PRACTICE MCQs

CLASS 10 MATHS (TERM - I)

AREA RELATED TO CIRCLES

BY

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learning simplified

Question 1:

If the perimeter and the area of a circle are numerically equal, then the radius of the circle is

(a) 2 units

(b) π units

(c) 4 units

(d) 7 units

Answer: (a) 2 units

Given, Numerical area of the circle = Numerical circumference of the circle

$\Rightarrow \pi r^2 = 2\pi r$

$\Rightarrow \pi r^2 - 2\pi r = 0$

$\Rightarrow \pi(r^2 - 2r) = 0$

$\Rightarrow r^2 - 2r = 0$ [Since $\pi \neq 0$]

$\Rightarrow r(r - 2) = 0$

$\Rightarrow r = 0$ or $r = 2$

But r cannot be zero

So, r = 2 units.

Question 2:

The area of a sector of a circle with radius 6 cm if angle of the sector is 90°, is

(a) 162/7 cm^2

(b) 172/7 cm^2

(c) 182/7 cm^2

(d) 192/7 cm^2

Answer: (d) 192/7 cm^2

Given, radius of circle (r) = 6 cm

Angle of the sector (θ) = 90°

Now, area of sector = (θ/360°) * πr^2

= (90°/360°) * (22/7) * 6^2

= (1/4) * (22/7) * 6 * 6

= (22/7) * 9

= 192/7 cm^2

Question 3:

In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre then the length of the arc, is

(a) 12 cm

(b) 15 cm

(c) 18 cm

(d) 22 cm

Answer: (d) 22 cm

Given, radius = 21 cm and θ = 60°

Circumference of the circle = 2πr

= 2 * (22/7) * 21

= 2 * 22 * 3

= 132 cm

Now, length of the arc APB = (60°/360°) * 132

= 132/6

= 22 cm

Question 4:

If the perimeter of a circle is equal to that of a square, then the ratio of their areas is:

(a) 22 : 7

(b) 14 : 11

(c) 7 : 22

(d) 11 : 14

Answer: (b) 14 : 11

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

Given, perimeter of circle = perimeter of square

$\Rightarrow 2\pi r = 4a$

$\Rightarrow a = \pi r/2$

Now, Area of circle/area of square $= \pi r^2/a^2$

$= \pi r^2/(\pi r/2)^2$

$= 4/\pi$

$= 4/(22/7)$

$= 2/(11/7)$

$= 14/11$

$\Rightarrow$ Area of circle : area of square = 14 : 11

Question 5:

The area of the square that can be inscribed in a circle of radius 8 cm is

(A) 256 cm^2

(B) 128 cm^2

(C) 642 cm^2

(D) 64 cm^2

Answer: (b) 128 cm^2

Radius of circle = 8 cm

Diameter of circle = 16 cm = diagonal of the square

Therefore, side of square = diagonal/√2 = 16/√2

Now, area of square = $(side)^2 = (16/√2)^2 = 256/2 = 128\ cm^2$

Question 6:

The radius of a circle whose circumference is equal to the sum of the circumferences of the two circles of diameters 36 cm and 20 cm is

(a) 56 cm

(b) 42 cm

(c) 28 cm

(d) 16 cm

Answer: (c) 28 cm

According to question,

Circumference of circle = Circumference of first circle + Circumference of second circle

$\pi D = \pi d_1 + \pi d_2$

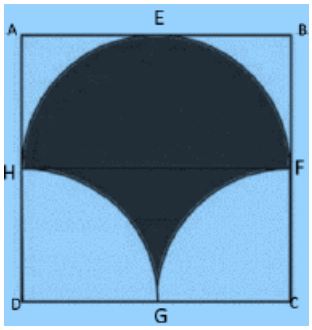
D = 36 + 20

D = 56 cm

So, Radius = 56/2 = 28 cm

Question 7:

In the figure given below, ABCD is a square of side 14 cm with E, F, G and H as the mid points of sides AB, BC, CD and DA respectively. The area of the shaded portion is



