Practice Questions - Term 1

Date: 22/11/2021

Subject: Mathematics

Topic : Areas Related to Circles Class: X

1. If the circumference of a circle exceeds its diameter by 180 cm, then find its radius in cm.

A. 32

B. 36

C. 40

D. 42 ✓

Let the radius of the circle be r cm.

The circumference of the circle with radius r is given by
$2\pi r$.

So,
$2\pi r = d + 180$

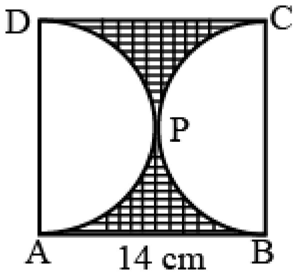
$2\pi r = 2r + 180$

$r = \frac{180}{2(\pi - 1)}$

$r = \frac{180}{2(3.14 - 1)}$

$r = \frac{180}{4.28} = 42.06\ cm$

2. Find the area of the shaded region in the figure given below, if ABCD is a square of side 14 cm and APD and BPC are semicircles.
(Take $\pi = \frac{22}{7}$)



A. 45 cm^2

B. 42 cm^2

C. 60 cm^2

D. 35 cm^2

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

From Figure, the diameter of circle is 14 cm. Two semi-circles make one full circle.

$\therefore$ The area of one full circle is
$= \frac{22}{7} \times 7^2 = 154\ cm^2$

The total area of square
$= 14^2 = 196\ cm^2$

The area of shaded portion = [Area of square- Area of full circle]
= 196 - 154 = $42 cm^2$.
Hence, area of shaded region
$= 42\ cm^2$

3. An arc of a circle is of length 5π cm and the sector it bounds has an area of 20π cm^2 . The radius of the circle is _______(in cm).

A. 12

B. 5

C. 8

D. 10

From the given data,

The area of the sector $= \frac{\theta}{360^\circ}\pi r^2 = 20\pi\ cm^2$ ---(i)

The length of arc $= \frac{\theta}{360^\circ}\pi \times 2r = 5\pi\ cm$ ---(ii)

From (i) and (ii),

$\theta r^2 = 7200$ and $\theta r = 900$

$\Rightarrow 900 \times r = 7200$

$r = 8\ cm.$

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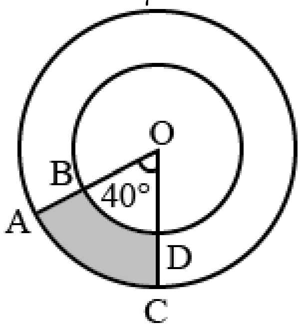
4. Find the area of the shaded region (in cm^2) as shown in figure of the two concentric circles with centre O and radius 7 cm and 14 cm respectively. Given $\angle$AOC = 40°.
(use π = $\frac{22}{7}$)



- A. 42.1 cm^2
- B. 51.32 cm^2
- C. 67.8 cm^2
- D. 96.5 cm^2

Given: radius for sector OAC = 14 cm and angle subtended = 40° and radius for sector OBD = 7 cm and angle subtended = 40°

Area of Sector = $\frac{x^\circ}{360^\circ} \times \pi r^2$

Required area = [Area of sector OAC – Area of sector OBD]

= $\frac{40^\circ}{360^\circ} \times \frac{22}{7} \times 14^2 - \frac{40^\circ}{360^\circ} \times \frac{22}{7} \times 7^2$

= 68.42 - 17.1

= $51.32\ cm^2$

$\therefore$ Area of shaded region = $51.32\ cm^2$

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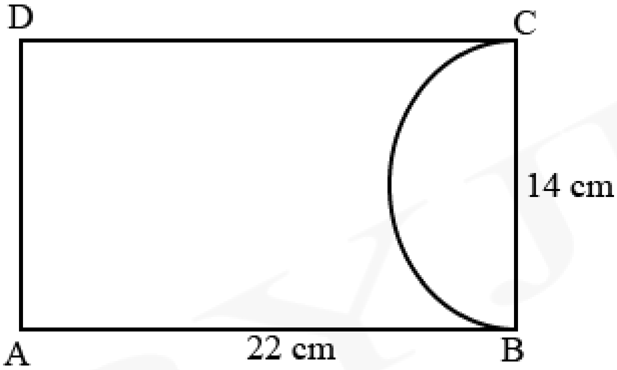
5. A paper is in the form of a rectangle ABCD where AB = 22 cm and BC = 14 cm. A semicircle portion with BC as diameter is cut off. Find the area of the remaining paper in cm^2.

