

# Quantitative Aptitude

## Mensurations 2D and 3D

### Level-1

**Q1** The ratio of length to breadth of a rectangular plot is 9 : 4 respectively. If the breadth is 200 metre less than the length, what is the perimeter of the rectangular plot?

- (A) 1030 metres (B) 2080 metres  
(C) 1040 metres (D) 1200 metres  
(E) None of these

**Q2** The radius of the wheel is 14 cm. If the speed of the wheel is 22 cm per second, then, find the number of revolutions by the wheel in 10 minutes.

- (A) 200 (B) 150  
(C) 300 (D) 350  
(E) 400

**Q3** The length, breadth and height of a room is 7m, 8m and 5m respectively. Find the length of the largest bamboo that can be kept inside the room.

- (A)  $\sqrt{137}$  m (B)  $\sqrt{139}$  m  
(C)  $\sqrt{138}$  m (D)  $\sqrt{136}$  m  
(E) none of these

**Q4** The perimeter of a rectangle is 24 meters more than the perimeter of a square whose sides are 10 meters. If the ratio of breadth to length of a rectangle is 3:5, then find the area of the rectangle.

- (A) 250 (B) 150  
(C) 224 (D) 240  
(E) 320

**Q5**

The perimeter of a rectangle is 100 m and the difference between the length and breadth of the rectangle is 10m. Find the perimeter of a square whose area is 300 m<sup>2</sup> more than the area of a rectangle.

- (A) 110 m (B) 120 m  
(C) 130 m (D) 140 m  
(E) 150 m

**Q6** The perimeter of a rectangle and the perimeter of a square are in the ratio of 7 : 2. The area of the square is 196 sq. cm and the length and breadth of the rectangle are in the ratio of 4 : 3. What is the area of the rectangle?

- (A) 2124 sq. cm (B) 2428 sq. cm  
(C) 2276 sq. cm (D) 2352 sq. cm  
(E) none of these

**Q7** The perimeter of the top of a rectangular table is 24 m. Whereas its area is 22 m<sup>2</sup>. What is the length of its diagonal?

- (A) 12 m (B) 8 m  
(C) 10 m (D) 5 m  
(E) none of these

**Q8** The total surface area of a sphere is 616 cm<sup>2</sup>. Find the volume of the sphere.

- (A) 1347.8 cm<sup>3</sup> (B) 1564.5 cm<sup>3</sup>  
(C) 1437.3 cm<sup>3</sup> (D) 1562.7 cm<sup>3</sup>  
(E) None of these

**Q9** What is the volume of a cylinder with radius 5 cm and height 28 cm? (Take  $\pi = 22/7$ )

- (A) 8750 (B) 2200



- (C) 3750 (D) 7500  
(E) 5460

**Q10** The length and breadth of a rectangle is in ratio 4: 7. If the Perimeter is 286 cm. Find the area of the rectangle.

- (A) 4532 sq cm (B) 4632 sq cm  
(C) 4732 sq cm (D) 4832 sq cm  
(E) None of these

**Q11** The circumference of two circles is 484 m and 1012 m respectively. What is the difference between the area of the larger circle and smaller circle?

- (A) 52832 m<sup>2</sup> (B) 45232 m<sup>2</sup>  
(C) 62832 m<sup>2</sup> (D) 78232 m<sup>2</sup>  
(E) 61812 m<sup>2</sup>

**Q12** if the side of a square is increased by 28 % then what will be the ratio of new area to old area ?

- (A) 5:8 (B) 1024 :625  
(C) 625 : 1024 (D) 8: 5  
(E) None of these

**Q13** What would be the cost of building a fence around a square plot with area equal to 361 sq.ft, if the price per foot of a building the fence is Rs.65?

- (A) Rs.5000 (B) Rs.4940  
(C) Rs.5200 (D) Rs.5300  
(E) None of these

**Q14** The volume of a hemisphere is  $3888\pi$  cm<sup>3</sup>, find the total surface area of the same hemisphere.

- (A)  $996\pi$  cm<sup>2</sup> (B)  $972\pi$  cm<sup>2</sup>  
(C)  $864\pi$  cm<sup>2</sup> (D)  $728\pi$  cm<sup>2</sup>  
(E) None of these

**Q15** The curved surface area of a cylindrical object is 990 m<sup>2</sup> and its volume is 4455 m<sup>3</sup>. Then what

is the ratio of the height and diameter of this object?

- (A) 35:36 (B) 18:35  
(C) 2:1 (D) 1:2  
(E) None of these

**Q16** The diagonal of a square is  $45\sqrt{2}$  cm, whose area is 13375 cm<sup>2</sup> less than the area of a circle. Find the circumference of the circle.

- (A) 440 cm (B) 441 cm  
(C) 442 cm (D) 443 cm  
(E) None of these

**Q17** The height of an equilateral triangle is 9 cm. Find the perimeter of the triangle.

- (A)  $24\sqrt{3}$  cm (B)  $12\sqrt{3}$  cm  
(C)  $18\sqrt{3}$  cm (D)  $12\sqrt{3}$  cm  
(E)  $8\sqrt{3}$  cm

**Q18** The volume of a cuboid is twice the volume of a cube. If the dimensions of the cuboid are 32 cm, 8 cm, 4 cm then the total surface area of the cube is?

- (A) 364 cm<sup>2</sup> (B) 384 cm<sup>2</sup>  
(C) 374 cm<sup>2</sup> (D) 394 cm<sup>2</sup>  
(E) none of these

**Q19** The surface area of a sphere is  $423.5\text{cm}^2$  less than the total surface area of a hemisphere. If the ratio between the radius of the hemisphere and sphere is 3 : 2, then find the radius of hemisphere.

- (A) 10.5cm (B) 7cm  
(C) 1cm (D) 5cm  
(E) 5.5cm

**Q20** The height of cylinder is increased by 50% and its radius is increased by 100%. Then its volume will increased by how much percent?