(a) 44cm²

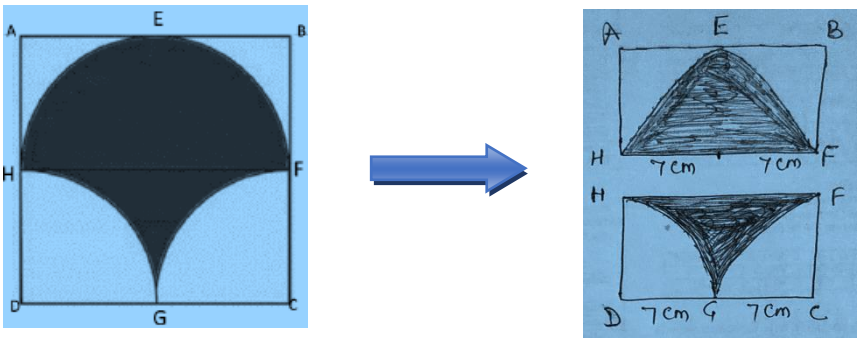
(b) 49 cm²

(c) 98 cm²

(d) 49π/2 cm²

Answer: (c) 98 cm²

The given figure can be break into two parts as



Now, area of shaded region = area of half circle + (area of half square – area of half circle)

= area of half square

= 1/2 * 14 * 14

= 98 cm²

Question 8:

A cow is tied with a rope of length 14 m at the corner of a rectangular field of dimensions 20 m * 16 m, then the area of the field in which the cow can graze is:

(a) 154 m^2

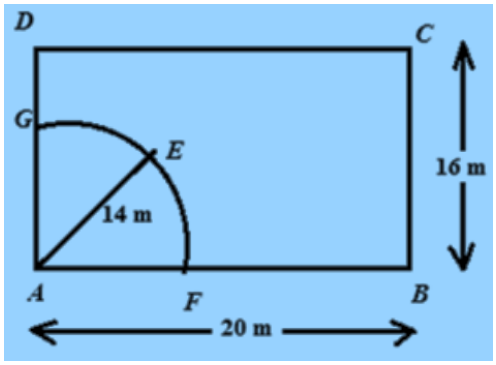
(b) 156 m^2

(c) 158 m^2

(d) 160 m^2

Answer: (a) 154 m^2

According to question, the figure can be constructed as:



Area of the field in which cow can graze = Area of a sector AFEG

$= (\theta/360) * \pi r^2$

$= (90/360) * \pi (14)^2$

$= (1/4) * (22/7) * 196$

$= 154\ m^2$

Question 9:

Match the columns

1. Area of quadrant	(A) $\pi r^2/2$
2. Area of equilateral triangle	(B) $(\sqrt{3}/4) * side^2$
3. Area of semi-circle	(C) $(\sqrt{3}/2) * side^2$

4. Perimeter of semi-circle (D) $\pi r^2/4$

(E) πr

(F) $\pi r + 2r$

(a) 1 → A, 2 → C, 3 → D, 4 → E

(b) 1 → B, 2 → C, 3 → F, 4 → E

(c) 1 → D, 2 → B, 3 → A, 4 → F

(d) 1 → D, 2 → B, 3 → E, 4 → F

Answer: (c) 1 → D, 2 → B, 3 → A, 4 → F

1. Area of quadrant --------> $\pi r^2/4$

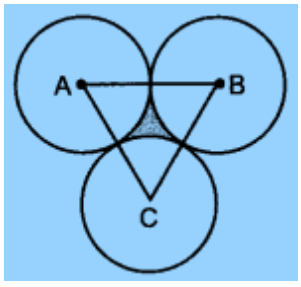
2. Area of equilateral triangle --------> $(\sqrt{3}/4) * side^2$

3. Area of semi-circle --------> $\pi r^2/2$

4. Perimeter of semi-circle --------> $\pi r + 2r$

Question 10:

ABC is an equilateral triangle. The area of the shaded region if the radius of each of the circle is 1 cm, is



(a) $2 – \pi/3$ cm^2

(b) $\sqrt{3} – \pi$ cm^2

(c) $\sqrt{3} – \pi/2$ cm^2

(d) $\sqrt{3} – \pi/4$ cm^2

Answer: (c) $(\sqrt{3} - \pi/2)$ cm^2

Given, radius of circle = 1 cm

So, side of triangle = 1 + 1 = 2 cm

So, area of equilateral triangle = $(\sqrt{3}/4) * 2 * 2 = \sqrt{3}$ cm^2

Area of one sector = (60/ 360) * π * 1 * 1 = π/6 cm^2

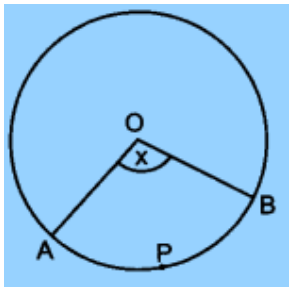
Area of three sector = 3 * π/6 = π/2 cm^2

Now, area of shaded region = area of triangle – area of three sectors

= (√3 - π/2) cm^2

Question 11:

In the given figure, O is the centre of a circle. If the area of sector OAPB is 5/18 of the area of the circle, then the value of x, is



(a) 50^0

(b) 75^0

(c) 100^0

(d) 125^0

Answer: (c) 100^0

Let r be the radius of the circle.

