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# MHT-CET MATHEMATICS

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- Based on Latest Paper Pattern
- Based on complete syllabus of Std. XI
- Chapter at a glance
- Shortcuts
- Previous Years' Questions



**Std. XI**

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**MHT-CET**

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# Mathematics

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## Subtopics

- Directed Angles and Systems of Measurement of an Angle
- Length of an Arc and Area of a Sector



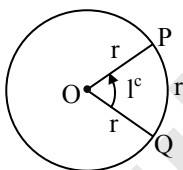
### Chapter at a glance

#### 1. Sexagesimal system (Degree measure):

- 1 right angle = 90 degree (=  $90^\circ$ )
- $1^\circ = 60$  minutes (=  $60'$ )
- $1' = 60$  seconds (=  $60''$ )

#### 2. Circular system (Radian measure):

- If  $r$  is radius of circle with centre  $O$ , and  $P$  and  $Q$  are two points such that  $l(\text{arc } PQ) = r$ , then  $m\angle POQ$  is defined to be 1 radian. It is denoted by  $1^c$ .
- A radian is a constant angle
- Radian measure is independent of the radius of the circle.



#### 3. Relation between degree measure and radian measure:

- $1^\circ = \left(\frac{\pi}{180}\right)^c = 0.01745^c$  (approx.)
- $1^c = \left(\frac{180}{\pi}\right)^\circ = 57^\circ 17' 48''$  (approx.)
- $x^\circ = \left(\frac{\pi x}{180}\right)^c$  and  $y^c = \left(\frac{180y}{\pi}\right)^\circ$

#### 4. Length of an arc and area of sector:

If in a circle of radius  $r$  an arc of length  $S$  subtends an angle of  $\theta^c$  at the centre, then

- Length of arc ( $S$ ) =  $r\theta$
- Area of corresponding sector =  $\frac{1}{2}r^2\theta$

i.e., Area =  $\frac{1}{2} \times r \times S$



### Shortcuts

- If the difference between measures of two directed angles is an integral multiple of  $360^\circ$ , then the two directed angles are co-terminal angles.
- The measure of quadrantal angles are integral multiples of  $90^\circ$ .
- The angle between two consecutive digits of a clock =  $30^\circ = \frac{\pi^c}{6}$
- Angle moved by hour hand in one hour =  $30^\circ$ .
- Angle moved by hour hand in one minute =  $\left(\frac{1}{2}\right)^\circ$ .
- Angle moved by minute hand in one minute =  $6^\circ$ .
- Sum of the measures of angles of triangle is  $\pi^c$  and of quadrilateral is  $2\pi^c$ .
- The sum of the measure of interior angles of a polygon of  $n$  sides =  $(n-2) \times 180^\circ = (n-2) \times \pi^c$
- Each interior angle of a regular polygon of  $n$  sides =  $180 \left(1 - \frac{2}{n}\right)^\circ = \frac{\pi(n-2)}{n}$  radian
- In a regular polygon:**
  - All the sides are equal
  - All the interior angles are equal
  - All the exterior angles are equal
  - Sum of all the exterior angles is  $360^\circ$
  - Each exterior angle =  $\frac{360^\circ}{\text{number of exterior angles}}$
  - Each interior angle =  $180^\circ - \text{exterior angle}$