- (A) 350 (B) 250  
(C) 500 (D) 400  
(E) 600



## Level-2

- Q1** The sum of the side of a square and the length of a rectangle is 108 cm. The perimeter of the rectangle is 126 cm and its breadth is 27 cm. Find is the side of the square.  
 (A) 87 (B) 89  
 (C) 72 (D) 76  
 (E) 64
- Q2** The sum of the circumference of a circle and the perimeter of a square is equal to 272 cm. The diameter of the circle is 56 cm. What is the sum of the area of the circle and the area of the square?  
 (A) None of these  
 (B) cannot be determined  
 (C) 3040 sq cm  
 (D) 2644 sq cm  
 (E) 2464 sq cm
- Q3** The sum of the length of a rectangle and side of a square is 84 cm. If the area of the square is 1296 cm<sup>2</sup> and the perimeter of the rectangle is 160 cm, then find the area of the rectangle.  
 (A) 1920 cm<sup>2</sup> (B) 1456 cm<sup>2</sup>  
 (C) 1648 cm<sup>2</sup> (D) 1056 cm<sup>2</sup>  
 (E) 1536 cm<sup>2</sup>
- Q4** The sum of the circumference of a circle and the perimeter of a rectangle is 132 cm. The area of the rectangle is 112 sq. cm and breadth of the rectangle is 8 cm. What is the area of the circle?  
 (A) 616 sq. cm.  
 (B) 540 sq. cm.  
 (C) 396 sq. cm.  
 (D) Cannot be determined  
 (E) None of these
- Q5** The ratio of the diameter of the base and the height of a cylinder is 2: 3. Find the radius of the cylinder if the approximate volume of the cylinder is 3234.01 cm<sup>3</sup>.  
 (A)  $\frac{21}{2}$  cm  
 (B)  $\frac{7}{2}$  cm  
 (C) 21 cm  
 (D) 7 cm  
 (E) 3 cm
- Q6** The radius and height of a cylinder is 16 cm and 21 cm respectively. If volume of a cone is 132 cm less than half of the volume of the cylinder and height of the cone is 12.5% more than radius of the cylinder, then find the radius of the cone.  
 (A) 25 cm (B) 21 cm  
 (C) 28 cm (D) 24 cm  
 (E) 26 cm
- Q7** The length of a 7m wide rectangular curtain is 24m. Find the ratio of the perimeter and diagonal of the curtain respectively.  
 (A) 31:20 (B) 62:27  
 (C) 65:28 (D) 62:25  
 (E) 56:25
- Q8** The ratio of the length to the breadth of a rectangular park is 3 : 2, if a man cycling along the boundary of the park at the speed of 24 Km/hr completes one round in 16 minutes, then what is the breadth of the park?  
 (A) 1200 m (B) 1280 m  
 (C) 1360 m (D) 1465 m  
 (E) 1565 m
- Q9** What is the size of the park if a guy cycles around its perimeter at a speed of 12 km/hr and completes one circle in 8 minutes? A



rectangular park has a length to width ratio of 3: 2. (in sq m)

- (A) 253600 (B) 153600  
(C) 353600 (D) 453600  
(E) None of these

**Q10** Inside a circular park, there is rectangular garden of perimeter 80 m. If cost of flooring the park (excluding the garden) at the rate of ₹11 per m<sup>2</sup> is ₹1121 and ratio of length to width of garden is 5: 3, then find the radius of the park.

- (A) 14 m (B) 35 m  
(C) 21 m (D) 28 m  
(E) 31 m

**Q11** The length of height and base of the right-angled triangle is 18 cm & 24cm respectively and the length of the hypotenous is equal to the diagonal of the square. Find the area of the square.

- (A) 450 (B) 230  
(C) 220 (D) 200  
(E) None of these

**Q12** The height of a right circular cylinder is 16 cm more than its radius. If the curved surface area of the cylinder is '672π' cm<sup>2</sup>, then find height of the cylinder.

- (A) 12 cm (B) 30 cm  
(C) 28 cm (D) 20 cm  
(E) 15 cm

**Q13** The area of a square is equal to the area of a rectangle. The length of the rectangle is 10 cm greater than the side length of the square, while the breadth is 4 cm less than the side length of the square. What is the side length of the square? (approx.)

- (A) 3 cm (B) 5 cm  
(C) 7 cm (D) 9 cm  
(E) 12 cm

**Q14** The height of a trapezium is 12 m and the ratio of the parallel sides are 5:4. If the area of the trapezium is 270 square meter, then find the length of the parallel sides.

- (A) 25, 20 (B) 15, 20  
(C) 18, 20 (D) 20, 22  
(E) 5, 20

**Q15** The radius of circle A is 25% less than radius of circle B and the sum of circumference of circle A and diameter of circle B is 188 cm. If the sum of radius of circle A&B is 12.5% less than the side of a square ,then find the perimeter of the square?

- (A) 200 cm (B) 216 cm  
(C) 204 cm (D) 238 cm  
(E) 224 cm

**Q16** The radius of a circle is (R-2) cm and area of same circle is 616 cm<sup>2</sup>. If radius of a cylinder is (R+5) cm and height of the cylinder is 10 cm more than radius of circle, then find the volume of the cylinder.

- (A) 36464 cm<sup>3</sup>  
(B) 35264 cm<sup>3</sup>  
(C) 33264 cm<sup>3</sup>  
(D) 34264 cm<sup>3</sup>  
(E) 54725 cm<sup>2</sup>

**Q17** Volume of a cuboid is 2772 m<sup>3</sup>. The length of the cuboid is equal to the side of the square whose perimeter is 72 m and the height of the cuboid is 22.22% less than the length of the cuboid. Find the total surface area of a cuboid.

- (A) 1672 m<sup>2</sup> (B) 1430 m<sup>2</sup>  
(C) 1125 m<sup>2</sup> (D) 1208 m<sup>2</sup>  
(E) 1500 m<sup>2</sup>

**Q18** There is a path of uniform width of 3.5 m around a circular park of area 346.5 m<sup>2</sup>. If there are 4 gates of width 3.5 m each on the outer perimeter of the boundary wall of the path,



then find the outer perimeter of the path (excluding gates). (Use  $\pi = \frac{22}{7}$ )

- (A)  $630 \text{ m}^2$  (B)  $616 \text{ m}^2$   
(C)  $602 \text{ m}^2$  (D)  $588 \text{ m}^2$   
(E)  $500 \text{ m}^2$

**Q19** There is a path around a right circular field and the radius of the field is 10 m more than the width of the path. If the area of the path is  $550 \text{ m}^2$  and the cost of planting grass in the circular field is ₹140 per  $\text{m}^2$ , then find the total cost of planting grass in the field?

