac{1}{2}d^2 : \dfrac{9}{8}d^2 = \dfrac{1}{2} : \dfrac{9}{8} = 4 : 9.$

134. Let length $= l$ metres and breadth $= b$ metres.

Then, original area $= (lb)$ m^2.

New length $= (140\%$ of $l)$ m $= \left(\dfrac{140}{100}\times l\right)$ m $= \dfrac{7l}{5}$ m.

New breadth $= (130\%$ of $b)$ m $= \left(\dfrac{130}{100}\times b\right)$m $= \dfrac{13b}{10}$ m.

New area $= \left(\dfrac{7l}{5}\times\dfrac{13b}{10}\right) = \left(\dfrac{91}{50}lb\right)$ m^2.

Increase $= \left(\dfrac{91}{50}lb - lb\right) = \dfrac{41}{50}lb$.

$\therefore$ Increase% $= \left(\dfrac{41}{50}\times lb\times\dfrac{1}{lb}\times 100\right)\% = 82\%$.

135. Let original length of each side $= x$ cm. Then, its area $= (x^2)$ cm^2.

Length of rectangle formed $= (x + 5)$ cm and its breadth $= x$ cm.

$\therefore \dfrac{x+5}{x} = \dfrac{3}{2} \Leftrightarrow 2x + 10 = 3x \Leftrightarrow x = 10.$

$\therefore$ Original length of each side = 10 cm and its area = 100 cm^2.

136. Let the length and width of the rectangle be l cm and b cm respectively.

Then, $(l - 4)(b + 3) = lb \Rightarrow lb + 3l - 4b - 12 = lb$
$\Rightarrow 3l - 4b = 12$ ...(*i*)

And, $l - 4 = b + 3 \Rightarrow l - b = 7$ ...(*ii*)

Multiplying (*ii*) by 4 and subtracting (*i*) from it, we get : $l = 16$.

Putting $l = 16$ in (*ii*), we get : $b = 9$.

$\therefore$ Perimeter of the original rectangle
$= 2(l + b) = [2(16 + 9)]$ cm $= 50$ cm.

137. Let the length and breadth of the rectangle be l and b units respectively. Then,

$l - 10 = b + 5$

$\Rightarrow l - b = 15$ ...(*i*)

And, $lb - (l - 10)(b + 5) = 210$

$\Rightarrow lb - (lb + 5l - 10b - 50) = 210$

$\Rightarrow -5l + 10b = 160 \Rightarrow -l + 2b = 32$ ...(*ii*)

Adding (*i*) and (*ii*), we get: $b = 47$. Putting $b = 47$ in (*i*), we get: $l = 62$.

Hence, area of the rectangle $= lb = (62 \times 47)$ sq. units = 2914 sq.units.

Clearly, 2925 > A > 2900.

138. Let original side $= x$ cm. Then, new side $= (x + 5)$ cm.

$\therefore (x + 5)^2 - x^2 = 165 \Leftrightarrow x^2 + 10x + 25 - x^2 = 165$
$\Leftrightarrow 10x = 140 \Leftrightarrow x = 14.$

Hence, the side of the square is 14 cm.

139. Let the lengths of the line segments be x cm and $(x + 2)$ cm.

Then, $(x + 2)^2 - x^2 = 32 \Leftrightarrow x^2 + 4x + 4 - x^2 = 32$
$\Leftrightarrow 4x = 28$
$\Leftrightarrow x = 7.$

$\therefore$ Length of longer line segment = (7 + 2) cm = 9 cm.

140. Let the length of each side of the square be x cm.

Then, length of rectangle = $(x + 5)$ cm and its breadth = $(x - 3)$ cm.

$\therefore$ $(x + 5)(x - 3) = x^2 \Leftrightarrow x^2 + 2x - 15 = x^2 \Leftrightarrow x = \frac{15}{2}$.

$\therefore$ Length $= \left(\frac{15}{2} + 5\right)$cm $= \frac{25}{2}$ cm, breadth

$= \left(\frac{15}{2} - 3\right)$cm $= \frac{9}{2}$ cm.

Hence, perimeter $= 2(l + b) = 2\left(\frac{25}{2} + \frac{9}{2}\right)$ cm = 34 cm

141. Let the length and breadth of the rectangle be l cm and b cm respectively.

Then, $2(l + b) = 10 \Rightarrow l + b = 5 \Rightarrow b = (5 - l)$ cm.

Area of the rectangle $= l(5 - l)$ cm^2 $= (5l - l^2)$ cm^2.

Area of the square $= 2(5l - l^2)$ cm^2 $= (10l - 2l^2)$ cm^2.

$\therefore$ $(l + 1)(6 - l) = (10l - 2l^2) \Rightarrow l^2 - 5l + 6 = 0$ $\Rightarrow (l - 3)(l - 2) = 0 \Rightarrow l = 3$.

Area of the square $= (10 \times 3 - 2 \times 9)$ cm^2 = 12 cm^2.

$\therefore$ Side of the square $= \sqrt{2}$ cm $= 2\sqrt{3}$ cm.

142. Let the sides of the two squares be x metres and y metres respectively.

Then, $29x^2 = 6y^2 - 1$ ...(*i*)

And, $9x - 4y = 1 \Rightarrow 4y = 9x - 1 \Rightarrow y = \frac{9x-1}{4}$ ...(*ii*)

From (*i*) and (*ii*), we get:

$$29x^2 = 6\left(\frac{9x-1}{4}\right)^2 - 1 \Rightarrow 29x^2 = 6\left(\frac{81x^2+1-18x}{16}\right) - 1$$

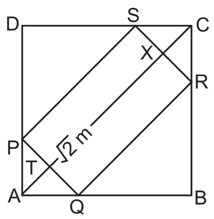
$\Rightarrow 243x^2 + 3 - 54x - 8 = 232x^2$

$\Rightarrow 11x^2 - 54x - 5 = 0 \Rightarrow (x - 5)(11x + 1) = 0 \Rightarrow x = 5$ m.

$\therefore y = \frac{9x-1}{4} = \frac{9\times5-1}{4} = 11$ m.

Required difference = (11 – 5) m = 6 m.

143. Let $AP = AQ = x$ metres.



Then, $x^2 + x^2 = (\sqrt{2})^2 \Rightarrow 2x^2 = 2 \Rightarrow x^2 = 1 \Rightarrow x = 1$ m.

So, ΔPAQ is isosceles.

$\therefore PT = QT = \left(\frac{\sqrt{2}}{2}\right)$m $= \left(\frac{1}{\sqrt{2}}\right)$m.

In ΔPTA, we have: $\angle PTA = 90°$.

$\therefore AT^2 = AP^2 - PT^2 = 1^2 - \left(\frac{1}{\sqrt{2}}\right)^2 = 1 - \frac{1}{2} = \frac{1}{2}$

or $AT = \left(\frac{1}{\sqrt{2}}\right)$m.

Similarly, $CX = \left(\frac{1}{\sqrt{2}}\right)$m.

$\therefore PS = QR = XT = AC - 2\times AT = \left[8\sqrt{2} - \left(2\times\frac{1}{\sqrt{2}}\right)\right]$m

$= \left(8\sqrt{2} - \frac{2}{\sqrt{2}}\right)$m $= \frac{14}{\sqrt{2}}$ m.

Area of the plank $= \left(\frac{14}{\sqrt{2}}\times\sqrt{2}\right)$m^2 = 14 m^2.

144. Perimeter = 64 m $\Rightarrow 2(l + b) = 64$.

$\therefore$ Area of 4 walls $= 2(l + b) \times h = (64 \times 4)$m^2 = 256 m^2.

145. Let breadth = x metres and length = $(2x)$ metres.

Area of 4 walls $= [2(2x + x) \times 4]$ m^2 $= (24x)$ m^2.

$\therefore$ $24x = 120 \Rightarrow x = 5$.

So, length = 10 m, breadth = 5 m.

Area of the floor = (10 × 5) m^2 = 50 m^2.

146. Area to be plastered $= [2(l + b) \times h] + (l \times b)$

$= \{[2(25 + 12) \times 6] + (25 \times 12)\}$ m^2

$= (444 + 300)$ m^2 = 744 m^2.

$\therefore$ Cost of plastering = Rs. $\left(744 \times \frac{75}{100}\right)$ = Rs. 558.

147. Let the breadth and height of the room be b metres and h metres respectively.

Then, length of the room = $(2b)$ metres.

Area of the ceiling $= (2b \times b)$ m $= (2b^2)$ m^2.

$2b^2 = \frac{5000}{25} = 200 \Rightarrow b^2 = 100 \Rightarrow b = 10$.

So, length = 20 m, breadth = 10 m. Area of 4 walls = $[2(20 + 10) \times h]$ m^2 $= (60h)$ m^2.

$\therefore$ $60h = \frac{64800}{240} = 270 \Rightarrow h = \frac{270}{60} = 4.5$ m.

148. Area of 4 walls $= 2(l + b) \times h$

$= [2(12.5 + 9) \times 7]$ m^2 = 301 m^2.

Area of 2 doors and 4 windows

$= [2(2.5 \times 1.2) + 4(1.5 \times 1)]$ m^2 = 12 m^2.

$\therefore$ Area to be painted = (301 – 12) m^2 = 289 m^2.

Cost of painting = ₹(289 × 3.50) = ₹ 1011.50.

149. Let the height of the room be x metres. Then, breadth of the room = $(2x)$ metres.

Area of 4 walls $= [2(16 + 2x) \times x]$ m^2 $= (32x + 4x^2)$ m^2.

$\therefore 32x + 4x^2 = 168 \times 2 \Rightarrow x^2 + 8x - 84 = 0$

$\Rightarrow x^2 + 14x - 6x - 84 = 0 \Rightarrow x(x + 14) - 6(x + 14) = 0$

$\Rightarrow (x + 14)(x - 6) = 0 \Rightarrow x = 6$.

Area of the floor = (16 × 12) m^2 = 192 m^2

150. $A_1 = 2(l + b) \times h$; $A_2 = 2(2l + 2b) \times 2h = 8(l + b) \times h = 4A_1$.

$\therefore$ Required cost = ₹ (4 × 475) = ₹ 1900.

151. Let $h = 2x$ metres and $(l + b) = 5x$ metres.

Length of the paper $= \frac{\text{Total cost}}{\text{Rate per m}} = \frac{260}{2}$ m = 130 m.

Area of the paper $= \left(130 \times \frac{50}{100}\right)$m^2 = 65 m^2.

Total area of 4 walls = (65 + 15) m^2 = 80 m^2.

$\therefore 2(l + b) \times h = 80 \Leftrightarrow 2 \times 5x \times 2x = 80$

$\Leftrightarrow x^2 = 4 \Leftrightarrow x = 2$.

Height of the room = 4 m.

152. Let the length, breadth and height of the room be $3x$, $2x$ and x respectively.

Area of 4 walls $= 2(l + b) \times h = 2(3x + 2x) \times x = 10\,x^2$.

New length $= 6x$, New breadth $= x$, New height $= \dfrac{x}{2}$.

New area of four walls $= \left[2(6x + x) \times \dfrac{x}{2}\right] = 7x^2$.

Decrease in area $= (10x^2 - 7x^2) = 3x^2$.

$\therefore$ Decrease% $= \left(\dfrac{3x^2}{10x^2} \times 100\right)\% = 30\%$.

153. I. Area $= (9 \times 4)$ sq. units $= 36$ sq. units.

Perimeter $= [2(9 + 4)]$ units $= 26$ units.

II. Area $= (6 \times 6)$ sq. units $= 36$ sq. units.

Perimeter $= (4 \times 6)$ units $= 24$ units.

III. Area $= \left(\dfrac{1}{2} \times 8 \times 9\right)$ sq. units $= 36$ sq. units

Third side $= \sqrt{8^2 + 9^2} = \sqrt{64 + 81} = \sqrt{145}$ units.

$\therefore$ Perimeter $= (8 + 9 + \sqrt{145})$ units $= (17 + \sqrt{145})$ units.

Hence, the area of all the three figure area equal.

154. $A_1 = \left(\dfrac{1}{2} \times 15 \times 12\right)\ \text{cm}^2 = 90\ \text{cm}^2$. $A_2 = 2A_1 = 180\ \text{cm}^2$.

$\therefore \dfrac{1}{2} \times 20 \times h = 180 \Leftrightarrow h = 18$ cm.

155. $\Delta = \dfrac{1}{2} \times \text{Base} \times \text{Height} \Rightarrow 40 \times \text{Base}$

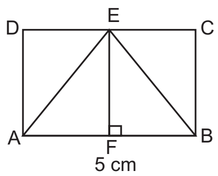
$= \dfrac{1}{2} \times \text{Base} \times \text{Height} \Rightarrow \text{Height} = 80$ cm.

156. $\dfrac{1}{2} \times \text{Base} \times \text{Height} = p \Rightarrow \dfrac{1}{2} x \times \text{Height} = p \Rightarrow \text{Height} = \dfrac{2p}{x}$.

157. Area of equilateral triangle $= \left(\dfrac{\sqrt{3}}{4} \times 8 \times 8\right)\text{cm}^2 = 16\sqrt{3}\ \text{cm}^2$.

158. Required ratio $= (6 \times 6) : \left(\dfrac{\sqrt{3}}{4} \times 6 \times 6\right) = 4 : \sqrt{3}$.

159. Area of $\Delta ABE = \dfrac{1}{2} \times AB \times EF = \dfrac{1}{2} \times AB \times BC$.



$\therefore \dfrac{1}{2} \times AB \times BC = 10 \Rightarrow \dfrac{1}{2} \times 5 \times BC = 10 \Rightarrow BC = \dfrac{2 \times 10}{5} = 4$.

Perimeter of rectangle $ABCD = 2(AB + BC) = [2(5 + 4)]$ cm $= 18$ cm.

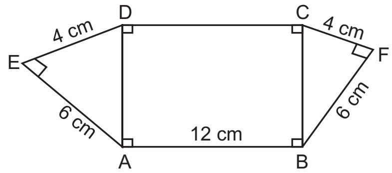
160. $\dfrac{1}{2} \times \text{Base} \times \text{Height} = 60 \times 60 \Rightarrow \dfrac{1}{2} \times \text{Base} \times 90 = 3600$

$\Rightarrow \text{Base} = \left(\dfrac{3600 \times 2}{90}\right) = 80$ m.

161. $AD = \sqrt{4^2 + 6^2}\ \text{cm} = \sqrt{52}\ \text{cm}$

$= 2\sqrt{13}\ \text{cm} = (2 \times 3.6)\ \text{cm} = 7.2$ cm.

$BC = AD = 7.2$ cm.



Area of the whole figure

$=$ area(ΔAED) + area(rect. ABCD) + area(ΔBFC)

$= \left[\left(\dfrac{1}{2} \times 4 \times 6\right) + (12 \times 7.2) + \left(\dfrac{1}{2} \times 4 \times 6\right)\right]\text{cm}^2$

$= (24 + 86.4)\ \text{cm}^2 = 110.4\ \text{cm}^2$.

162. $QR = \sqrt{(PR)^2 - (PQ)^2} = \sqrt{(25)^2 - 3^2}$ cm

$= \sqrt{625 - 9}\ \text{cm} = \sqrt{616}\ \text{cm} = 2\sqrt{154}$ cm.

163. Area of ΔPQR

$= \dfrac{1}{2} \times QR \times PQ = \left(\dfrac{1}{2} \times 2\sqrt{154} \times 3\right)\text{cm}^2 = 3\sqrt{154}\ \text{cm}^2$.

164. Base of the triangle = 8 cm. Height of the triangle = 8 cm.

Area of the triangle $= \left(\dfrac{1}{2} \times 8 \times 8\right)\text{cm}^2 = 32\ \text{cm}^2$.

Area of the square $= (8 \times 8)\ \text{cm}^2 = 64\ \text{cm}^2$.

$\therefore$ Required area $= (64 - 32)\ \text{cm}^2 = 32\ \text{cm}^2$.

165. $x = \dfrac{1}{2} \times CD \times LM;\ y = \dfrac{1}{2} \times CM \times BC = \dfrac{1}{2} \times \left(\dfrac{1}{2} CD\right) \times LM$

$= \dfrac{1}{4} \times CD \times LM = \dfrac{1}{2} x;$

$z = \dfrac{1}{2} \times CM \times LM = \dfrac{1}{2} \times \left(\dfrac{1}{2} CD\right) \times LM = \dfrac{1}{4} \times CD \times LM = \dfrac{1}{2} x.$

$\therefore x = 2y = 2z$.

166. Let base $= 3x$ cm and altitude $= 4x$ cm.

Then, $\dfrac{1}{2} \times 3x \times 4x = 1176 \Leftrightarrow 12x^2 = 2352$

$\Leftrightarrow x^2 = 196 \Leftrightarrow x = 14$ cm.

$\therefore$ Altitude $= (4 \times 14)$ cm $= 56$ cm.

167. Since $3^2 + 4^2 = 5^2$, so it is a right-angled triangle with Base = 3 cm and Height = 4 cm.

$\therefore$ Area $= \left(\dfrac{1}{2} \times 3 \times 4\right)\text{cm}^2 = 6\ \text{cm}^2$.

168. Since $(20)^2 + (21)^2 = (29)^2$, so it is a right-angled triangle with Base = 20 m Height = 21 m.

$\therefore$ Area $= \left(\dfrac{1}{2} \times 20 \times 21\right)\text{m}^2 = 210\ \text{m}^2$.

169. Let the sides of the triangle be $5x$, $5x$ and $4x$ cm respectively.

Then, $5x + 5x = 4x + 14$ or $14x = 14$ or $x = 1$.

So, $a = 5$ cm, $b = 5$ cm, $c = 4$ cm.

$s = \frac{a+b+c}{2} = \left(\frac{14}{2}\right) \text{cm} = 7 \text{ cm}.$ $(s - a) = 2$ cm, $(s - b)$ $= 2$ cm, $(s - c) = 3$ cm.

$\therefore$ Area of the triangle $= \sqrt{7\times2\times2\times3}\ \text{cm}^2 = 2\sqrt{21}\ \text{cm}^2.$

170. Ratio of sides $= \frac{1}{2} : \frac{1}{3} : \frac{1}{4} = 6 : 4 : 3.$

Perimeter = 52 cm. So, sides are

$\left(52\times\frac{6}{13}\right)$ cm, $\left(52\times\frac{4}{13}\right)$ cm and $\left(52\times\frac{3}{13}\right)$ cm.

So, $a = 24$ cm, $b = 16$ cm, $c = 12$ cm.

$\therefore$ Length of smallest side = 12 cm.

171. Let the sides of the triangle be x cm, $(x + 1)$ cm and $(x + 2)$ cm respectively.

Then, $x + (x + 1) + (x + 2) = 120 \Rightarrow 3x + 3 = 120$ $\Rightarrow 3x = 117 \Rightarrow x = 39.$

$\therefore$ Length of greatest side = (39 + 2) cm = 41 cm.

172. Let $a = 3x$ cm, $b = 4x$ cm and $c = 5x$ cm. Then, $s = 6x$ cm.

$A = \sqrt{s\,(s-a)\,(s-b)\,(s-c)}$

$= \sqrt{6x\times3x\times2x\times x} = (6x^2)\ \text{cm}^2.$

$\therefore 6x^2 = 216 \Leftrightarrow x^2 = 36 \Leftrightarrow x = 6.$

So $a = 18$ cm, $b = 24$ cm and $c = 30$ cm.

Perimeter = (18 + 24 + 30) cm = 72 cm.

173. $a = 6$ cm, $b = 8$ cm, $c = 10$ cm. So, $s = \frac{6+8+10}{2} = 12$ cm.

Area of the triangle $= \sqrt{12\times6\times4\times2}\ \text{cm}^2 = 24\ \text{cm}^2.$

Let the length of the required altitude be x cm.

Then, $\frac{1}{2}\times10\times x = 24 \Rightarrow x = \frac{24\times2}{10} = \left(\frac{48}{10}\right)$ cm = 4.8 cm.

174. **Note:** If the mid-points of three sides of a triangle are joined, the whole triangle is divided into four triangles of equal area.

$a = 3$ cm, $b = 4$ cm and $c = 5$ cm.

It is a right-angle triangle with base = 3 cm and height = 4 cm.

$\therefore$ Its area $= \left(\frac{1}{2}\times3\times4\right)\text{cm}^2 = 6\ \text{cm}^2.$

Area of required triangle $= \left(\frac{1}{4}\times6\right)\text{cm}^2 = \frac{3}{2}\ \text{cm}^2.$

175. Keeping the above note in mind, we have: Required ratio = 1 : 1

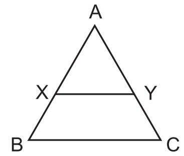
176. **Note:** The line segment joining the mid-points of two sides of a triangle is parallel to the third side and equal to half of it.

Then, perimeter of the second triangle

$= \frac{1}{2}(5+6+7)\ \text{cm} = 9\ \text{cm}.$

177. **Note:** The ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.

Since XY || BC, we have:



$\angle AXY = \angle ABC$ and $\angle AYX = \angle ACB$.

Also, $\angle A = \angle A$ (common)

So, $\Delta AXY \sim \Delta ABC$.

Let area $(\Delta ABC) = x$ sq. units.

