Bank Job Lecture Sheet

Lecture 12

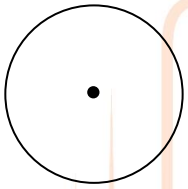
Lecture Contents

☑ Geometry (Circle)

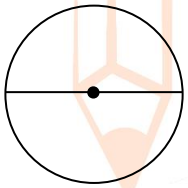
Geometry (Circle)

Basic Concept:

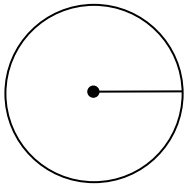
Circumference বা Perimeter (পরিধি বা পরিসীমা): বৃত্তের পূর্ণ বক্র রেখার দৈর্ঘ্যকে পরিধি বলে। c দ্বারা প্রকাশ করা হয়। $c = 2\pi r$



Diameter (ব্যাস): বৃত্তের কেন্দ্র বরাবর পরিধির যে কোন দুই বিন্দুর সংযোজক সরলরেখাকে ব্যাস বলে। D দ্বারা প্রকাশ করা হয়। $D = 2r$

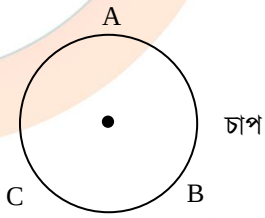


Radius (ব্যাসার্ধ): বৃত্তের কেন্দ্র থেকে পরিধির যে কোন দূরত্বকে ব্যাসার্ধ বলে। r দ্বারা প্রকাশ করা হয়।

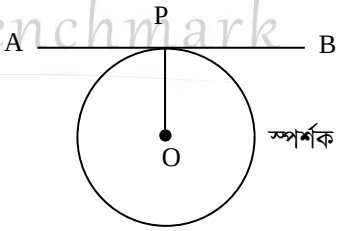


Chord (জ্যা): বৃত্তের পরিধির যে কোন দুই বিন্দুর সংযোজক সরলরেখাকে জ্যা বলে।

Arc (চাপ/বৃত্তচাপ): বৃত্তের পরিধির যে কোন অংশকে চাপ বলে। AB, BC, CA এগুলো চাপ।



Tangent (স্পর্শক): পরিধির যে কোন একটি বিন্দুতে অঙ্কিত সরলরেখাকে স্পর্শক বলে। স্পর্শ বিন্দুতে বৃত্তের ব্যাসার্ধ ঐ স্পর্শ বিন্দুর উপর লম্ব হয়। $OP \perp AB$



To be remembered:

- বৃত্তের একই চাপের উপর দন্ডায়মান বৃত্তস্থ কোন কেন্দ্রস্থ কোণের অর্ধেক বা কেন্দ্রস্থ কোন বৃত্তস্থ কোণের দ্বিগুণ।
- অর্ধবৃত্তস্থ কোণ এক সমকোণ।
- বৃত্তে অন্তর্লিখিত চতুর্ভুজের যে কোন দুইটি বিপরীত কোণের সমষ্টি দুই সমকোণ।
- Area = πr^2, Circumfereuce = $2\pi^2$, $\pi = \frac{22}{7}$ বা, 3.1416

Teacher's Discussion

1. To represent a family budget on a circle graphy, how many degrees of the circle should be used to represent an item that is 20% of the total budget? [ICB Asst. Programmer- 2017]

A. 60° B. 62° C. 70° D. 72° **Ans:** ==

2. When bent in the form of a circle of radius 28 cm. If it is bent in the form of a square, what will be its area in cm? [Combined 7 Banks Senior Officer- 2021**]**

A. 7744 B. 5808 C. 1936 D. 3872 **Ans:** C

3. If the redius of a circle is tripled, the circumference is? [Bangladesh Bank AD- 2021**]**

A. multiplied by 3 B. multiplied by 6

C. multiplied by 9 D. multiplied by 12 **Ans:** A

4. The pemimeter of a circle measures 16πcm, what is the area of the circle in sq. cm? [Bangladesh Bank Officer- 2019**]**

A. $32\sqrt{2}$ B. 64π C. 256π D. 128π **Ans:** B

5. The ratio of diameters of two circles is 2 : 3. The circumference of the smaller circle is what percentage of the larger circle? [UCB, PO- 2020**]**

A. 37.5% B. 40% C. 50% D. 66.7% **Ans:** D

6. The side length of a square inscribed in a circle is 2. What is the area of circle?

A. π B. $\sqrt{2}\,\pi$ C. 2π D. $2\sqrt{2}\,\pi$ **Ans:** C

7. The diameter of the driving wheel of a bus is 140 cm. How many revolutions per minute must the wheel make in order to keep a speed of 66 km per hour? [Combined 9 Bank Senior Officer (General)-2023]

A. 200 B. 250 C. 300 D. 350 **Ans: B**

8. A circular logo is enlarged to fit the lid of a jar. The new diameter is 50 percent larger than the original. By what percentage has the area of the logo increased?