Area of sector OAPB = (x/360) * πr^2

According to question

Area of sector OAPB = (5/18) * area of circle

=> (x/ 360) * πr^2 = (5/18) * πr^2

=> x/ 360 = 5/18

=> x/ 20 = 5

=> x = 100^0

Question 12:

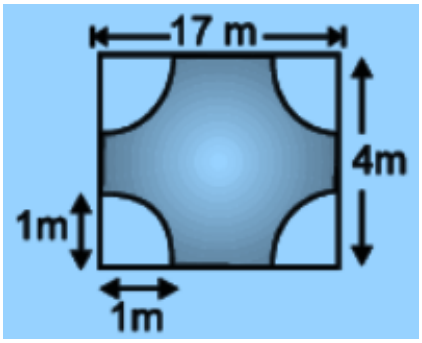
The perimeter of the following shaded portion of the figure is

(a) 40 m

(b) 40.07 m

(c) 35.72 m

(d) 35 m



Answer: (c) 35.72 m

The length and breadth of rectangle is 17 m and 4 m respectively.

Then perimeter of rectangle = 2(L + B) = 2(17 + 4) = 42 m

The radius of one fourth circle given in figure is 1 m.

Then perimeter of one fourth circle = 1/4 * 2πr = (π * 1)/2 = π/2

Then perimeter of four one fourth circle = 4 * π/2 = 2π = 2 * 3.14 = 6.28 m

Then perimeter of shaded figure = 42 − 6.28 = 35.72 m

Question 13:

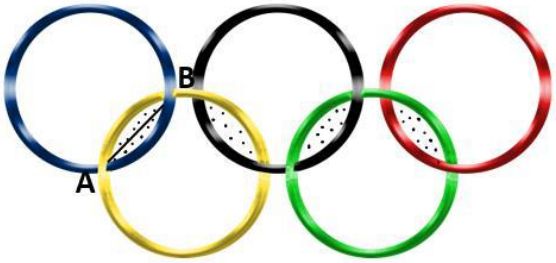
Given below is the picture of the Olympic rings made by taking five congruent circles of radius 1cm each, intersecting in such a way that the chord formed by joining the point of intersection of two circles is also of length 1cm. Total area of all the dotted regions assuming the thickness of the rings to be negligible is

(a) $4(\pi/12 - \sqrt{3}/4)$ cm²

(b) $(\pi/6 - \sqrt{3}/4)$ cm²

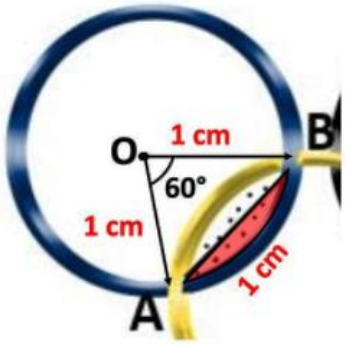
(c) $4(\pi/6 - \sqrt{3}/4)$ cm²

(d) $8(\pi/6 - \sqrt{3}/4)$ cm²



Answer: (d) $8(\pi/6 - \sqrt{3}/4)$ cm^2

Let us consider only one circle.



In ΔOAB, all sides are equal.

So, ΔOAB is an equilateral triangle and all angles are 60^0.

