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,
   \[
   2\pi r = d + 180
   \]
   \[
   2\pi r = 2r + 180
   \]
   \[
   r = \frac{180}{2(\pi - 1)}
   \]
   \[
   r = \frac{180}{2(3.14 - 1)}
   \]
   \[
   r = \frac{180}{4.28} = 42.06 \text{ cm}
   \]
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 \( \pi = \frac{22}{7} \))

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
\[ = \frac{22}{7} \times 7^2 = 154 \text{ cm}^2 \]

The total area of square
\[ = 14^2 = 196 \text{ cm}^2 \]

The area of shaded portion = [Area of square - Area of full circle]
\[ = 196 - 154 = 42 \text{ cm}^2 \]

Hence, area of shaded region
\[ = 42 \text{ cm}^2 \]
3. An arc of a circle is of length $5\pi$ cm and the sector it bounds has an area of $20\pi$ 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 $= \pi r^2 = 20\pi$ cm$^2$ ---(i)
The length of arc $= \frac{\theta}{360}\pi \times 2r = 5\pi$ cm ---(ii)

From (i) and (ii),
$\theta r^2 = 7200$ and $\theta r = 900$
$\Rightarrow 900 \times r = 7200$
$r = 8$ cm.
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 $\angle AOC = 40^\circ$.

Given: radius for sector OAC = 14 $cm$, angle subtended = $40^\circ$ and radius for sector OBD = 7 $cm$, angle subtended = $40^\circ$

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 $cm^2$
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 = $22 \times 14 = 308 \text{ cm}^2$

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

Required area = [Area of rectangle - Area of semicircle]
$= 308 - 77 = 231 \text{ cm}^2$
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. \(275 \pi \, \text{cm}^2\)
B. \(361 \pi \, \text{cm}^2\)
C. \(133 \, \text{cm}^2\)
D. \(192.5 \, \text{cm}^2\)

Area of the region in between outer and inner circle = Area of outer circle – Area of inner circle

Area of the outer circle = \(\pi (18)^2 = 324 \pi \, \text{cm}^2\)
Area of the inner circle = \(\pi (7)^2 = 49 \pi \, \text{cm}^2\)
So, area of the required region = \(324 \pi - 49\pi = 275 \pi \, \text{cm}^2\)
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
\[ = \frac{140}{360} \times \pi \times 20 \text{ cm} \times 20 \text{ cm} \]

Area of inner sector
\[ = \frac{140}{360} \times \pi \times 4 \text{ cm} \times 4 \text{ cm} \]

Area of shaded region = Outer sector - Inner sector
\[ = \frac{140\pi}{360} (400 \text{ cm}^2 - 16 \text{ cm}^2) \]
\[ = \frac{7}{18} \times \frac{22}{7} \times 384 \text{ cm}^2 = 469.3 \text{ cm}^2 \]
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?

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

Area of the semicircle a = \( \frac{1}{2} \times \pi \times 8^2 = 100.57 \text{ cm}^2 \).

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 = \( \frac{1}{2} \times \pi \times 4^2 = 25.14 \text{ cm}^2 \)

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 \( \text{ cm}^2 \).

The area of the shaded part is 100.57 \( \text{ cm}^2 \).
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.

\[ \text{Area of the shaded region} = \text{Area of semicircle} - \text{Area of segment of the sector BAC} \]

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

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

Area of the shaded region
\[ = (i) - (ii) \]
\[ = 19.64 - 7.14 \]
\[ = 12.5 \text{ cm}^2 \]
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 = $\pi d = 50\pi$ cm

∴ Distance covered in an hour = $12000 \times \pi d = 12000 \times 50\pi \, cm = 1884000 \, cm = 18.84 \, km$

Hence the speed of the cyclist is 18.84 km/hr.
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 \( r_2 \).

\[
\pi r_2^2 = 9 \pi r_1^2
\]

\[
\Rightarrow r_1^2 = 9 \times 4^2
\]

\[
\Rightarrow r_1 = 12
\]

Here, radius of the circle cannot be negative.

\[
\therefore r_1 = 12 \text{ cm}
\]

Circumference of the circle of radius \( r_1 \)

\[
= 2\pi r_1 = 2 \times 3.14 \times 12 = 75.36 \text{ cm}
\]
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$^2$

∴ Area of remaining square plate

$= 544$ cm$^2$
13. The given figure is a sector of a circle of radius 20 cm. Find the perimeter of the sector.
(Take $\pi = 3.14$)

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

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

$= 20.93 + 40$

$= 60.93 \text{ cm}$
14. A car travels 0.99 km distance in which each wheel makes 450 complete revolutions. Find the radius of its wheel in m.