- (A) ₹99000 (B) ₹110000  
(C) ₹77000 (D) ₹121000  
(E) ₹140000

**Q20** The area of a rectangular field is 25% less than that of a square field. The cost of cultivating the square field at the rate of Rs.  $12.5/\text{m}^2$  is Rs. 5000. If the ratio of the length and breadth of the rectangular field is 4:3, respectively, then find the perimeter of the rectangular field.

- (A) 60 metres (B) 120 metres  
(C) 100 metres (D) 80 metres  
(E) 70 metres



## Level-3

- Q1** Rahul has a solid cube which is made of copper. He wants to melt it and redesign it in another form by changing its parameters. Its length, breadth, and height change as +10%, +10%, -20%. What is the % change in this cube's surface area?
- (A) +1% (B) +2%  
(C) -1% (D) No Change  
(E) -2%
- Q2** Ratio of the radius of the cone to height of the cone is 7:9 and the height of the cone is equal to the height of the cylinder. If the volume of the cone is  $3696 \text{ cm}^3$  and the radius of the cylinder is half of the radius of the cone, then find the volume of the cylinder?
- (A)  $2824 \text{ cm}^3$  (B)  $2696 \text{ cm}^3$   
(C)  $2456 \text{ cm}^3$  (D)  $2772 \text{ cm}^3$   
(E) None of these
- Q3** The ratio between the angles of a polygon having four sides is 6:3:4:5. The smallest angle of a triangle is one-fourth the largest angle of the quadrilateral. Largest angle of the triangle is  $10^\circ$  more than second largest angle of the triangle. What is the second largest angle of the triangle?
- (A)  $80^\circ$   
(B)  $60^\circ$   
(C)  $70^\circ$   
(D) Cannot be determined  
(E)  $50^\circ$
- Q4** The diameters of the external and internal surfaces of a hollow spherical shell are 10cm and 6 cm, respectively. If it is recasted into a solid cylinder of length  $\frac{8}{3} \text{ cm}$ , find the diameter of the cylinder.
- (A) 28 (B) 14  
(C) 26 (D) 18  
(E) 30
- Q5** The ratio of the perimeter of a squared field and another field which is in shape of an equilateral triangle is 2:3, respectively. If the cost of cultivating the whole squared field at the rate of Rs. 11.8/m<sup>2</sup> is Rs. 2655, then find the cost of fencing the triangular field at the rate of Rs. 3.5/metre.
- (A) Rs. 405 (B) Rs. 195  
(C) Rs. 275 (D) Rs. 465  
(E) Rs. 315
- Q6** The ratio of the perimeter of a square field and another field which is in the shape of an equilateral triangle is 8:9, respectively. If the cost of cultivating the square field at the rate of Rs. 4.5/m<sup>2</sup> is Rs. 10368, then find the cost of fencing the triangular field at the rate of Rs. 2.5/metre.
- (A) Rs. 540 (B) Rs. 360  
(C) Rs. 750 (D) Rs. 600  
(E) Rs. 450
- Q7** The perimeter of a rectangular park is 228 m and the length of the park 22 m more than the breadth of the park. A path has been made inside around the park of width 3 m and it has been paved with marbles. If the length and the breadth of each marble is 45 cm and 36 cm, respectively then find the number of marbles used for paving the path.
- (A) 4000 (B) 3000  
(C) 2000 (D) 5000



(E) 6000

- Q8** Two cubes A and B are melted down to form a cuboid. The ratio of the side of cube A to that of cube B is 5: 6. If the breadth and height of the cuboid are 110% and 80% of the side of cube A and the length of the cuboid is 31 cm, then find the surface area of the cuboid?

(A)  $1478 \text{ cm}^2$   
 (B)  $1522 \text{ cm}^2$   
 (C)  $1354 \text{ cm}^2$   
 (D)  $1292 \text{ cm}^2$   
 (E) None of these

- Q9** There is a square field of area ' $y$ '  $\text{m}^2$ . A cylindrical ditch of radius 7 meters and depth 2 meters is dug, and the earth is taken out and spread over the remaining part of the square field, the height of the square field which goes up by 0.77 meters. What is the value of ' $y$ ' ?

(A)  $548 \text{ m}^2$  (B)  $524 \text{ m}^2$   
 (C)  $554 \text{ m}^2$  (D)  $504 \text{ m}^2$   
 (E)  $500 \text{ m}^2$

- Q10** There are two toys, one of cylindrical shape of base radius 8 cm and volume  $4608 \text{ cm}^3$ . Another toy of conical shape having height 25% less than the height of first toy and volume of the conical toy is  $2592 \text{ cm}^3$ . Find the relation between radii of both the toys. [Take  $\pi = 3$ ]

(A) Radius of second toy is 52% more than radius of first toy.  
 (B) Radius of second toy is 6 cm more than radius of first toy.  
 (C) Radius of first toy is 4 cm less than radius of second toy.  
 (D) Radius of second toy is 4 cm more than twice the radius of first toy.  
 (E) none of these



# Answer Key

## Level-1

Q1 (C)  
Q2 (B)  
Q3 (C)  
Q4 (D)  
Q5 (B)  
Q6 (D)  
Q7 (C)  
Q8 (C)  
Q9 (B)  
Q10 (C)

Q11 (C)  
Q12 (B)  
Q13 (B)  
Q14 (B)  
Q15 (A)  
Q16 (A)  
Q17 (C)  
Q18 (B)  
Q19 (A)  
Q20 (C)





## Level-2

Q1 (C)  
Q2 (C)  
Q3 (E)  
Q4 (A)  
Q5 (D)  
Q6 (B)  
Q7 (D)  
Q8 (B)  
Q9 (B)  
Q10 (C)

Q11 (A)  
Q12 (C)  
Q13 (C)  
Q14 (A)  
Q15 (E)  
Q16 (C)  
Q17 (D)  
Q18 (C)  
Q19 (A)  
Q20 (E)



