Circles

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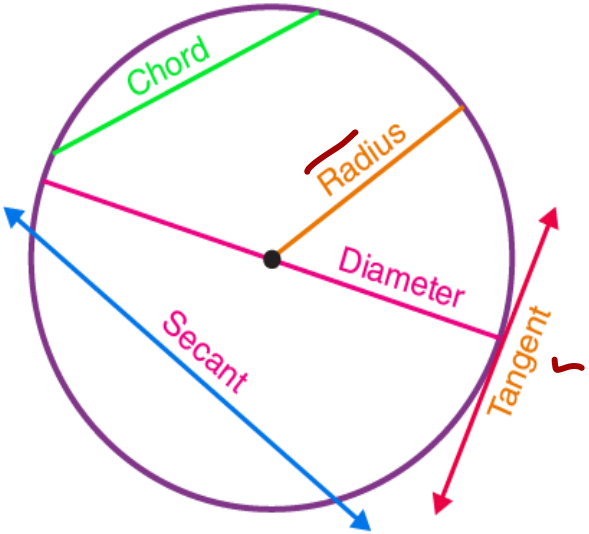
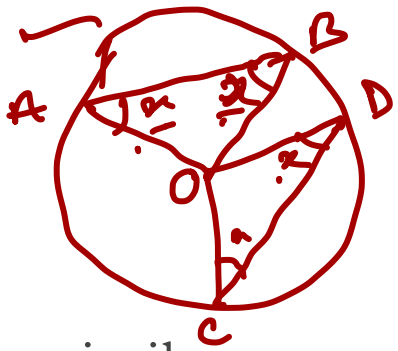
Basic Insight

Segment

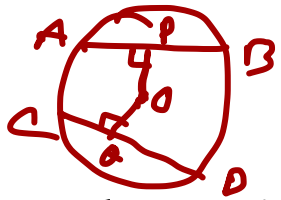


Properties of Circles:



- The outer line of a circle is at equidistant from the centre.
- The diameter of the circle divides it into two equal parts.
- Circles which have equal radii are congruent to each other.
- Circles which are different in size or having different radii are similar.
- The diameter of the circle is the largest chord and is double the radius.

Properties of Chords:

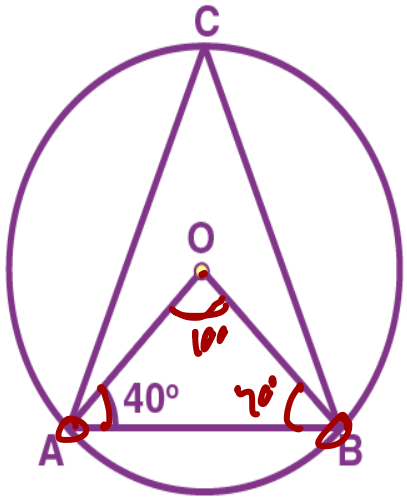


- Chords which are equal in length subtend equal angles at the center of the circle.
- If the angles subtended by the chords of a circle are equal in measure, then the length of the chords is equal.
- Equal chords of a circle are equidistant from the center of the circle.

Chord Length = $2 \times \sqrt{(r^2 - d^2)}$

Preliminary

1. In the given figure, if ∠OAB = 40°, then ∠ACB is equal to



A. 40°
B. 50°
C. 60°
D. 70°

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$\angle OAB = 40°$ ΔOAB

$\angle OBA = 40°$ $OA = OB$

$= 180 - 40 - 40$

$= 100$

$\angle AOB =$ [illegible]

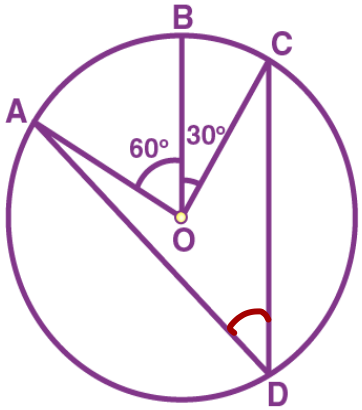
$\angle ACB =$ [illegible]