Now, area of red shaded region = area of sector with angle 60^0 and radius 1 cm

– area of equilateral triangle with 1 cm

$= (60/ 360) * \pi * 1^2 - (\sqrt{3}/4) * 1^2$

$= (\pi/6 - \sqrt{3}/4)$ cm^2

Now, required area = 8 * area of red portion = $8 * (\pi/6 - \sqrt{3}/4)$ cm^2

Question 14:

The circumference of a circle is 100 cm. The side of a square inscribed in the circle is

(a) $50\sqrt{2}$ cm

(b) $100/\pi$ cm

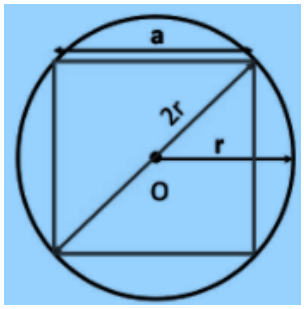
(c) 50√2/π cm

(d) 100√2/π cm

Answer: (c) 50√2/π cm

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

Given, circumference of a circle is 100 cm



=> 2πr = 100

=> πr = 50

=> r = 50/π cm

Now, diagonal of square = diameter of circle

= 2 * 50/π

= 100/π cm

Now, diagonal^2 = side^2 + side^2

=> $(100/\pi)^2 = a^2 + a^2$

=> $2a^2 = (100/\pi)^2$

=> $a^2 = (1/2) * (100/\pi)^2$

=> $a = (1/\sqrt{2}) * (100/\pi)$

=> $a = (2/2\sqrt{2}) * (100/\pi)$

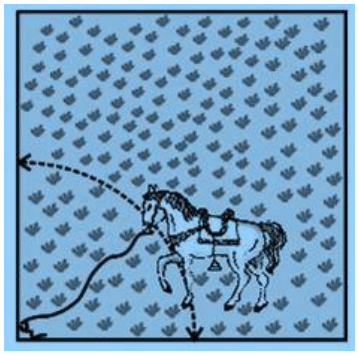
=> $a = (2/\sqrt{2}) * (50/\pi)$

=> $a = \{(\sqrt{2} * \sqrt{2})/\sqrt{2}\} * (50/\pi)$

=> $a = 50\sqrt{2}/\pi$ cm

Question 15:

A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 7 m long rope as shown in the figure. The area of that part of the field in which the horse can graze, is



(a) 39/2 m^2

(b) 49/2 m^2

(c) 63/2 m^2

(d) 77/2 m^2

Answer: (d) 77/2 m^2

Here, Length of the rope = 7 m

Radius of the circular region grazed by the horse = 7 m

(i) Area of the circular portion grazed = $(\theta/360°) * \pi r^2$

$= (90°/360°) * 22/7 * 7^2$

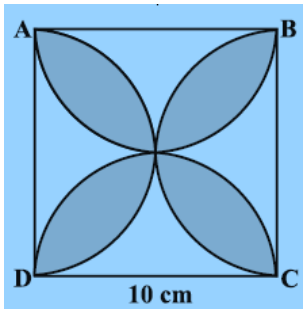
$= (1/4) * 22/7 * 7 * 7$

$= 77/2\ m^2$

Question 16:

Find the area of the shaded design in Fig. 12.17, where ABCD is asquare of side 10 cm and semicircles are drawn with each side of the square asdiameter.

(Use $\pi = 3.14$)



(a) 39 cm^2

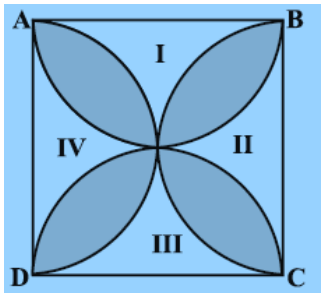
(b) 49 cm^2

(c) 57 cm^2

(d) 77 cm^2

Answer: (c) 57 cm^2

Let us mark the four unshaded regions as I, II, III and IV as shown in the figure.



Now, Area of I + Area of III

= Area of ABCD – Areas of two semicircles of each of radius 5 cm

= 10 * 10 – 2 * 1/2 * π

= 100 – 3.14 * 25

= 100 – 78.5

= 21.5 cm^2

Similarly, Area of II + Area of IV = 21.5 cm^2

So, area of the shaded design = Area of ABCD – Area of (I + II + III + IV)

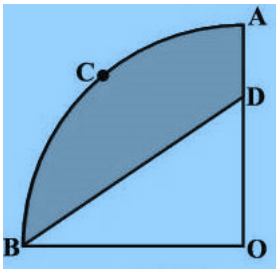
= 100 – 2 * 21.5

= 100 – 43

= 57 cm^2

Question 17:

In the given figure, OACB is a quadrant of a circle with centre O and radius 3.5 cm. If OD = 2 cm, then the area of the shaded region, is