## Level-3

Q1 (C)

Q2 (D)

Q3 (C)

Q4 (A)

Q5 (E)

Q6 (A)

Q7 (A)

Q8 (C)

Q9 (C)

Q10 (C)



# Hints & Solutions

## Level-1

### Q1 Text Solution:

Let the length of rectangular plot =  $9x$   
 And breadth of the plot =  $4x$   
 According to question,  $9x - 4x = 200$  metres  
 $5x = 200$  metres  
 $x = 40$  metres  
 Length =  $360$  m, breadth =  $160$  m  
 Perimeter of rectangle =  $2(l+b)$   
 $= 2(360+160)$   
 $= 2 \times 520$   
 $= 1040$  metres

### Q2 Text Solution:

Distance cover by wheel in 1 revolution =  
 Circumference of the wheel  
 Distance cover by wheel in 1 revolution  
 $= 2\pi r = 2 \times \frac{22}{7} \times 14 = 88$  cm  
 Distance cover by wheel in 10 minutes  
 $= 22 \times 10 \times 60 = 13200$  cm ( $D = s \times t$ )  
 Number of revolution =  $\frac{13200}{88} = 150$

### Q3 Text Solution:

room is a cuboidal shape  
 Diagonal of cuboid =  $\sqrt{l^2 + b^2 + h^2}$   
 $= \sqrt{7^2 + 8^2 + 5^2}$   
 $= \sqrt{138}$

### Q4 Text Solution:

Perimeter of square =  $10 \times 4 = 40$  m  
 Perimeter of rectangle =  $40 + 24 = 64$  m  
 Let the length and breadth of the rectangle be  
 $5x$  and  $3x$  respectively.  
 According to the question,  
 $2 \times (5x + 3x) = 64$   
 $x = 4$   
 Required area =  $5 \times 4 \times 3 \times 4 = 240$

### Q5 Text Solution:

Let length and breadth of the rectangle are ' $l$ ' and ' $b$ ', respectively.

The perimeter of the rectangle is  $100$  m.

Therefore,

$$2(l + b) = 100$$

$$l + b = 50$$

also ;

$$l - b = 10$$

Adding the above two equations, we get:

$$2l = 60$$

$$l = 30$$

Substituting this value of  $l$  in  $l + b = 50$ , we get:

$$b = 20$$

$$\text{Area of rectangle} = l \times b = 30 \times 20$$

$$\text{Area of rectangle} = 600 \text{ m}^2$$

Let the side of the square be  $x$  m.

the area of the square is  $300 \text{ m}^2$  more than the area of the rectangle. Therefore;

$$\text{Area of square} = 900 \text{ m}^2$$

$$\Rightarrow x^2 = 900$$

$$\Rightarrow x = 30 \text{ m}$$

$$\text{Perimeter of square} = 4 \times x$$

$$\text{Perimeter of square} = 4 \times 30 = 120 \text{ m}$$

Therefore, the perimeter of the square whose area is  $300 \text{ m}^2$  more than the area of the rectangle is  $120$  m.

### Q6 Text Solution:

$$\text{Side of the square} = \sqrt{196} = 14 \text{ cm.}$$

$$\text{Perimeter of the square} = 4 \times 14 = 56 \text{ cm}$$

$$\text{Perimeter of the rectangle} = \frac{7}{2} \times 56 = 196 \text{ cm}$$

Let the length and breadth of the rectangle be  $4x$  cm and  $3x$  cm respectively.

$$2 \times (4x + 3x) = 196$$

$$x = \frac{196}{14} = 14$$

$$\text{Area of the rectangle} = 4x \times 3x$$



$$= 56 \times 42 = 2352 \text{ sq. cm}$$

Option 'd' is the correct

**Q7 Text Solution:**

Let length be  $l$  m & breadth be  $b$  m.

$$\text{Perimeter} = 2(l + b)$$

$$l + b = 12$$

$$\text{Area} = lb$$

$$\Rightarrow lb = 22$$

Now;

$$(l + b)^2 = l^2 + b^2 + 2lb$$

$$\Rightarrow 12^2 = l^2 + b^2 + 44$$

$$\Rightarrow 100 = l^2 + b^2$$

$$\text{Diagonal of rectangle} = \sqrt{(l^2 + b^2)} = 10$$

**Q8 Text Solution:**

$$\text{TSA} = 616 \text{ cm}^2$$

$$\Rightarrow 4 \times \frac{22}{7} \times r^2 = 616$$

$$\Rightarrow r^2 = 7 \times 7$$

$$\Rightarrow r = 7 \text{ cm}$$

$$\text{Therefore; Volume} = \frac{4}{3} \times \frac{22}{7} \times r^3$$

$$= \frac{4}{3} \times \frac{22}{7} \times 7^3$$

$$= 1437.3 \text{ cm}^3$$

**Q9 Text Solution:**

$$\text{The volume of Cylinder} = \pi r^2 h$$

Calculation:

According to the question

Volume of cylinder

$$\Rightarrow \pi r^2 h$$

$$\Rightarrow \frac{22}{7} \times 5^2 \times 28$$

$$\Rightarrow 2200$$

$\therefore$  The volume of the cylinder is 2200

**Q10 Text Solution:**

Let the length and breadth of the rectangle be  $4x$  and  $7x$ .

We know perimeter of rectangle =  $2(l + b)$

According to the question :

$$2(4x + 7x) = 286$$

$$22x = 286$$

$$x = 13 \text{ cm}$$

Therefore, area of rectangle ( $l \times b$ ) =  $4x \times 7x$

$$= (4 \times 13) \times (7 \times 13)$$

$$= 52 \times 91$$

$$= 4732 \text{ cm}^2$$

**Q11 Text Solution:**

Let the radius of the 1st circle be  $x$  & 2nd circle by  $y$  cm.