(A) 50 (B) 80 (C) 100 (D) 125 **Ans:** D

9. A pipe of 2 inch diameter fills a water tank in one hour. If the diameter of the pipe is 4 inch in what time will the pipe fill the same tank?

(A) 10 minutes (B) 15 minutes (C) 30 minutes (D) 45 minutes **Ans:** B

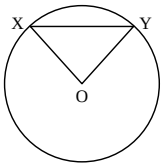
10. If the difference between the circumference and diameter of a circle is 60cm, then the radius of the circle is:

(A) 7cm (B) 9cm (C) 10cm (D) 14cm **Ans:** D

11. If a square is inscribed in a circle of radius r, then the area of the square is-

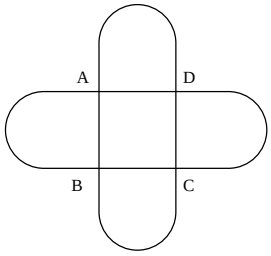
(A) πr^2 (B) $\frac{r^2}{2}$ (C) r^2 (D) $2r^2$ **Ans:** D

12. In the below figure, O is the center of the circle, XO is perpendicular to YO and the area of triangle XOY is 32. What is the area of circle O?



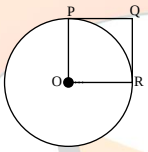
(A) 16π (B) 32π (C) 64π (D) 128π **Ans:** C

13. In the below figure, ABCD is a square and semicircles are constructed on each side of the square. If AB is 2, what is the area of the entire figure?



(A) $2 + 4\pi$ (B) $2 - 4\pi$ (C) $4 + 8$ (D) $4 + 2\pi$ **Ans:** D

14. In circle O below, if the length of arc PR is 57, what is the area of square OPQR in square unit?



(A) 10 (B) 10π (C) 100 (D) 100π **Ans:** C

Student's Drill

1. The length of a rope, to which a cow is tied, is increased from 19m to 30m. How much additional ground will it be able to graze? Assume that the cow is able to move on all sides with equal ease.

(A) 1696 sq m (B) 1694 sq m (C) 1594 sq m (D) 1756 sq. m **Ans:** B

2. If the radius of a circle is increased by 1%, then the area of that circle increases by what percent?

(A) 1.01% (B) 1.1% (C) 2.1% (D) 2.01% **Ans:** D

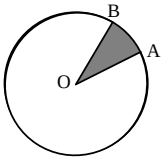
3. A goat is tied to one corner of a square plot of side 12m by a rope 7m long. Find the area it can graze?

(A) 19.25 sq. m (B) 155 sq. m (C) 144 sq. m (D) 38.48 sq. m **Ans:** D

4. The measurements of a rectangle are 12 ft by 16 ft. What is the area, in square feet, of the smallest circle that can cover this entirely (so that no part of the rectangle is outside the circle)?

(A) 192 (B) 384 (C) 100π (D) 128π **Ans:** C

5. In the below figure, O is the center of the circle. If the shaded area AOB is 2π and the radius of the circle is 4. What is the value of $\angle AOB$ in degree?



(A) $\frac{45}{2}$ (B) 30 (C) 45 (D) 60 **Ans:** C

6. A wheel rotates 10 times per minutes and moves 20 feet during each rotation. How many feet does the wheel move in 1 hour?

(A) 10,000 (B) 12,000 (C) 18,000 (D) 20,000 **Ans:** B

7. To represent a family budget on a circle graph, how many degrees of the circle should be used to represent an item that is 20% of the total budget?

(A) 76° (B) 72° (C) 60° (D) 20° **Ans:** B

8. A person rides a bicycle round a circular path of radius 50m. The radious of the wheel of the bicycle is 50cm. The cycle comes to the starting point for the first time in 1 hour. What is the number of revolutions of the wheel in 15 minutes

(A) 20 (B) 25 (C) 30 (D) 35 **Ans:** B

9. The difference between the radii of bigger circle and smaller circle is 14 cm and the difference between their areas is 1056 cm^2. Radius of the smaller circle is

(A) 7 cm (B) 5 cm (C) 9 cm (D) 3 cm **Ans:** B

Solution of Student's Drill

1. Solution:

Additional area (Where cow will graze)