A. 221

B. 210

C. 231

D. 240



Area of rectangle = $22 \times 14 = 308 cm^2$

Area of semicircle

= $\frac{1}{2} \times \frac{22}{7} \times (7)^2 = 77 cm^2$

Required area = [Area of rectangle - Area of semicircle]

= 308 – 77 = $231 cm^2$

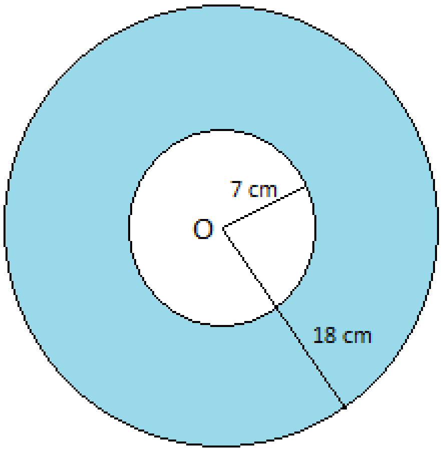
6. Radius of the outer circle is 18 cm and the radius of the inner circle is 7 cm. What is the area of the region between the outer and the inner circles?

A. 275 πcm^2

B. 361 πcm^2

C. 133 cm^2

D. 192.5 cm^2



Area of the region in between outer and inner circle = Area of outer circle – Area of inner circle
Area of the outer circle = $\pi(18)^2$ = 324 πcm^2
Area of the inner circle = $\pi(7)^2$ = 49 πcm^2
So, area of the required region = 324 π - 49π = 275 πcm^2

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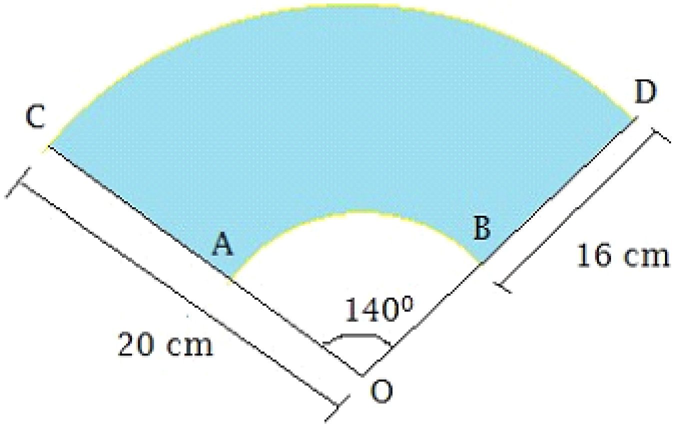
7. Calculate the area of the shaded region in the figure given in cm^2.