ATP:

$$\text{Circumference of 1st circle} = 2 \times \frac{22}{7} \times x$$

$$\Rightarrow \frac{44}{7} \times x = 484$$

$$\Rightarrow x = 77 \text{ cm}$$

$$\text{Similarly } y = 161 \text{ cm}$$

Therefore; difference between the circle

$$= \pi(y^2 - x^2)$$

$$= \frac{22}{7}(161^2 - 77^2) = 62832 \text{ cm}^2$$

**Q12 Text Solution:**

28 % can be written as  $\frac{7}{25}$

Means initially if the side was 25 it will become 32 after increment .

So the ratio of new area to old area =  $32 \times 32 :$

$$25 \times 25 = 1024 : 625$$

**Q13 Text Solution:**

Let the side of the square plot be 'a' ft.

Given area of the plot ( $a \times a$ ) = 361

$$\Rightarrow a = 19$$

Length of the fence = Perimeter of the plot =  $4a$

$$= 76 \text{ ft.}$$

$$\text{Cost of building the fence} = 76 \times 65 = \text{Rs.}4940$$

**Q14 Text Solution:**

Let the radius of the hemisphere be 'r' cm.

$$\text{Volume of hemisphere} = \left(\frac{2}{3}\right) \times \pi \times r^3$$

$$3888\pi = \left(\frac{2}{3}\right) \times \pi \times r^3$$

$$\text{Or, } 5832 = r^3$$

$$\text{So, } r = 18$$

The total surface area of hemisphere =  $3\pi r^2$

$$\text{So, required area} = 3 \times \pi \times 18^2 = 972\pi \text{ cm}^2$$



Hence, option b.

**Q15 Text Solution:**

$$\text{Curved surface area} = 2\pi rh = 990$$

$$\text{Volume} = \pi r^2 h = 4455$$

$$\pi rh = 495$$

$$\text{So } r = \frac{4455}{495} = 9$$

$$h = 990 \times \frac{7}{22} \times \frac{1}{9} \times \frac{1}{2} = \frac{35}{2}$$

$$\text{So required ratio} = 35:36$$

Hence, option a.

**Q16 Text Solution:**

Let the side of the square be  $s$ .

$$\text{Diagonal} = 45\sqrt{2}$$

Therefore, the side of the square is 45 cm.

Let the area of the square be  $x$ .

$$x = s^2 = (45)^2 = 2025 \text{ cm}^2$$

Let's denote the radius of the circle by  $r$  & area be  $y$ . Then;

$$y = \frac{22}{7} \times r^2$$

Also; area of the circle is  $13375 \text{ cm}^2$  more than the area of the square, so we have:

$$y = x + 13375$$

$$y = 2025 + 13375$$

$$y = 15400$$

$$\frac{22}{7} \times r^2 = 15400$$

$$r = 70 \text{ cm}$$

The circumference of the circle ;

$$C = 2 \times \frac{22}{7} \times r = 2 \times \frac{22}{7} \times 70$$

$$= 440 \text{ cm}$$

**Q17 Text Solution:**

Let the length of each side of the triangle be ' $a$ ' cm

$$\text{Height of equilateral triangle} = \frac{\sqrt{3}}{2} \times a$$

$$\text{So, } 9 = \frac{\sqrt{3}}{2} \times a$$

$$\text{Or, } a = 6\sqrt{3}$$

$$\text{Required perimeter} = 6\sqrt{3} \times 3 = 18\sqrt{3} \text{ cm}$$

Hence, option C.

**Q18 Text Solution:**

Here length of cuboid = 32cm,

breadth of cuboid = 8cm and height of cuboid = 4cm

$\therefore$  volume of cuboid = length  $\times$  breadth  $\times$  height

$$= 32 \text{ cm} \times 8 \text{ cm} \times 4 \text{ cm} = 1024 \text{ cm}^3.$$

According to the question:

volume of cuboid =  $2 \times$  volume of cube

$$1024 \text{ cm}^3 = 2 \times \text{side}^3$$

$$\Rightarrow 512 \text{ cm}^3 = \text{side}^3$$

$$\Rightarrow (8 \text{ cm})^3 = \text{side}^3$$

$\therefore$  Side of cube = 8 cm.

Since, the total surface area of the cube =  $6 \times \text{side}^2$

$$= 6 \times 8^2 = 384 \text{ cm}^2$$

**Q19 Text Solution:**

T. Surface Area of hemisphere =  $3\pi r^2$

T. Surface Area of sphere =  $4\pi r^2$

let the radius of the sphere =  $2x$

let the radius of the hemisphere =  $3x$

$$3\pi r^2 - 4\pi r^2 = 423.5$$

$$3 \times \frac{22}{7} \times 9x^2 - 4 \times \frac{22}{7} \times 4 \times x^2 = 423.5$$

$$\frac{22}{7} (27x^2 - 16x^2) = 423.5$$

$$x^2 = 12.25$$

$$x = 3.5$$

radius of hemisphere =  $3x$

$$= 10.5 \text{ cm}$$

**Q20 Text Solution:**

Let the height of the cylinder be 2 unit

After increment height =  $\frac{3}{2} \times 2 = 3 \text{ unit}$   
(increased by 50%)

Also, let the radius be 1 unit

After increment New radius =  $\frac{2}{1} \times 1 = 2 \text{ unit}$   
(increased by 100%)

The volume before increment =  $\pi \times 1 \times 2 = 2\pi$

$$\text{Volume after increment} = \pi \times 4 \times 3 = 12\pi$$



Percentage increase in Volume =

$$\frac{10\pi}{2\pi} \times 100\% = 500\%$$



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## Level-2

**Q1 Text Solution:**

Let the length of the square is 'L' cm and the side of the square be 'a' cm.

According to the question,

$$2 \times (L + 27) = 126$$

$$L = 63 - 27 = 36 \text{ cm}$$

$$36 + a = 108$$

$$a = 108 - 36 = 72 \text{ cm}$$

Option '72' is the correct answer.