We know that, 0.99 km = 990 m

Total Distance traveled = No. of revolutions x Circumference

⇒ 990 = 450 × 2π × r
⇒ 990 = 450 × 2 × \(\frac{22}{7}\) × r
⇒ r = \(\frac{990 \times 7}{450 \times 2 \times 22}\)
⇒ r = \(\frac{7}{20}\) = 0.35 m
15. A circle has radius 5 cm. A section of its circumference has length \( \pi \) 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 = \( \pi \) cm

Angle subtended

\[
\begin{align*}
\text{Angle subtended} &= \frac{\text{Arc length}}{\text{Circumference}} \times 360° \\
&= \frac{\pi}{2\pi r} \times 360° \\
&= \frac{\pi}{2\pi \times 5} \times 360° \\
&= \frac{\pi}{10\pi} \times 360° \\
&= 36°
\end{align*}
\]
16. A pendulum swings through an angle of $30^\circ$ 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 $\theta$

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

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

$$r = \frac{8.8 \times 21}{11} = 16.8 \text{ cm}$$
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 
\[\frac{\pi r^2}{a^2}\]
\[\Rightarrow \frac{\pi r^2}{\left(\frac{\pi r}{2}\right)^2}\]
\[\Rightarrow 1 : \frac{\pi}{4}\]
\[\Rightarrow 4 : \frac{22}{7}\]
\[\Rightarrow 28 : 22 \Rightarrow 14 : 11\]
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.

\[ \text{Area of sector POQ} = \frac{\theta}{360^\circ} \times \pi r^2 \]
\[ = \frac{60^\circ}{360^\circ} \times \pi 4^2 = 8.4 \text{ cm}^2 \]

In triangle OSQ which is right angled at S,
\[ OO^2 = SQ^2 + OS^2 \]
\[ \Rightarrow 16 = 4 + OS^2 \]
\[ OS = 2\sqrt{3} \]

Area of triangle POQ
\[ = \frac{1}{2} \times \text{base} \times \text{height} \]
\[ = \frac{1}{2} \times 4 \times 2\sqrt{3} \]
\[ = 6.9 \text{ cm}^2 \]

Now,
Area of segment PSQR = Area of sector POQ - Area of triangle POQ
\[ = 8.4 - 6.9 \text{ cm}^2 \]
\[ = 1.5 \text{ cm}^2 \]

A. 2 cm\(^2\)  
B. 1.5 cm\(^2\)  
C. 3 cm\(^2\)  
D. 0.5 cm\(^2\)
The radius of the circle given above is 7 cm and the angle subtended by the arc is 60°.
If the area of \( \triangle OAB \) is \( 21 \text{ cm}^2 \), then find the area of segment APBA.
\( \pi = \frac{22}{7} \)

A. \( 5.8 \text{ cm}^2 \)

B. \( 4.7 \text{ cm}^2 \)

C. \( 8 \text{ cm}^2 \)

D. \( 1 \text{ cm}^2 \)
Area of sector OAPBO = \( \frac{60}{360} \times \pi r^2 \)

\[ = \frac{60}{360} \times \frac{22}{7} \times 7^2 = 25.7 \text{ cm}^2 \]

Area of segment APBA
Area of sector OAPBO - Area of triangle OAB

\[ = 25.7 - 21 = 4.7 \text{ cm}^2 \]

Therefore, area of segment APBA
\[ = 4.7 \text{ cm}^2 \]
20. Given below is a combination figure of square ABCD of side 26 cm and four circles. Find the area of the shaded region.

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 = $\frac{90^\circ}{360^\circ} \times \pi \times 13^2 = 132.66 \text{ cm}^2$

Total area of shaded region = Area of four sectors
= $4 \times 132.66 \text{ cm}^2$
= $530.64 \text{ cm}^2$

- A. $530.64 \text{ cm}^2$
- B. $402.83 \text{ cm}^2$
- C. $360 \text{ cm}^2$
- D. $480.53 \text{ cm}^2$