Then, area $(\Delta XY) = \frac{x}{2}$ sq.units $\frac{(AB)^2}{(AX)^2} = \frac{x}{(x/2)}$

$\Rightarrow \frac{AB}{AX} = \sqrt{2} \Rightarrow \frac{AX+BX}{AX} = \sqrt{2} \Rightarrow 1 + \frac{BX}{AX} = \sqrt{2}$

$\Rightarrow \frac{BX}{AX} = \left(\sqrt{2}-1\right) \Rightarrow \frac{AX}{BX} = \frac{1}{(\sqrt{2}-1)}.$

178. **Note :** The areas of two similar triangles are in the ratio of the squares of the corresponding altitudes. Let the length of the required altitude be x cm.

Then, $\frac{12}{48} = \frac{(2.1)^2}{x^2} \Rightarrow x^2 = (4.41\times4) \Rightarrow x = 2.1\times2 = 4.2$ cm.

179. $9y = \frac{\sqrt{3}}{4}\times6\times6 \Rightarrow y = \left(\frac{\sqrt{3}}{4}\times6\times6\times\frac{1}{9}\right) = \sqrt{3}.$

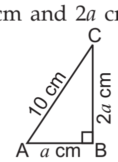
180. Let the length of each side containing the right angle be x cm.

Then, $x^2 + x^2 = 5^2 \Rightarrow 2x^2 = 25 \Rightarrow x^2 = \frac{25}{2} \Rightarrow x = \frac{5}{\sqrt{2}}.$

$\therefore$ Area of the triangle $= \left(\frac{1}{2}\times\frac{5}{\sqrt{2}}\times\frac{5}{\sqrt{2}}\right)\text{cm}^2$

$= \left(\frac{25}{4}\right)\text{cm}^2 = 6.25\ \text{cm}^2.$

181. Let the sides be a cm and $2a$ cm.



Then, $a^2 + (2a)^2 = (10)^2 \Leftrightarrow 5a^2 = 100 \Leftrightarrow a^2 = 20.$

$\therefore$ Area $= \left(\frac{1}{2}\times a\times2a\right) = a^2 = 20\ \text{cm}^2.$

182. Let the length of the other side containing the right angle be x cm.

Then, $\frac{1}{2}\times4\times x = 20 \Rightarrow x = 10$ cm.

Hypotenuse $= \sqrt{(10)^2+4^2}$ cm $= \sqrt{116}$ cm $= 2\sqrt{29}$ cm.

Let the altitude on the hypotenuse be h cm.

Then, $\frac{1}{2}\times2\sqrt{29}\times h = 20 \Rightarrow h = \frac{20}{\sqrt{29}}$ cm.

183. Area of the triangle $= \left(\frac{1}{2}\times12\times5\right)\text{cm}^2 = 30\ \text{cm}^2.$

Hypotenuse $= \sqrt{(12)^2+5^2}$ cm $= \sqrt{169}$ cm = 13 cm.

Let the perpendicular distance of the hypotenuse from the opposite vertex be x cm.

Then, $\frac{1}{2} \times 13 \times x = 30 \Rightarrow x = \frac{60}{13} = 4\frac{8}{13}$ cm.

184. Let the base be b cm and height be h cm.

Then, $\frac{1}{2}bh = 180 \Rightarrow bh = 360.$

And, $b^2 + h^2 = (41)^2 \Rightarrow b^2 + h^2 = 1681.$

$\therefore$ $(b - h)^2 = b^2 + h^2 - 2bh = 1681 - 720 = 961$

$\Rightarrow (b - h) = \sqrt{961} = 31$ cm.

185. Let Base = b cm and Height = h cm.

$b + h + 26 = 60 \Leftrightarrow b + h = 34 \Leftrightarrow (b + h)^2 = (34)^2$ ...(i)

Also, $b^2 + h^2 = (26)^2$ ...(ii)

$\therefore (b + h)^2 - (b^2 + h^2) = (34)^2 - (26)^2$

$\Leftrightarrow 2bh = (34 + 26)(34 - 26) = 480$

$\Leftrightarrow bh = 240 \Leftrightarrow \frac{1}{2}bh = 120.$

$\therefore$ Area = 120 cm^2.

186. Let the length of each of the sides containing the right angle be x cm.

Then, hypotenuse = $\sqrt{x^2 + x^2}$ cm $= \sqrt{2x^2}$ cm $= \sqrt{2}x$ cm.

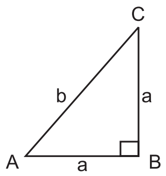
Perimeter of the triangle $= (x + x + \sqrt{2}x)$ cm $= (2x + \sqrt{2}x)$ cm

$= \sqrt{2}x(\sqrt{2} + 1)$cm.

$\therefore \sqrt{2}x(\sqrt{2}+1) = (4\sqrt{2}+4) = 4(\sqrt{2}+1) \Rightarrow \sqrt{2}x = 4 \Rightarrow x = 2\sqrt{2}.$

Hence, hypotenuse = $(\sqrt{2} \times 2\sqrt{2})$cm $= 4$ cm.

187. Let the sides be a metres, a metres and b metres.



Then, $2a + b = 6 + 3\sqrt{2}$ and $b^2 = a^2 + a^2 = 2a^2 \Leftrightarrow b = \sqrt{2}\,a.$

$\therefore \quad 2a + \sqrt{2}\,a = 6 + 3\sqrt{2} \Leftrightarrow a = 3.$

$\therefore \quad$ Area $= \left(\frac{1}{2} \times 3 \times 3\right) \text{m}^2 = 4.5 \text{ m}^2.$

188. Let the length of the base and height be x cm each.

Then, $\frac{1}{2}x^2 = 162 \Rightarrow x^2 = 324 \Rightarrow x = \sqrt{324} = 18$ cm.

Hypotenuse = $\sqrt{(18)^2 + (18)^2}$cm $= \sqrt{648}$ cm $= 18\sqrt{2}$ cm.

$\therefore$ Perimeter = $(18 + 18 + 18\sqrt{2})$ cm $= 18(2 + \sqrt{2})$ cm

$= 18(2 + 1.41)$ cm $= (18 \times 3.41)$ cm

$= 61.38$ cm.

189. Area of the triangle $= \frac{1}{2}ab\sin\theta = \left(\frac{1}{2} \times 10 \times 10 \times \sin 45^\circ\right)\text{cm}^2$

$= \left(\frac{1}{2} \times 10 \times 10 \times \frac{1}{\sqrt{2}}\right)\text{cm}^2 = \left(\frac{50}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}\right)\text{cm}^2 = 25\sqrt{2}\text{ cm}^2.$

190. Let the smallest side be x cm. Then, other sides are 13 cm and $(17 - x)$ cm.

Let $a = 13$, $b = x$ and $c = (17 - x)$. So, $s = 15$.

Area $= \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{15 \times 2 \times (15 - x)(x - 2)} = \sqrt{30(15 - x)(x - 2)}.$

$\therefore 30(15 - x)(x - 2) = (30)^2$

$\Leftrightarrow (15 - x)(x - 2) = 30 \Leftrightarrow x^2 - 17x + 60 = 0$

$\Leftrightarrow (x - 12)(x - 5) = 0 \Leftrightarrow x = 12$ or $x = 5$.

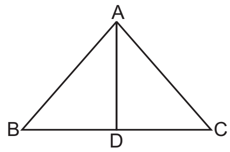
$\therefore$ Smallest side = 5 cm.

191. Area of an equilateral triangle of side a cm $= \left(\frac{\sqrt{3}}{4}a^2\right)\text{cm}^2.$

$\therefore \frac{\sqrt{3}}{4}a^2 = 24\sqrt{3} \Leftrightarrow a^2 = 96 \Leftrightarrow a = 4\sqrt{6}$ cm.

$\therefore$ Perimeter = 3a = 12 $12\sqrt{6}$ cm.

192. Let ABC be the equilateral triangle and AD be the altitude on base BC.



In an equilateral triangle, the altitude and the median coincide.

So, BC = DC = $\left(\frac{2\sqrt{3}}{2}\right)\text{cm} = \sqrt{3}$ cm.

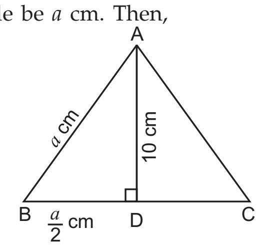
Let the length of the altitude AD be x cm.

Then, in right angled ΔADB,

$AB^2 = AD^2 + BD^2 \Rightarrow (2\sqrt{3})^2 = x^2 + (\sqrt{3})^2 \Rightarrow x^2 = (12 - 3)$

$= 9 \Rightarrow x = 3$ cm.

193. Let each side be a cm. Then,



$\left(\frac{a}{2}\right)^2 + (10)^2 = a^2 \Leftrightarrow \left(a^2 - \frac{a^2}{4}\right) = 100$

$\Leftrightarrow \frac{3a^2}{4} = 100 \Leftrightarrow a^2 = \frac{400}{3}.$

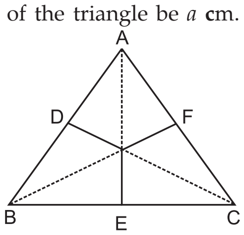
$\therefore$ Area $= \frac{\sqrt{3}}{4} \times a^2 = \left(\frac{\sqrt{3}}{4} \times \frac{400}{3}\right)\text{cm}^2 = \frac{100}{\sqrt{3}}\text{cm}^2.$

194. Let the length of sides of the two triangles be a_1 and a_2 respectively and their altitudes be h_1 and h_2 respectively. Then,

$$\frac{\frac{\sqrt{3}}{4}a_1^2}{\frac{\sqrt{3}}{4}a_2^2} = \frac{25}{36} \Rightarrow \left(\frac{a_1}{a_2}\right)^2 = \left(\frac{5}{6}\right)^2 \Rightarrow \frac{a_1}{a_2} = \frac{5}{6}.$$

And, $\dfrac{\frac{1}{2}\times a_1\times h_1}{\frac{1}{2}\times a_2\times h_2}=\dfrac{25}{36}\Rightarrow\dfrac{5}{6}\times\dfrac{h_1}{h_2}=\dfrac{25}{36}\Rightarrow\dfrac{h_1}{h_2}=\dfrac{25}{36}\times\dfrac{5}{6}=\dfrac{5}{6}.$

195. Let each side of the triangle be a cm.



Then, area (ΔAOB) + ar (ΔBOC) + ar (ΔAOC) = ar (ΔABC)

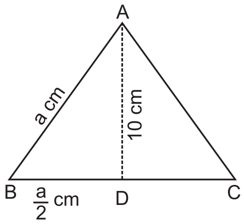
$\Rightarrow\dfrac{1}{2}\times a\times 6+\dfrac{1}{2}\times a\times 7+\dfrac{1}{2}\times a\times 8=\dfrac{\sqrt{3}}{4}a^2$

$\Rightarrow\dfrac{a}{2}(6+7+8)=\dfrac{\sqrt{3}}{4}a^2\Rightarrow a=\left(\dfrac{21}{2}\times\dfrac{4}{\sqrt{3}}\right)=14\sqrt{3}$ cm.

196. Let the side of the triangle be a. Then,

$a^2=\left(\dfrac{a}{2}\right)^2+x^2 \;\Leftrightarrow\; \dfrac{3a^2}{4}=x^2 \;\Leftrightarrow\; a^2=\dfrac{4x^2}{3}.$

$\therefore$ Area $=\dfrac{\sqrt{3}}{4}a^2=\dfrac{\sqrt{3}}{4}\times\dfrac{4}{3}x^2=\dfrac{x^2}{\sqrt{3}}=\dfrac{x^2\sqrt{3}}{3}.$



197. Let the length of side of the square be a units.

Then, $BE=EC=DF=FC=\dfrac{a}{2}$

$AE=\sqrt{(AB)^2+(BE)^2}=\sqrt{a^2+\left(\dfrac{a}{2}\right)^2}$

$=\sqrt{a^2+\dfrac{a^2}{4}}=\sqrt{\dfrac{5a^2}{4}}=\dfrac{\sqrt{5}a}{2}.$

Similarly, $AF=\dfrac{\sqrt{5}a}{2}.$

$EF=\sqrt{(CE)^2+(CF)^2}=\sqrt{\left(\dfrac{a}{2}\right)^2+\left(\dfrac{a}{2}\right)^2}=\sqrt{\dfrac{2a^2}{4}}=\dfrac{a}{\sqrt{2}}.$

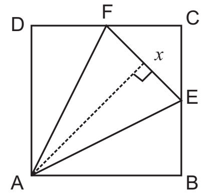
$EX=\dfrac{1}{2}EF=\dfrac{a}{2\sqrt{2}}.$

$AX=\sqrt{(AE)^2-(EX)^2}=\sqrt{\left(\dfrac{\sqrt{5}a}{2}\right)^2-\left(\dfrac{a}{2\sqrt{2}}\right)^2}$

$=\sqrt{\dfrac{5a^2}{4}-\dfrac{a^2}{8}}=\sqrt{\dfrac{9a^2}{8}}=\dfrac{3a}{2\sqrt{2}}.$

$\therefore$ Area (ΔAEF) $=\dfrac{1}{2}\times EF\times AX=\dfrac{1}{2}\times\dfrac{a}{\sqrt{2}}\times\dfrac{3a}{2\sqrt{2}}=\dfrac{3a^2}{8}.$

Required ratio $=\dfrac{3a^2}{8}:a^2=3:8.$



198. Area of a square with side a = a^2 sq. units.

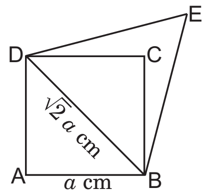
Area of a triangle with base.

$=a=\left(\dfrac{1}{2}\times a\times h\right)$ sq. units

$\therefore\quad a^2=\dfrac{1}{2}\times a\times h \;\Leftrightarrow\; h=2a.$

Hence, the altitude of the triangle is $2a$.

199. Let the side of the square be a cm.



Then, the length of its diagonal = $\sqrt{2}\,a$ cm.

Area of equilateral triangle with side

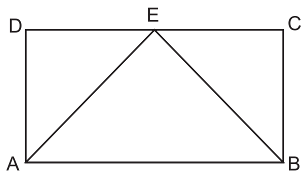
$\sqrt{2}\,a=\dfrac{\sqrt{3}}{4}\times(\sqrt{2}\,a)^2=\dfrac{\sqrt{3}\,a^2}{2}.$

$\therefore$ Required ratio $=\dfrac{\sqrt{3}\,a^2}{2}:a^2=\sqrt{3}:2.$

200. Area of rectangle = lb sq. units.

Area of the triangle $=\dfrac{1}{2}lb$ sq. units.

$\therefore$ Required ratio $=lb:\dfrac{1}{2}lb=2:1.$



201. Let each side of the triangle be a cm and each side of the square be b cm.

Then, X $=\dfrac{\sqrt{3}}{4}a^2$ and Y $=b^2$, where $3a=4b$, *i.e.*, $b=\dfrac{3a}{4}.$

$\therefore\quad$ X $=\dfrac{\sqrt{3}}{4}a^2$ and Y $=\dfrac{9a^2}{16}$ $\qquad\left[\because\; b=\dfrac{3a}{4}\right]$

Now, $\dfrac{\sqrt{3}}{4}a^2=\dfrac{1.732}{4}a^2=0.433\,a^2$ and $\dfrac{9a^2}{16}=0.5625\,a^2.$

$\therefore\quad$ X < Y.

202. Let the side of the square be a cm.

Then, its diagonal $= \sqrt{2}\, a$ cm.

Now, $\sqrt{2}\, a = 12\sqrt{2} \Rightarrow a = 12$ cm.

Perimeter of the square $= 4a = 48$ cm.

Perimeter of the equilateral triangle $= 48$ cm.

Each side of the triangle $= 16$ cm.

Area of the triangle $= \left(\frac{\sqrt{3}}{4} \times 16 \times 16\right) \text{cm}^2 = (64\sqrt{3}) \text{ cm}^2.$

203. $\frac{a}{b} = \frac{\frac{1}{2} x \times h_1}{\frac{1}{2} y \times h_2}$ $bxh_1 = ayh_2 \Leftrightarrow \frac{h_1}{h_2} = \frac{ay}{bx}.$

$\left[\text{Ratio of areas} = \frac{a}{b}, \text{Ratio of base} = x : y\right]$

Hence, $h_1 : h_2 = ay : bx.$

204. Let the sides of the triangle be $2x$, $3x$, $4x$ and their corresponding altitudes be h_1, h_2, h_3 respectively. Then,

$\frac{1}{2} \times 2x \times h_1 = \frac{1}{2} \times 3x \times h_2 = \frac{1}{2} \times 4x \times h_3$

$\Rightarrow xh_1 = \frac{3}{2} xh_2 = 2xh_3 = k(\text{say})$

$\Rightarrow h_1 = \frac{k}{x}, h_2 = \frac{2k}{2x}, h_3 = \frac{k}{2x}.$

$\therefore h_1 : h_2 : h_3 = \frac{k}{x} : \frac{2k}{3x} : \frac{k}{2x} = 1 : \frac{2}{3} : \frac{1}{2} = 6 : 4 : 3.$

205. Let the sides be x cm and (80% of x) cm $= \frac{4x}{5}$ cm.

Then, initial area

$= \frac{\sqrt{3}}{4} x^2$, final area $= \frac{\sqrt{3}}{4} \cdot \left(\frac{4x}{5}\right)^2 = \frac{16\sqrt{3}\, x^2}{100}.$

Decrease in area $= \left(\frac{\sqrt{3}}{4} x^2 - \frac{16\sqrt{3}}{100} x^2\right) \text{cm}^2 = \frac{9\sqrt{3}\, x^2}{100} \text{ cm}^2.$

Decrease% $= \left(\frac{9\sqrt{3}\, x^2}{100} \times \frac{4}{\sqrt{3}\, x^2} \times 100\right)\% = 36\%.$

206. Let initial base $= b$ cm and initial height $= h$ cm.

Then, initial area $= \left(\frac{1}{2} bh\right) \text{cm}^2.$

New base $=$ (140% of b) cm $= \left(\frac{140b}{100}\right)$ cm $= \left(\frac{7b}{5}\right)$ cm.

New height $=$ (60% of h) cm $= \left(\frac{60h}{100}\right)$ cm $= \left(\frac{3h}{5}\right)$ cm.

New area $= \left(\frac{1}{2} \times \frac{7b}{5} \times \frac{3h}{5}\right) \text{cm}^2 = \left(\frac{21}{50} bh\right) \text{cm}^2.$

Area decreased $= \left(\frac{1}{2} bh - \frac{21}{50} bh\right) \text{cm}^2 = \left(\frac{4}{50} bh\right) \text{cm}^2.$

Percentage decrease $= \left(\frac{4bh}{50} \times \frac{2}{bh} \times 100\right)\% = 16\%.$

207. $A_1 = \frac{\sqrt{3}}{2} a^2$ and $A_2 = \frac{\sqrt{3}}{2} (2a)^2 = 4 \times \frac{\sqrt{3}}{2} a^2 = 4A_1.$

$\therefore$ K = 4.

208. Since vertical angles are equal and corresponding sides are proportional, the two triangles are similar. So, the ratio of their areas is equal to the ratio of the squares of their corresponding sides.

$\therefore$ Ratio of their areas $= \frac{(3x)^2}{(4x)^2} = \frac{9}{25} = 9 : 25.$

209. Original area $= \frac{1}{2} ab \sin\theta.$

New area $= \frac{1}{2} \times (2a) \times (2b) \sin\theta = 4\left(\frac{1}{2} ab \sin\theta\right)$

$= 4 \times$ original area.

210. Let $EF = x$ units. Then, $DF = 2x$ units.

$\frac{1}{2} \times EF \times DF = 5 \Rightarrow \frac{1}{2} \times x \times 2x = 5 \Rightarrow x^2 = 5 \Rightarrow x = \sqrt{5}.$

$\therefore DE = \sqrt{(DF)^2 + (EF)^2} = \left(2\sqrt{5}\right)^2 + \left(\sqrt{5}\right)^2 = \sqrt{25} = 5$ units

$\therefore AE = \sqrt{(DE)^2 - (AD)^2} = \sqrt{5^2 - 4^2} = \sqrt{9} = 3$ units.

AB = 2AE = 6 units.

$\therefore$ Area of rect. ABCD = AB × AD

= (6 × 4) sq. units = 24 sq. units.

211. Let the length and breadth of the rectangle be l cm and b cm respectively.

Then, $2(l + b) = 12$ or $l + b = 6$ or $b = (6 - l)$.

Sum of areas of the four triangles

$= \frac{\sqrt{3}}{4}[2l^2 + 2(6 - l)^2] = \frac{\sqrt{3}}{4}(4l^2 - 24l + 72)$

$= \sqrt{3}\,(l^2 - 6l + 18).$

$\therefore \sqrt{3}(l^2 - 6l + 18) = 10\sqrt{3} \Rightarrow l^2 - 6l + 18 = 10$

$\Rightarrow l^2 - 6l + 8 = 0 \Rightarrow (l - 4)(1 - 2) = 0$

$\Rightarrow l = 4$ or $l = 2$.

Hence, length = 4 cm, breadth = 2 cm.

Area of rectangle = (4 × 2) cm² = 8 cm².