(a) 39/8 cm^2

(b) 49/8 cm^2

(c) 57/8 cm^2

(d) 67/8 cm^2

Answer: (b) 49/8 cm^2

Radius of quadrant = 1 cm

Area of shaded region = Area of quadrant - Area of ΔOBD

Now, Area of quadrant = $(\theta/360°) * \pi r^2$

$= (90°/360°) * 22/7 * 3.5 * 3.5$

$= (1/4) * 22 * 0.5 * 3.5$

$= (1/4) * 11 * 3.5$

$= 38.5/4$

$= 385/40$

$= 77/8\ cm^2$

Area of ΔOBD = $(1/2) * OB * OD = (1/2) * 3.5 * 2 = 3.5 = 35/10 = 7/2\ cm^2$

So, area of shaded region = Area of quadrant - Area of ΔOBD

$= 77/8 – 7/2$

$= (77 – 7 * 4)/8$

$= (77 – 28)/8$

$= 49/8\ cm^2$

Question 18:

The area of the sector of a circle with radius 4 cm and of angle 30°, is

(a) 3.15 cm^2

(b) 3.78 cm^2

(c) 4.19 cm^2

(d) 5.20 cm^2

Answer: (c) 4.19 cm^2

Area of the sector = $(\theta/360) * \pi r^2$

$= (30/360) * 3.14 * 4 * 4$

$= (12.56)/3$

= 4.19 cm^2 (approx.)

Question 19:

Area of a sector of angle p (in degrees) of a circle with radius R is

(a) (p/180) * 2πR

(b) (p/180) * πR^2

(c) (p/360) * 2πR

(d) (p/720) * $2\pi R^2$

Answer: (d) (p/720) * $2\pi R^2$

Given radius (r) = R

Angle of sector (θ) = p

Area of the sector = (θ/360°) * πr^2

= (p/360°) * πR^2

= (2/2) * (p/360°) * πR^2

= (p/720°) * $2\pi R^2$

Question 20:

The diameter of a wheel is 1.26 m. The distance travelled in 300 revolutions is

(a) 2670 m

(b) 2880 m

(c) 1980 m

(d) 1188 m

Answer: (d) 1188 m

Radius of the wheel = 1.26/2 = 0.63 m

Distance travelled in one revolution = 2πr

= 2 * 22/7 * 0.63

= 3.96 m

Now, Distance travelled in 300 revolutions= 300 * 3.96

= 1188 m

Question 21:

The length of the minute hand of a clock is 14 cm. The area swept by the minute hand in 5 minutes is

(a) 153.9 cm^2

(b) 102.6 cm^2

(c) 51.3 cm^2

(d) 205.2 cm^2

Answer: (c) 51.3 cm^2

Angle swept by the minute hand in 1 minute = 360°/60 = 6°

So, angle swept by the minute hand in 5 minutes = 6° × 5 = 30°

Length of minute hand (r) = 14 cm

Now, area swept by the minute hand = $(\theta/360) * \pi r^2$

= (30/360) * 22/7 * 14 * 14

= 154/3

= 51.3 cm^2

Question 22:

If the sum of the areas of two circles with radii R_1 and R_2 is equal to the area of a circle of radius R, then

(a) $R_1 + R_2 = R$

(b) $R_1^2 + R_2^2 = R^2$

(c) $R_1 + R_2 < R$

(d) $R_1^2 + R_2^2 < R^2$

Answer: (b) $R_1^2 + R_2^2 = R^2$

According to given condition,

Area of circle = Area of first circle + Area of second circle

$\Rightarrow \pi R^2 = \pi R_1^2 + \pi R_2^2$

$\Rightarrow R_1^2 + R_2^2 = R^2$

Question 23:

The area of a quadrant of a circle with circumference of 22 cm is

(a) 77 cm^2

(b) 77/8 cm^2

(b) 35.5 cm^2

(c) 77/2 cm^2

Answer: (b) 77/8 cm^2

Let r be the radius of the circle.

Given, circumference of circle = 22 cm

$\Rightarrow 2\pi r = 22$

$\Rightarrow 2 * (22/7) * r = 22$

$\Rightarrow r = 7/2$ cm

Now, Area of quadrant of a circle = $(1/4) * \pi r^2$

$= (1/4) * (22/7) * (7/2) * (7/2)$

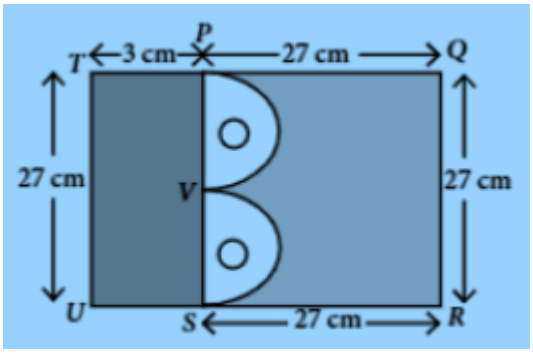
$= 77/8\ cm^2$

Case Study Based Questions

Question 24:

Read the given text and answer the following questions.