$\angle ACB = \frac{1}{2} \angle AOB$

$= \frac{1}{2} \times 100$

$= 50°$

2. In the below figure, the value of ∠ADC is:



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$\angle AOC = 60 + 30 = 90^\circ$

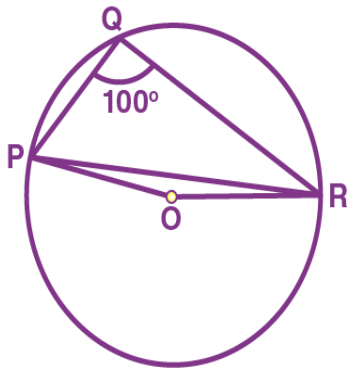
$\angle ADC = \frac{1}{2} \angle AOC$

$= \frac{1}{2} \times 90$

$= 45^\circ$

A. 60°
B. 30°
C. 45°
D. 55°

3. In the given figure, find angle OPR.



$\angle POR = 360° - 200°$

$= 160°$

$OP = OR$

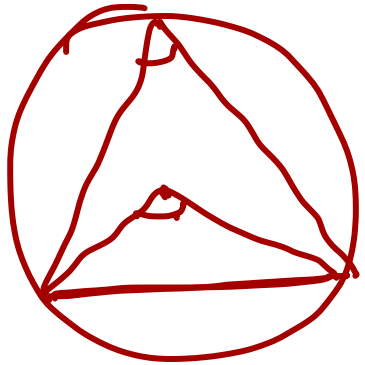
$\Delta OPR = \angle OPR + \angle PQR + \angle ORP$

$\Rightarrow 180° - 160° = 2\angle OPR$

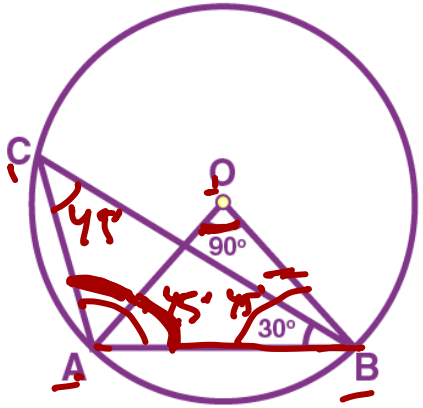
$\Rightarrow 20° = 2\angle OPR$

$\therefore \angle OPR = 10°$

A. 20°
B. 15°
C. 12°
D. ~~10°~~



4. In the given figure, ∠AOB = 90° and ∠ABC = 30°, then ∠CAO is equal to:



A. 30°
B. 45°
~~C. 60°~~
D. 90°

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$\triangle OAB$,

$OA = OB$ radii

$\angle OAB$ $\angle ACB$

$\triangle ABC$

$\angle ACB = \angle ACO + \angle CAO + \angle ABC$

$= 45 + \angle CAO + 30$

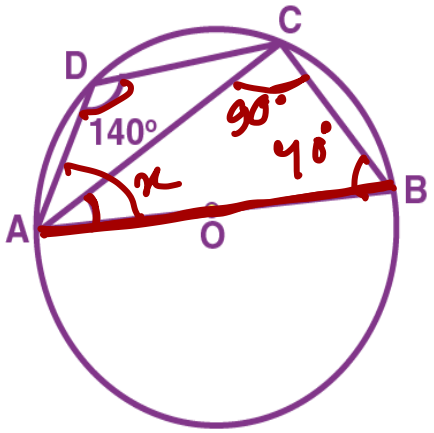
$90 = 75 + \angle CAO$

$\Rightarrow \angle CAO = 105$

$= 105 - 45$

$= 60°$

5. ABCD is a cyclic quadrilateral such that AB is a diameter of the circle circumscribing it and ∠ADC = 140°, then ∠BAC is equal to:



