

Vacation Work for class- Ten
Chapter- Eight
Exercise- 8.1
Trigonometry

Creative Multiplication Choice Question

1. What is the angle between the hour hand and the minute hand at time 2 : 30?

[My.B.- 20]

- a) 210° (App) b) 135° (App)
c) 105° (App) d) 102° (App)

2. What is the angle between the hour hand and the minute 9 : 25 AM? [Dj.B.- 20]

- a) 120° b) 127.5°
c) 132.5° d) 197°

3. What is the angle between the hour hand and minute hand at time 7 : 35 AM?

[J.B.- 20]

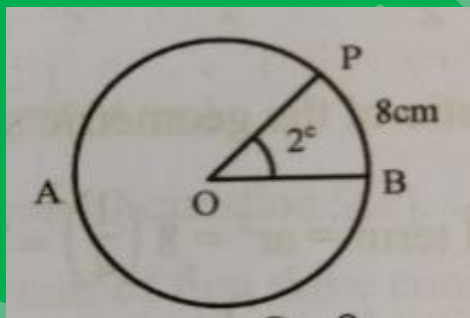
- a) -17.5° b) -15.5°
c) 15.5° d) 17.5°

4. A hill produces an angle of $7'$ at a point 450 kilometer from the foot of the hill.

What is the height of the hill? [Ctg.B.- 20]

- a) 920 m b) 1000 m
c) 1100 m d) 2700 m

5.



In circle ABP with the centre O then what is the value of OB? [C.B.- 20]

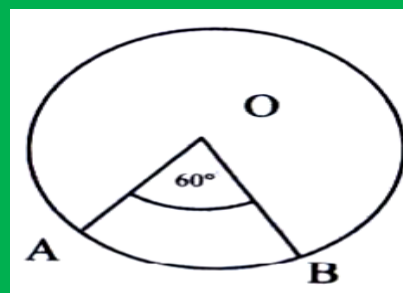
- a) 2 cm b) 4 cm
c) 8 cm d) 16 cm

6. What is the circular measure of the angle subtended by an arc of length 15 cm at the centre of a circle with radius 9 cm?

[Dj.B.- 19]

- a) 0.60 radian (app.)
b) 0.83 radian (app.)
c) 1.67 radian (app.)
d) 95.49 radian (app.)

7.



In the figure, centre of the circle is O and arc $AB = 60$ cm then what is the radius of the circle? [S.B.- 17]

- a) $\frac{\pi}{180}$ cm b) π cm
c) $\frac{180}{\pi}$ cm d) 20π cm

8. A wheel rotates 35 times to cover 250 metres. What is the radius? [B.B.- 19]

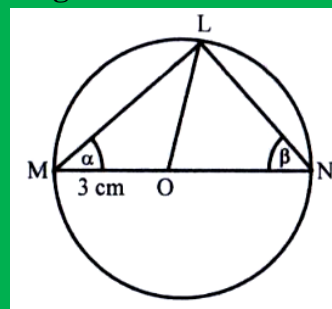
- a) 1.137 m (Nearly)
b) 1.5 m (Nearly)
c) 1.6 m (Nearly)
d) 1.71 m (Nearly)

9. If we express an angle by P° and Q^c in radian and circular system then which one of the following relations is correct?

[B.B.- 19]

- a) $\frac{P}{180} = \frac{Q}{\pi}$ b) $\frac{\pi}{180} = \frac{P}{Q}$
c) $\frac{Q}{180} = \frac{P}{\pi}$ d) $PQ = \frac{\pi}{180}$

Answer to the questions no. (10 – 11) with the given below statement:



Here, $\alpha : \beta = 3 : 4$ and O is the centre of circle.

10. What is the value of α in radian?

[Ctg.B.- 19]

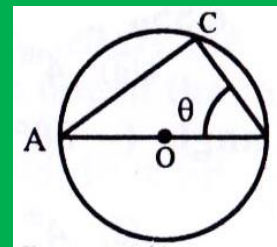
- a) $\frac{4\pi}{7}$ b) $\frac{3\pi}{7}$
c) $\frac{3\pi}{14}$ d) $\frac{2\pi}{14}$

11. What is the value of the length of the arc LM?

[Ctg.B.- 19]