**Q2 Text Solution:**

Given that,

$$2\pi r + (4 \times \text{side}) = 272 \text{ -----(1)}$$

$$2r = 56 \text{ cm -----(given)}$$

$$\text{Therefore, } r = 28 \text{ cm}$$

Substituting the equation in (1)

Let the side of the square be 'y'

$$\Rightarrow 2 \times \frac{22}{7} \times 28 + (4y) = 272$$

$$\Rightarrow 176 + 4y = 272$$

$$\Rightarrow 4y = 96$$

$$\Rightarrow \text{Side of the square, } y = 24$$

Sum of the area of square and circle

$$\Rightarrow \text{Side} \times \text{side} + \pi r^2$$

$$\Rightarrow 24 \times 24 + \frac{22}{7} \times 28 \times 28$$

$$\Rightarrow 576 + 2464$$

$$\Rightarrow 3040 \text{ cm}^2$$

**Q3 Text Solution:**

According to the question,

$$\text{Length of each side of the square} = \sqrt{1296} = 36 \text{ cm}$$

$$\text{Length of the rectangle} = 84 - 36 = 48 \text{ cm}$$

According to the question,

$$2(l + b) = 160$$

$$\text{Or, } 48 + b = 80$$

$$\text{Or, } b = 32$$

Therefore, the breadth of the rectangle = 32 cm

$$\text{Area of the rectangle} = \text{Length} \times \text{Breadth} = 48 \times 32 = 1536 \text{ cm}^2$$

**Q4 Text Solution:**

$$\text{Length of the rectangles} = \frac{112}{8} = 14 \text{ cm.}$$

$$\text{Perimeter of the rectangle} = 2(14 + 8) = 44 \text{ cm.}$$

$$\text{Circumference of the circle} = 132 - 44 = 88 \text{ cm.}$$

$$R = \frac{88 \times 7}{2 \times 22} = 14 \text{ cm}$$

$$\text{Area of the circle} = \frac{22}{7} \times 14 \times 14 = 616 \text{ sq. cm.}$$

**Q5 Text Solution:**

Let diameter of base be  $2x$  cm & height of cylinder be  $3x$  cm

$$\therefore \text{Radius} = \frac{2x}{2} = x \text{ cm}$$

We know,

$$\text{Volume of cylinder} = \pi r^2 h \quad (r \rightarrow \text{radius, } h \rightarrow \text{height})$$

ATQ,

$$\pi r^2 h = 3234$$

$$\frac{22}{7} \times x^2 \times 3x = 3234$$

$$x = 7 \text{ cm}$$

$$\text{Radius} = 7 \text{ cm}$$

**Q6 Text Solution:**

$$\text{Volume of the cylinder} = \frac{22}{7} \times 16 \times 16 \times 21 = 16896 \text{ cm}^2$$

$$\text{Volume of the cone} = \frac{16896}{2} - 132 = 8316 \text{ cm}^2$$

Let radius of the cone be 'R' cm.

According to question,

$$\frac{1}{3} \times \frac{22}{7} \times R^2 \times 18 = 8316$$

$$R^2 = 441$$

$$R = 21 \text{ cm}$$

**Q7 Text Solution:**

Length of the rectangular curtain = 24m

The breadth of the rectangular curtain = 7m

$$\text{Perimeter of the curtain} = 2 \times (24 + 7) = 62 \text{ m}$$

$$\text{Diagonal of the curtain} = \sqrt{24^2 + 7^2} = \sqrt{576 + 49} = \sqrt{625} = 25 \text{ m}$$



Required ratio = 62: 25

**Q8 Text Solution:**

perimeter = distance covered in 16 minutes

$$\frac{24000}{60} \times 16 = 6400 \text{ m}$$

Let the length be  $3x$  m and breadth be  $2x$  m.  
then

$$2(3x+2x) = 6400 \text{ m}$$

$$5x = 3200 \text{ m}$$

$$x = 640 \text{ m}$$

$$\text{Length} = 3 \times 640 = 1920 \text{ m}$$

$$\text{Breadth} = 2 \times 640 = 1280 \text{ m}$$

**Q9 Text Solution:**

Correct Option: B

Perimeter = Distance covered in 8 minutes

$$= \frac{12000}{60} \times 8 = 1600 \text{ m}$$

Let the dimensions be length  $3x$  and width  $2x$  m. Consequently,  $2 \times (3x + 2x) = 1600$

$$\text{or, } 10x = 1600$$

$$\therefore x = 160$$

$$\text{Length is } 160 \times 3 = 480 \text{ m.}$$

$$\text{Width} = 160 \times 2 = 320 \text{ m}$$

The park's size is 480 by 320, or 153600 square metres.

As a result, choice B is accurate.

**Q10 Text Solution:**

Let length and width of the garden is ' $5x$ ' and ' $3x$ ' respectively.

$$\text{Perimeter of the garden} = 2 \times (5x + 3x) = 80$$

$$8x = 40$$

$$x = 5$$

$$\text{Area of garden} = 5x \times 3x = 375 \text{ m}^2$$

$$\text{Area of circular park (excluding the garden)} =$$

$$\frac{11121}{11} = 1011 \text{ m}^2$$

$$\text{Area of park} = 375 + 1011 = 1386 \text{ m}^2$$

Let radius of park = ' $r$ ' m

$$\pi r^2 = 1386$$

$$r^2 = 441$$

$$r = 21 \text{ m}$$

The radius of the park = 21 m

**Q11 Text Solution:**

We know the Pythagoras theorem,

Height = 18cm

Base = 24cm

hypotenuse

$$\sqrt{18^2 + 24^2} = \sqrt{324 + 576} = \sqrt{900}$$

$$= 30 \text{ cm}$$

Given that the hypotenuse is equal to the diagonal of the square.

and diagonal of the square =  $\sqrt{2}a$ , where  $a$  is the side of the square.

$$\text{So, } \sqrt{2}a = 30$$

$$a = \frac{30}{\sqrt{2}}$$

area of square

$$\text{side}^2 = \left( \frac{30}{\sqrt{2}} \right)^2 = \frac{900}{2} = 450 \text{ cm}^2$$

**Q12 Text Solution:**

Let the radius of the cylinder be ' $x$ ' cm

So, height of the cylinder = ' $x + 16$ ' cm

Curved surface area of cylinder =  $2\pi rh$  {Where ' $r$ ' is radius and ' $h$ ' is height}

$$\text{So, } 672\pi = 2\pi \times x \times (x + 16)$$

$$\text{Or, } 336 = x^2 + 16x$$

$$\text{So, } x^2 + 16x - 336 = 0$$

$$\text{Or, } x^2 + 28x - 12x - 336 = 0$$

$$\text{Or, } x(x - 12) + 28(x - 12) = 0$$

$$\text{Or, } (x - 12)(x + 28) = 0$$

$$\text{So, } x = 12 \text{ or } x = -28$$

Since the radius cannot be negative, we may discard  $x = -28$ .

$$\text{So, height of the cylinder} = 12 + 16 = 28 \text{ cm}$$

Hence, option c.