212. Area of the field = ar (ΔAFE) + ar (ΔAGB) + ar (ΔBGC) + ar (ΔDHC) + or (trap $DEFH$)

$= \left(\frac{1}{2} \times AF \times EF\right) + \left(\frac{1}{2} \times AG \times BG\right) + \left(\frac{1}{2} \times CG \times BG\right)$
$+ \left(\frac{1}{2} \times DH \times CH\right) + \left\{\frac{1}{2} \times (DH + EF) \times HF\right\}$

$= \left(\frac{1}{2} \times 50 \times 30\right) + \left(\frac{1}{2} \times 80 \times 50\right) + \left(\frac{1}{2} \times 70 \times 50\right)$
$+ \left(\frac{1}{2} \times 20 \times 30\right) + \left\{\frac{1}{2} \times (20 + 30) \times 70\right\}$

[$\because$ $CG = (AC - AG) = (150 - 80)$ m

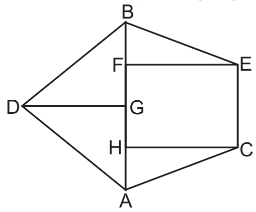
$= 70$ m, $CH = (AC - AH)$

$= (150 - 120)$ m $= 30$ m,

$HF = (AH - AF) = (120 - 50)$ m $= 70$ m]

$= (750 + 2000 + 1750 + 300 + 1750)$ m² $= 6550$ m².

213. Interchanging the distances to C and D, the field may be drawn as shown in the adjoining figure.



We have : AB = 40 m, AF = 30 m, AG = 20 m, AH = 10 m, CH = 30 m, DG = 20 m, EF = 30 m.

Area of the field = ar (ΔAHC) + ar (rect $CEFH$) + ar (ΔBFE) + ar (ΔBGD) + ar (ΔAGD)

$$= \left(\frac{1}{2}\times AH\times CH\right)+(CH\times FH)+\left(\frac{1}{2}\times BF\times EF\right)+\left(\frac{1}{2}\times BG\times DG\right)+\left(\frac{1}{2}\times AG\times DG\right)$$

$$= \left(\frac{1}{2}\times 10\times 30\right)+(30\times 20)+\left(\frac{1}{2}\times 10\times 30\right)+\left(\frac{1}{2}\times 20\times 20\right)+\left(\frac{1}{2}\times 20\times 20\right)$$

= (150 + 600 + 150 + 200 + 200) m^2 = 1300 m^2.

214. The field may be drawn as shown in the adjoining figure.

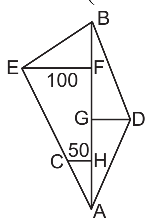
We have: AB = 400 m, AF = 300 m, AG = 200 m, AH = 100 m, EF = 100 m, CH = 50 m, DG = x metres.

Area of the field

= ar (ΔAGD) + ar (ΔBGD) + ar (ΔBFE) + ar (trap $CEFH$) + ar (ΔAHC)

$$= \left(\frac{1}{2}\times AG\times GD\right)+\left(\frac{1}{2}\times BG\times GD\right)+\left(\frac{1}{2}\times BF\times EF\right)+\frac{1}{2}\times (EF+CH)\times FH+\left(\frac{1}{2}\times AH\times CH\right)$$

$$= \left(\frac{1}{2}\times 200\times x\right)+\left(\frac{1}{2}\times 200\times x\right)+\left(\frac{1}{2}\times 100\times 100\right)+\left\{\frac{1}{2}\times(100+50)\times 200\right\}+\left(\frac{1}{2}\times 100\times 50\right)$$



= (100x + 100x + 5000 + 15000 + 2500) m^2

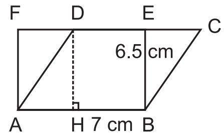
= (22500 + 200x) m^2.

$\therefore$ 22500 + 200x = 27500 $\Rightarrow$ 200x = 5000 $\Rightarrow$ x = 25 m.

215. Area of the field = (Base × Height) = (150 × 80) m^2 = 12000 m^2.

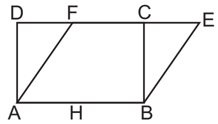
$\therefore$ Cost of watering = ₹(12000 × 0.50) = ₹ 6000.

216. Area of ||gm $ABCD$ = (AB × DH) = (AB × BE) = (7 × 6.5) cm^2 = 45.5 cm^2.



217. Let $ABCD$ be the rectangle and $ABEF$ be the parallelogram.

Let AB = 10 cm.

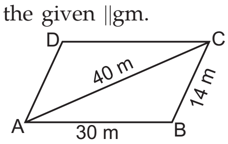


2(AB + BC) = 36 $\Rightarrow$ BC + 10 = 18 $\Rightarrow$ BC = 8 cm.

$\therefore$ Area of ||gm $ABEF$ = (10 × 8) cm^2 = 80 cm^2.

218. 10 × 12 = 20 × h $\Rightarrow$ h = $\frac{120}{60}$ = 6 m.

219. Let $ABCD$ be the given ||gm.



Area of ||gm $ABCD$ = 2 × (area of ΔABC).

Now, a = 30 m, b = 14 m, c = 40 m.

$\therefore$ $s = \frac{1}{2}(30+14+40)$ m = 42 m.

$\therefore$ Area of ΔABC = $\sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{42\times 12\times 28\times 2}$ m^2 = 168 m^2.

Hence, area of || gm $ABCD$ = (2 × 168) m^2 = 336 m^2.

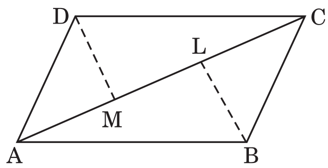
220. Let $ABCD$ be the given ||gm. Let AC = 70 cm.

Draw $BL \perp AC$ and $DM \perp AC$.

Then, DM = BL = 27 cm.

Area of || gm ACBD = ar (ΔABC) + ar (ΔACD)

$= \left[\left(\frac{1}{2}\times 70\times 27\right)+\left(\frac{1}{2}\times 70\times 27\right)\right]$ sq. cm = 1890 sq. cm.

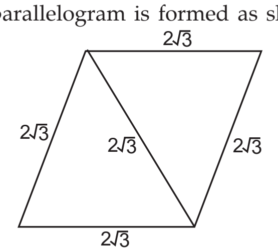


221. Let the altitude of the triangle be h_1 and base of each be b.

Then, $\frac{1}{2}$ × b_1 × h_1 = b × h_2, where h_2 = 100 m

$\Leftrightarrow$ h_1 = 2 h_2 = (2 × 100) m = 200 m.

222. Clearly, a parallelogram is formed as shown.



Area of the || gm so formed = Sum of areas of the two triangles = $\left[2\times\left\{\frac{\sqrt{3}}{4}\times(2\sqrt{3})^2\right\}\right]\text{cm}^2=\left(2\times\frac{\sqrt{3}}{4}\times 12\right)\text{cm}^2$

$=6\sqrt{3}\text{ cm}^2.$

Let the length of the altitude be h cm.

Then, $2\sqrt{3}\,h=6\sqrt{3}\Rightarrow h=3$ cm.

223. Let each have base = b and height = h.

Then, $P = b\times h$, $R = b\times h$, $T = \frac{1}{2}\times b\times h$.

So, $P = R$, $P = 2T$ and $T = \frac{1}{2}R$ are all correct statements.

224. $\frac{1}{2}d_1\times d_2 = 150 \Leftrightarrow \frac{1}{2}\times 10\times d_2 = 150 \Leftrightarrow d_2 = 30$ cm.

225. $\frac{1}{2}d_1\times 2d_1 = 25 \Leftrightarrow d_1^2 = 25 \Leftrightarrow d_1 = 5.$

$\therefore$ Sum of lengths of diagonals = (5 + 10) cm = 15 cm.

226. Perimeter of the rhombus = 56 m. Each side of the rhombus = $\frac{56}{4}$ m = 14 m.

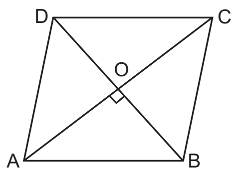
Height of the rhombus = 5 m.

$\therefore$ Area = (14 × 5) m^2 = 70 m^2.

227. Area = $\frac{1}{2}d_1d_2 = \left(\frac{1}{2}\times 24\times 10\right)\text{cm}^2 = 120\text{ cm}^2.$

$OA = \frac{1}{2}d_1 = \left(\frac{1}{2}\times 24\right)\text{cm} = 12\text{ cm}.$

$OB = \frac{1}{2}d_2 = \left(\frac{1}{2}\times 10\right)\text{cm} = 5\text{ cm}.$



$AB^2 = OA^2 + OB^2 = (12)^2 + 52 = 169 \Leftrightarrow AB = 13$ cm.

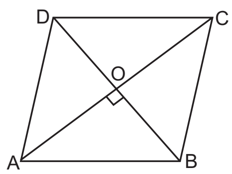
$\therefore$ Perimeter = (13 × 4) cm = 52 cm.

228. $AB = 26$ cm and $AC = 48$ cm $\Rightarrow OA = \left(\frac{1}{2}\times 48\right)$ cm = 24 cm.

$OB^2 = AB^2 - OA^2 = (26)^2 - (24)^2 = (26 + 24)(26 - 24) = 100$

$\Rightarrow OB = 50 \Rightarrow BD = 2 \times OB = (2 \times 50)$ cm = 100 cm.

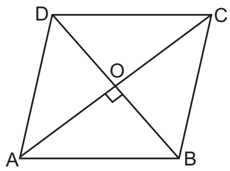
$\therefore$ Area = $\frac{1}{2}\times AC\times BD=\left(\frac{1}{2}\times 48\times 100\right)\text{cm}=2400\text{ cm}^2$



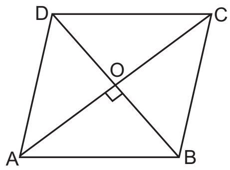
229. $\frac{1}{2}\times 6\times d=24\Rightarrow d=\frac{24}{3}=8$ cm.

OA = 4 cm and OB = 3 cm.

$\therefore\ AB=\sqrt{(OA)^2+(OB)^2}=\sqrt{4^2+3^2}=5$ cm.



230. Let $AC = x$. Then, $BD = \frac{3}{4}x$.



So, $OA=\frac{1}{2}AC=\frac{x}{2}$ and $OB=\frac{1}{2}BD=\frac{3}{8}x.$

$AB=\sqrt{(OA)^2+(OB)^2}=\sqrt{\left(\frac{x}{2}\right)^2+\left(\frac{3x}{8}\right)^2}$

$=\sqrt{\frac{x^2}{4}+\frac{9x^2}{64}}=\sqrt{\frac{25x^2}{64}}=\frac{5x}{8}.\ \frac{5x}{8}=20\Rightarrow x=\frac{20\times 8}{5}=32$ m.

So, the length of diagonals are 32 m and 24 m.

$\therefore$ Area of the rhombus = $\left(\frac{1}{2}\times 32\times 24\right)\text{m}^2=384\text{ m}^2.$

231. $d_1=\left(\frac{80}{100}\times d_2\right)\Leftrightarrow d_1=\frac{4d_2}{5}.$

Area of rhombus $=\frac{1}{2}d_1d_2=\left(\frac{1}{2}\times\frac{4d_2}{5}\times d_2\right)=\frac{2}{5}(d_2)^2.$

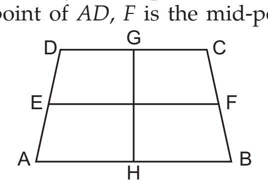
232. A square and a rhombus on the same base are equal in area.

233. Area of trapezium = $\left[\frac{1}{2}\times(1.5+2.5)\times 6.5\right]\text{m}^2=13\text{ m}^2.$

234. Let the required distance be x cm.

Then, $\frac{1}{2}\times(6+10)\times x=32\Rightarrow x=4$ cm.

235. Let $ABCD$ be the given trapezium in which $AB \parallel CD$, E is the mid-point of AD, F is the mid-point of BC.



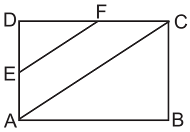
Then,

$EF=\frac{1}{2}(AB+CD)\Rightarrow AB+CD=2\,EF=(2\times 4)\text{ cm}=8\text{ cm}.$

$\therefore$ Area of the trapezium = $\frac{1}{2}(AB+CD)\times GH$

$=\left(\frac{1}{2}\times 8\times 4\right)\text{cm}^2=16\text{ cm}^2.$

236. Let $AD = x$ and $DC = y$.



Then, $AE = ED = \frac{x}{2}$ and $DE = FC = \frac{y}{2}$.

area $(\Delta EDF) = \left(\frac{1}{2} \times \frac{x}{2} \times \frac{y}{2}\right) = \frac{xy}{8}$.

area (trap. $AEFC$) = area (ΔADC) − area (ΔEDF)

$= \frac{xy}{2} - \frac{xy}{8} = \frac{3xy}{8}$.

$\therefore$ Required ratio $= \frac{xy}{8} : \frac{3xy}{8} = 1:3$.

237. Area of field $= \left[\frac{1}{2} \times (5x + 3x) \times 24\right] m^2 = (96x)\, m^2$.

$\therefore$ $96x = 1440 \Leftrightarrow x = \frac{1440}{96} \Leftrightarrow x = 15$.

Longer side of field = 5 × 15 = 75 m

238. $\frac{1}{2}$ (sum of parallel sides) × depth = Its area

$\Leftrightarrow \frac{1}{2}(12+8) \times d = 840 \Leftrightarrow d = 84$ m.

239. **(A)** Area $= \left(\frac{22}{7} \times 7 \times 7\right) cm^2 = 154\ cm^2$.

(B) Area = (12 × 10) cm^2 = 120 cm^2.

(C) Area = (12 × 12) cm^2 = 144 cm^2.

(D) Area = (14 × 11) cm^2 = 154 cm^2.

240. (*a*) Perimeter = (4 × 10) cm = 40 cm.

(*b*) Perimeter = 2(12 + 9) cm = 42 cm.

(*c*) Perimeter $= \left(2 \times \frac{22}{7} \times 7\right)$ cm = 44 cm.

(*d*) Perimeter = (4 × 9) cm = 36 cm.

241. (*a*) Side $= \sqrt{36}$ cm = 6 cm. Perimeter = (4 × 6) cm = 24 cm.

(*b*) Perimeter = (3 × 9) cm = 27 cm.

(*c*) Breadth $= \left(\frac{40}{10}\right)$ cm = 4 cm.

Perimeter = 2(10 + 4) cm = 28 cm.

(*d*) Perimeter $= \left(2 \times \frac{22}{7} \times 4\right) cm = \left(\frac{176}{7}\right) cm = 25.14$ cm.

242. Radius $= \frac{3.5}{2}\ cm = \frac{7}{4}$ cm.

$\therefore$ Circumference $= \left(2 \times \frac{22}{7} \times \frac{7}{4}\right)$ cm = 11 cm.

243. Area of circle $= \left(\frac{22}{7} \times 14 \times 14\right) cm^2 = 616\ cm^2$.

Let the length of the rectangle be l cm.

Then, $22l = 616 \Rightarrow l = \frac{616}{22} = 28$ cm.

244. Required% $= \left[\frac{\pi \times (5)^2}{2\pi \times 5} \times 100\right]\% = 250\%$.

245. Speed = 12 km/hr $= \left(12 \times \frac{5}{18}\right)$ m/s $= \frac{10}{3}$ m/s.

Distance covered $= \left(20 \times 2 \times \frac{22}{7} \times 50\right)$ m $= \frac{44000}{7}$ m.

Time taken =

$\frac{\text{Distance}}{\text{Speed}} = \left(\frac{4400}{7} \times \frac{3}{10}\right)s = \left(\frac{4400 \times 3}{7} \times \frac{1}{60}\right)\text{min} = \frac{220}{7}\text{min}$

$= 31\frac{3}{7}$ min.

246. Area of the cut portion $= \left(4 \times \frac{22}{7} \times 5 \times 5\right) cm^2 = \left(\frac{2200}{7}\right) cm^2$.

Area of the uncut portion $= \left[\left(\frac{22}{7} \times 20 \times 20\right) - \frac{2200}{7}\right] cm^2$

$= \left(\frac{8800}{7} - \frac{2200}{7}\right) cm^2 = \left(\frac{6600}{7}\right) cm^2$.

$\therefore$ Required ratio $= \frac{6600}{7} : \frac{2200}{7} = 3:1$.

247. Area of the field grazed $= \left(\frac{22}{7} \times 14 \times 14\right)$ sq. ft = 616 sq. ft.

Number of days taken to graze the field

$= \frac{616}{100}$ days = 6 days (approx.).

248. $2\pi R = 2\ (l + b) \Leftrightarrow 2\pi R = 2\ (26 + 18)$ cm

$\Leftrightarrow R = \left(\frac{88}{2 \times 22} \times 7\right)$ = 14 cm.

$\therefore$ Area of the circle $= \pi R^2 = \left(\frac{22}{7} \times 14 \times 14\right) cm^2 = 616\ cm^2$.

249. $2(14x + 11x) = 100 \Rightarrow 25x = 50 \Rightarrow x = 2$.

So, length and breadth of the rectangular field are 28 m and 22 m respectively.

Area of the circle = Area of the rectangular field = (28 × 22) m^2 = 616 m^2.

Let the radius of the circle be r meters.

Then, $\frac{22}{7} \times r^2 = 616 \Rightarrow r^2 = \frac{616 \times 7}{22} = 196 \Rightarrow r = 14$ m.

$\therefore$ Diameter = (2 × 14) m= 28 m.

250. $\pi R^2 = 24.64 \Leftrightarrow R^2 = \left(\frac{24.64}{22} \times 7\right) = 7.84 \Leftrightarrow R = \sqrt{7.84} = 2.8$ cm.

$\therefore$ Circumference $= \left(2 \times \frac{22}{7} \times 2.8\right)$ cm = 17.60 m.

251. $\pi R^2 = 18634 \Rightarrow R^2 = 18634 \times \frac{7}{22} = 5929 \Rightarrow R = 77$ m.

Circumference$= \left(2 \times \frac{22}{7} \times 77\right)$ m = 484 m.

$\therefore$ Cost of fencing = ₹ (365 × 484) = ₹ 176660.

252. $2\pi R = 396 \Rightarrow R = \frac{396 \times 7}{2 \times 22} = 63$ m.

Area $= \pi R^2 = \left(\frac{22}{7} \times 63 \times 63\right) m^2 = 12474\ m^2$.

253. $2\pi R = 1047.2 \Rightarrow R = \frac{1047.2 \times 7}{2 \times 22} = 166.6$ m.

$\therefore$ Area $= \pi R^2 = \left(\frac{22}{7} \times 166.6 \times 166.6\right) m^2 = 87231.76\ m^2$.

254. $2\pi R_1 = 132 \Rightarrow R_1 = \frac{132 \times 7}{2 \times 22} = 21$ m.

$2\pi R_2 = 176 \Rightarrow R_2 = \frac{176 \times 7}{2 \times 22} = 28$ m.

$\therefore$ Required difference $= \pi (R_2^2 - R_1^2) = \pi (R_2 + R_1)(R_2 - R_1)$

$= \left(\frac{22}{7} \times 49 \times 7\right) m^2 = 1078\ m^2$.

255. Circumference of the plot $= \left(\frac{3300}{15}\right) m = 220$ m. $2\pi R = 220$

$\Rightarrow R = \frac{220 \times 7}{2 \times 22} = 35$ m.

Area of the plot $= \left(\frac{22}{7} \times 35 \times 35\right) m^2 = 3850\ m^2$.

$\therefore$ Cost of flooring = ₹ (3850 × 100) = ₹ 385000.

256. $2\pi R = \pi R^2 \Leftrightarrow R = 2 \Leftrightarrow 2R = 4$. Hence, diameter = 4.

257. $\pi R^2 = 7 \times (2\pi R) \Rightarrow R = 14$.

$\therefore$ Circumference $= \left(2 \times \frac{22}{7} \times 14\right)$ units $= 88$ units.

258. $2\pi R - R = 37 \Leftrightarrow \left(\frac{44}{7} - 1\right) R = 37 \Leftrightarrow R = 7$.

$\therefore$ Area of the circle $= \left(\frac{22}{7} \times 7 \times 7\right) cm^2 = 154\ cm^2$.

259. Let the radius of the new park be R m.
Then, $\pi R^2 = \pi \times 8^2 + \pi \times 6^2 = 100\ \pi \Rightarrow R^2 = 100$
$\Rightarrow R = 10$ m.

260. $\pi R_1^2 + \pi R_2^2 = \pi R_3^2 \Leftrightarrow R_1^2 + R_2^2 = R_3^2 \Leftrightarrow (9)^2 + R_2^2 = (15)^2$
$\Leftrightarrow R_2^2 = (15)^2 - (9)^2 = 144$
$\Leftrightarrow R_2 = 12$ cm.

261. We have : $R_1 + R_2 = 140$ ...(*i*)

And, $2\pi (R_1 - R_2) = 88 \Rightarrow R_1 - R_2 = \frac{88 \times 7}{2 \times 22} = 14$. ...(*ii*)

Adding (*i*) and (*ii*) we get : $2R_1 = 154$ or $R_1 = 77$.
Putting $R_1 = 77$ in (*i*) we get : $R_2 = 63$.
So, the diameters of the circles are 154 cm and 126 cm.

262. Let the height of the triangle be x cm.

Then, radius of the circle = (120 % of x) cm $= \left(\frac{6x}{5}\right)$ cm.

$\therefore \frac{1}{2} \times 36 \times x = \frac{22}{7} \times \frac{6x}{5} \times \frac{6x}{5} \Rightarrow x = \left(\frac{18 \times 7 \times 5 \times 5}{22 \times 6 \times 6}\right)$ cm.

So, radius of the circle $= \left[\frac{6}{5} \times \left(\frac{18 \times 7 \times 5 \times 5}{22 \times 6 \times 6}\right)\right]$ cm $= \left(\frac{105}{22}\right)$ cm.

$\therefore$ Area of the circle $= \left(\frac{22}{7} \times \frac{105}{22} \times \frac{105}{22}\right) cm^2 = \left(\frac{1575}{22}\right) cm^2$

$= 71.6\ cm^2 \approx 72\ cm^2$.