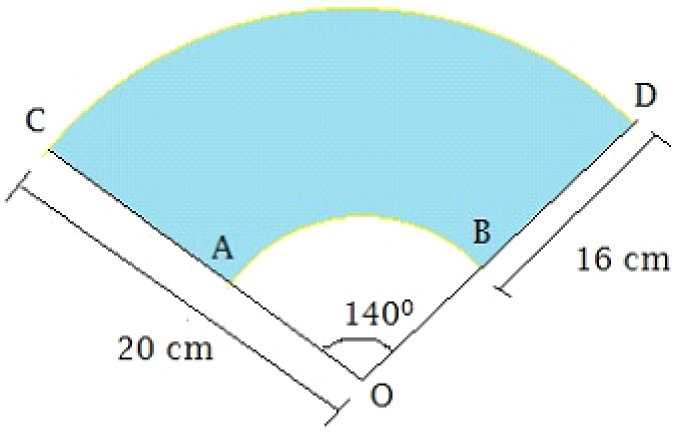


A. 469.3

B. 281.2

C. 1120.4

D. 2499.7



Area of outer sector

$= \frac{140}{360} \times \pi \times 20\ cm \times 20\ cm$

Area of inner sector

$= \frac{140}{360} \times \pi \times 4\ cm \times 4\ cm$

Area of shaded region = Outer sector - Inner sector

$= \frac{140\pi}{360}(400\ cm^2 - 16\ cm^2)$

$= \frac{7}{18} \times \frac{22}{7} \times 384\ cm^2 = 469.3\ cm^2$

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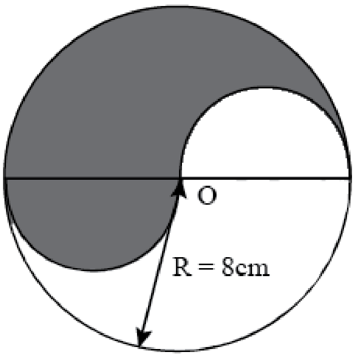
8. The Yin-Yang symbol can be explained by the following dimensions. What would be the area covered by the Yin (black) region if the radius of the larger circle is, R = 8 cm?

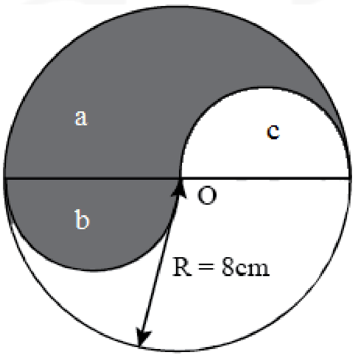


A. 97.75 cm^2

B. 94.54cm^2

C. 98.12 cm^2

D. 100.57 cm^2



Here we are asked to find the area of the shaded part. The figure can be split into 3 semicircle i.e. a, b and c in order to find the area.

Area of the semicircle a =$\frac{1}{2} \times \frac{22}{7} \times 8^2$ = 100.57 cm^2.

The diameter of semicircles b and c is equal to the radius of the semicircle a.Therefore the area of both the semicircles will be the same.

Area of the semicircle =$\frac{1}{2} \times \pi \times r^2$ = $\frac{1}{2} \times \frac{22}{7} \times 4^2$ = 25.14 cm^2

The area of the shaded part = Area of semicircle a + Area of semicircle b – Area of the semicircle c = 100.57 +25.14 – 25.14 = 100.57 cm^2

The area of the shaded part is 100.57 cm^2.

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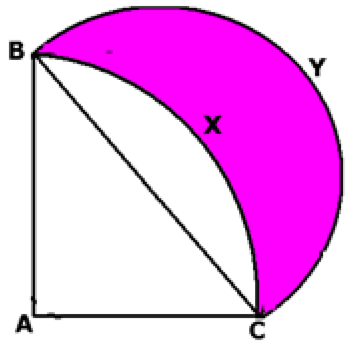
9. Find the area of the shaded region where ABC is a quadrant of radius 5 cm and a semicircle is drawn with BC as diameter.



A. 19.64 cm^2

B. 12.5 cm^2

C. 7.14 cm^2

D. 8.8 cm^2

Area of the shaded region = Area of semicircle-Area of segment of the sector BAC

Area of the semicircle with BC as diameter
$= \frac{1}{2} \times \frac{22}{7} \times \frac{5}{\sqrt{2}} \times \frac{5}{\sqrt{2}}$
$= 19.64\ cm^2 \ldots (i)$

Area of segment = Area of quadrant - Area of ΔABC
$= \frac{90}{360} \times \frac{22}{7} \times 5^2 - \frac{1}{2} \times 5 \times 5$
$= 19.64 - 12.5$
$= 7.14\ cm^2 \ldots (ii)$

Area of the shaded region
$= (i) - (ii)$
$= 19.64 - 7.14$
$= 12.5\ cm^2$

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10. In a cycle race, a boy was cycling in such a way that the wheels are making 200 revolutions per minute. Diameter of the wheel is 50cm, what is the cycling speed per hr?

