


# MATHEMATICS

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**AIM POINT**  
**MATHEMATICS**  
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**XI<sup>th</sup>, XII<sup>th</sup>, TARGET IIT-JEE  
(MAIN + ADVANCE) & COMPATETIVE EXAM  
FOR XI (PQRS)**

## **MEASUREMENT OF ANGLE & Their Properties**

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## THINGS TO REMEMBER

1. (i)  $\pi^c = 180^\circ$

(ii)  $1^\circ = \frac{\pi^c}{180}$

(iii)  $1^c = \frac{180^\circ}{\pi}$

(iv)  $1^\circ = 60'$

(v)  $1' = \left(\frac{1}{60}\right)^\circ$

(vi)  $1^\circ = (3600)''$

(vii)  $1'' = \left(\frac{1}{3600}\right)^\circ$

(viii)  $\frac{D}{180} = \frac{C}{\pi}$

(ix)  $90^\circ = \text{Right angle} = 100^s$

$1^s = 100'$

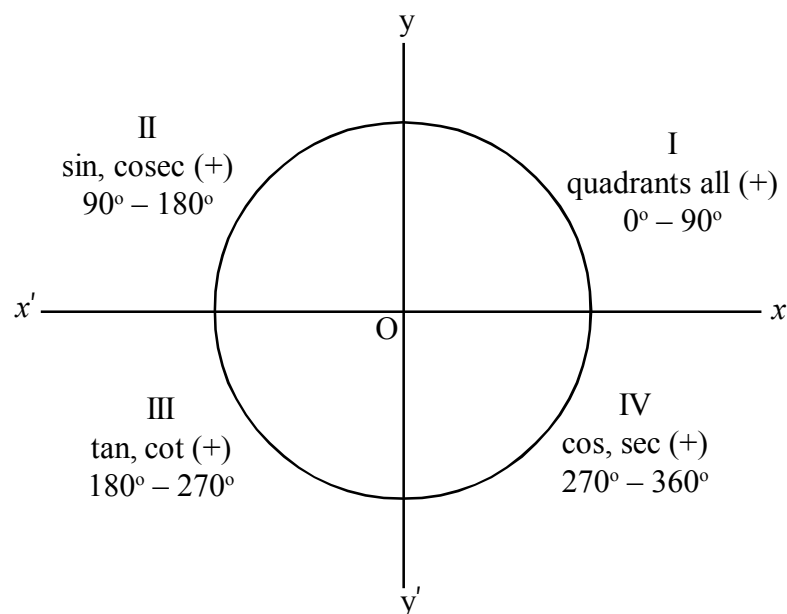
$1' = 100''$

(x)  $\frac{D}{90} = \frac{G}{100} = \frac{2R}{\pi}$

(xi)

Degree	$30^\circ$	$45^\circ$	$60^\circ$	$90^\circ$	$180^\circ$	$270^\circ$	$360^\circ$
Radians	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$	$\pi$	$3\pi/2$	$2\pi$

2. (i)



(ii) TRIGONOMETRICAL function is changable at degree  $90^\circ$  &  $270^\circ$ .

(iii) Trigonometrical function is not changable at degree  $180^\circ$  &  $360^\circ$ .