263. Let the radius of the pond be R metres.

Then, $\pi R^2 = 616 \Rightarrow R^2 = \frac{616 \times 7}{22} = 196 \Rightarrow R = 14$ m.

Radius of the stage $= \left(\frac{14}{2}\right) m = 7m$.

$\therefore$ Area where water is present

$= \pi (14^2 - 7^2) = \left(\frac{22}{7} \times 21 \times 7\right) m^2 = 462\ m^2$.

264. Side of the square $= \frac{44}{4}$ cm = 11 cm.

Area of the square = $(11 \times 11)\ cm^2 = 121\ cm^2$.

$2\pi R = 44 \Leftrightarrow 2 \times \frac{22}{7} \times R = 44 \Leftrightarrow R = 7$ cm.

Area of circle $= \pi R^2 = \left(\frac{22}{7} \times 7 \times 7\right) cm^2 = 154\ cm^2$.

$\therefore$ Area of the circle is larger by 33 cm^2.

265. Side of the square field $= \sqrt{12100}$ m $= 110$ m.

Perimeter of the circular field = Perimeter of the square field = (4 × 110) m = 440 m.

$2\pi R = 440 \Rightarrow R = \frac{440 \times 7}{2 \times 22} = 70$ m.

$\therefore$ Area of the circular field $= \left(\frac{22}{7} \times 70 \times 70\right) m^2 = 15400\ m^2$

266. Let the radius of the circle be R cm.
Then ,

$\pi R^2 = 39424 \Rightarrow R^2 = 39424 \times \frac{7}{22} = 12544 \Rightarrow R = 112$ cm.

Perimeter of the square = 112 cm.

Side of the square $= \left(\frac{112}{4}\right)$ cm $= 28$ cm.

$\therefore$ Area of the square = $(28 \times 28)\ cm^2 = 784\ cm^2$.

267. Length of wire $= 2\pi \times R = \left(2 \times \frac{22}{7} \times 56\right)$ cm = 352 cm.

Side of the square $= \frac{352}{4}$ cm = 88 cm.

Area of the square = $(88 \times 88)\ cm^2 = 7744\ cm^2$.

268. Area of the square = 407044 cm^2.

Side of the square $= \sqrt{407044}$ cm $= 638$ cm.

Circumference of circle = 638 cm.
Let the radius of the circle be R cm.

Then, $2\pi R = 638 \Rightarrow R = \frac{638 \times 7}{2 \times 22} = 101.5$ cm.

$\therefore$ Area of the circle $= \left(\frac{22}{7} \times 101.5 \times 101.5\right) cm^2 = 32378.5\ cm^2$.

269. Side of the square $= \sqrt{484}$ cm $= 22$ cm.

Perimeter of the square $= (22 \times 4)$ cm $= 88$ cm.

$2\pi R = 88 \Leftrightarrow 2 \times \frac{22}{7} \times R = 88 \Leftrightarrow R = \left(88 \times \frac{7}{44}\right) = 14$ cm.

$\therefore$ Required area $= \pi R^2 = \left(\frac{22}{7} \times 14 \times 14\right)$ cm^2 $= 616$ cm^2.

270. Length of wire $= 2\pi R = \left(2 \times \frac{22}{7} \times 21\right)$ cm $= 132$ cm.

Perimeter of rectangle $= 2\,(6x + 5x)$ cm $= 22x$ cm.

$\therefore\ 22x = 132 \Leftrightarrow x = 6.$

So, the sides of the rectangle are 36 cm and 30 cm.

$\therefore$ Area of the rectangle $= (36 \times 30)$ cm^2 $= 1080$ cm^2.

271. Area of the flower bed $= [(100 \times 100) - 8614]$ m^2 $= 1386$ m^2.

Let the radius of the circular flower bed be R metres.

Then, $\pi R^2 = 1386 \Rightarrow R^2 = \frac{1386 \times 7}{22} = 441 \Rightarrow R = 21$ m.

272. Total area of the field $= [(180 \times 120) + 40000]$ m^2 $= (21600 + 40000)$ m^2 $= 61600$ m^2.

$\therefore\ \pi R^2 = 61600 \Leftrightarrow R^2 = \left(61600 \times \frac{7}{22}\right) = (400 \times 7 \times 7)$ m

$\Leftrightarrow R = (20 \times 7)$ m $= 140$ m.

273. $\frac{\pi R_1^2}{\pi R_2^2} = \frac{4}{1} \Rightarrow \frac{R_1^2}{R_2^2} = \frac{4}{1} \Rightarrow \frac{R_1}{R_2} = \frac{2}{1}.$

274. $\frac{\pi R_1^{\,2}}{\pi R_2^{\,2}} = \frac{16}{49} \Leftrightarrow \frac{R_1^{\,2}}{(14 \times 14)} = \frac{16}{49}$

$\Leftrightarrow R_1^{\,2} = \frac{14 \times 14 \times 16}{49}$

$\Leftrightarrow R_1 = \frac{14 \times 4}{7} = 8$ m.

275. Let the radii of the two circles be $3r$ and $2r$ respectively,

Then, required ratio $= \frac{2\pi\,(3r)}{2\pi\,(2r)} = \frac{3}{2} = 3:2.$

276. Let the radii of the two circles be r and $3r$ respectively.

Then, required ratio $= \frac{\pi\, r^2}{\pi\,(3r)^2} = \frac{\pi\, r^2}{9\pi r^2} = 1:9.$

277. $\frac{2\pi R_1}{2\pi R_2} = \frac{2}{3} \Rightarrow \frac{R_1}{R_2} = \frac{2}{3} \Rightarrow \frac{\pi R_1^2}{\pi R_2^2} = \left(\frac{2}{3}\right)^2 = \frac{4}{9}.$

278. Let the radius of the given circle be R cm and the side of the square be a cm.

Then, $2\pi R = 4a \Leftrightarrow \frac{R}{a} = \frac{2}{\pi}.$

Ratio of their areas $= \frac{\pi R^2}{a^2}$

$= \left(\pi \times \frac{4}{\pi^2}\right) = \left(\frac{4}{22} \times 7\right)$

$= \frac{14}{11} = 14:11.$

279. Let the area of each of the circle and the square be x sq.units.

Let the radius of the circle be r units and the side of the square be a unit.

Then, $\pi r^2 = x \Rightarrow r = \sqrt{\frac{x}{\pi}}$. And, $a^2 = x \Rightarrow a = \sqrt{x}.$

$\therefore$ Required ratio $= \frac{\sqrt{x}}{\sqrt{\frac{x}{\pi}}} = \sqrt{\pi}:1.$

280. Proceeding as in Q.279, we have:

Ratio of perimeters $= \frac{2\pi\sqrt{\frac{x}{\pi}}}{4\sqrt{x}} = \sqrt{\pi}:2.$

281. Distance covered in 1 revolution $= 2\pi R$

$= \left(2 \times \frac{22}{7} \times 0.63\right)$ m $= \frac{99}{25}$ m.

....

$= \left(\frac{99}{25} \times 500\right)$ m $= 1980$ m.

282. Distance covered in 1 revolution

$= \left(2 \times \frac{22}{7} \times \frac{56}{2}\right)$ cm $= 176$ cm.

Required number of revolutions

$= \left(\frac{1.1 \times 1000 \times 100}{176}\right) = 625.$

283. Distance covered in 1 revolution

$= \left(2 \times \frac{22}{7} \times 70\right)$ cm $= 440$ cm.

Number of revolutions made in 1 hr

$= \left(\frac{66 \times 1000 \times 100}{440}\right) = 15000.$

$\therefore$ Number of revolutions per minute $= \frac{15000}{60} = 250.$

284. Distance covered in 4 sec $= \left(\frac{30}{7} \times 7\right)$ m $= 30$ m.

Distance covered in 1 sec $= \frac{30}{4}$

Distance covered in 1 revolution $= \left(\frac{30}{4}\right)$ m $= \frac{15}{2}$ m.

$\therefore$ Required speed $= \left(\frac{15}{2}\right)$ m/s $= \left(\frac{15}{2} \times \frac{18}{5}\right)$ km/hr $= 27$ km/hr.

285. Distance covered in 5 sec $= \left(2 \times \frac{22}{7} \times 70 \times 10\right)$ cm $= 4400$ cm $= 44$ m.

Distance covered in 1 sec $= \left(\frac{44}{5}\right)$ m $= 8.8$ m.

$\therefore$ Speed $= 8.8$ m/sec $= \left(8.8 \times \frac{18}{5}\right)$ km/hr $= 31.68$ km/hr.

286. Distance covered in 1 revolution $= \left(2 \times \frac{22}{7} \times 35\right)$ cm = 220 cm.

Total distance covered by the wheel = (22 × 30) km = 660 km.

∴ Number of revolutions made by the wheel

$$= \left(\frac{660 \times 1000 \times 100}{220}\right) = 300000.$$

287. Let each wheel make x revolutions per sec.

Then, $\left[\left(2\pi \times \frac{7}{2} \times x\right) + (2\pi \times 7 \times x)\right] \times 10 = 1980$

$\Leftrightarrow \left(\frac{22}{7} \times 7 \times x\right) + \left(2 \times \frac{22}{7} \times 7 \times x\right) = 198$

$\Leftrightarrow 66x = 198 \Leftrightarrow x = 3.$

Distance moved by smaller wheel in 3 revolutions

$$= \left(2 \times \frac{22}{7} \times \frac{7}{2} \times 3\right) \text{ cm} = 66 \text{ cm}.$$

∴ Speed of smaller wheel $= \frac{66}{3}$ cm/s = 22 cm/s.

288. Distance covered by smaller wheel in 1 revolution

$= (2\pi \times 15)$ cm $= (30\pi)$ cm.

Distance covered by larger wheel in 1 revolution

$= (2\pi \times 25)$ cm $= (50\pi)$ cm.

Let $k \times 30\pi = 15 \times 50\pi$. Then, $k = \left(\frac{15 \times 50\pi}{30\pi}\right) = 25.$

∴ Required number of revolutions = 25.

289. Required number of rotations

$$= \frac{\text{Circumference of bigger ring}}{\text{Circumference of smaller ring}} = \frac{2 \times \pi \times 10}{2 \times \pi \times 2} = 5.$$

290. Let the diameter of the wheel be d metres.

Distance covered in 1 revolution $= (\pi d)$ m.

Distance covered in 113 revolutions $= (113\pi d)$ m.

$\therefore\ 113 \times \frac{22}{7} \times d = 226 \times 10$

$\Leftrightarrow\ d = \left(226 \times 10 \times \frac{7}{22} \times \frac{1}{113}\right) \text{m} = 6\frac{4}{11} \text{m}.$

291. Let the rear wheel make x revolutions. Then, the front wheel makes $(x + 5)$ revolutions.

$(x + 5) \times 40 = 48x \Rightarrow 8x = 200 \Rightarrow x = 25.$

Distance travelled by the cart = (48 × 25) ft = 1200 ft.

292. Circumference of the front wheel $= \left(2 \times \frac{22}{7} \times 14\right)$ cm = 88 cm.

Circumference of the rear wheel $= \left(2 \times \frac{22}{7} \times 21\right)$ cm = 132 cm.

Required distance = L.C.M. of 88 cm and 132 cm = 264 cm.

293. Time taken by front wheel to complete one revolution

$$= \left(\frac{3.5}{15}\right) \text{sec} = \frac{7}{30} \text{ sec}.$$

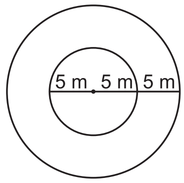
Time taken by rear wheel to complete one revolution

$$= \left(\frac{3}{15}\right) \text{sec} = \frac{1}{5} \text{ sec}.$$

∴ Required time $= \left[\text{L.C.M. of } \frac{7}{30} \text{ and } \frac{1}{5}\right]$ sec

$$= \left(\frac{\text{L.C.M. of 7 and 1}}{\text{H.C.F. of 30 and 5}}\right) \text{sec} = \frac{7}{5} \text{ sec} = 1.4 \text{ sec}.$$

294. Let the circumference of front wheel be x metres.



Then, circumference of rear wheel $= (x - 1)$ metres.

$\therefore\ \frac{600}{x} - \frac{600}{(x+1)} = 30 \Rightarrow \frac{1}{x(x+1)} = \frac{1}{20}$

$\Rightarrow x(x-1) = 20 \Rightarrow (x^2 + x - 20 = 0$

$\Rightarrow (x + 5)(x - 4) = 0 \Rightarrow x = 4\text{m}.$

295. Since the diameter is the longest chord of a circle, so maximum possible distance = (10 + 5) m = 15 m.

296. Radius of the ground = 17.5 m. Radius of inner circle = (17.5 − 1.4) m = 16.1 m.

Area of the garden $= \pi \times \left[(17.5)^2 - (16.1)^2\right] \text{m}^2$

$$= \left[\frac{22}{7} \times (17.5 + 16.1)(17.5 - 16.1)\right] \text{m}^2$$

$$= \left[\frac{22}{7} \times 33.6 \times 1.4\right] \text{m}^2 = 147.84 \text{ m}^2.$$

297. Radius of the plot = 21 m.

Area of the path

$= \pi[(24.5)^2 - (21)^2] \text{ m}^2 = [\pi(24.5 + 21)(24.5 - 21)] \text{ m}^2$

$= \left(\frac{22}{7} \times 45.5 \times 3.5\right) \text{m}^2 = 500.5 \text{ m}^2.$

∴ Cost of gravelling = ₹ (500.5 × 4) = ₹ 2002.

298. Uncut area $= \pi(5^3 - 3^2)$ cm $= \left(\frac{22}{7} \times 8 \times 2\right) \text{cm}^2.$

Let the required radius be r cm.

Then, $\pi r^2 = \left(\frac{22}{7} \times 16\right) \Rightarrow r^2 = 16 \Rightarrow r = 4$ cm.

299. Let the radius of the ground be R metres.

Then, $2\pi R = 88 \Rightarrow R = \left(\frac{88 \times 7}{2 \times 22}\right) = 14$ m.

Area of land strip $= \pi\left[(14)^2 - (11)^2\right] \text{m}^2 = \left(\frac{22}{7} \times 25 \times 3\right) \text{m}^2$

$$= \left(\frac{1650}{7}\right) \text{m}^2.$$

∴ Cost of levelling = ₹ $\left(\frac{1650}{7} \times 7\right)$ = ₹ 1650.

300. $\pi R_1^2 = 616 \Leftrightarrow R_1^2 = \left(616 \times \frac{7}{22}\right) = 196 \Leftrightarrow R_1 = 14$ cm.

$\pi R_2^2 = 154 \Leftrightarrow R_2^2 = \left(154 \times \frac{7}{22}\right) = 49 \Leftrightarrow R_2 = 7$ cm.

Breadth of the ring $= (R_1 - R_2)$ cm = (14 − 7) cm = 7 cm.

301. Let the radii of the outer and inner circles be R and r respectively.

Then, $2\pi R - 2\pi r = 44 \Rightarrow 2\pi (R - r) = 44$

$$\Rightarrow (R - r) = \frac{44 \times 7}{22 \times 2} = 7.$$

302. Since weight of the disc is proportional to its area, we have:

$$\pi(R^2 - r^2) = \frac{24}{25}\pi R^2 \Rightarrow R^2 - r^2 = \frac{24}{25}R^2 \Rightarrow r^2 = \frac{1}{25}R^2$$

$$R^2 = 25r^2 \Rightarrow R = 5r.$$

303. Let the radius of the pool be R ft. Radius of the pool including the wall = $(R + 4)$ ft.

Area of the concrete wall

$= \pi[(R+4)^2 - R^2]$ sq. ft

$= \pi[(R+4+R)(R+4-R]$ sq. ft $= 8\pi\ (R+2)$ sq.ft.

$8\pi\ (R+2) = \frac{11}{25}\pi R^2$

$\Leftrightarrow 11R^2 = 200\ (R + 2$

$\Leftrightarrow 11R^2 - 200R - 400 = 0$

$\Leftrightarrow 11R^2 - 220R + 20R - 400 = 0$

$\Leftrightarrow 11R\ (R - 20) + 20\ (R - 20) = 0$

$\Leftrightarrow (R - 20)\ (11R + 20) = 0 \quad \Leftrightarrow \quad R = 20.$

$\Leftrightarrow$ Radius of the pool = 20 ft.

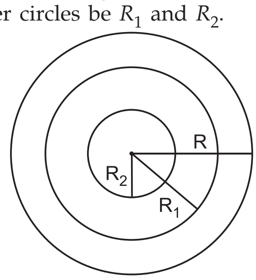
304. $\frac{2\pi R_1}{2\pi R_2} = \frac{23}{22} \Leftrightarrow \frac{R_1}{R_2} = \frac{23}{22} \Leftrightarrow R_1 = \frac{23}{22}R_2.$

Also, $R_1 - R_2 = 5$ m

$\Leftrightarrow \frac{23R_2}{22} - R_2 = 5 \Leftrightarrow R_2 = 110.$

$\Leftrightarrow$ Diameter of inner circle = (2×110) m = 220 m.

305. Let the radius of the given circle be R. Let the radii of the two inner circles be R_1 and R_2.



Then, $\pi(R_1^2 - R_2^2) = \pi R_2^2$

$\Rightarrow R_1^2 - R_2^2 = R_2^2$

$$\Rightarrow R_1^2 = 2R_1^2 \Rightarrow \frac{R_2^2}{R_1^2} = \frac{1}{2} \Rightarrow \frac{R_2}{R_1} = \frac{1}{\sqrt{2}}.$$

306. Let the original radius of the circle be R cm.

Then, $\pi[(R+1)^2 - R^2] = 22 \Rightarrow (2R+1) = \frac{22 \times 7}{22} = 7$

$$\Rightarrow 2R = 6 \Rightarrow R = 3 \text{ cm}.$$

307. Perimeter of rectangle = [2(8 + 7)] cm = 30 cm.

Perimeter of square = (2 × 30) cm = 60 cm.

Side of the square = $\left(\frac{60}{4}\right)$cm = 15 cm.

Radius of the semi-circle = $\left(\frac{15}{2}\right)$cm.

$\therefore$ Circumference = $\left(\frac{22}{7} \times \frac{15}{2}\right)$cm $= \left(\frac{165}{7}\right)$cm $= 23.57$ cm.

308. Area of the semi circle

$$= \frac{1}{2}\pi R^2 = \left(\frac{1}{2} \times \frac{22}{7} \times 7 \times 7\right)\text{m}^2 = 77\,\text{m}^2.$$

309. Perimeter of window

$$= \pi R + 2R = \left(\frac{22}{7} \times \frac{63}{2} + 63\right)\text{cm} = (99 + 63)\text{ cm} = 162\text{ cm}.$$

310. $\pi R = 33 \Rightarrow R = \left(\frac{33 \times 7}{22}\right) = \left(\frac{21}{2}\right)$ m.

$\therefore$ Required distance = 2 R = 21 m.

311. Given :

$$= \pi R + 2R = 36 \Leftrightarrow (\pi + 2)R = 36 \Leftrightarrow R = \frac{36}{\left(\frac{22}{7} + 2\right)}\text{cm} = 7\text{cm}.$$

Required area = $\frac{\pi R^2}{2} = \left(\frac{22}{7} \times \frac{7 \times 7}{2}\right)\text{cm}^2 = 77\text{ cm}^2.$

312. $\frac{\pi R^2}{2} = 11088 \Rightarrow R^2 = 11088 \times 2 \times \frac{7}{22} = 7056 \Rightarrow R = 84$ m.

$\therefore$ Perimeter = $\pi R + 2R = \left(\frac{22}{7} \times 84 + 2 \times 84\right)$m $= 432$ m.

313. Length of each side of the square = $\sqrt{81}$ cm = 9 cm.

Length of wire = (9 × 4) cm = 36 cm.

$$\pi R + 2R = 36 \Leftrightarrow (\pi + 2)R = 36 \Leftrightarrow R = \frac{36}{\left(\frac{22}{7} + 2\right)} = 7\text{cm}.$$

Area of the semicircle

$$= \frac{1}{2}\pi R^2 = \left(\frac{1}{2} \times \frac{22}{7} \times 7 \times 7\right)\text{cm}^2 = 77\text{cm}^2.$$

314. Area of the shaded region

$$= \frac{1}{2}\pi\left(\frac{LM}{2}\right)^2 + \frac{1}{2}\pi\left(\frac{LN}{2}\right)^2 + \frac{1}{2}\pi\left(\frac{MN}{2}\right)^2$$

$$= \frac{1}{8}\pi\left[(LM)^2 + (LN)^2 + (MN)^2\right] = \frac{1}{8}\pi\,[2\,(MN)^2]$$

$$= \frac{1}{4}\pi\,(MN)^2 = \frac{1}{4}\pi x^2.$$

315. Area of the shaded portion = Area of semi-circle with AB as diameter + Area of semi-circle with BC as diameter + Area (ΔABC) – Area of semi-circle with AC as diameter

$$= \frac{1}{2}\pi\left(\frac{AB}{2}\right)^2 + \frac{1}{2}\pi\left(\frac{BC}{2}\right)^2 + 12 - \frac{1}{2}\pi\left(\frac{AC}{2}\right)^2$$

$$= \frac{1}{8}\pi\left[(AB)^2 + (BC)^2 - (AC)^2\right] + 12 = \frac{1}{8}\pi\,[(AC)^2 - (AC)^2] + 12$$

= 12 sq. units. $[\because (AB)^2 + (BC)^2 = (AC)^2]$

316. Perimeter of the shaded area = Sum of circumferences of semi-circles with OP, PQ and OQ as diameters.

$$= \pi\left(\frac{OP}{2}\right)+\pi\left(\frac{PQ}{2}\right)+\pi\left(\frac{OQ}{2}\right)$$

$$= [\pi(7+7+14)]\text{cm} = \left(\frac{22}{7}\times 28\right)\text{cm} = 88 \text{ cm}.$$

317. Let the length of the side of the square be x cm.

Then, radius of each semi circle = $\left(\frac{x}{2}\right)$ cm.

$$\text{Total area} = \left[x^2+\frac{\pi}{2}\left(\frac{x}{2}\right)^2+\frac{\pi}{2}\left(\frac{x}{2}\right)^2\right]\text{cm}^2$$

$$= \left(x^2+\frac{\pi}{4}x^2\right)\text{cm}^2.$$

$$\therefore\ x^2+\frac{\pi}{4}x^2 = 350 \Rightarrow x^2+\frac{22x^2}{28} = 350$$

$$\Rightarrow x^2+\frac{11x^2}{14} = 350$$

$$\Rightarrow \frac{25x^2}{14} = 350 \Rightarrow x^2 = \left(\frac{350\times 14}{25}\right) = 196$$

$\Rightarrow x$ = 14 cm.