**Q13 Text Solution:**

Let the side of the square is  $x$  cm

So, length of rectangle =  $(x + 10)$  cm

And, breadth of rectangle =  $(x - 4)$  cm

ATQ,





$$x^2 = (x + 10)(x - 4)$$

$$x^2 = x^2 + 10x - 4x - 40$$

$$6x = 40$$

$$x = 6.67 \text{ cm} \approx 7 \text{ cm (approx.)}$$

**Q14 Text Solution:**

Area = 270 square meters

Height = 12 m

Let Side = 5x, 4x

Area of trapezium =

$$\frac{1}{2} \times \text{height} \times \text{sum of parallel sides}$$

ATP

$$270 = \frac{1}{2} \times 12 \times (5x + 4x)$$

$$\Rightarrow 270 = 6 \times (9x)$$

$$\Rightarrow 270 = 54x$$

$$\Rightarrow x = \frac{270}{54}$$

$$\Rightarrow x = 5$$

Side will be = (5 × 5), (5 × 4) = 25m, 20m

**Q15 Text Solution:**

let the radius of circle B = 4x

So, radius of circle A =  $4x \times \frac{75}{100} = 3x$

Circumference of circle =  $2\pi r$

Given, circumference of circle + diameter of circle = 188 cm

$$2 \times \frac{22}{7} \times 3x + 2 \times 4x = 188 \text{ cm}$$

$$\frac{132x}{7} + 8x = 188 \text{ cm}$$

$$132x + 56x = 1316 \text{ cm}$$

$$188x = 1316 \text{ cm}$$

$$x = 7 \text{ cm}$$

$$\text{side of square} = \frac{100}{87.5} \times (3 \times 7 + 4 \times 7) = 56 \text{ cm}$$

perimeter of square =  $4 \times \text{side}$

$$56 \times 4 = 224 \text{ cm}$$

**Q16 Text Solution:**

According to question,

$$\frac{22}{7} \times (R - 2)^2 = 616$$

$$(R - 2)^2 = 196$$

$$R - 2 = 14$$

$$R = 16$$

So, radius of circle =  $16 - 2 = 14 \text{ cm}$

$$\begin{aligned} \text{Required volume} &= \frac{22}{7} \times (16 + 5)^2 \times (14 + 10) \\ &= 33264 \text{ cm}^3 \end{aligned}$$

**Q17 Text Solution:**

The length of the cuboid is =  $\frac{72}{4} = 18 \text{ m}$

Height of cuboid is =  $18 \times \frac{100 - 22.22}{100} = 14 \text{ m}$

So, breadth of the cuboid is =  $\frac{2772}{14 \times 18} = 11 \text{ m}$

So, total surface area of cuboid is =  $2 \times (14 \times 11 + 11 \times 18 + 14 \times 18) = 1208 \text{ m}^2$

**Q18 Text Solution:**

Inner perimeter of path = Perimeter of the park

Let radius of the park = 'r' m

Area of park =  $\pi r^2 = 346.5$

$$\frac{22}{7} \times r^2 = 346.5$$

$$r^2 = 110.25$$

$$r^2 = 10.5^2$$

$$r = 10.5 \text{ m}$$

Outer radius of the path =  $10.5 + 3.5 = 14 \text{ m}$

Outer perimeter of the path (including gates) =

$$\begin{aligned} &\pi r^2 \\ &= \frac{22}{7} \times 14^2 \end{aligned}$$

$$= 616 \text{ m}^2$$

Outer perimeter of the path (excluding gates) =

$$\begin{aligned} &616 - 4 \times 3.5 \\ &= 602 \text{ m}^2 \end{aligned}$$

**Q19 Text Solution:**

Let the width of the path = 'x' m

And the radius of the field = (x + 10) m

So,

$$\begin{aligned} &\frac{22}{7} \times [(x + 10 + x)^2 - (x + 10)^2] \\ &= 550 \end{aligned}$$

$$(3x + 20) \times x = 175$$

$$3x^2 + 20x - 175 = 0$$

$$3x^2 + 35x - 15x - 175 = 0$$

$$x(3x + 35) - 5(3x + 35) =$$

$$x = 5$$

Now, the radius of the field =  $5 + 10 = 15 \text{ m}$

$$\text{The area of the field} = \frac{22}{7} \times 15 \times 15 = \frac{4950}{7}$$



And the total cost of planting grass in the field:

$$\frac{4950}{7} \times 140 = ₹990000$$

**Q20 Text Solution:**

$$\text{Area of the square field} = \frac{5000}{12.5} = 400 \text{ m}^2$$

$$\text{Area of the rectangular field} = 0.75 \times 400 = 300 \text{ m}^2$$

Let the length and breadth of the rectangular field be  $4x$  meters and  $3x$  meters, respectively.

Therefore,

$$4x \times 3x = 300$$

$$\text{Or, } x^2 = \frac{300}{12} = 25$$

$$\text{Or, } x = 5$$

Therefore, perimeter of the rectangular field = 2

$$\times (4x + 3x) = 70 \text{ metres}$$

Hence, option e.



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## Level-3

**Q1 Text Solution:**

Answer: C

Solution:-

Let the surface area of each side of the initial cube be 100.

The surface area of the resulting cuboid would be given by  $2(lb + bh + lh)$

Now, the change is calculated as

$$\text{Length} = 10 + 10\% \times 10 = 11$$

$$\text{Breadth} = 10 + 10\% \times 10 = 11$$

$$\text{Height} = 10 - 20\% \times 10 = 8$$

Now, the total surface area of the cuboid =  $2(lb + bh + lh)$

$$= 2(11 \times 11 + 11 \times 8 + 8 \times 11) = 2 \times (121 + 88 + 88) = 2 \times 297 = 594$$

$$\text{Initial surface area} = 6 \text{ sides} \times 100 = 600$$

$$\% \text{ change in surface area} = \left( \frac{594 - 600}{600} \right) \times 100$$

$$= \left( \frac{-6}{600} \right) \times 100$$

$$= -1\%$$

The percentage change in surface area of this cube is -1%.