A. 30°
B. 40°
C. 50°
D. 80°

$\angle ADC + \angle ABC = 180$

$\Rightarrow 140 + \angle ABC = 180$

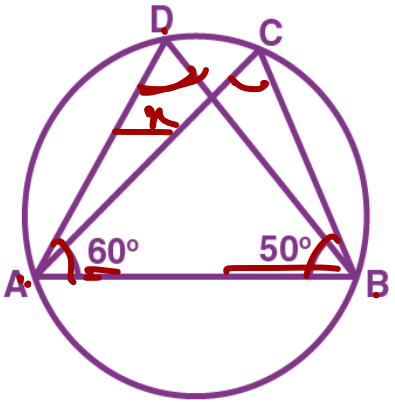
$\therefore \angle ABC = 40°$

$\angle ACB$ $\quad$ $\triangle ACB$

$x = 180 - 90 - 40$

$= 50°$

6. In the given figure, if $\angle DAB = 60^\circ$, $\angle ABD = 50^\circ$, then $\angle ACB$ is equal to:



A. 50°
B. 60°
~~C. 70°~~
D. 80°

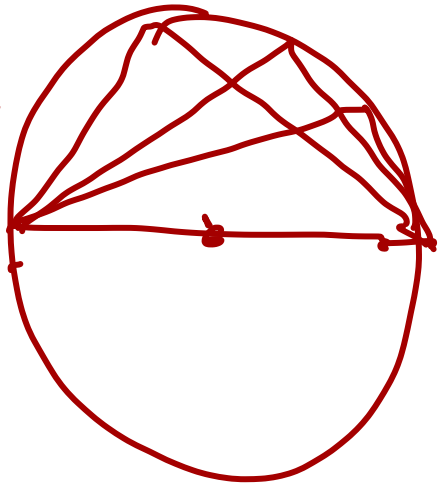
$\angle ACB = \angle ADB$

$\angle ABD$

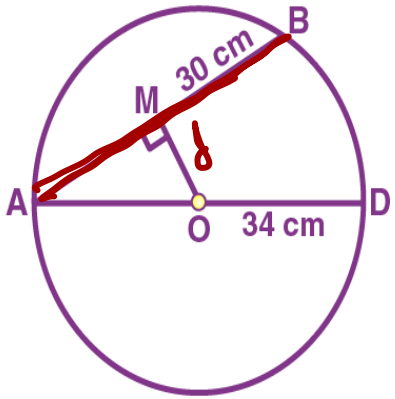
$\angle ADB = x = 180 - 60 - 50$

$= 180 - 110$

$= 70 = \angle ACB$



7. AD is the diameter of a circle and AB is a chord. If AD = 34 cm, AB = 30 cm, the distance of AB from the centre of the circle is-



MB = 30

AB = x

AD = Diameter = 34

OA = radius = $\frac{34}{2}$ = 17.