318. Area of the shaded portion = (Sum of areas of 2 smaller semi-circles + Sum of areas of 2 bigger semi-circles) – Sum of areas of 2 smaller semi-circles

= Sum of areas of 2 bigger semi-circles

$$= \left(2\times\frac{\pi R^2}{2}\right)\text{sq. units} = (\pi R^2)\text{ sq. units}.$$

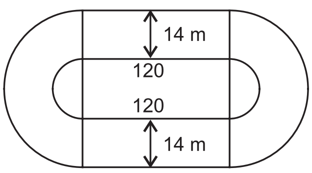
319. Required length = $2a$ + Sum of circumferences of 2 semi-circles of radius $r = 2a + 2\pi r = 2(a + \pi r)$.

320. Area of the shaded region = Area of the semi-circle with radius a units – Area of the triangle with base $2a$ units and height a units

$$= \left(\frac{\pi a^2}{2}-\frac{1}{2}\times 2a\times a\right)\text{sq. units}.$$

$$= \left(\frac{\pi a^2}{2}-a^2\right)\text{sq. units} = a^2\left(\frac{\pi}{2}-1\right)\text{sq.units}$$

321. Area of the track = Area of the two rectangles + Area of the two semi-circular ring ends

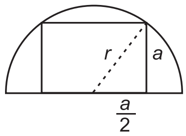


$$= \left[(2\times 120\times 14)+2\times\frac{\pi}{2}\times\{(49)^2-(35)^2\}\right]\text{m}^2$$

$$= \left[3360+\frac{22}{7}\times(49+35)(49-35)\right]\text{m}^2$$

$$= \left(3360+\frac{22}{7}\times\ 84\times 14\right)\text{m}^2 = (3360+3696)\text{ m}^2 = 7056\text{ m}^2.$$

322. Let each side of the square be a cm and the radius of the semi-circle be r cm.



Then, a^2 = 40 cm^2.

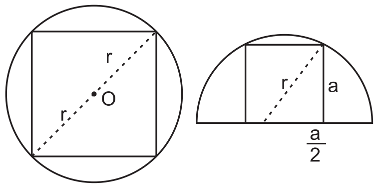
$$r^2 = a^2+\left(\frac{a}{2}\right)^2 = a^2+\frac{a^2}{4} = \frac{5a^2}{4} = \left(\frac{5\times 40}{4}\right) = 50.$$

$$\therefore \text{ Area of the semi-circle} = \frac{\pi r^2}{2} = \left(\pi\times\frac{50}{2}\right)\text{cm}^2 - (25\pi)\text{cm}^2.$$

323. Let the radius of each of the circle and the semi-circle be r units.

Diagonal of the first square = $(2r)$ units.

Let the side of the second square be a units.

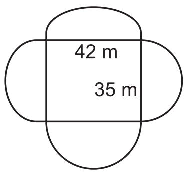


Then, $r^2 = a^2 + \left(\frac{a}{2}\right)^2 \Rightarrow r^2 = \frac{5a^2}{4} \Rightarrow a^2 = \frac{4r^2}{5}$.

$\therefore$ Ratio of the areas of the two squares

$$= \frac{\frac{1}{2}\times(2r)^2}{a^2} = \frac{2r^2}{\left(\frac{4r^2}{5}\right)} = \frac{5}{2} = 5:2.$$

324. Clearly, the radii of the semi-circular ends along the length and breadth are $\left(\frac{42}{2}\right)$ m and $\left(\frac{35}{2}\right)$ m. i.e. 21 m and 17.5 m respectively.



$\therefore$ Area of the total field = Area of rectangle with dimensions 42 m × 35 m + 2 × Area of semi-circle with radius 21 m + 2 × Area of semi-circle with radius 17.5 m

$$= \left(42\times 35+2\times\frac{22}{7}\times\frac{21\times 21}{2}+2\times\frac{22}{7}\times\frac{17.5\times 17.5}{2}\right)\text{m}^2$$

= (1470 + 1386 + 962.5) m^2 = 3818.5 m^2.

325. Area of the sector

$$= \left(\frac{1}{2}\times\text{arc}\times R\right) = \left(\frac{1}{2}\times 3.5\times 5\right)\text{cm}^2 = 8.75\text{ cm}^2.$$

326. Area of the sector

$$= \frac{\pi R^2\theta}{360} = \left(\frac{22}{7}\times 7\times 7\times\frac{108}{360}\right)\text{cm}^2 = 46.2\text{ cm.}^2$$

327. $\dfrac{\pi R^2 \times 56}{360} = 17.6 \Rightarrow R^2 = \left(\dfrac{17.6 \times 360 \times 7}{22 \times 56}\right) = 36 \Rightarrow R = 6$ cm.

328. Area of the shaded portion

$$= \left(\pi r^2 \times \frac{42}{360} + \pi r^2 \times \frac{58}{360} + \pi r^2 \times \frac{80}{360}\right) \text{cm}^2$$

$$= \left[\frac{\pi r^2}{360}(42 + 58 + 80)\right] \text{cm}^2 = \left[\frac{22}{7} \times (\sqrt{7})^2 \times \frac{180}{360}\right] \text{cm}^2 = 11 \text{ cm}^2.$$

329. Angle traced by the minute hand in 5 minutes

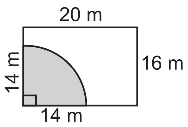
$$= \left(\frac{360}{60} \times 5\right)^{\circ} = 30^{\circ}.$$

$\therefore$ Area of the sector

$$= \left(\frac{22}{7} \times 7 \times 7 \times \frac{30}{360}\right) \text{cm}^2 = 12.83 \text{ cm}^2.$$

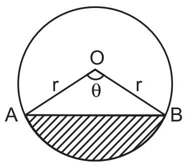
330. Required area = Area of the quadrant with radius 14 m

$$= \left(\frac{22}{7} \times 14 \times 14 \times \frac{90}{360}\right) \text{m}^2 = 154 \text{ m}^2.$$



331. Area of the segment = (Area of sector OAB) – (Area of ΔOAB)

$$= \left(\frac{\pi r^2 \theta}{360^{\circ}} - \frac{1}{2} r^2 \sin\theta\right) = r^2\left(\frac{\pi\theta}{360^{\circ}} - \frac{1}{2}\sin\theta\right).$$



332. Length of the arc

$$= \frac{2\pi r\theta}{360} = \left(2 \times \frac{22}{7} \times 21 \times \frac{56}{360}\right) \text{cm} = \left(\frac{308}{15}\right) \text{cm} = 20.53 \text{ cm}.$$

333. $2\pi r = 100.$

So, length of the ar $= \dfrac{2\pi r\theta}{360} = \left(\dfrac{100 \times 20}{360}\right)$ units

$$= \left(\frac{50}{9}\right) \text{units} = 5.55 \text{ units}.$$

334. Side of the square $= \dfrac{120}{4}$ cm = 30 cm.

Radius of the required circle $= \left(\dfrac{1}{2} \times 30\right)$ cm = 15 cm.

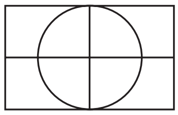
....

$= \pi \times \quad {}^2 \quad {}^2$

$$= \left[\frac{22}{7} \times (15)^2\right] \text{cm}^2.$$

335. Radius of the requird circle $= \left(\dfrac{1}{2} \times 30\right)$ cm = 15 cm.

Area of the circle $= \left(\dfrac{22}{7} \times 7 \times 7\right) \text{cm}^2 = 154 \text{ cm}^2.$

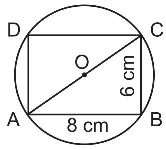


336. Diameter of the circle $= AC = \sqrt{(AB)^2 + (BC)^2}$

$$= \sqrt{8^2 + 6^2} \text{ cm} = \sqrt{100} \text{ cm} = 10 \text{ cm}.$$

Radius = 5 cm.

Required area = (Area of the circle) – (Area of the rectangle)



$$= \left[\left(\frac{22}{7} \times 5 \times 5\right) - (8 \times 6)\right] \text{cm}^2$$

$$= \left(\frac{550}{7} - 48\right) \text{cm}^2 = \left(\frac{214}{7}\right) \text{cm}^2 = 30.57 \text{ cm}^2 \approx 30.6 \text{ cm}^2.$$

337. Area of the rectangle = 32 cm^2. One side = 8 cm.

Other side $= \left(\dfrac{32}{8}\right)$ cm = 4 cm

$\therefore$ Diameter of the circle = Diagonal of the rectangle

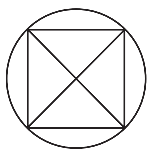
$$= \sqrt{8^2 + 4^2} \text{ cm} = \sqrt{80} \text{ cm} = 4\sqrt{5} \text{ cm}.$$

338. $\pi R^2 = 220 \Leftrightarrow R^2 = \left(220 \times \dfrac{7}{22}\right) = 70.$

Now, $R = \dfrac{1}{2} \times (\text{diagonal}) \Leftrightarrow \text{diagonal} = 2R.$

Area of the seuare

$$= \frac{1}{2} \times (\text{diagonal})^2 = \left(\frac{1}{2} \times 4R^2\right) - 2R^2 = (2 \times 70) \text{ cm}^2 = 140 \text{ cm}^2.$$



339. Given R = 4 cm.

$R = \dfrac{1}{2} \times$ (diagonal of the square) $\Leftrightarrow$ dagonal = 2R = 8 cm.

Required area $= \pi R^2 \; \dfrac{1}{2} \times (8)^2 = (\pi \times 16 - 32)$

$= (16\pi - 32)$ cm^2.

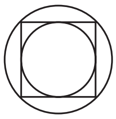
340. $2\pi R = 100 \Leftrightarrow R = \dfrac{100}{2\pi} = \dfrac{50}{\pi}.$

$R = \dfrac{1}{2} \times \text{diagonal} \Leftrightarrow \text{diagonal} = 2R = \dfrac{2 \times 50}{\pi} = \dfrac{100}{\pi}.$

$\therefore$ Area of the square $= \dfrac{1}{2} \times (\text{diagonal})^2 = \dfrac{1}{2} \times \left(\dfrac{100}{\pi}\right)^2$

$$\Leftrightarrow a^2 = \frac{1}{2} \times \left(\frac{100}{\pi}\right)^2 \Leftrightarrow a = \frac{1}{\sqrt{2}} \times \frac{100}{\pi} = \frac{50\sqrt{2}}{\pi} \text{ cm}.$$

341. Let r_1 and r_2 be the radii of the inscribed and circumscribed circles respectively.



Then, $r_1 = \frac{5}{2}$ cm.

$r_2 = \frac{1}{2} \times$ diagonal of the square $= \frac{1}{2} \times 5\sqrt{2} = \frac{5\sqrt{2}}{2}$ cm.

$\therefore$ Required ratio $= \dfrac{2\pi \times \frac{5\sqrt{2}}{2}}{2\pi \times \left(\frac{5}{2}\right)} = \sqrt{2} : 1.$

342. Let the radius of the circle be r and the side of the square be a.

Then, diagonal of the square

$= 2r \Rightarrow \sqrt{2}\,a = 2r \Rightarrow a = \frac{2}{\sqrt{2}}\,r = \sqrt{2}r.$

Area of one shaded portion $= \frac{1}{4}\left[\pi r^2 - (\sqrt{2}r)^2\right] = \frac{1}{4}(\pi - 2)\,r^2.$

$\therefore \frac{1}{4}(\pi - 2)r^2 = \frac{4}{7} \Rightarrow \left(\frac{22}{7} - 2\right)r^2 = \frac{16}{7} \Rightarrow r^2 = \frac{16}{7} \times \frac{7}{8} \times 2$

$\Rightarrow r = \sqrt{2}.$

343. Let r_1 and r_2 be the radii of the incircle and circumcircle of a square respectively and let each side of the square be a.

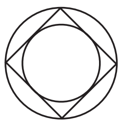
Then, $r_1 = \frac{a}{2}$. $r_2 = \frac{1}{2} \times$ diagonal of the sequence

$= \frac{1}{2} \times \sqrt{2}a = \frac{\sqrt{2}a}{2}$ cm.

$\therefore$ Required ratio $= \dfrac{\pi \times \left(\frac{a}{2}\right)^2}{\pi \times \left(\frac{\sqrt{2}a}{2}\right)^2} = 1 : 2.$

344. Let the radius of the circle be r and the side of the circumscribed and inscribed squares be a_1 and a_2 respectively. Then, $a_1 = 2r$.

Diagonal of inscribed square



$= 2r \Rightarrow \sqrt{2}a_2 = 2r \Rightarrow a_2 = \frac{2r}{\sqrt{2}} = \sqrt{2}\,r.$

$\therefore$ Required ratio $= \dfrac{a_1^2}{a_2^2} = \dfrac{(2r)^2}{(\sqrt{2}r)^2} = \dfrac{4r^2}{2r^2} = 2 : 1.$

345. Radius of each circle = 2 units.

Area of the shaded region

= Area of the rectangle – Area of two circles

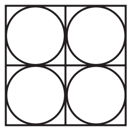
$= [(8 \times 4) - 2 \times \pi(2)^2]$ sq. units $= (32 - 8\pi)$ sq. units.

346. Side of square paper $= \sqrt{784}$ cm = 28 cm.

Radius of each circular plate $= \left(\frac{1}{4} \times 28\right)$ cm = 7 cm.

Circumference of each circular plate $= \left(2 \times \frac{22}{7} \times 7\right)$ cm

= 44 cm

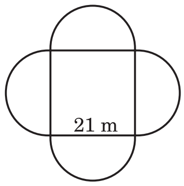


347. Length of the fence = $4\pi R$,

where $R = \frac{21}{2}$ m

$= \left(4 \times \frac{22}{7} \times \frac{21}{2}\right)$ m = 132 m.

Cost of fencing = ₹ $\left(132 \times \frac{25}{2}\right)$ = ₹ 1650.



348. $\frac{a}{\sqrt{3}} = 8 \Rightarrow \frac{a}{2\sqrt{3}} = \frac{1}{2} \times 8 = 4$ cm.

$\left[\because \text{circum radius} = \frac{a}{\sqrt{3}}, \text{inradius} = \frac{a}{2\sqrt{3}}\right]$

349. Radius of incircle of an equilateral triangle $= \frac{a}{2\sqrt{3}}$.

Radius of circumcircle of an equilateral triangle $= \frac{a}{\sqrt{3}}$.

$\therefore$ Required ratio $= \frac{\pi a^2}{12} : \frac{\pi a^2}{3} = \frac{1}{12} : \frac{1}{3} = 1 : 4.$

350. Radius of circumcircle $= \frac{a}{\sqrt{3}} = \frac{12}{\sqrt{3}}$ cm $= 4\sqrt{3}$ cm.

351. Radius of incircle $= \frac{a}{2\sqrt{3}} = \frac{42}{2\sqrt{3}}$ cm $= 7\sqrt{3}$ cm.

Area of incircle $= \left(\frac{22}{7} \times 49 \times 3\right)$ cm^2 = 462 cm^2.

352. Radius of incircle $= \frac{a}{2\sqrt{3}}$.

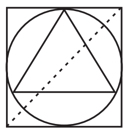
Area of incircle $= \left(\frac{\pi \times a^2}{12}\right)$ cm^2.

$\therefore \frac{\pi a^2}{12} = 154 \Leftrightarrow a^2 = \frac{154 \times 12 \times 7}{22} \Leftrightarrow a = 14\sqrt{3}.$

$\therefore$ Perimeter of the triangle $= (3 \times 14\sqrt{3})$ cm

$= (42 \times 1.732)$ cm = 72.7 cm (approx.)

353. Side of equilateral triangle, $a = 4\sqrt{3}$ cm. Radius of circle,



$r = \frac{a}{\sqrt{3}} = \left(\frac{4\sqrt{3}}{\sqrt{3}}\right)$cm = 4 cm.

Let each side of the square be x cm.

Then, $x = 2r = 8$ cm.

$\therefore$ Diagonal of the square

$= \sqrt{8^2 + 8^2}$ cm $= \sqrt{128}$ cm $= 8\sqrt{2}$ cm.

354. We have: $AE \perp BC$ and $AD = BD = CD = r$.

$AE = AD + DE = r + DE$.

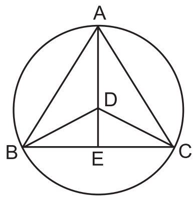
In ΔBDC,

$BE = \sqrt{(BD)^2 - (DE)^2} = \sqrt{r^2 - (DE)^2} = \sqrt{(r - DE)(r + DE)}$.

$\therefore$ Area of the triangle $= \frac{1}{2} \times BC \times AE$

$= \frac{1}{2} \times 2BE \times AE = BE \times AE = \sqrt{(r - DE)(r + DE)}\ (r + DE)$

$= (r - DE)^{\frac{1}{2}} (r + DE)^{\frac{3}{2}}$.



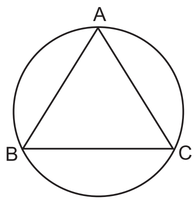
355. Let A, B and C denote the positions of the three boys. Then, $AB = BC = AC$.

So, ΔABC is equilateral.

Let the side of ΔABC be a.

Then, $\frac{a}{\sqrt{3}} = 5 \Rightarrow a = 5\sqrt{3}$.

$\therefore$ Required shortest distance $= 5\sqrt{3}$ m.



356. Radius, $r = 1$.

Let each side of the equilateral triangle be a.

Then, $\frac{a}{\sqrt{3}} = 1$ or $a = \sqrt{3}$.

$\therefore$ Area of the triangle

$= \frac{\sqrt{3}}{4} a^2 = \frac{\sqrt{3}}{4} \times (\sqrt{3})^2 = \frac{3\sqrt{3}}{4}$ sq. units.

357. We have : $a = 6$, $b = 11$, $c = 15$. $s = \frac{1}{2}(6 + 11 + 15) = 16$.

Area of the triangle, $\Delta = \sqrt{16 \times 10 \times 5 \times 1} = 20\sqrt{2}$ cm^2.

Radius of incircle $= \frac{\Delta}{s} = \frac{20\sqrt{2}}{16} = \frac{5\sqrt{2}}{4}$ cm.

358. $r = \frac{\text{Product of sides}}{4\,\Delta}$

$\Rightarrow \Delta = \frac{\text{Product of sides}}{4\,r} = \frac{196}{4 \times 2.5} = 19.6 \text{ cm}^2$.

359. $s = \frac{13 + 14 + 15}{2} = \frac{42}{2} = 21$.

$\therefore \quad \Delta = \sqrt{21 \times 8 \times 7 \times 6} = (2 \times 3 \times 7) \text{ cm}^2 = 84$ cm^2.

Radius of circle $= \left(\frac{13 \times 14 \times 15}{4 \times 84}\right) \text{cm}^2 = \left(\frac{65}{8}\right) \text{cm} = 8.125$ cm.

360. Let the radius of in circle be r cm.

Then, $2\pi r = 88 \Leftrightarrow r = \left(88 \times \frac{7}{22} \times \frac{1}{2}\right) = 14$.

Semi-perimeter, $s = \left(\frac{30}{2}\right) \text{cm} = 15$ cm.

$\therefore$ Area of the triangle $= r \times s = (14 \times 15)$ cm^2 = 210 cm^2.

361. Radius $= \frac{\text{Area}}{\text{Semi-perimeter}} = \left(\text{Area} \times \frac{2}{\text{Area}}\right) = 2$.

362. Let the perimeter of each be a. Then,

side of the equilateral triangle $= \frac{a}{3}$;

side of the square $= \frac{a}{4}$;

radius of the circle $= \frac{a}{2\pi}$.

$\therefore$ $T = \frac{\sqrt{3}}{4} \times \left(\frac{a}{3}\right)^2 = \frac{\sqrt{3}\,a^2}{36}$; $S = \left(\frac{a}{4}\right)^2 = \frac{a^2}{16}$; C

$= \pi \times \left(\frac{a}{2\pi}\right)^2 = \frac{a^2}{4\pi} = \frac{7a^2}{88}$.

So, $C > S > T$.

363. Let the area of each be a. Then,

radius of the circle $= \frac{\sqrt{a}}{\pi}$; side of the square $= \sqrt{a}$;

side of the triangle $= \sqrt{\frac{a \times 4}{\sqrt{3}}}$.