- A. 14.7 km/hr
- B. 17 km/hr
- C. 18.84 km/hr
- D. 20 km/hr

Diameter of the cycle wheel = 50cm [radius=25cm]

No. of revolutions per minute = 200

∴ No. revolutions in an hour = 200 x 60 = 12000

Distance covered in one revolution = Circumference of the wheel = πd = 50 π cm

∴ Distance covered in an hour = 12000 x πd = 12000 x 50π cm = 1884000 cm = 18.84 km

Hence the speed of the cyclist is 18.84 km/hr.

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11. What will be the circumference of a circle having area 9 times the area of a circle with diameter 8 cm?

A. 88 cm

B. 70 cm

C. 72.51 cm

D. 75.36 cm

Let r_1 and r_2 be radii of two circles such that area of circle of radius r_1 is 9 times the area of circle of radius r_2.

$r_2 = \frac{8}{2}$ cm = 4 cm

And we know that, area of a circle= πr^2
where r is its radius

Therefore, πr_1^2 = $9\pi r_2^2$

$\Rightarrow \pi r_1^2$ = $9\pi \times 4^2$

$\Rightarrow r_1^2 = 144$

$\Rightarrow r_1 = \pm 12$

Here, radius of the circle cannot be negative.

$\therefore r_1 = 12\ cm$

Circumference of the circle of radius r_1
$= 2\pi r_1 = 2 \times 3.14 \times 12 = 75.36\ cm$

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12. A drain cover is made from a square metal plate of side 40 cm and has 336 holes of radius 1 cm each drilled in it. Find the area in cm^2 of the remaining square plate.
(Take $\pi = \frac{22}{7}$)

A. $253\ cm^2$

B. $544\ cm^2$ ✓

C. $636\ cm^2$

D. $564\ cm^2$

Area of a square plate
$= \text{side}^2$

Given length of the side of the square plate = 40 cm
Area of square plate
$= 40^2$
$= 1600\ cm^2$

Area of a circle
$= \pi\, r^2$
There are 336 holes of radius 1 cm each.

Total area of circles
$= 336 \times \frac{22}{7} \times 1^2$
$= 1056\ cm^2$

Remaining area = [Area of square plate- Total area of circles]
$= 1600 - 1056$
$= 544\ cm^2$

$\therefore$ Area of remaining square plate
$= 544\ cm^2$

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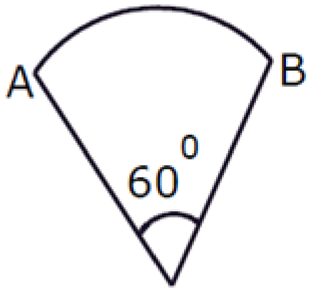
13. The given figure is a sector of a circle of radius 20 cm. Find the perimeter of the sector.
(Take π = 3.14)



A. 55.25 cm

B. 60.93 cm

C. 65.48 cm

D. 70.17 cm

The circumference i.e , perimeter of a sector of angle \60^\circ\) of a circle with radius R is given by

$$\frac{60^\circ}{360^\circ} \times 2\pi R + 2R$$

$$= \frac{1}{6} \times 2\pi (20) + 2(20)$$

$$= 20.93 + 40$$
$$= 60.93\ cm$$

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14. A car travels 0.99 km distance in which each wheel makes 450 complete revolutions. Find the radius of its wheel in m.

- **A.** 0.45
- **B.** 0.35
- **C.** 0.55
- **D.** 0.65

We know that, $0.99\ km = 990\ m$

Total Distance traveled = No. of revolutions x Circumference

$\Rightarrow 990 = 450 \times 2\pi \times r$
$\Rightarrow 990 = 450 \times 2 \times \frac{22}{7} \times r$
$\Rightarrow r = \frac{990 \times 7}{450 \times 2 \times 22}$
$\Rightarrow r = \frac{7}{20} = 0.35\ m$

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15. A circle has radius 5 cm. A section of its circumference has length π cm. What is the angle subtended by this section at the centre?