- a) 3.3660 cm b) 4.0392 cm
c) 5.3856 cm d) 6.7320 cm
12. What is the degree the angle between the minute hand and hour hand of a clock when it is 8 : 30 am? [All B.- 18]
a) 105° b) 90°
c) 75° d) 60°
13. Which one is the correct value of $65^{\circ}42'$? [D.B.- 17]
a) 65.5° b) 65.6°
c) 65.7° d) 65.8°
14. Which one of the following is the radian form of 60° ? [R.B.- 17]
a) 3.1416 b) 3.0419
c) 2.0419 d) 1.0472
15. What is the angle between the hour hand and the minute hand at time 8 : 20 am? [Dj.B.- 17]
a) 140° b) 130°
c) 115° d) 110°
16. What is the angle between hour hand and minute hand of a clock when it is 1 : 20 pm? [C.B.- 17]
a) 80° b) 90°
c) 100° d) 111°
17. $2^{\circ} =$ What? [Ctg.B.- 17]
a) $\frac{\pi^c}{45}$ b) $\frac{\pi^c}{90}$
c) $\frac{\pi^c}{180}$ d) $\frac{\pi^c}{360}$
18. The diameter of a wheel is 3.1416 metre. What is the circumference of the wheel? [S.B.- 17]
a) 31.007 metre
b) 19.739 metre
c) 9.870 metre
d) 7.752 metre
19. Which one is correct? [J.B.- 17]
a) $r = s\theta$ b) $s = \frac{r}{\theta}$
c) $r = \frac{\theta}{s}$ d) $s = r\theta$
20. $\frac{2\pi}{11} =$ What? [B.B.- 17]
a) $43^{\circ}32'38''$ b) $32^{\circ}43'38.18''$
c) $38^{\circ}32'43''$ d) $32^{\circ}38'43.18''$
21. 1 Radian = What? [D.B.- 16, R.B.- 15]
a) 60° b) $59^{\circ}17'44.81''$
c) $58^{\circ}17'44.81''$ d) $57^{\circ}17'44.81''$

22. Radius of a circle is 5 cm. What is measure of central angle based on 13 cm arc? [D.B.- 16]
a) 0.38° b) 0.38^c
c) 2.60^c d) 2.60°
23. In an isosceles triangle equal angle are 70° . What is another angle in radian? [C.B.- 16]
a) $\frac{\pi}{9}$ b) $\frac{9}{2\pi}$
c) $\frac{9\pi}{2}$ d) $\frac{2\pi}{9}$
24. The angles of a triangle are in arithmetical progression and the smallest angle is half of the largest angle. What is the value of largest angle in circular system? [Ctg.B.- 16]
a) $\frac{\pi}{9}$ b) $\frac{\pi}{3}$
c) $\frac{\pi}{2}$ d) $\frac{4\pi}{9}$
25. In which quadrant does in $(9 \cdot \frac{\pi}{2} - \theta)$ lie? [Ctg.B.- 16]
a) 1st b) 2nd
c) 3rd d) 4th
- 26.



In the figure $\sin\theta = \frac{\sqrt{3}}{2}$ and O is the centre of the circle then - [S.B.- 16]

- i. Circumference of the circle is 2π .
- ii. Area of the circle is π .
- iii. Value of θ is $\frac{\pi}{6}$.

Which one of the following is correct?

- a) i and ii b) i and iii
c) ii and iii d) i, ii and iii

27. [J.B.- 16]

- i. Circumference = $\pi \times$ radius
- ii. Radian angle is a constant angle.
- iii. 1 Radian is expressed in 1^R .

Which one of the following is correct?

- a) i and ii b) i and iii
c) ii and iii d) i, ii and iii

28. The summation and difference of two angles are $\frac{\pi}{3}$ and $\frac{\pi}{6}$ radian respectively.

Find the larger angle? [D.B.- 15]

- a) $\frac{\pi}{2}$ b) $\frac{\pi}{3}$
c) $\frac{\pi}{4}$ d) $\frac{\pi}{6}$

29. At 6 am in the morning then what is the angle in radian between the hour-hand and minute hand? [D.B.-15]

- a) $\frac{\pi}{3}$ b) $\frac{\pi}{2}$
c) π d) 2π

30. As usually — [D.B.- 15]

- i. π is irrational number.
ii. The approximate value of π is 3.14159.
iii. π is an English letter.

Which one of the following is correct?