Perimeter of the circle $= 2\pi\sqrt{\frac{a}{\pi}} = 2\sqrt{\pi a}$

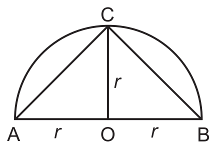
$= 2\sqrt{3.14 \times a} = 2 \times 1.77\sqrt{a} = 3.54\sqrt{a}$.

Perimeter of the square $= 4\sqrt{a}$;

Perimeter of the triangle $= 3 \times \sqrt{\frac{4a}{1.732}} = 3 \times \sqrt{2.31a}$

$= 3 \times 1.52\sqrt{a} = 4.56\sqrt{a}$.

364. Required area $= \frac{1}{2} \times \text{base} \times \text{height} = \left(\frac{1}{2} \times 2r \times r\right) = r^2$.



365. Required area $= \frac{\pi}{2} \times \left(\frac{AC}{2}\right)^2 = \frac{\pi}{2} \times \frac{AC^2}{4} = \frac{\pi}{2} \times \frac{AB^2 + BC^2}{4}$

$= \frac{\pi}{2} \times \left(\frac{AB^2}{4} + \frac{BC^2}{4}\right) = \frac{\pi}{2} \times \left(\frac{AB}{2}\right)^2 + \frac{\pi}{2} \times \left(\frac{BC}{2}\right)^2$

$= 81 + 36 = 117$ cm^2.

366. Let original radius be R cm.

Then, original circumference $= (2\pi R)$ cm.

New radius $= (175\%$ of $R)$ cm $= \left(\frac{175}{100} \times R\right)$ cm $= \frac{7R}{4}$ cm.

New circumference $= \left(2\pi \times \frac{7R}{4}\right)$ cm $= \frac{7\pi R}{2}$ cm.

Increase in circumference $= \left(\frac{7\pi R}{2} - 2\pi R\right)$ cm $= \frac{3\pi R}{2}$ cm.

Increase% $= \left(\frac{3\pi R}{2} \times \frac{1}{2\pi R} \times 100\right)\% = 75\%$.

367. Let the original and new radius of the balloon be r cm and R cm respectively.

Then, $2\pi r = 20 \Rightarrow r = \frac{20}{2\pi}$. And, $2\pi R = 25 \Rightarrow R = \frac{25}{2\pi}$.

$\therefore$ Required difference $= (R - r) = \left(\frac{25}{2\pi} - \frac{20}{2\pi}\right) = \frac{5}{2\pi}$.

368. Let original diameter be d metres.

Then, its circumference $= (\pi d)$ metres.

Time taken to cover $(8\pi d)$ m $= 40$ min.

New diameter $= (10d)$ m.

Then, its circumference $= (\pi \times 10d)$ m.

$\therefore$ Time taken to go round it once

$= \left(\frac{40}{8\pi d} \times 10\pi d\right)$ m $= 50$ min.

369. Let the original radius be R cm.

New radius $= \left(\frac{106}{100}R\right)$ cm $= \left(\frac{53R}{50}\right)$ cm.

Original area $= \pi R^2$.

$$\text{Increase in area} = \pi\left(\frac{53R}{50}\right)^2 - \pi R^2 = \pi R^2\left[\left(\frac{53}{50}\right)^2 - 1\right]$$

$$= \frac{\pi R^2\,[(53)^2 - (50)^2]}{2500} = \frac{\pi R^2\,(103 \times 3)}{2500}\ \text{m}^2.$$

Increase% $= \left(\frac{\pi R^2 \times 309}{2500} \times \frac{1}{\pi R^2} \times 100\right)\% = 12.36\%$.

370. Let the original radius be R. New radius $= (100 + 200)\%$ of $R = 300\%$ of $R = 3R$.

Original area $= \pi R^2$; New area $= \pi \times (3R)^2 = 9\pi R^2$.

Increase in area $= (9\pi R^2 - \pi R^2) = 8\pi R^2$.

$\therefore$ Increase% $= \left(\frac{8\pi R^2}{\pi R^2} \times 100\right)\% = 800\%$.

371. Let the original radius be R cm.

New radius $= (90\%$ of $R)$ cm $= \left(\frac{90}{100} \times R\right)$ cm $= \frac{9R}{10}$ cm.

Original area $= \pi R^2$.

Diminished area $= \left[\pi R^2 - \pi\left(\frac{9R}{10}\right)^2\right]$ cm^2

$= \left[\left(1 - \frac{81}{100}\right)\pi R^2\right]$ cm^2 $= \left(\frac{19}{100}\pi R^2\right)$ cm^2.

Decrease% $= \left(\frac{19\pi R^2}{100} \times \frac{1}{\pi R^2} \times 100\right)\% = 19\%$.

372. Let the original radius be R. New radius $= 2R$.

Original area $= \pi R^2$, New area $= \pi(2R)^2 = 4\pi R^2$. Increase in area $= (4\pi R^2 - \pi R^2) = 3\pi R^2$.

Increase% $= \left(\frac{3\pi R^2}{\pi R^2} \times 100\right)\% = 300\%$.

373. Let the original radius be R. New radius $= 3R$.

Original circumference $= 2\pi R$. New circumference $= 2\pi(3R) = 6\pi R$.

$\therefore$ Required ratio $= \frac{6\pi R}{2\pi R} = 3$.

374. $2\pi R_1 = 4\pi$ and $2\pi R_2 = 8\pi \Rightarrow R_1 = 2$ and $R_2 = 4$

$\Rightarrow$ Original area $= (4\pi \times 2^2) = 16\pi$,

Increased area $= (4\pi \times 4^2) = 64\pi$.

Thus, the area quadruples.

375. Let the original circumference be x units. Then, new circumference $= 120\%$ of $x = \left(\frac{6x}{5}\right)$.

Let original radius $= r$ and new radius $= R$.

$2\pi r = x \Rightarrow r = \frac{7x}{2 \times 22} = \frac{7x}{44}$.

And, $2\pi R = \frac{6x}{5} \Rightarrow R = \frac{6x}{5} \times \frac{7}{2 \times 22} = \frac{21x}{110}$

Original area $= \pi r^2 = \left(\frac{22}{7} \times \frac{7x}{44} \times \frac{7x}{44}\right) = \frac{7x^2}{88}$.

New area $= \pi R^2 = \left(\frac{22}{7} \times \frac{21x}{110} \times \frac{21x}{110}\right) = \frac{63x^2}{550}$

Increase in area $= \left(\frac{63x^2}{550} - \frac{7x^2}{88}\right) = \frac{77x^2}{2200}$.

$\therefore$ Increase% $= \left(\frac{77x^2}{2200} \times \frac{88}{7x^2} \times 100\right)\% = 44\%$.

376. Let the original circumference be x. Then, new circumference $= 50\%$ of $x = \frac{x}{2}$.

Let original radius $= r$ and new radius $= R$.

$2\pi r = x \Rightarrow r = \frac{x \times 7}{2 \times 22} = \frac{7x}{44}$.

$2\pi R = \frac{x}{2} \Rightarrow R = \frac{x}{2} \times \frac{7}{2 \times 22} = \frac{7x}{88}$.

Original area $= \pi r^2 = \left(\frac{22}{7} \times \frac{7x}{44} \times \frac{7x}{44}\right) = \frac{7x^2}{88}$.

New area $= \pi R^2 = \left(\frac{22}{7} \times \frac{7x}{88} \times \frac{7x}{88}\right) = \frac{7x^2}{352}$.

Decrease in area $= \left(\frac{7x^2}{88} - \frac{7x^2}{352}\right) = \frac{21x^2}{352}$.

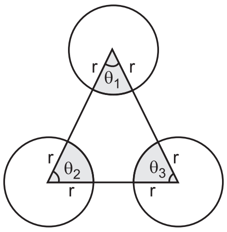
$\therefore$ Decrease% $= \left(\frac{21x^2}{352} \times \frac{88}{7x^2} \times 100\right)\% = 75\%$.

377. We have:

$$\text{Required area} = \frac{\pi r^2\theta_1}{360} + \frac{\pi r^2\theta_2}{360} + \frac{\pi r^2\theta_3}{360}$$

$$= \frac{\pi r^2}{360}(\theta_1 + \theta_2 + \theta_3)$$

$$= \frac{\pi r^2 \times 180}{360} = \frac{\pi r^2}{2}. \quad [\because \theta_1 + \theta_2 + \theta_3 = 180°]$$



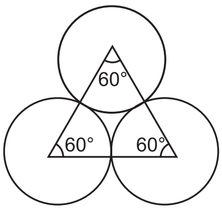
378. Required area

= (Area of an equilateral Δ of side 7 cm) – (3 × area of sector with θ = 60° and r = 3.5 cm)

$$= \left[\left(\frac{\sqrt{3}}{4}\times 7\times 7\right) - \left(3\times\frac{22}{7}\times 3.5\times 3.5\times\frac{60}{360}\right)\right]\text{cm}^2.$$

$$= \left(\frac{49\sqrt{3}}{4} - 11\times 0.5\times 3.5\right)\text{cm}^2$$

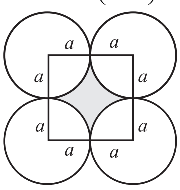
$$= (21.217 - 19.25)\ \text{cm}^2 = 1.967\ \text{cm}^2.$$



379. Required area = (Area of the square – Area of four quadrants each of radius a)

$$= \left[(2a)^2 - 4\times\frac{1}{4}\times\frac{22}{7}\times a^2\right]\text{sq. units}$$

$$= \left(4a^2 - \frac{22}{7}a^2\right)\text{sq. units} = \left(\frac{6a^2}{7}\right)\text{sq. units.}$$



380. $$\text{Required area} = \left(63\times 63 - 4\times\frac{1}{4}\times\frac{22}{7}\times\frac{63}{2}\times\frac{63}{2}\right)\text{m}^2$$

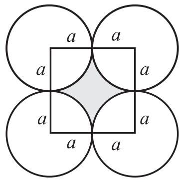
$$= 850.5\ \text{m}^2.$$

381. Side of the square = $2r$.

Diagonal of the square = $2\sqrt{2}\,r$.

$\therefore$ Diameter of the inner circle $= (2\sqrt{2}r - 2r) = 2r(\sqrt{2} - 1)$

Radius of the inner circle = $r(\sqrt{2} - 1)$.



382. As discussed in Q. 379, we have :

$$\frac{6a^2}{7} = \frac{96}{7} \Rightarrow a^2 = \frac{96}{7}\times\frac{7}{6} = 16 \Rightarrow a = 4\ \text{cm}.$$

383. Let the diameter of the round fort be D.

Distance through the middle passage = D. Roundabout distance = $\frac{\pi D}{2}$.

Time taken to cover distance D = 14 min.

Time taken to cover distance

$$\frac{\pi D}{2} = \frac{14}{D}\times\frac{\pi D}{2} = 7\pi = \left(7\times\frac{22}{7}\right)\text{min} = 22\ \text{min}.$$

$\therefore$ Required time difference = (22 – 14) min = 8 min.

384. Clearly, the longer diagonal of the kite is the diameter of the circle.

Also, $\angle ABC$ = 90° (angle in a semi-circle)

Let $AB = AD = 3x$ and $BC = CD = 4x$.

Then, $AC = \sqrt{AB^2 + BC^2} = 5x$.

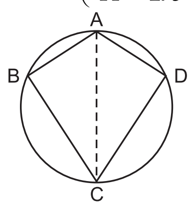
Area of the kite = 2 × area (ΔABC)

$$= 2\times\frac{1}{2}\times BC\times AB = 3x\times 4x = 12x^2.$$

$$\text{Area of the circle} = \pi r^2 = \left(\frac{22}{7}\times\frac{5x}{2}\times\frac{5x}{2}\right) = \frac{275}{14}x^2.$$

$$\text{Area wasted} = \left(\frac{275}{14}x^2 - 12x^2\right) = \frac{107}{14}x^2.$$

$$\text{Required percentage} = \left(\frac{107}{14}\times\frac{14}{275}\times 100\right)\% = 39\%.$$



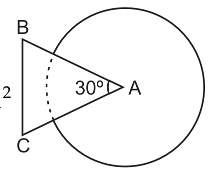
385. Area that can be grazed by the cow

= (Area of a circle with radius 8 cm) – (Area of a sector with r = 8 m and θ = 30°)

$$= \left(\pi\times 8^2 - \pi\times 8^2\times\frac{30}{360}\right)\text{m}^2$$

$$= \left(64\pi - \frac{64\pi}{12}\right)\text{m}^2 = \left[64\pi\left(1 - \frac{1}{12}\right)\right]\text{m}^2$$

$$= \left(64\pi\times\frac{11}{12}\right)\text{m}^2 = \frac{176\pi}{3}\ \text{m}^2.$$



386. In ΔABC, $AB = AC \Rightarrow \angle ABC = \angle ACB = 75°$.

So, $\angle CBD = \angle BCE = (180° - 75°) = 105°$.

$BD = CE = 2$ m.

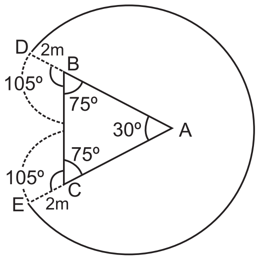
$\therefore$ Area that can be grazed by the cow

= [Area of a circle with radius 12 cm − Area of a sector with r = 12 m and θ = 30°] + 2 × (Area of a sector with r = 2 m and θ = 105°)

$$= \left[\left\{\pi\times(12)^2 - \pi\times(12)^2\times\frac{30}{360}\right\} + 2\left(\pi\times 2^2\times\frac{105}{360}\right)\right]\text{m}^2$$

$$= \left[(144\pi - 12\pi) + \frac{7}{3}\pi\right]\text{m}^2$$

$$= \left[\left(132 + 2\frac{1}{3}\right)\pi\right]\text{m}^2 = \left(134\frac{1}{3}\pi\right)\text{m}^2.$$



387. Clearly, radius of each circle = 1 cm.

Area of sector $OACBO$ = Area of sector $O'ADBO'$

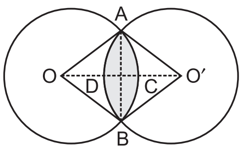
$$= \left(\frac{1}{4}\times\pi\times 1^2\right)\text{cm}^2 = \left(\frac{\pi}{4}\right)\text{cm}^2.$$

Area of square $OAO'B$ = (1 × 1) cm^2 = 1 cm^2.

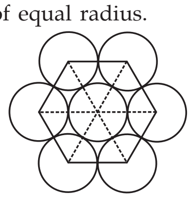
$\therefore$ Required area = (Area of sector $OACBO$ + Area of sector

$O'ADBO'$ − Area of square $OAO'B$)

$$= \left(\frac{\pi}{4} + \frac{\pi}{4} - 1\right)\text{cm}^2 = \left(\frac{\pi}{2} - 1\right)\text{cm}^2.$$



388. When 3 congruent circles touch each other externally, the triangle formed with their centres is an equilateral triangle. Hence, when a circle is surrounded by identical circles, centres of two consecutive circles make an angle of 60° with the central circle. Thus, six identical circles can surround a circle of equal radius.



389. Distance moved by the skater in 44 sec

$$= \text{Circumference of the circle} = \left(2\times\frac{22}{7}\times 28\right)\text{m} = 176\text{ m}.$$

$$\text{Speed of skater} = \left(\frac{176}{44}\right)\text{m/sec} = 4\text{ m/sec}.$$

Perimeter of hexagon = (6 × 48) m = 288 m.

$$\therefore \quad \text{Required difference} = \left(\frac{288}{4}\right)\text{sec} = 72\text{ sec}.$$

390. Area of a hexagon $= \dfrac{6a^2}{4\tan 30°} = \left(\dfrac{6\times 1^2}{4\times\dfrac{1}{\sqrt{3}}}\right)\text{cm}^2$

$$= \left(\frac{6\sqrt{3}}{4}\right)\text{cm}^2 = \left(\frac{3\sqrt{3}}{2}\right)\text{cm}^2.$$

391. Required difference $= \dfrac{\pi\times(2a)^2}{4} = \dfrac{4\pi a^2}{4} = \pi a^2.$

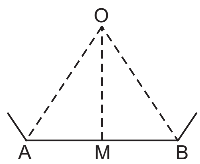
392. Let AB be a side of the polygon and O be the centre of the circle.

Let $OM \perp AB$.

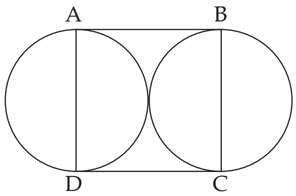
Perimeter = $2p \Rightarrow AB = \dfrac{2p}{n}$.

$\therefore$ Area of the polygon = n × area

$(\Delta OAB) = n\times\dfrac{1}{2}AB\times OM = n\times\dfrac{1}{2}\times\dfrac{2p}{n}\times r = pr.$



393.



Let length of each side of square = 2π

According to the question,

$$\frac{\pi r^2}{2} + \frac{\pi r^2}{2} + 42 = \text{Area of square}$$

$\Rightarrow \pi r^2 + 42 = 4r^2$

$\Rightarrow 4r^2 - \pi r^2 = 42$

$\Rightarrow r^2\left(4 - \dfrac{22}{7}\right) = 42$

$\Rightarrow r^2\left(\dfrac{28-22}{7}\right) = 42$

$\Rightarrow \dfrac{6r^2}{7} = 42$

$\Rightarrow r^2 = \dfrac{42\times 7}{6}$

$\Rightarrow r^2 = 7\times 7$

$\Rightarrow r = 7$

$\therefore$ $2r$ = 14 cm

394. Given: Radius of a circle = 3cm

Area of circle = πr^2

$= \pi\times 3^2 = 9\pi$ sq. cm.

395. Given length and width of a square base plate of brass is x cm and 1 mm

Volume of the plate of square base = Area of base × height

$$= x^2 \times \frac{1}{10} = \frac{x^2}{10} \text{ cu.cm.}$$

According to the question.

$$\frac{x^2}{10} \times 8.4 = 4725$$

$$\Rightarrow x^2 = \frac{4725 \times 10}{8.4} = 5625$$

$$\Rightarrow x = \sqrt{5625}$$

= 75 cm

396. Let the length of rectangle be lm

And the breadth of the rectangle be b m

Then area of the rectangle = $l \times b$

$lb = 150\text{m}^2$ ....(i)

According to the question.

$$(l-5)\times(b+2) = 150 - 30 = 120$$

$$(l-5)\times(b+2) = 120 \quad \text{... (ii)}$$

$\Rightarrow lb - 5b + 2l - 10 = 120$

$150 - 5b + 2l - 10 = 120$

$5b - 2l = 20$

$$\frac{5\times150}{l} - 2l^2 = 20l$$

$2l^2 + 20l - 750 = 0$

$$l^2 + 10l - 375 = 0$$

$$l(l+25) - 15(l+25) = 0$$

$$(l-15)(l+25) = 0$$

On solving both equations we get,

l = 15m and b = 10m

side of square = length of rectangle (given)

So, the perimeter of the square = 4 × l = 4 × 15 = 60m

397. Area of square = 4sq. units.

Side of square = $\sqrt{4}$ = 2 units

Diagonal of square = $2\sqrt{2}$ units

Radius of the circle = $2\sqrt{2}$ units

$\therefore$ Area of circle = πr^2

$$= \pi \times \left(2\sqrt{2}\right)^2$$

= 8π sq. units.

398. Given:

$$\Rightarrow \frac{\text{Circumference of circle}}{\text{Diameter of circle}} = \frac{22}{7}$$

$$\Rightarrow \frac{\text{Circumference of circle}}{\text{Twice of radius}} = \frac{22}{7}$$

$$\Rightarrow \frac{1\frac{4}{7}}{2r} = \frac{22}{7}$$

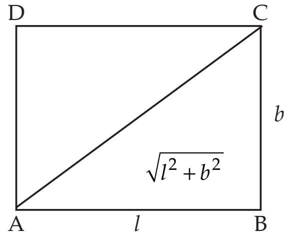
$$\Rightarrow \frac{\frac{11}{7}}{2r} = \frac{22}{7}$$

$$\Rightarrow \frac{11}{14r} = \frac{22}{7}$$

$\Rightarrow 14r \times 22 = 11 \times 7$

$$\Rightarrow r = \frac{11\times7}{14\times22} = \frac{1}{4} \text{ m}$$

399.



Let the length of carpet be l meter and breadth the b meter.

$\therefore$ Diagonal = $\sqrt{l^2+b^2}$ ....(i)

According to the question,

lb = 120 and 2 (l + b) = 46

$\Rightarrow l + b)$ = 23

On squaring both sides.

$$(l+b)^2 = 23^2$$

$$\Rightarrow l^2 + b^2 + 2lb = 529$$

$$\Rightarrow l^2 + b^2 + 2\times120 = 529$$

$$\Rightarrow l^2 + b^2 = 529 - 240 = 289$$

$$\therefore \sqrt{l^2+b^2} = \sqrt{289} = 17$$

Diagonal of the carpet = 17 m

400. Radius and height of a right circular cylinder is 7cm and 20 cm respectively.

Total surface area of right circular cylinder = $2\pi rh + 2\pi r^2$

$$= 2\pi r(h+r)$$

$$= 2\times\frac{22}{7}\times7(20+7)$$

= 2 × 22 × 27 = 1188 sq. cm.

401. Height of triangle = perimeter of square

Diagonal of square = $8\sqrt{2}$ m

$\therefore$ Length of each side of square $= \frac{8\sqrt{2}}{\sqrt{2}}$ = 8 m

$\therefore$ Perimeter of square = 4 × 8 = 32 m = Height

Area of other square = 729

Side of square = $\sqrt{729}$

= 27 m = base of triangle

$\therefore$ Area of triangle

$= \frac{1}{2}$ × base × height

$= \frac{1}{2}\times27\times32 = 432$ sq. m.