A. 36°

B. 45°

C. 50°

D. 60°

Radius = 5 cm

Arc length = π cm

Angle subtended

$= \frac{Arc\ length}{Circumference} \times 360^\circ$

$= \frac{\pi}{2\pi r} \times 360^\circ$

$= \frac{\pi}{2\pi \times 5} \times 360^\circ$

$= 36^\circ$

BYJU'S

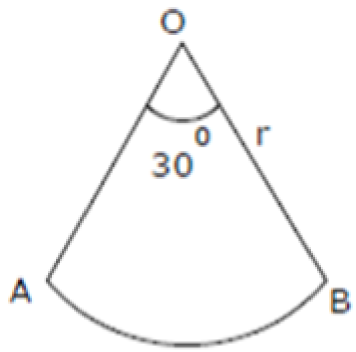
16. A pendulum swings through an angle of 30° and describes an arc 8.8 cm in length. Find the length of pendulum in cm.

A. 14.5

B. 15.1

C. 17.3

D. 16.8



Let r be the length of the pendulum.

Given: Length of arc = 8.8 cm.
$\angle AOB = 30^{\circ}$

Length of an arc of a sector of an angle θ
$= \frac{\theta}{360} \times 2\pi r$

$\Rightarrow 8.8 = \frac{30^{\circ}}{360^{\circ}} \times 2 \times \frac{22}{7} \times r$

$r = \frac{8.8 \times 21}{11} = 16.8\ cm$

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17. If the perimeter of a circle is equal to that of a square, then the ratio of area of circle to the square is ______.

A. 22 : 07

B. 14 : 11

C. 7 : 22

D. 11 : 14

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

Given, $4a = 2\pi r \Rightarrow a = \frac{\pi r}{2}$

Ratio of the areas of circle to square is

$\pi r^2 : a^2$

$\Rightarrow \pi r^2 : (\frac{\pi r}{2})^2$

$\Rightarrow 1 : \frac{\pi}{4}$

$\Rightarrow 4 : \frac{22}{7}$

$\Rightarrow 28 : 22 \Rightarrow 14 : 11$

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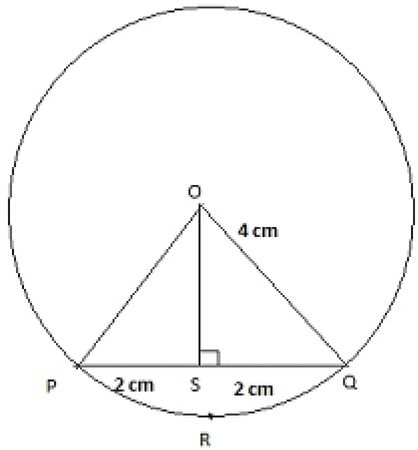
18. A circle having radius 4 cm contains a chord of length 4 cm and subtends an angle of 60 degrees. Find the area of the minor segment of the chord.