Ram bought a plot QRUT to build his house. He leaves space of two congruent semi-circles for gardening and a rectangular area of breadth 3 m for car parking as shown in the given figure.



(i). Find the area of square PQRS.

(a) 700 m^2

(b) 729 m^2

(c) 735 m^2

(d) 754 m^2

(ii). Find the area of car parking.

(a) 36 m^2

(b) 64 m^2

(c) 81 m^2

(d) 100 m^2

(iii). What is the radius of semi-circle?

(a) 6.50 m

(b) 6.75 m

(c) 7 m

(d) 7.25 m

(iv). What is the area of two semi-circles?

(a) 132.8 m^2

(b) 136.2 m^2

(c) 140.8 m^2

(d) 143.2 m^2

(v). Find the area of shaded region.

(a) 638.8 m^2

(b) 640.8 m^2

(c) 666.8 m^2

(d) 678.8 m^2

Answers:

(i). (b) 729 m^2

From the figure, side of square PQRS = 27 m

So, area of square PQRS = 27 * 27 = 729 m^2

(ii). (c) 81 m^2

Area of rectangular left for car parking is area of region PSUT.

So, its area = 27 * 3 = 81 m^2

(iii). (b) 6.75 m

Diameter of semi circle = PV = PS/2 = 27/2 = 13.5 m

So, radius of semi-circle = 13.5/2 = 6.75 m

(iv). (d) 143.2 m^2

Area of a semi circle = $\pi r^2/2$

So, area of both semi circles = $2 * \pi r^2/2 = \pi r^2 = 22/7 * 6.75 * 6.75 = 143.2\ m^2$

(v). (c) 666.8 m^2

Area of shaded region = area of QRUT – area of two semi-circles

$= 30 * 27 – 143.2$

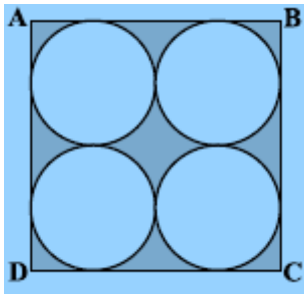
$= 810 – 143.2$

$= 666.8\ m^2$

Question 25:

Read the following text and answer the question the following questions.

A farmer has a square field ABCD in which he cuts four circles for gardening the different flowers as shown in the figure. The side of the square field is 16 cm.



(i). Find the area of square ABCD.

(a) 148 cm^2

(b) 184 cm^2

(c) 236 cm^2

(d) 256 cm^2

(ii). Find the radius of the circle.

(a) 16 cm

(b) 8 cm

(c) 4 cm

(d) 2 cm

(iii). What is the area of four circle?

(a) 148.12 cm^2

(b) 176.18 cm^2

(c) 201.14 cm^2

(d) 212.26 cm^2

(iv). What is the length of diagonal of square ABCD?

(a) 16√2 cm

(b) 8√2 cm

(c) 4√2 cm

(d) 2√2 cm

(v). Find the area of shaded region.

(a) 48.86 cm^2

(b) 50.86 cm^2

(c) 54.86 cm^2

(d) 58.86 cm^2

Answer:

(i). (d) 256 cm^2

Given, the side of a square is 16 cm

So, its area = 16 * 16 = 256 cm^2

(ii). (c) 4 cm

Diameter of each circle = 16/2 = 8 cm

So, radius of each circle = 8/2 = 4 cm

(iii). (c) 201.14 cm^2

Radius of each circle = 4 cm

Now, area of each circle = πr^2

So, area of 4 circles = 4 * πr^2

= 4 * 22/7 * 4 * 4

= 201.14 cm^2

(iv). (a) 16√2 cm

Length of diagonal of square = side√2 = 16√2 cm

(v). (c) 54.86 cm^2

Area of shaded region = area of square ABCD – area of 4 circles

= 256 – 201.14

= 54.86 cm^2

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