402. Total cost to construct a boundary wall around a rectangular plot = ₹ 46000

Rate of construction per meter = ₹ 200

Perimeter of rectangular plot $= \frac{46000}{200} = 230$ m

Let length and breadth of rectangular plot be 13 x meter and 10x meter respectively

$$\therefore 2(13x + 10x) = 230$$

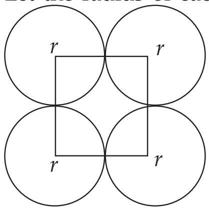
$$\Rightarrow 2\times23x = 230$$

$$\Rightarrow x = \frac{230}{2\times23} = 5$$

$\therefore$ Length = 13 × 5 = 65 m

Breadth = 10 × 5 = 50 m
∴ Area of plot = 65 × 50
= 3250 sq. m^2

403. Let the radius of each circle be 'r' cm.



Then the side of the square will be '2r' cm
Area covered by the four circles in the square

$$= 4\times\frac{1}{4}\times\pi r^2 = \pi r^2 cm^2$$

Area of the square $=(2r)^2 = 4r^2 cm^2$

Now, according to the question,
Remaining area of the square

$$4r^2 - \pi r^2 = 168$$

$$r^2\left(4-\frac{22}{7}\right)=168$$

$$r^2\times(28-22)=168\times 7$$

$$r^2 = \frac{168\times 7}{6} = 28\times 7 = 7\times 4\times 7$$

$$\therefore\ r = \sqrt{7\times 7\times 4} = 7\times 2 = 14 \text{ cm.}$$

404. Given length and breadth of courtyard is 25m long and 16 m respectively.
Area of courtyard = (25 × 16)sq. m^2 = 400 sq. m^2
Dimensions of bricks 20 cm by 10 cm

Area of the surface of brick $=\left(\frac{20\times 10}{10000}\right)m^2$

$$\therefore \text{ Number of bricks } = \frac{400}{\frac{20\times 10}{10000}}$$

$$= \frac{400\times 10000}{20\times 10} = 20000 \text{ bricks}$$

405. Area of square = 3136 cm^2
Side of squared = $\sqrt{3136}$ = 56 cm
Perimeter of square = 4a
= (4 × 56)cm= 224cm = Diameter of circle
∴ Circumference of circle = πd

$$\frac{22}{7}\times 224 = 704 \text{ cm}$$

406. Given base of triangle and its height is 15 cm and 12 cm respectively
Area of first triangle = $\frac{1}{2}\times$base × height

$$= \frac{1}{2}\times 15\times 12 = 90 \text{ sq. cm.}$$

According to given information
Let height of triangle be h cm.
Area of new triangle = 180 sq. cm.
Base = 20 sq. cm.

$$\Rightarrow 180 = \frac{1}{2}\times 20\times h$$

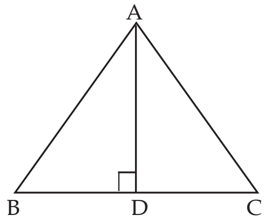
$$\Rightarrow h = \frac{2\times 180}{20} = 18 \text{ cm.}$$

407. Let each equal side of isosceles triangle be x cm
Perimeter of an isosceles triangle = 36cm

$$\therefore\ x + x + 14 = 36$$

⇒ 2x = 36 – 14 = 22

$$= x = \frac{22}{2} = 11 \text{ cm.}$$



BD = DC = 7cm.
From ΔABD.
By using Pythagoras theorem

$$AD = \sqrt{AB^2 - BD^2} = \sqrt{11^2 - 7^2}$$

$$= \sqrt{121-49} = \sqrt{72}$$

$$= 3\times 2\sqrt{2}$$

$6\sqrt{2}$ cm.

∴ Area of Δ ABC

$$= \frac{1}{2}\times BC\times AD$$

$$= \frac{1}{2}\times 14\times 6\sqrt{2}$$

$$= 42\sqrt{2} \text{ sq. cm.}$$

408. Radius of circle = 7cm
Given Area of rectangle = Area of circle = πr^2

$$= \frac{22}{7}\times 7\times 7 = 154 cm^2$$

409. Each edges of cube = a cm
∴ Total surface area of cube = 6a^2
⇒ 6a^2 = 864

$$\Rightarrow a^2 = \frac{864}{6} = 144$$

$$\Rightarrow a = \sqrt{144} = 12 \text{ cm}$$

∴ Volume of cube = a^3 cu.cm.
= (12 × 12 × 12) cu.cm.
= 1728 cu.cm.

410. Let the radius of circle be r cm and side of square be a cm.
Then circumference of circle
= 2πr and perimeter of square = 4a

According to the question, $2\pi r = 4a\times\frac{110}{100}$

$$\Rightarrow 2\pi r = \frac{44a}{10}$$

$$\Rightarrow r = \frac{44a}{2\pi\times 10}$$

$$\Rightarrow r = \frac{11a}{5\pi}$$

$$\Rightarrow a = \frac{5\pi r}{11} \quad \text{....(i)}$$

Also, $\pi r^2 - a^2 = 216$

⇒ $\pi r^2 - \frac{25\pi r^2}{121} = 216$ [from equation (i)]

⇒ $\frac{121\pi r^2 - 25\pi r^2}{121} = 216$

⇒ $r^2\left[121\pi - 25\pi^2\right] = 26136$

⇒ $r^2\left[121\times\frac{22}{7} - 25\times\frac{22}{7}\times\frac{22}{7}\right] = 26136$

⇒ $r^2\left[\frac{2662}{7} - \frac{12100}{49}\right] = 26136$

⇒ $r^2\left[\frac{6534}{49}\right] = 26136$

⇒ $r^2 = \frac{26136\times 49}{6534} = 196$

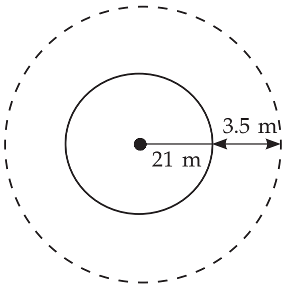
⇒ $r^2 = 196$

⇒ r = 14 cm

∴ $a = \frac{5\pi r}{11} = 5\times\frac{22}{7}\times\frac{14}{11} = 20\text{cm}$

Hence, diagonal of square = $\sqrt{2}a = 20\sqrt{2}$ cm.

411.



Diameter of park = 42 m
∴ Radius of park = r_1 = 21 m
Radius of park along with path = R_1= 21 + 3.5 = 24.5m

⇒ Area of path = $\pi(R_1)^2 - \pi(r_1)^2$

∴ Area of path
= Area of park alone with path – Area of park

= $\pi\times(24.5)^2 - \pi\times(21)^2 = \pi\left[(24.5)^2 - (21)^2\right]$

= $\pi[600.25 - 441] = \pi[15925] = \frac{159.25\times 22}{7} = 500.5$ sq. m

Hence, cost of gravelling the path = 500.5 × 4 = ₹ 2002

412. Statement I

Perimeter of the circle = 88 cms

⇒ $2\pi r = 88$

$r = \frac{88\times 7}{22}\times\frac{1}{2}$

⇒ r = 14

Area of circle = πr^2

$= \frac{22}{7}\times 14\times 14$

= 616 cm^2

Statement II

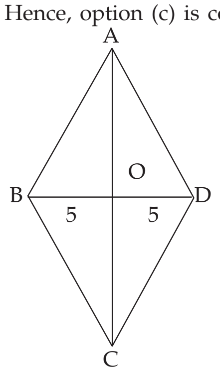
Diameter of the circle = 28 cm
Radius of the circle = 14 cm

Area of circle = πr^2

= $\frac{22}{7}\times 14\times 14 = 616\text{cm}^2$

The data either in statement I alone or statement II alone are sufficient to answer the question.
Hence, option (c) is correct.

413.



Side of a rhombus = 13cm
Diagonal of rhombus = 10cm
In ΔAOB

AO = $\sqrt{13^2 - 5^2} = \sqrt{169-25} = \sqrt{144} = 12$ cm.

⇒ AC = 24

Area of rhombus $= \frac{1}{2}\times d_1\times d_2 = \frac{1}{2}\times 24\times 10 = 120$ sq. cm.

414. Given length of the piece of wire = 84 cm
Length of the piece of wire = Circumference of circle

$= 2\pi r = 2\times\frac{22}{7}\times 84 = 528$ cm.

Length of each side of square = a
∴ Perimeter of square = 4a = 528 cm

∴ Side of square = $\frac{528}{4}$ = 132 cm

415. Length of hall = 50 m
Breadth of hall = 45 m
Area of hall = (50 × 45) m
Maximum length of a square tiles
= HCF of 50 m and 45 m = 5 meter
Area of tiles = 5 × 5 = 25 sq. m.
∴ Number of tiles

$= \frac{50\times 45}{25} = 90$ tiles

415. Side of square = a units
Side of hexagon = b units.
According to the question,
4a = 6b

⇒ $\frac{a}{b} = \frac{6}{4} = \frac{3}{2}$

∴ $\frac{\text{Area of hexagon}}{\text{Area of square}} = \frac{6\times\frac{\sqrt{3}}{4}\times b^2}{a^2}$

$= \frac{6\times\sqrt{3}\times 2\times 2}{4\times 3\times 3}$

$= \frac{2\sqrt{3}}{3}$

Hence required ratio = $2\sqrt{3}:3$

EXERCISE

(DATA SUFFICIENCY TYPE QUESTIONS)

Directions (*Questions 1 to 26*): ***Each of the questions given below consists of a sta tement and/or a question and two statements numbered I and II given below it. You have to decide whether the data provided in the statement(s) is/are sufficient to answer the question. Read both the statements and***

Give answer (a) if the data in Statement I alone are sufficient to answer the question, while the data in Statement II alone are not sufficient to answer the question;

Give answer (b) if the data in Statement II alone are sufficient to answer the question, while the data in Statement I alone are not sufficient to answer the question;

Give answer (c) if the data either in Statement I or in Statement II alone are sufficient to answer the question;

Give answer (d) if the data even in both Statements I and II together are not sufficient to answer the question;

Give answer (e) if the data in both Statements I and II together are necessary to answer the question.

1. What is the area of the rectangular plot ? **(Bank P.O., 2009)**

I. The length of the plot is 375 metres.

II. The length of the plot is thrice its breadth.

2. Is the perimeter of a certain rectangular park greater than 50 metres ?

I. The two shorter sides of the park are each 15 metres long.

II. The length of the park is 5 metres greater than the width of the park. **(N.I.F.T., 2007)**

3. What is the area of the square ? **(Bank P.O., 2008)**

I. One side of the square is 21 cm.

II. The perimeter of the square is 84 cm.

4. What is the area of the plot ?

I. The perimeter of the plot is 208 metres.

II. The length is more than the breadth by 4 metres.

5. The area of a playground is 1600 m^2. What is its perimeter ?

I. It is a perfect square playground.

II. It costs ₹ 3200 to put a fence around the playground at the rate of ₹ 20 per metre.

6. What is the area of the rectangle ?

I. The ratio of the length and the breadth is 3 : 2.

II. The area of the rectangle is 3.6 times its perimeter.

7. The area of a playground is 15400 square metres. What is its perimeter?

I. It is a circular playground.

II. It costs ₹ 30800 to clean the playground @ ₹ 2 per sq. ft. **(Bank P.O., 2007)**

8. What is the area of the circle ? **(Bank P.O., 2009)**

I. Perimeter of the circle is 88 cm.

II. Diameter of the circle is equal to the side of the square having area 784 sq. cm.

9. A rectangular field is 40 yards long. Find the area of the field. **(M.B.A., 2006)**

I. A fence around the outside of the field is 140 yards long.

II. The distance from one corner of the field to the opposite corner is 50 yards.

10. Area of a square is equal to the area of a circle. What is the circumference of the circle?

I. The diagonal of the square is x inches.

II. The side of the square is y inches.

11. The area of a rectangle is equal to the area of a right-angled triangle. What is the length of the rectangle?

I. The base of the triangle is 40 cm.

II. The height of the triangle is 50 cm.

12. What will be the cost of gardening a strip of land inside around a circular field, at the rate of ₹ 85 per sq. metre ?

I. The area of the field is 1386 sq. metres.

II. Breadth and length of the field are in the ratio of 3 : 5 respectively.

13. What is the area of the right-angled triangle? **(Bank Recruitment, 2009)**

I. Height of the triangle is three-fourths of the base.

II. Hypotenuse of the triangle is 5 metres.

14. What is the length of the line SQ which is the diagonal of a square as well as the diameter of a circle?

I. All the four vertices of the square lie on the circumference of the circle.

II. The numerical value of the area of the circle is twice the length of SQ.

15. What is the area of the rectangle ?

I. The difference between the sides is 5 cm.

II. The measure of its diagonal is 10 cm.

16. What is the area of the circle ?

I. An arc of length 4 cm subtends an angle of 60° at the centre.

II. A chord of length 5 cm subtends an angle of 90° at the centre.

17. What is the perimeter of a semi-circle? **(Bank P.O., 2010)**

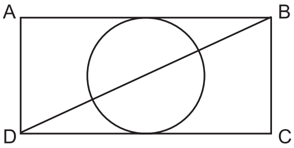
I. The radius of the semi-circle is equal to half the side of a square.

II. The area of the square is 196 sq. cm.

18. What is the perimeter of the rectangle *ABCD*?

I. Area of the circle is 38.5 sq. cm.

II. *AB* = 10 cm.



19. The area of a rectangle is equal to the area of a circle. What is the length of the rectangle ?

I. The radius of the circle is equal to the breadth of the rectangle.

II. The perimeter of the rectangle is 14 cm more than that of the circle.

20. Determine the perimeter of the square.

I. A circle is inscribed in the square.

II. The area of the circle is 36π.

21. What is the height of a right-angled triangle? **(M.A.T., 2005)**

I. The area of the right-angled triangle is equal to the area of a rectangle whose breadth is 12 cm.

II. The length of the rectangle is 18 cm.

22. Is the area of circular region X greater than the area of circular region Y ?

I. The circumference of X is greater than the circumference of circle Z and the circumference of Z is less than the circumference of Y.

II. The radius of X is greater that the radius of Y. **(N.I.F.T., 2007)**

23. What is the height of the triangle ?

I. The area of the triangle is 20 times its base.

II. The perimeter of the triangle is equal to the perimeter of a square of side 10 cm.

24. What will be the cost of painting the inner walls of a room if the rate of painting is ₹ 20 per square foot ?

I. Circumference of the floor is 44 feet.

II. The height of the wall of the room is 12 feet.

25. The diameter of the rear wheel of a vehicle is 1.2 m. What is the diameter of the front wheel?

I. Front wheel makes 240 revolutions while rear wheel makes 80.

II. In 240 revolutions, the front wheel covers a distance of $301\frac{5}{7}$ m.

26. There are two concentric circles C_2 and C_2 with radii r_1 and r_2. The circles are such that C_1 fully encloses C_1. Then, what is the radius of C_1 ?

I. The difference of their circumferences is k cm.

II. The difference of their areas is m sq. cm.

Directions (*Questions 27 to 36*): ***Each of the questions below consists of a question followed by three statements. You have to study the question and the statements and decide which of the statement(s) is/are necessary to answer the question.***

27. What is the area of rectangular field ?

I. The perimeter of the field is 110 metres.

II. The length is 5 metres more than the width.

III. The ratio between length and width is 6 : 5 respectively.

(*a*) I and II only

(*b*) Any two of the three

(*c*) All I, II and III

(*d*) I, and either II or III only

(*e*) None of these

28. What is the area of the hall ?

I. Material cost of flooring per square metre is ₹ 2.50.

II. Labour cost of flooring the hall is ₹ 3500.

III. Total cost of flooring the hall is ₹ 14,500.

(*a*) I and II only (*b*) II and III only

(*c*) All I, II and III (*d*) Any two of the three

(*e*) None of these

29. What is the area of the square? **(Bank P.O., 2006)**

I. Measure of diagonal of the square is given.

II. Measure of one side of the square is given.

III. Perimeter of the square is given.

(*a*) Only II (*b*) Only III

(*c*) Only I and III (*d*) Only II and III

(*e*) Any one of the three

30. What is the area of the right-angled triangle ? **(Bank P.O., 2009)**

I. Base of the triangle is X cm.

II. Height of the triangle is Y cm.

III. Hypotenuse of the triangle is Z cm.

(*a*) Only I and II (*b*) Only II

31. What is the length of the diagonal of the given rectangle?

I. The perimeter of the rectangle is 34 cm.

II. The difference between the length and breadth is 7 cm.

III. The length is 140% more than the breadth.

(*a*) Any two of the three (*b*) All I, II and III

(*c*) I, and either II or III (*d*) I and II only

(*e*) II and III only

32. What is the cost of flooring the rectangular hall ? **(M.A.T. 2006, R.B.I., 2002)**

I. Length and breadth of the hall are in the respective ratio of 3 : 2.

II. Length of the hall is 48 m and cost of flooring is ₹ 85 per sq. m.

III. Perimeter of the hall is 160 m and cost of flooring is ₹ 85 per sq. m.

(*a*) I and II only

(*b*) II and III only

(c) III only

(*d*) I, and either II or III only
(e) Any two of the three

33. What is the area of a right-angled triangle ? **(M.A.T., 2007)**

I. The perimeter of the triangle is 30 cm.
II. The ratio between the base and the height of the triangle is 5 : 12.
III. The area of the triangle is equal to the area of a rectangle of length 10 cm.

(*a*) I and II only
(*b*) II and III only
(*c*) I and III only
(*d*) III, and either I or II only
(*e*) None of these

34. A path runs around a rectangular lawn. What is the width of the path ?

I. The length and breadth of the lawn are in the ratio of 3 : 1 respectively.
II. The width of the path is ten times the length of the lawn.
III. The cost of gravelling the path @ ₹ 50 per m^2 is ₹ 8832.

(*a*) All I, II and II (*b*) III, and either I or II
(*c*) I and III only (*d*) II and III only
(*e*) None of these

35. What is the area of the equilateral triangle ?

I. Length of the perpendicular from one of the vertices to the opposite side is x cm.
II. Length of each side of the triangle is y cm.
III. Perimeter of the triangle is z cm.

(*a*) Any one of the three (*b*) Any two of the three
(*c*) I and either II and III (*d*) All I, II and III
(*e*) Question cannot be answered even with information in all three statements

36. What is the area of the isosceles triangle ?

I. Perimeter of the isosceles triangle is 18 metres.
II. Base of the triangle is 8 metres.
III. Height of the triangle is 3 metres.

(*a*) I and II only
(*b*) II and III only
(*c*) I and III only
(*d*) II, and either I or III only
(*e*) Any two of the three

Directions (*Questions 37 to 41*): ***Each of the questions given below is followed by three statements. You have to study the question and all the three statements given to decide whether any information provided in the statement(s) is/are redundant and can be dispensed with while answering the given question.***

37. What will be the cost of painting the four walls of a room with length, width and height 5 metres, 3 metres and 8 metres respectively? The room has one door and one window.

I. Cost of painting per square metre is ₹ 25.
II. Area of window is 2.25 sq. metres which is half of the area of the door.
III. Area of the room is 15 sq. metres.

(*a*) I only
(*b*) II only
(*c*) III only
(*d*) II or III
(*e*) All are required to answer the question

38. What is the cost of painting the two adjacent walls of a hall at ₹ 5 per m^2 which has no windows or doors ?

I. The area of the hall is 24 sq. m.
II. The breadth, length and height of the hall are in the ratio of 4 : 6 : 5 respectively.
III. Area of one wall is 30 sq. m.

(*a*) I only
(*b*) II only
(*c*) III only
(*d*) Either I or III
(*e*) All I, II and III are required

39. What is the area of the given rectangle ?

I. Perimeter of the rectangle is 60 cm.
II. Breadth of the rectangle is 12 cm.
III. Sum of two adjacent sides is 30 cm.

(*a*) I only (*b*) II only
(*c*) III only (*d*) I and II only
(*e*) I or III only

40. What is the area of the given right-angled triangle?

I. Length of the hypotenuse is 5 cm.
II. Perimeter of the triangle is four times its base.
III. One of the angles of the triangle is 60°.

(*a*) II only
(*b*) III only
(*c*) II or III only
(*d*) II and III both
(*e*) Information given in all the three statements together is not sufficient to answer the question.

41. What is the height of the triangle whose area is equal to the area of a rectangle?

I. The ratio between the length and breadth of the rectangle is 3 : 2.
II. The base of the triangle is 16 cm.
III. The perimeter of the rectangle is 80 cm.

(*a*) Only I
(*b*) Only I or II
(*c*) Only III
(*d*) All I, II. and III together are required
(*e*) None of these

ANSWERS

1. (*e*)	**2.** (*a*)	**3.** (*c*)	**4.** (*e*)	**5.** (*c*)	**6.** (*e*)	**7.** (*a*)	**8.** (*c*)	**9.** (*c*)	**10.** (*c*)
11. (*d*)	**12.** (*e*)	**13.** (*e*)	**14.** (*b*)	**15.** (*e*)	**16.** (*c*)	**17.** (*e*)	**18.** (*e*)	**19.** (*e*)	**20.** (*e*)
21. (*d*)	**22.** (*b*)	**23.** (*a*)	**24.** (*e*)	**25.** (*c*)	**26.** (*e*)	**27.** (*b*)	**28.** (*c*)	**29.** (*e*)	**30.** (*d*)
31. (*a*)	**32.** (*e*)	**33.** (*a*)	**34.** (*a*)	**35.** (*a*)	**36.** (*d*)	**37.** (*c*)	**38.** (*c*)	**39.** (*e*)	**40.** (*c*)
41. (*d*)									

SOLUTIONS

1. I. Length = 375 m.

II. Breadth = $\left(\frac{1}{3}\times 375\right)$ m = 125 m.

$\therefore$ Area of the plot = (375×125) m^2 = 46875 m^2.