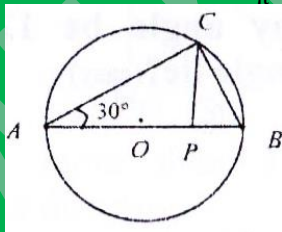
- a) I b) ii
c) i and ii d) i and iii

31. $1^\circ = \text{Radian}$? [Dj.B.- 15]

- a) $\frac{\pi^c}{180}$ b) $\frac{D\pi^c}{180}$
c) $\frac{5\pi^c}{180}$ d) $\frac{4\pi^c}{180}$

32. Radius of a Circle is 7 cm. What is the measurement of the angle at the centre in degree subtended by an arc of length 14 cm? [J.B.- 15]

- a) $\frac{\pi}{360}$ b) $\frac{\pi}{1260}$
c) $\frac{360}{\pi}$ d) $\frac{1260}{\pi}$



Answer to the questions no. (33 – 34) following the above geometric figure -

33. If O is the centre of the circle then what is the measure of $\angle ACB$?

[B.B.- 15]

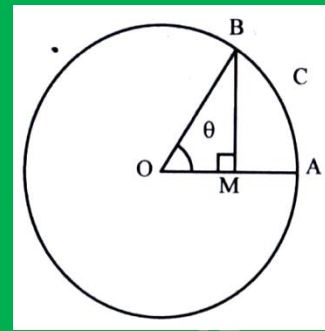
- a) 45° b) 60°
c) 80° d) 90°

34. What is the length of the circumference of circle ABC if $AB = 2r$ unit? [B.B.- 15]

- a) $\frac{\pi r}{2}$ unit b) πr unit
c) $2\pi r$ unit d) $4\pi r$ unit

Creative Questions:

1.



In figure $OA = 10$ cm. [Ctg.B.- 19]

- a) Express θ° in radians.
b) A sprinter starts his journey at 'A' and reached at 'B' within 5 seconds then find the velocity of the sprinter when $\theta = 60^\circ$.
c) If $2\left(\frac{OM}{OB}\right)^2 = 1 + 2\left(\frac{BM}{OB}\right)^2$ then find the value of θ . [where $0^\circ \leq \theta \leq 2\pi$]

2.

The wheel of a car moving from Dhaka to Khulna revolves 720 times in a minute. The radius of the wheel is 0.25 meter. [Dj.B.- 17]

- a) Find the circumference of the wheel.
b) Find the speed of the car.
c) If the distance of Dhaka and Khulna subtends 2° angle at the centre of the earth then find the time required to go from Dhaka to Khulna. [The radius of the earth is 6440 km]

Exercise-8.2

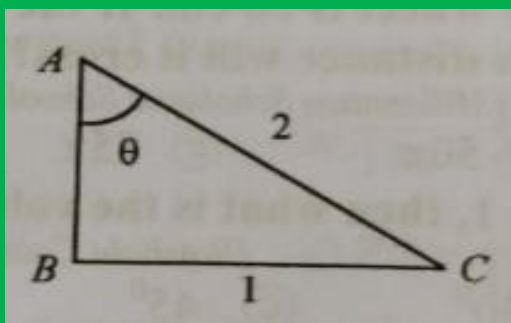
Trigonometry

Creative Multiplication Choice Questions

1. What is the value of $\cos(-300^\circ)$?
[D.B.- 20]

- a) $\frac{1}{2}$ b) $\frac{\sqrt{3}}{2}$
c) $-\frac{1}{2}$ d) $-\frac{\sqrt{3}}{2}$

2.



From the figure – [D.B.- 20]

- i. $AB^2 = 5$ unit
ii. $2\cos\theta + \sqrt{3} = 2\sqrt{3}$
iii. $\sin\theta + 2\cos^2\theta = 2$

Which one of the following is correct?

- a) i and ii b) i and iii
c) ii and iii d) i, ii and iii

3. In which quadrant the angle -570° lies?
[R.B.- 20]

- a) First b) Second
c) Third d) Fourth

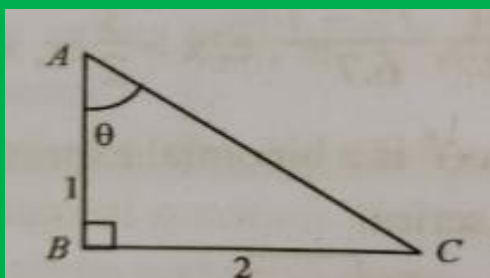
4. What is the value of $\cos 2A$ if $\sin A = \frac{1}{\sqrt{2}}$?
[R.B.- 20]

- a) -1 b) 0
c) $\frac{1}{\sqrt{2}}$ d) 1

5. In which quadrant the angle -1765° will be located?
[Dj.B.- 20]

- a) 1st b) 2nd
c) 3rd d) 4th

6.