Hence, the answer is -1%.

**Q2 Text Solution:**

$$3696 = \frac{1}{3} \times \frac{22}{7} \times 7x \times 7x \times 9x$$

$$x = 2$$

$$\text{Radius of the cone} = 7 \times 2 = 14 \text{ cm}$$

$$\text{Radius of the cylinder} = \frac{14}{2} = 7 \text{ cm}$$

$$\text{Height of the cone} = 9 \times 2 = 18 \text{ cm}$$

$$\text{Volume of the cylinder} = \frac{22}{7} \times 7 \times 7 \times 18 = 2772 \text{ cm}^3$$

**Q3 Text Solution:**

$$\text{The largest angle of the quadrilateral} = \frac{6 \times 360}{6+4+5+3} = 120^\circ$$

$$\text{The smallest angle of the triangle} = 120 \times \frac{1}{4} = 30^\circ$$

If the second largest angle of the triangle is  $x^\circ$ , then the largest angle of the triangle =  $(x^\circ + 10)$

$$30 + x + x + 10 = 180$$

$$x = 70$$

**Q4 Text Solution:**

The external diameter of a sphere = 10 cm

The internal diameter of the sphere = 6 cm

$$\text{Volume of the sphere} = \frac{4}{3} \pi (R^3 - r^3)$$

$$= \left( \frac{4}{3} \right) \left( \frac{22}{7} \right) (10^3 - 6^3)$$

$$= \left( \frac{4}{3} \right) \left( \frac{22}{7} \right) (784)$$

$$= \frac{9856}{3} \text{ cm}^3$$

$$\text{Height of the cylinder formed} = \frac{8}{3} \text{ cm}$$

Let the radius of the cylinder be 'r' cm

$$\text{Volume of the cylinder} = \pi r^2 h$$

$$= \frac{22}{7} \times r^2 \times \frac{8}{3} = \frac{9856}{3}$$

$$r^2 = 392$$

$$r = 14 \text{ cm}$$

$$\text{So Diameter of the cylinder} = 2 \times 14 = 28 \text{ cm}$$

**Q5 Text Solution:**

Let each side of the squared field be a metres

$$\text{Therefore, } a^2 = 2655 \div 11.8 = 225$$

$$\text{Or, } a^2 = 225$$

$$\text{Or, } a = 15 \text{ metres}$$

Therefore, the perimeter of the squared field =

$$4a = 60 \text{ meters}$$

Perimeter of the equilateral triangular field = 60

$$\times \frac{3}{2} = 90 \text{ metres}$$

Therefore, the cost of fencing the equilateral triangular field =  $90 \times 3.5 = \text{Rs. } 315$

Hence, option e.

**Q6 Text Solution:**

Let each side of the square field be 'a' metres

$$\text{Therefore, } a^2 = \frac{10368}{4.5}$$

$$\text{Or, } a^2 = 2304$$

$$\text{Or, } a = 48 \text{ metres}$$



Therefore, perimeter of the square =  $4a = 192$  metres

Perimeter of the equilateral triangular field =  $192 \times \frac{9}{8} = 216$  metres

Therefore, the cost of fencing the equilateral triangular field =  $216 \times 2.5 = \text{Rs. } 540$

Hence, option a.

**Q7 Text Solution:**

Let, the length of the park = 'x' m

Then, the breadth of the park =  $(x - 22)$  m

So,  $2 \times (x + x - 22) = 228$

$2x - 22 = 114$

$2x = 136$ ,  $x = 68$

Therefore, the length of the park = 68 m

And, the breadth of the park =  $68 - 22 = 46$  m

So, area of the path =  $68 \times 46 - 62 \times 40 = 3128 - 2480 = 648 \text{ m}^2$

And, area of each marble =  $45 \times 36 = 1620 \text{ cm}^2 = 0.162 \text{ m}^2$

Number of marbles required =  $\frac{648}{0.162} = 4000$

Hence, option a.

**Q8 Text Solution:**

Let the sides of cube A and cube B are '5x' cm and '6x' cm respectively.

So, breadth of the cuboid = 110% of  $5x = 5.5x$  cm

And height of the cuboid = 80% of  $5x = 4x$  cm

Since, the total volume of both the cubes together = volume of the cuboid

So,

$$(5x)^3 + (6x)^3 = 31 \times 5.5x \times 4x$$

$$341x^3 = 682x^2$$

$$x = 2$$

Length of the cuboid = 31 cm

Breadth of the cuboid =  $5.5 \times 2 = 11$  cm

Height of the cuboid =  $4 \times 2 = 8$  cm

So, surface area of the cuboid =  $2 \times (31 \times 11 + 11 \times 8 + 31 \times 8) = 1354 \text{ cm}^2$

**Q9 Text Solution:**

Volume of the cylindrical ditch =  $\pi r^2 h$   
 $= \frac{22}{7} \times 7 \times 7 \times 2 = 308 \text{ m}^3$

Area of remaining field =  $(y - \pi r^2) \text{ m}^2$   
 $= (y - 154) \text{ m}^2$

According to Question,

$$(y - 154) \times 0.77 = 308$$

$$(y - 154) = 400$$

$$y = 554 \text{ m}^2$$

**Q10 Text Solution:**

Let height of first toy be 'h' cm

So,  $\pi \times 8 \times 8 \times h = 4608$

$$h = 4608 / 192 = 24 \text{ cm}$$

Height of second toy =  $0.75 \times 24 = 18$  cm

Let radius of second toy be 'r' cm.

$$\text{So, } \frac{1}{3} \times \pi \times r^2 \times 18 = 2592$$

$$r^2 = 144$$

$$r = 12 \text{ cm}$$

Therefore, radius of first toy is 4 cm less than radius of second one.

Hence, option c.