Thus, both I and II are required.

$\therefore$ Correct answer is (*e*).

2. I. Since b = 15 m, So $l > 25$ m.

So, $(l + b) > 30$ m $\Rightarrow 2(l + b) > 60$ m.

$\therefore$ I alone gives the answer. Hence, correct answer is (*a*).

3. I. Side = 21 cm $\Rightarrow$ Area = (side)^2 = 441 cm^2.

II. Perimeter = 84 cm $\Rightarrow$ Side = $\left(\frac{84}{4}\right)$ cm = 21 cm $\Rightarrow$ Area = (Side)^2 = 441 cm^2.

$\therefore$ Either I or II alone gives the answer. So, correct answer is (*c*).

4. I. P = 208 m.

II. Let breadth = x metres. Then, length = $(x + 4)$ m.

$\therefore$ P = $[2\{x + (x + 4)\}]$ m = $(4x + 8)$ m.

Using both I and II, we have:

$4x + 8 = 208 \Rightarrow 4x = 200 \Rightarrow x = 50$.

Hence area = (50×54) m^2 = 2700 m^2.

Thus, both I and II are required.

$\therefore$ Correct answer is (*e*).

5. Area = 1600 m^2.

I. Side = $\sqrt{1600}$ m = 40 m.

So, perimeter = (40×4) m = 160 m.

$\therefore$ I alone gives the answer.

II. Perimeter = $\frac{\text{Total cost}}{\text{Cost per metre}} = \frac{3200}{20}$ m = 160 m.

$\therefore$ II alone gives the answer.

$\therefore$ Correct answer is (*c*).

6. I. Let $l = 3x$ metres and $b = 2x$ metres.

Then, area = $(6x^2)$ m^2.

II. Perimeter = $2(3x + 2x)$ m = $(10x)$ m.

$\therefore$ $6x^2 = 3.6 \times 10x \Leftrightarrow x = \frac{(3.6\times 10)}{6} = 6$.

$\therefore$ l = 18 m and b = 12 m and so area can be obtained.

Thus, I and II together give the answer.

$\therefore$ Correct answer is **(*e*)**.

7. I. Since the playground is circular, we have :

$\pi r^2 = 15400 \Rightarrow r^2 = \frac{15400\times 7}{22} = 4900 \Rightarrow r = 70$ m

$\Rightarrow$ Perimeter = $2\pi r$ = $\left(2\times\frac{22}{7}\times 70\right)$ m = 440 m.

II. Area = $\left(\frac{30800}{2}\right)$ m^2 = 15400 m^2.

Thus, I alone given the answer.

$\therefore$ Correct answer is (*a*).

8. Let the radius of the circle be r.

I. Perimeter = $2\pi r = 88 \Rightarrow r = \left(\frac{88\times 7}{2\times 22}\right) = 14$ cm.

$\therefore$ Area = $\pi r^2 = \left(\frac{22}{7}\times 14\times 14\right)$ cm^2 = 616 cm^2.

II. $2r$ = Side of the square = $\sqrt{784}$ cm = 28 cm $\Rightarrow r$ = 14 cm.

$\therefore$ Area = $\pi r^2 = \left(\frac{22}{7}\times 14\times 14\right)$cm^2 = 616 cm^2.

So, either I alone or II alone gives the answer.

$\therefore$ Correct answer (*c*).

9. I. l = 40 yards. Perimeter = 140 yards.

$2(l + b) = 140 \Rightarrow l + b = 70$

$\Rightarrow b = (70 - l) = 30$ yards.

Area of the field = (40×30) sq. yds = 1200 sq. yds.

II. l = 40 yards.

$l^2 + b^2 = (50)^2 \Rightarrow b^2 = 2500 - l^2 = 2500 - 1600 = 900$

$\Rightarrow b$ = 30 yards.

Area of the field = (40×30) sq. yds = 1200 sq. yds.

So, either I alone or II alone gives the answer.

$\therefore$ Correct answer is **(*c*)**.

10. I. Area of the circle = Area of the square

$= \frac{1}{2}x^2$ sq. inches.

$\Rightarrow \pi r^2 = \frac{1}{2}x^2 \Rightarrow r = \sqrt{\frac{x^2}{2\pi}} = \frac{x}{\sqrt{2\pi}}$.

$\therefore$ Circumference of the circle = $2\pi r$, which can be obtained.

$\therefore$ I alone gives the answer.

II. Area of the circle = Area of the square = y^2 sq. inches

$\Rightarrow \pi r^2 = y^2 \Rightarrow r = \frac{y}{\sqrt{\pi}}$.

$\therefore$ Circumference of the circle = $2\pi r$, which can be obtained.

Thus, II alone gives the answer.

$\therefore$ Correct answer is (*c*).

11. Given : Area of rectangle = Area of a right-angled triangle

$\Rightarrow\ l \times b = \frac{1}{2} \times B \times H$

I. gives, B = 40 cm.

II. gives, H = 50 cm.

Thus, to find l, we need b also, which is not given.

$\therefore$ Given data is not sufficient to give the answer.

$\therefore$ Correct answer is (*d*).

12. I. $\pi R_1^2 = 1386 \Leftrightarrow R_1^2 = \left(1386 \times \frac{7}{22}\right) \Leftrightarrow R_1 = 21$ m.

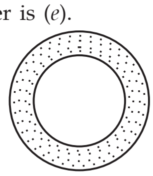
II. R_2 = (21 – 1.4) m = 19.6 m.

$\therefore$ Area $= \pi(R_1^2 - R_2^2) = \frac{22}{7} \times [(21)^2 - (19.6)^2]$ m^2.

Thus, the required cost may be obtained.

$\therefore$ I and II together will give the answer.

$\therefore$ Correct answer is (*e*).



13. I. Let base = x , Then, height = $\frac{3}{4}x$.

II. Hypotenuse = 5 m.

Using both I and II, we have:

$$x^2 + \left(\frac{3}{4}x\right)^2 = 5^2 \Rightarrow x^2 = \frac{9}{16}x^2 + 25$$

$$\Rightarrow \frac{25x^2}{16} = 25 \Rightarrow x^2 = 16 \Rightarrow x = 4.$$

So, base 4 m, height = 3 m.

$\therefore$ Area $= \left(\frac{1}{2} \times 4 \times 3\right)$ m^2 = 6 m^2.

Thus, both I and II together give the answer.

$\therefore$ Correct answer is **(*e*).**

14. Let the length of SQ be x. Then, radius of the circle = $\frac{x}{2}$.

I. The fact given in the question can be inferred form the information given in I.

II. $\pi\left(\frac{x}{2}\right)^2 = 2x \Rightarrow \frac{\pi x^2}{4} = 2x$

$$\Rightarrow \pi x^2 = 8x \Rightarrow \pi x = 8 \Rightarrow x = \frac{8 \times 7}{22} = \frac{28}{11}.$$

Thus, II alone gives the answer.

$\therefore$ Correct answer is (*b*).

15. I. Let the sides be x cm and (x + 5) cm.

II. $d = \sqrt{(x+5)^2 + x^2}$

$\Leftrightarrow (x + 5)^2 + x^2 = (10)^2$

$\Leftrightarrow 2x^2 + 10x - 75 = 0$

$$\Leftrightarrow x = \frac{-10 \pm \sqrt{100+600}}{4} = \frac{-10 + \sqrt{700}}{4}$$

$$= \frac{-10 + 10\sqrt{7}}{4} = \frac{-10 + 10 \times 2.6}{4}.$$

Thus, sides and therefore area may be known.

Thus, both I and II are needed to get the answer.

$\therefore$ Correct answer is (*e*).

16. I. Length of arc = $\frac{2\pi R\theta}{360} \Leftrightarrow 4 = \left(\frac{2 \times \frac{22}{7} \times R \times 60}{360}\right)$.

This gives R and therefore, area of the circle = πR^2.

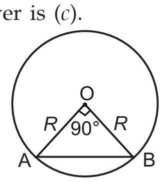
Thus, I only gives the answer.

II. $R^2 + R^2 = 5^2 \Leftrightarrow 2R^2 = 25 \Leftrightarrow R^2 = \frac{25}{2}$.

$\therefore$ Area of the circle = $\pi R^2 = \left(\frac{22}{7} \times \frac{25}{2}\right)$ sq. cm.

Thus, II only gives the answer.

$\therefore$ Correct answer is (*c*).



17. Let the radius of the semi-circle be r and the side of the square be a.

I. $r = \frac{a}{2}$.

II. $a = \sqrt{196}$ cm = 14 cm.

From I and II, we have : r = 7 cm.

$\therefore$ Perimeter of semi-circle = $\pi r + 2r$

$$= \left(\frac{22}{7} \times 7 + 2 \times 7\right) \text{cm} = 36 \text{ cm}.$$

Thus, both I and II are required.

$\therefore$ Correct answer is (*e*).

18. Let radius of the circle be r. Then, $BC = r$.

I. $\pi r^2 = 38.5 \Rightarrow r^2 = \frac{38.5 \times 7}{22} = 12.25 \Rightarrow r = 3.5.$

II. AB = 10 cm.

Using both I and II, we have: AB = 10 cm and BC = 3.5 cm.

$\therefore$ Perimeter = 2(10 + 3.5) cm = 27 cm.

Thus, both I and II together give the answer.

$\therefore$ Correct answer is (*e*).

19. Given : $l \times b = \pi R^2$. ...(*i*)

I. gives, $R = b$. ...(*ii*)

From (*i*) and (*ii*), we get $l = \frac{\pi R^2}{b} = \frac{\pi R^2}{R} = \pi R$. ...(*iii*)

II. gives, 2 (l + b) = $2\pi R$ + 14

$\Rightarrow l + b = \pi R + 7 \Rightarrow l + R = \pi R + 7$

$\Rightarrow l = \pi R - R + 7 \Rightarrow l = l - \frac{l}{\pi} + 7 \Rightarrow l = 7\pi$.

[Using (*iii*)]

Thus, I and II together give l. $\therefore$ Correct answer is (*e*).

20. Let the radius of the circle be r and the side of the square be a.

I. Diameter of the circle = side of the square i.e. $2r = a$.

II. $\pi r^2 = 36\,\pi \Rightarrow r^2 = 36 \Rightarrow r = 6$.

Using both I and II, we have : a = 12 units.

$\therefore$ Perimeter of the square = (4 × 12) units= 48 units. Thus, both I and II together give the answer.

$\therefore$ Correct answer is (*e*).

21. Using both **I** and **II**, we have:

Area of right-angled triangle = Area of rectangle = (18 × 12) cm^2 = 216 cm^2.

But, we can't find the height of the triangle unless the base is given.

Thus,. even both I and II together do not give the answer.

$\therefore$ Correct answer is (*d*).

22. **I.** From the given information, the circumference of circles x and y and hence their radii cannot be compared.

II. $r_X > r_Y \Rightarrow \pi r_X^2 > \pi r_Y^2 \Rightarrow$ area of circle $X >$ area of circle Y

Thus, II alone gives the answer.

$\therefore$ Correct answer is (*b*).

23. **I.** $A = 20 \times B \Rightarrow \frac{1}{2} \times B \times H = 20 \times B \Rightarrow H = 40$.

$\therefore$ I alone gives the answer.

II. gives, perimeter of the triangle = 40 cm. This does not give the height of the triangle.

$\therefore$ Correct answer is (*a*).

24. **I.** Gives, $2\pi R = 44$.

II. Gives, $H = 12$.

$\therefore$ $A = 2\pi RH = (44 \times 12)$.

Cost of painting = ₹ (44 × 12 × 20).

Thus, I and II together give the answer.

$\therefore$ Correct answer is **(*e*)**.

25. Let the radius of the front and rear wheels be r_1 and r_2 respectively.

Then, $r_2 = \left(\frac{1.2}{2}\right) \text{m} = 0.6 \text{ m}$.

I. $240 \times 2\pi r_1 = 80 \times 2\pi r_2$

$\Rightarrow 240\, r_1 = 80\, r_2 \Rightarrow 3\, r_1 = r_2$.

$\Rightarrow r_1 = \frac{r_2}{3} = \left(\frac{0.6}{3}\right) \text{m} = 0.2 \text{ m}$.

So, diameter of front wheel = (2 × 0.2) m = 0.4 m.

II. $240 \times 2\pi r_1 = 301\frac{5}{7} \Rightarrow r_1 = \left(\frac{2112}{7} \times \frac{7}{2 \times 22} \times \frac{1}{240}\right) = 0.2 \text{ m}$.

So, diameter of front wheel = (2 × 0.2) m = 0.4 m.

Thus, either I alone or II alone gives the answer.

$\therefore$ Correct answer is **(*c*)**.

26. **I.** $2\pi(r_1 - r_2) = k \Rightarrow r_1 - r_2 = \frac{k}{2\pi}$ ...(*i*)

II. $\pi\left(r_1^2 - r_2^2\right) = m \Rightarrow \left(r_1^2 - r_2^2\right) = \frac{m}{\pi} \Rightarrow (r_1 - r_2)(r_1 + r_2) = \frac{m}{\pi}$

$\Rightarrow (r_1 + r_2) = \frac{m}{\pi} \times \frac{2\pi}{k} = \frac{2m}{k}$ ...(*ii*)

Adding (*i*) and (*ii*) we get : $2r_1 = \frac{k}{2\pi} + \frac{2m}{k} = \frac{k^2 + 4m\pi}{2k\pi}$

$\Rightarrow r_1 = \frac{k^2 + 4\,m\pi}{4k\pi}$.

Thus, both I and II together give the answer.

$\therefore$ Correct answer is (*e*).

27. **I.** $2\,(l + b) = 110 \Rightarrow l + b = 55$.

II. $l = (b + 5) \Rightarrow l - b = 5$.

III. $\frac{l}{b} = \frac{5}{6} \Rightarrow 5l - 6b = 0$

These are three equations in l and b. We may solve them pairwise.

$\therefore$ Any two of the three will give the answer.

So Correct answer is (*b*).

28. **I.** Material cost = ₹ 2.50 per m^2.

II. Labour cost = ₹ 3500.

III. Total cost = ₹ 14,500.

Let the area be A sq. metres.

$\therefore$ Material cost = ₹ (14500 – 3500) = ₹ 11,000.

$\therefore$ $\frac{5A}{2} = 11000 \Leftrightarrow A = \left(\frac{11000 \times 2}{5}\right) = 4400\ m^2$.

Thus, all I, II and III are needed to get the answer.

$\therefore$ Correct answer is (*c*).

29. **I.** Area = $\frac{1}{2} \times (\text{diagonal})^2$.

II. Area = (Side)^2

III. Area = $\left(\frac{\text{Perimeter}}{4}\right)^2$

Thus, only one of I, II and III gives the answer.

$\therefore$ Correct answer is (***e***).

30. Area of triangle = $\frac{1}{2} \times \text{Base} \times \text{Height}$.

The above formula can be used if we know any two of the base, height and hypotenuse of the triangle.

Thus, any two of the three, together give the answer.

$\therefore$ Correct answer is (*d*).

31. **I.** $2\,(l + b) = 34 \Rightarrow l + b = 17$ ...(*i*)

II. $(l - b) = 7$ ...(*ii*)

III. $l = (100 + 140)\%$ of b

$\Rightarrow l - \frac{240}{100}b = 0 \Rightarrow 100l - 240b = 0 \Rightarrow 5l - 12b = 0$ ...(*iii*)

These are 3 equations in l and b. We may solve them pairwise.

$\therefore$ Any two of the three will give the answer. So, Correct answer is **(*a*)**.

32. **I.** Let $l = 3x$ metres and $b = 2x$ metres.

II. $l = 48$ m, Rate of flooring = ₹ 85 per m^2.

III. $2(l + b) = 160 \Leftrightarrow l + b = 80$,

Rate of flooring = ₹ 85 per m^2.

From **I** and **II**, we get $3x = 48 \Leftrightarrow x = 16$.

$\therefore$ $l = 48$ m, $b = 32$ m $\Rightarrow$ Area of floor = (48×32) m^2.

$\therefore$ Cost of flooring = ₹ $(48 \times 32 \times 85)$.

Thus, I and II give the answer.

From **II** and **III**, we get: $l = 48$ m, $b = (80 - 48)$ m = 32 m.

$\therefore$ Area of floor and cost of flooring is obtained.

Thus, II and III give the answer.

From **III** and **I**, we get: $3x + 2x = 80 \Leftrightarrow 5x = 80$

$\Leftrightarrow x = 16$.

$\therefore$ $l = (3 \times 16)$ m = 48 m and $b = (2 \times 16)$ m = 32 m.

$\therefore$ Area of floor and the cost of flooring is obtained.

Thus, III and I give the answer.

Hence, any two of the three will give the answer.

$\therefore$ Correct answer is (*e*).

33. From II, base : height = 5 : 12.

Let base = $5x$ and height = $12x$.

Then, hypotenuse = $\sqrt{(5x)^2 + (12x)^2} = 13x$.

From I, perimeter of the triangle = 30 cm.

$\therefore$ $5x + 12x + 13x = 30 \Leftrightarrow x = 1$.

So, base = $5x$ = 5 cm; height = $12x$ = 12 cm.

$\therefore$ Area = $\left(\frac{1}{2} \times 5 \times 12\right)$ cm^2 = 30 cm^2.

Thus, I and II together give the answer.

Clearly III is redundant, since the breadth of the rectangle is not given.

$\therefore$ Correct answer is (*a*).

34. **III.** Area of the path = $\frac{8832}{50}$ m^2 = $\frac{4416}{25}$ m^2.

II. Width of path = $10 \times$ (length of the lawn).

I. Length = $3x$ metres and breadth = x metres.

Clearly, all the three will be required to find the width of the path.

$\therefore$ Correct answer is (*a*).

35. **I.** Let each side of the equilateral triangle be a cm.

Then, $a^2 - \left(\frac{a}{2}\right)^2 = x^2 \Rightarrow \frac{3a^2}{4} = x^2 \Rightarrow a^2 = \frac{4x^2}{3}$.

$\therefore$ Area of the triangle = $\left(\frac{\sqrt{3}}{4} \times \frac{4x^2}{3}\right) = \left(\frac{\sqrt{3}x^2}{3}\right)$ cm^2.

II. Area of the triangle = $\left(\frac{\sqrt{3}}{4} y^2\right)$ cm^2.

III. Each side of the triangle = $\left(\frac{z}{3}\right)$ cm.

$\therefore$ Area of the triangle = $\left[\frac{\sqrt{3}}{4} \times \left(\frac{z}{3}\right)^2\right]$ cm^2 = $\left(\frac{z^2}{12\sqrt{3}}\right)$ cm^2.

Thus, any one of I, II and III is sufficient to give the answer.

So, correct answer is (*a*).

36. **II.** Base = 8 m. **I.** Perimeter = 18 m. **III.** Height = 3 m.

From II and I, we get : $b = 8$ and $a + b + a = 18$ and so $a = 5$.

Thus, the three sides are 5 m, 5 m and 8 m. From this, the area can be found out.

From II and III, we get: Area = $\left(\frac{1}{2} \times 8 \times 3\right)$ m^2.

$\therefore$ Correct answer is (*d*).

37. Area of 4 walls = $[2(5 + 3) \times 8]$ m = 128 m^2.

II. Area to be painted

= $[128 - (2.25 + 2.25 \times 2)]$ m^2 = 121.25 m^2.

From **I** and **II**, we get : Cost of painting

= ₹ (121.25×25) = ₹ 3031.25.

Thus, only I and II are required while III is redundant.

$\therefore$ Correct answer is (*c*).

38. From II, let $l = 4x$, $b = 6x$ and $h = 5x$.

Then, area of the hall = $(24x^2)$ m^2.

From **I** Area of the hall = 24 m^2.

From II and I, we get $24x^2 = 24 \Leftrightarrow x = 1$.

$\therefore$ $l = 4$ m, $b = 6$ m and $h = 5$ m.

Thus, area of two adjacent walls = $[(l \times h) + (b \times h)]$ m^2 can be found out and so the cost of painting two adjacent walls may be found out.

Thus, III is redundant. $\therefore$ Correct answer is (*c*).

39. From **I** and **II**, we can find the length and breadth of the rectangle and therefore the area can be obtained. So, **III** is redundant.

Also, from **II** and **III**, we can find the length and breadth and therefore the area can be obtained. So, I is redundant.

$\therefore$ Correct answer is (*e*).

40. $\frac{BC}{AC} = \cos 60° = \frac{1}{2} \Rightarrow BC = \frac{5}{2}$ cm $\quad [\because AC = 5 \text{ cm}]$

From **I** and **III**, we get :

$a = \frac{5}{2}$ cm, $b = 5$ cm and $\theta = 60°$.

$\therefore$ $A = \frac{1}{2} ab \sin C$ gives the area.

Thus, I and III give the result. So, II is redundant.

Again, **II** gives $a + b + c = 4a \Rightarrow b + c = 3a$

$\Rightarrow c = 3a - 5 \quad [\because b = 5 \text{ from I}]$

$a^2 + (3a - 5)^2 = 25$. This gives a and therefore c.

Now, area of $\Delta ABC = \frac{1}{2} \times a \times c$, which can be obtained.

Thus I and II give the area. So, III is redundant.

$\therefore$ Correct answer is (*c*).