Which of the following is the value of $\sec\theta$ in the light of the above figure?

[Dj.B.- 20]

- a) $\sqrt{5}$ b) $\frac{\sqrt{5}}{2}$
c) $\frac{2}{\sqrt{5}}$ d) $\frac{1}{\sqrt{5}}$

7. If θ be an acute angle and $\sin\theta = \frac{3}{5}$ then the value of $\cot\theta$ will be –

[Dj.B.- 20]

- a) $\frac{12}{5}$ b) $\frac{4}{3}$
c) $\frac{5}{4}$ d) $\frac{3}{4}$

8. In which quadrant the angle -2295° lies?
[C.B.- 20]

- a) First b) Second
c) Third d) Foruth

9. In which quadrant the angle -840° is?
[Ctg.B.- 20]

- a) First b) Second
c) Third d) Foruth

10. If $2\sin\theta = 1$ then $\tan\theta =$ What?

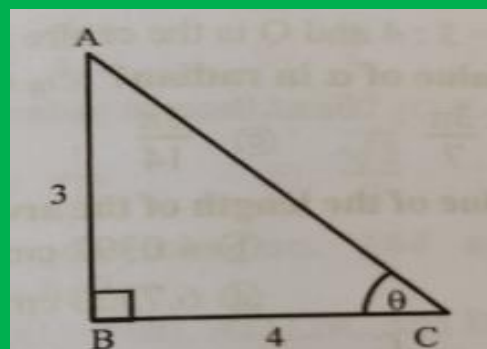
[Ctg.B.- 20]

- a) $-\frac{1}{\sqrt{3}}$ b) $\frac{1}{\sqrt{3}}$
c) $\frac{1}{3}$ d) $\frac{1}{2}$

11. In which quadrant does the angle -510° lies?
[S.B.- 20]

- a) First b) Second
c) Third d) Foruth

12.



In the figure – [S.B.- 20]

- i. The value of AC is 5 unit.
ii. The area of ΔABC is 6 square unit.
iii. The value of θ is 60° .

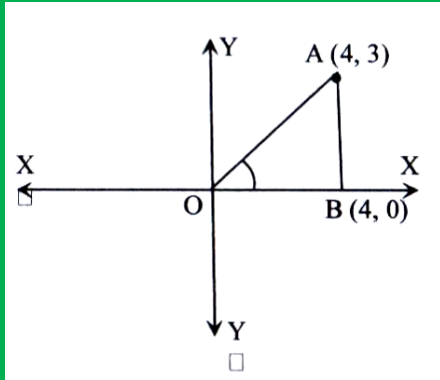
Which one of the following is correct?

- a) i and ii b) i and iii

13. If $\cos\theta = \frac{b}{a}$ and $a > b > 0$ then which one of the following is correct of $\cot\theta$? [B.B.- 20]

- a) $\pm \frac{a}{\sqrt{a^2-b^2}}$ b) $\pm \frac{b}{\sqrt{a^2-b^2}}$
 c) $\pm \frac{a}{\sqrt{a^2+b^2}}$ d) $\pm \frac{b}{\sqrt{a^2+b^2}}$

14.



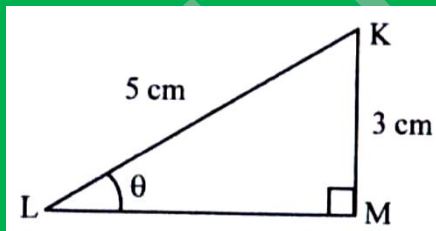
Cosec(- θ) + sec(- θ) = What? [D.B.- 19]

- a) $-\frac{5}{12}$ b) $-\frac{35}{12}$
 c) $\frac{1}{5}$ d) $\frac{7}{5}$

15. $\sin\left(\frac{25\pi}{2} - \theta\right)$ is in which quadrant? [R.B.- 19]

- a) First b) Second
 c) Third d) Foruth

16.