**Directed Angles and Systems of Measurement of an Angle**

- If the initial ray and directed ray are opposite rays, then directed angle formed is called as  
 (A) zero angle  
 (B) straight angle  
 (C) co-terminal angle  
 (D) standard angle
- The measure of co-terminal angles always differ by an integral multiple of  
 (A)  $90^\circ$  (B)  $180^\circ$   
 (C)  $270^\circ$  (D)  $360^\circ$
- Which of the following pairs of angles are not coterminal?  
 (A)  $330^\circ, -60^\circ$  (B)  $405^\circ, -675^\circ$   
 (C)  $1230^\circ, -930^\circ$  (D)  $450^\circ, -630^\circ$
- The angle of measure  $-1560^\circ$  lies in  
 (A) 1<sup>st</sup> quadrant (B) 2<sup>nd</sup> quadrant  
 (C) 3<sup>rd</sup> quadrant (D) 4<sup>th</sup> quadrant
- Minute hand of a clock gains \_\_\_\_\_ on hour hand in one minute.  
 (A)  $5^\circ 30'$  (B)  $59^\circ$   
 (C)  $5^\circ 50'$  (D)  $360^\circ$
- $(74.87)^\circ =$   
 (A)  $74^\circ 52' 52''$  (B)  $74^\circ 52' 12''$   
 (C)  $74^\circ 12' 52''$  (D)  $74^\circ 0' 52''$
- $5^\circ 37' 30'' =$   
 (A)  $\left(\frac{\pi}{4}\right)^\circ$  (B)  $\left(\frac{\pi}{8}\right)^\circ$   
 (C)  $\left(\frac{\pi}{16}\right)^\circ$  (D)  $\left(\frac{\pi}{32}\right)^\circ$
- A wheel makes 3600 rotations in 1 hour. Through how many radians does it turn in 1 minute?  
 (A)  $12\pi^\circ$  (B)  $10\pi^\circ$   
 (C)  $60\pi^\circ$  (D)  $120\pi^\circ$
- The radian measure of an angle of  $-260^\circ$  is  
 (A)  $\left(\frac{-13\pi}{12}\right)^\circ$  (B)  $\left(\frac{-13\pi}{9}\right)^\circ$   
 (C)  $\left(\frac{-12\pi}{9}\right)^\circ$  (D)  $\left(\frac{-26\pi}{9}\right)^\circ$
- If the measures of angles of a quadrilateral are in the ratio  $2 : 3 : 7 : 6$ , then their measures in degrees will be  
 (A)  $20^\circ, 40^\circ, 60^\circ, 80^\circ$   
 (B)  $40^\circ, 60^\circ, 80^\circ, 100^\circ$   
 (C)  $40^\circ, 60^\circ, 140^\circ, 120^\circ$   
 (D)  $40^\circ, 60^\circ, 160^\circ, 120^\circ$

- If the sum of two angles is 1 radian and the difference between them is  $1^\circ$ , then the smaller angle is  
 (A)  $\left(\frac{90}{\pi} - \frac{1}{2}\right)^\circ$  (B)  $\left(\frac{90}{\pi} + \frac{1}{2}\right)^\circ$   
 (C)  $\left(\frac{180}{\pi} - 1\right)^\circ$  (D)  $\left(\frac{180}{\pi} + 1\right)^\circ$
- If the difference between two acute angles of a right angled triangle is  $\frac{2\pi^\circ}{5}$ , then the angles in degrees are  
 (A)  $81^\circ, 9^\circ$  (B)  $35^\circ, 55^\circ$   
 (C)  $20^\circ, 40^\circ$  (D)  $50^\circ, 30^\circ$
- The exterior angle of a regular pentagon in radian measure is  
 (A)  $\frac{\pi^\circ}{5}$  (B)  $\frac{2\pi^\circ}{5}$   
 (C)  $\frac{3\pi^\circ}{5}$  (D)  $\frac{4\pi^\circ}{5}$
- The radian measure of the interior angle of a regular heptagon is  
 (A)  $\frac{\pi^\circ}{7}$  (B)  $\frac{3\pi^\circ}{7}$   
 (C)  $\frac{5\pi^\circ}{7}$  (D)  $\frac{7\pi^\circ}{5}$
- At 3:40, the hour hand and minute hands of a clock are inclined at  
 (A)  $\left(\frac{13\pi}{18}\right)^\circ$  (B)  $\left(\frac{\pi}{9}\right)^\circ$   
 (C)  $\left(\frac{3\pi}{8}\right)^\circ$  (D)  $\left(\frac{5\pi}{6}\right)^\circ$