$= \pi (30)^2 - \pi (19)^2$

$= \pi (30^2 - 19^2)$

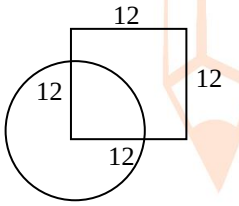
$= \pi (30 + 19)(30 - 19)$

$= \frac{22}{7} \times 49 \times 11 = 22 \times 77 = 1694$ **(Ans.)**

2. Solution:

$1 + 1 + \frac{1 \times 1}{100} = 2 + .01 = 2.01\%$ **(Ans.)**

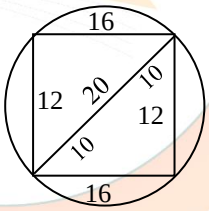
3. Solution:



$\text{Area} = \frac{\pi r^2}{4} = \frac{\pi \times 7^2}{4}$

$= \frac{22}{7} \times \frac{7 \times 7}{4} = \frac{77}{2} = 38.5$ **(Ans.)**

4. Solution:



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

$= \pi(10)^2 = 100\pi$ **(Ans.)**

5. Solution:

πr^2 cover করে 360°

$\therefore$ 1 " " $\frac{360}{\pi r^2}$

$\therefore 2\pi$ " " $\frac{360 \times 2\pi}{\pi r^2} = \frac{360 \times 2}{4^2} = 45°$ **(Ans.)**

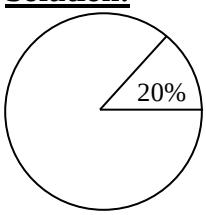
6. Solution:

A wheel rotates by 1 min 10×20 feet

" " " " 60 " $10 \times 20 \times 60$

$= 12000$ feet **(Ans.)**

7. Solution:



100% = 360°,

$1\% = \frac{360}{100}$

$20\% = \frac{360 \times 20}{100} = 72°$ **(Ans.)**

8. Solution:

Circumference of circular path = $2\pi r = 2\pi \times 50m$

$= 100\pi \times 100cm = 10000\pi$ cm

Circumference of wheel

$= 2\pi r = 2\pi \times 50$ cm $= 100\pi$ cm

The wheel goes in 60 mins 10000π cm

" " " " 1 " $\frac{10000\pi}{60}$ "

" " " " 15 " $\frac{10000\pi \times 15}{60}$

$= 2500\pi$ cm

$\therefore$ No. of revolution $= \frac{2500\pi}{100\pi} = 25$ **(Ans.)**

9. Solution:

$R - r = 14$

$\Rightarrow \pi R^2 - \pi r^2 = 1056$

$\Rightarrow \pi (R^2 - r^2) = 1056$

$\Rightarrow (R + r)(R - r) = 1056 \times \frac{7}{22}$

$\Rightarrow R + r = \frac{1056 \times 7}{7 \times 14} = 24$

$\therefore R - r = 14 \quad \therefore r = \frac{24 - 14}{2} = 5$ **(Ans.)**

Home Practice

1. The length of an arc is 7π. If the diameter of the circle is 14, what is the degree of central angle by that are? [BUP (FBS): 2021-22]

A. 90° B. 120° C. 180° D. 275° **Ans:** C

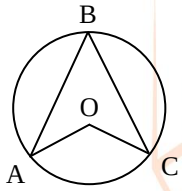
2. A circle whose center is at origin passess through point (4, 3). The length of the radious of this circle is? [BUP (FBS): 2021-22]

A. 6 B. 7 C. 5 D. 8 **Ans:** C

3. Diameter of a circle was 8 cm. If diameter is 12 cm. What is the area? [BUP (FBS): 2021-22]

A. 16π B. 20π C. 24π D. 36π **Ans:** D

4. Circle O with $\angle AOC$ and $\angle ABC$ is shown in the diagram below. What is the ratio of $\angle AOC$ to $\angle ABC$? [BUP (FBS): 2021-22]



A. 1:2 B. 3:1 C. 2:1 D. 1:3 **Ans:** C

5. $\text{Cosec}\theta + \cot\theta = \frac{5}{6}$, What is the value of $\text{cosec}\theta - \cot\theta$? [BUP (FBS): 2021-22]

A. $\frac{1}{6}$ B. $\frac{5}{6}$ C. 1 D. $\frac{6}{5}$ **Ans:** D

6. Find out the exact value of $\cos\frac{8\pi}{3}$ [BUP (FBS): 2021-22]

A. $\frac{1}{2}$ B. $\frac{1}{4}$ C. $\frac{-1}{2}$ D. $\frac{-1}{4}$ **Ans:** C