3. (i)  $\sin(-\theta) = -\sin\theta$

$$\cos(-\theta) = \cos\theta$$

$$\tan(-\theta) = -\tan\theta$$

$$\cot(-\theta) = -\cot\theta$$

$$\sec(-\theta) = \sec\theta$$

$$\operatorname{cosec}(-\theta) = -\operatorname{cosec}\theta$$

4. (i)  $\sin(90 + \theta) = \cos\theta$

$$\cos(90 + \theta) = -\sin\theta$$

$$\tan(90 + \theta) = -\cot\theta$$

$$\cot(90 + \theta) = -\tan\theta$$

$$\sec(90 + \theta) = -\operatorname{Cosec}\theta$$

$$\operatorname{cosec}(90 + \theta) = \sec\theta$$

5. (i)  $\sin(90 - \theta) = \cos\theta$

$$\cos(90 - \theta) = \sin\theta$$

$$\tan(90 - \theta) = \cot\theta$$

$$\cot(90 - \theta) = \tan\theta$$

$$\sec(90 - \theta) = \operatorname{Cosec}\theta$$

$$\operatorname{cosec}(90 - \theta) = \sec\theta$$

6. (i)  $\sin(180 - \theta) = \sin\theta$

$$\cos(180 - \theta) = -\cos\theta$$

$$\tan(180 - \theta) = -\tan\theta$$

$$\cot(180 - \theta) = -\cot\theta$$

$$\sec(180 - \theta) = -\sec\theta$$

$$\operatorname{cosec}(180 - \theta) = \operatorname{cosec}\theta$$

7. (i)  $\sin(180 + \theta) = -\sin\theta$

$$\cos(180 + \theta) = -\cos\theta$$

$$\tan (180 + \theta) = \tan \theta$$

$$\cot (180 + \theta) = \cot \theta$$

$$\sec (180 + \theta) = -\sec \theta$$

$$\operatorname{cosec} (180 + \theta) = -\operatorname{cosec} \theta$$

8. (i)  $\sin (270 - \theta) = -\cos \theta$

$$\cos (270 - \theta) = -\sin \theta$$

$$\tan (270 - \theta) = \cot \theta$$

$$\cot (270 - \theta) = \tan \theta$$

$$\sec (270 - \theta) = -\operatorname{cosec} \theta$$

$$\operatorname{cosec} (270 - \theta) = -\sec \theta$$

9. (i)  $\sin (270 + \theta) = -\cos \theta$

$$\cos (270 + \theta) = \sin \theta$$

$$\tan (270 + \theta) = -\cot \theta$$

$$\cot (270 + \theta) = -\tan \theta$$

$$\sec (270 + \theta) = \operatorname{cosec} \theta$$

$$\operatorname{cosec} (270 + \theta) = -\sec \theta$$

10. (i)  $\sin (360 - \theta) = -\sin \theta$

$$\cos (360 - \theta) = \cos \theta$$

$$\tan (360 - \theta) = -\tan \theta$$

$$\cot (360 - \theta) = -\cot \theta$$

$$\sec (360 - \theta) = \sec \theta$$

$$\operatorname{cosec} (360 - \theta) = -\operatorname{cosec} \theta$$

11. (i)  $\sin (360 + \theta) = \sin \theta$

$$\cos (360 + \theta) = \cos \theta$$

$$\tan (360 + \theta) = \tan \theta$$

$$\cot (360 + \theta) = \cot \theta$$

$$\sec (360 + \theta) = \sec \theta$$

$$\operatorname{cosec} (360 + \theta) = \operatorname{cosec} \theta$$

## MEASUREMENT OF ANGLES

1. Meaning of  $\pi$  or prove that  $c = 2\pi r$ .
2. Show that the radian is a constant angle.
3. Prove that  $1^\circ = \frac{180^\circ}{\pi}$   
or, Relation between degrees and Radian.
4. Prove that  $\theta = \frac{l}{r}$   
or, Relation between Arc, radian and angle.
5. Write the sign.
  - (i)  $\sin 1280^\circ$  (ii)  $\cos 1850^\circ$  (iii)  $\tan 1950^\circ$  (iv)  $\cos 2011^\circ$
6. Convert into radian.
  - (i)  $40^\circ 20'$  (ii)  $11^\circ/16$  (iii)  $-4^\circ$  (iv)  $70^\circ/6$  (v)  $(2.64)^\circ$
7. Convert into radian.
  - (i)  $42^\circ 57' 16''$  (ii)  $72^\circ 53' 51''$  (iii)  $41^\circ 22' 50''$
8. Convert into degree.
  - (i)  $(2.64)^\circ$  (ii)  $7\pi^\circ/c$  (iii)  $-4^\circ$  (iv)  $11/16$
9.  $65^\circ 27' 16''$  change in circular degree.
10. Find the angle  $\alpha$  between hour hand and minute hand in circular measure at 4 O'clock.
11. Find the angle  $\alpha$  between hour hand and minute hand in circular measure at  $3\frac{1}{2}$  O'clock.
12. In a circle of diameter 40cm, the length of a chord is 20cm. Find the length of minor arc of the chord.
13. The minute hand of a watch is 1.5cm, long. How far does its tip move in.
  - (a) 50 minutes (b) 40 minutes
14. If the arc of same length in two circles subtend angles of  $75^\circ$  and  $120^\circ$  at their respective centre, find the ratio of their radii.
15. A wheel makes 360 revolutions in one minute. Through how many radians does it turn in one second ?
16. Find the angle in radian through which a pendulum swings if its length is 75cm. and the tip one second ?
  - (a) 10cm (b) 15cm (c) 21cm
17. The difference between the two acute angles of a right angled triangle is  $2\pi/5$  radian. Express the angle in degrees.