OM = d

Length of chord $AB = 2\sqrt{r^2 - d^2}$

$\Rightarrow 30 = 2\sqrt{17^2 - d^2}$

$\Rightarrow 15 = \sqrt{289 - d^2}$

$\Rightarrow 225 = 289 - d^2$

$\Rightarrow d^2 = 64$

$d = 8$ cm

A. 4 cm

~~B. 8 cm~~

C. 15 cm

D. 17 cm

8. The sector of a circle is 45° and radius is 4 cm, then the area of the sector and arc will be:

A. 22/7 and 44/7
B. 44/7 and 22/7
C. 78/7 and 22/7
D. 38/7 and 44/7

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

$$= \frac{45}{360} \times \frac{22}{7} \times 4 \times 4$$

$$= \frac{44}{7}$$

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

$$= \frac{45}{360} \times 2 \times \frac{22}{7} \times 4$$

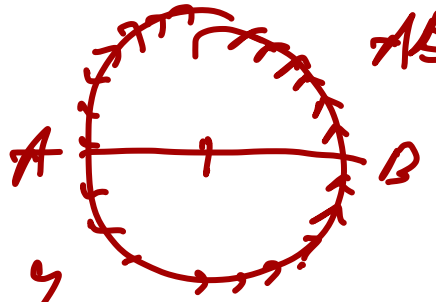
$$= \frac{22}{7}$$

9. A circular field has a diameter of 56 meters. If the cost of fencing is $10 per meter, what is the total cost of fencing the field?

A. 1750
B. 1780
C. 1760
D. 1740

$d = 56\text{ cm}$

$r = \frac{56}{2} = 28\text{ cm}$



$AB = 56\text{ cm}$

$OB = 28\text{ cm}$

$= 2\pi r = 2 \times \frac{22}{7} \times 28$

$= 176\text{ cm} \times 10$

$= \$1760$

10. A circular path of width 2 meters is laid around a circular garden with a radius of 7 meters. What is the area of the path?

A. 88 m²
~~B. 100 m²~~
C. 110 m²
D. 132 m²

$r = 7$

$R = 7 + 2 = 9$

πr^2

$= \pi \times (7)^2 = 49\pi$

$\pi R^2 = \pi \times (9)^2$

$= 81\pi$

$= 81\pi - 49\pi$

$= 32\pi$

$= 32 \times \frac{22}{7}$

$= \frac{704}{7}$ $= 100.57$

$= 100$

Written

1. A circular field has a diameter of 28 meters. If the cost of laying grass is $5 per square meter, what is the total cost of laying grass in the field?

Given that,

Diameter of the circle in 28 m.

∴ radius " " " will be $28/2$ m

$= 14$ m.

We know,

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

$= \frac{22}{7} \times 14^2$

$= \frac{22}{\cancel{7}} \times \cancel{14}^{2} \times 14$

$= 616 \text{ m}^2$

∴ Required cost to laying grass will be,

$= \$(61 \times 5)$

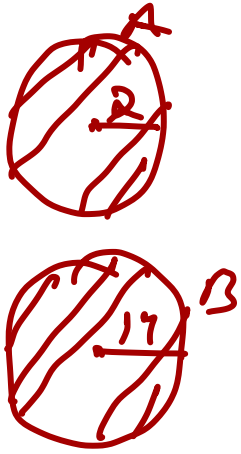
$= \$305$ Ans

2. Pizza A has a radius of 7 cm, and Pizza B has a radius of 14 cm. How many times larger is the area of Pizza B compared to Pizza A?

Given that,

Radius of pizza A is $r_1 = 7$ cm

" " " B " $r_2 = 14$ cm.