A. $2cm^2$

B. $1.5\ cm^2$

C. $3\ cm^2$

D. $0.5\ cm^2$



Area of sector POQ

$= \frac{\theta}{360^\circ} \times \pi r^2$

$= \frac{60^\circ}{360^\circ} \times \pi 4^2 = 8.4\ cm^2$

In triangle OSQ which is right angled at S,

$OQ^2 = SQ^2 + OS^2$

$\Rightarrow 16 = 4 + OS^2$

$OS = 2\sqrt{3}$

Area of triangle POQ

$= \frac{1}{2} \times base \times height$

$= \frac{1}{2} \times 4 \times 2\sqrt{3}$

$= 6.9\ cm^2$

Now,

Area of segment PSQR = Area of sector POQ - Area of triangle POQ

$= 8.4 - 6.9\ cm^2$

$= 1.5\ cm^2$

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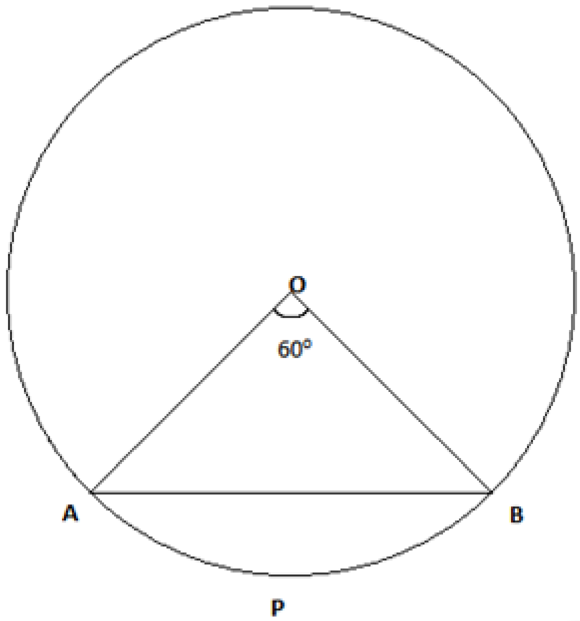
19.



The radius of the circle given above is 7cm and the angle subtended by the arc is 60°.

If the area of ΔOAB is $21 cm^2$, then find the area of segment APBA.

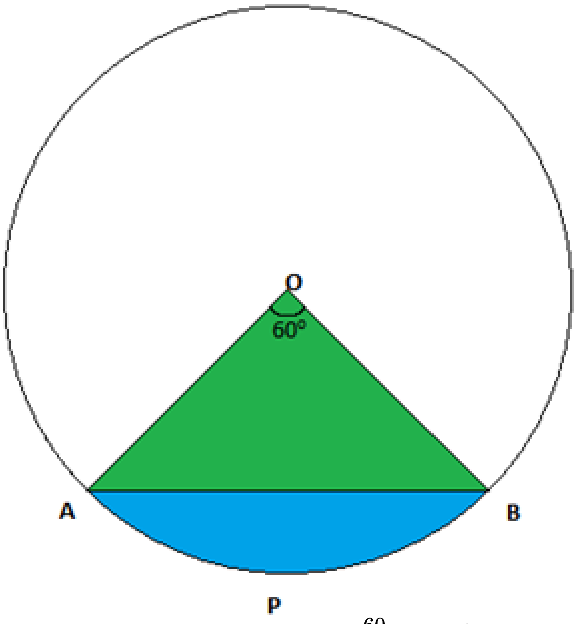
$(\pi = \frac{22}{7})$

A. $5.8\ cm^2$

B. $4.7\ cm^2$

C. $8\ cm^2$

D. $1\ cm^2$



Area of sector OAPBO $= \frac{60}{360} \times \pi r^2$

$= \frac{60}{360} \times \frac{22}{7} \times 7^2 = 25.7\ cm^2$

Area of segment APBA

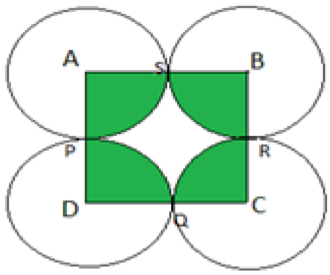
Area of sector OAPBO - Area of triangle OAB

$= 25.7 - 21 = 4.7\ cm^2$

Therefore, area of segment APBA

$= 4.7\ cm^2$

20. Given below is a combination figure of square ABCD of side 26cm and four circles. Find the area of the shaded region.



A. 530.64 cm^2

B. 402.83 cm^2

C. 360 cm^2

D. 480.53 cm^2

The given figure forms four sectors:

Area of a sector of angle$\theta = \frac{\theta}{360^\circ} \times \pi r^2$

Area of one sector APS = $\frac{90^\circ}{360^\circ} \times \pi \times 13^2$= 132.66 cm^2

Total area of shaded region = Area of four sectors
= 4 × 132.66 cm^2
= 530.64cm^2

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