**Length of an Arc and Area of a Sector**

- The radius of the circle whose arc of length 15 cm makes an angle of  $\frac{3}{4}$  radian at the centre is  
 (A) 10 cm (B) 20 cm  
 (C)  $11\frac{1}{4}$  cm (D)  $22\frac{1}{2}$  cm
- A circular wire of radius 7 cm is cut and bend again into an arc of a circle of radius 12 cm. The angle subtended by the arc at the centre is  
 (A)  $50^\circ$  (B)  $210^\circ$   
 (C)  $100^\circ$  (D)  $60^\circ$



18. If a pendulum 18 cm long oscillates through an angle of  $32^\circ$ , then length of the path described by its extremity is  
(A)  $\frac{5\pi}{16}$  cm (B)  $\frac{16\pi}{5}$  cm  
(C)  $\frac{8\pi}{45}$  cm (D)  $\frac{6\pi}{5}$  cm
19. If two circular arcs of the same length subtend angles of  $60^\circ$  and  $80^\circ$  at their respective centres, then the ratio of their radii is  
(A)  $\frac{3}{4}$  (B)  $\frac{4}{3}$   
(C)  $\frac{\sqrt{3}}{2}$  (D)  $\frac{9}{16}$
20. In a circle of diameter 66 cm, the length of a chord is 33 cm. The length of minor arc of the chord is  
(A)  $33\pi$  cm (B)  $11\pi$  cm  
(C)  $22\pi$  cm (D)  $5.5\pi$  cm
21. A wire 96 cm long is bent, so as to lie along the arc of a circle of 180 cm radius. The angle subtended at the centre of the arc in degree is  
(A)  $30^\circ$  (B)  $29^\circ 30'$   
(C)  $28^\circ 30'$  (D)  $30^\circ 30'$
22. A railway engine is travelling along a circular railway track of radius 1500 meters with a speed of 66 km/ hour. The angle turned by the engine in 10 seconds is  
(A)  $\frac{15^\circ}{7}$  (B)  $\frac{7^\circ}{15}$   
(C)  $\frac{90^\circ}{11}$  (D)  $\frac{11^\circ}{90}$
23. The distance between 6.00 A. M. and 3.15 P. M. by the tip of the 12 cm long hour hand in a clock is  
(A)  $\frac{35}{2}\pi$  cm (B)  $18\pi$  cm  
(C)  $\frac{37}{2}\pi$  cm (D)  $19\pi$  cm
24. If Kalyan is 48 km from Mumbai and the earth being regarded as a sphere of radius 6400 km, then the angle subtended at the centre of the earth by the arc joining them is (Take  $\pi = 22/7$ )  
(A)  $22^\circ 64'$  (B)  $24^\circ 65'$   
(C)  $23^\circ 62''$  (D)  $25^\circ 46''$
25. The perimeter of a certain sector of a circle is equal to half that of the circle of which it is a sector. Then the circular measure of sector is  
(A)  $(\pi + 2)$  radians  
(B)  $(\pi - 2)$  radians  
(C)  $(\pi + 1)$  radians  
(D)  $(\pi - 1)$  radians
26. The perimeter of a sector of a circle, of area  $36\pi$  sq.cm., is 28 cm. The area of sector is equal to  
(A) 12 sq.cm (B) 16 sq.cm  
(C) 48 sq.cm (D) 96 sq.cm
27. Two circles each of radius 14 cm intersect each other. If the distance between their centres is  $14\sqrt{2}$  cm, the area common to both is  
(A) 140 sq.cm (B) 112 sq.cm  
(C) 154 sq.cm (D) 308 sq.cm

**Miscellaneous**

28. The angles of a triangle are in AP. If the smallest angle is  $36^\circ$ , then the measure of the other angles are  
(A)  $60^\circ, 84^\circ$  (B)  $54^\circ, 90^\circ$   
(C)  $36^\circ, 108^\circ$  (D)  $72^\circ, 108^\circ$



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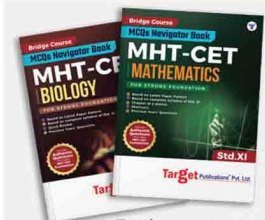
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