∴ Area of pizza A will be,

$= \pi r_1^2$

$= \pi \times (7)^2 = 49\pi$ cm^2

Again, Area of pizza B will be,

$= \pi r_2^2$

$= \pi (14)^2$

$= 196\pi$ cm^2

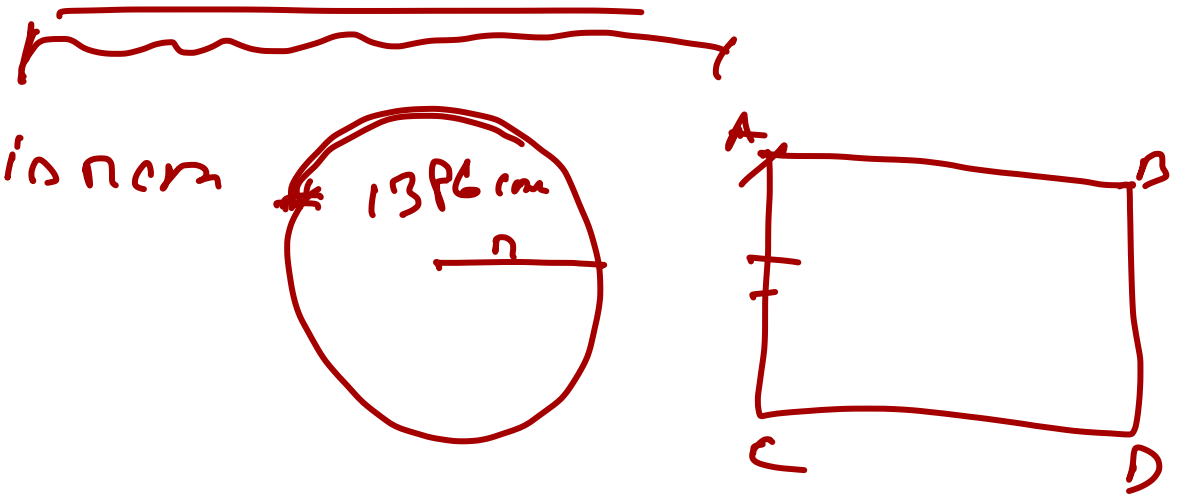
$\therefore$ Required ratio $= \frac{196\pi}{49\pi}$

$= 4.$

$\therefore$ pizza B will be 4 times longer than pizza A

3. A wire is bent into the shape of a circle with an area of 1,386 cm². If the same wire is bent into a square, what is the length of each side of the square?

Let,
the radius of the circle is r cm



ATQ,

$\pi r^2 = 1386$

$\Rightarrow r^2 = \frac{1386}{\pi}$

$\Rightarrow r^2 = \frac{63 \cancel{1386} \times 7}{\cancel{22}}$

$\Rightarrow r^2 = 441$

$\therefore r = 21$

So, the radius of the circle is 21 cm.

∴ Circumference of the circle will be,

$$= 2\pi r$$

$$= 2 \times \frac{22}{7} \times 21^3$$

$$= 132 \text{ cm}$$

Since the circumference of the circle is equal to the perimeter of the square, the length of each side of the square will be,

$$= \frac{132}{4} \text{ cm.}$$

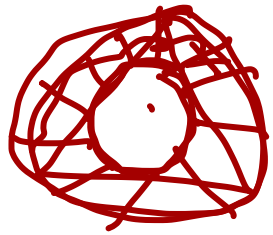
$$= 33 \text{ cm}$$

Ans

4. The length of a side of an equilateral triangle is 8 cm. The area of the region lying between the circum circle and the encircle of the triangle is

given that,

each side of the triangle is $a = 8$ cm.



$\therefore$ radius of the circum circle $R = \frac{a}{\sqrt{3}}$ cm

$= \frac{8}{\sqrt{3}}$ cm

$\therefore$ radius of the incircle $r = \frac{a}{2\sqrt{3}}$ cm

$= \frac{8}{2\sqrt{3}}$ cm

$= \frac{4}{\sqrt{3}}$ cm

So the area of the circumcircle will be,

$$= \pi R^2 = \pi \times \left(\frac{8}{\sqrt{3}}\right)^2$$

$$= \frac{64\pi}{3} \text{ cm}^2$$

and, " " " " incircle will be,

$$= \pi r^2 = \pi \times \left(\frac{4}{\sqrt{3}}\right)^2$$

$$= \frac{16\pi}{3} \text{ cm}^2$$

∴ Area between the circumcircle and incircle will be,

$$= \frac{64\pi}{3} - \frac{16\pi}{3}$$

$$= \frac{48\pi}{3}$$

$$= 16\pi \text{ cm}^2$$

Ans

$= 2\pi r$

$= 2 \times \frac{22}{7} \times 14$

$= 88$ cm

500 m দূরত্ব অতিক্রম করতে চাকাটি কতবার ঘুরবে ?

$= 50000$ cm

Thank You

$= \frac{50000}{88}$

$= 568.18 \approx 569$ বার