According to the above figure then what is the value of $\tan\theta \cos\theta$? [S.B.- 19]

- a) $\frac{3}{5}$ b) $\frac{15}{16}$
 c) $\frac{16}{15}$ d) $\frac{5}{3}$

17. What is the value of $\cos(120^\circ)$?

[S.B.- 19]

- a) $-\frac{\sqrt{3}}{2}$ b) $-\frac{1}{2}$
 c) $\frac{1}{2}$ d) $\frac{\sqrt{3}}{2}$

18. If $\tan\theta = 1$ then – [S.B.- 19]

- i. $\sin\theta + \frac{1}{\sec\theta} = \sqrt{2}$
 ii. $\sin^2\theta + \cot^2\theta = \frac{3}{2}$
 iii. $\sec(-\theta) + \operatorname{cosec}(-\theta) = 2\sqrt{2}$

Which one of the following is correct?

- a) i and ii b) i and iii
 c) ii and iii d) i, ii and iii

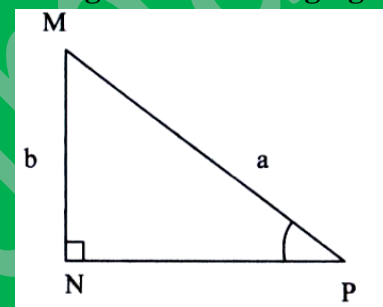
19. In which quadrant the angle -785° lie? [J.B.- 19]

- a) First b) Second
 c) Third d) Foruth

20. If $\cos\theta = \frac{4}{5}$ then find the value of $\tan\theta$? [B.B.- 19]

- a) $\frac{3}{5}$ b) $\frac{3}{4}$
 c) $\frac{5}{4}$ d) $\frac{5}{3}$

Answer to the questions no. (21 – 22) in according to the following figure:



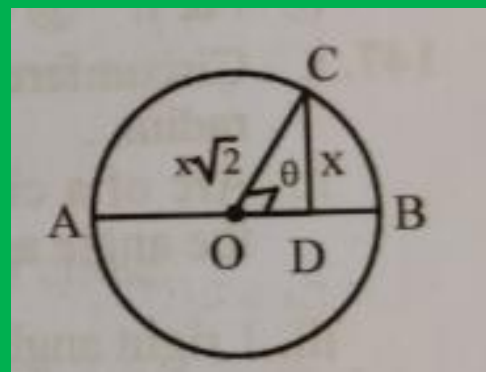
21. $\sin P + \cos M =$ What? [C.B.- 19]

- a) $\frac{2b}{a}$ b) $\frac{2a}{b}$
 c) $\frac{b + \sqrt{a^2 - b^2}}{a}$ d) $\frac{a + \sqrt{a^2 - b^2}}{a}$

22. What is the value of $\tan M$? [C.B.- 19]

- a) $\frac{b}{\sqrt{a^2 - b^2}}$ b) $\frac{a}{\sqrt{a^2 - b^2}}$
 c) $\frac{\sqrt{a^2 - b^2}}{b}$ d) $\frac{\sqrt{a^2 - b^2}}{a}$

23.



In the diagram then – [B.B.- 19]

- i. In triangle DOC, $DO = x$.
 ii. $AB = 2x$
 iii. $\theta = \frac{\pi}{4}$

Which one of the following is correct?

- a) i and ii b) i and iii
 c) ii and iii d) i, ii and iii

24. $\cos^2 \frac{\pi}{3} - \sin^2(-\frac{\pi}{3}) =$ What? [B.B.- 19]

- a) $-\frac{1}{2}$ b) $-\frac{1}{4}$
 c) $\frac{1}{2}$ d) 1

25. $\cos\theta = \frac{1}{2}, \pi < \theta < 2\pi$ then what is the value of θ ? [All B.- 18]

- a) $\frac{\pi}{3}$ b) $\frac{4\pi}{3}$
 c) $\frac{5\pi}{3}$ d) $\frac{11\pi}{6}$

26. What is the value of $\cos(\frac{-31\pi}{3})$?

[D.B.- 17]

- a) 1 b) $\frac{\sqrt{3}}{2}$
 c) $\frac{1}{2}$ d) $\frac{1}{\sqrt{2}}$

27. If $\cos\theta = \frac{1}{\sqrt{2}}$ then — [D.B.- 17]

- i. $\sec^2 \theta = 2$
 ii. $\sin^2 \theta = \frac{1}{2}$
 iii. $\tan^2 \theta = 1$

Which one of the following is correct?

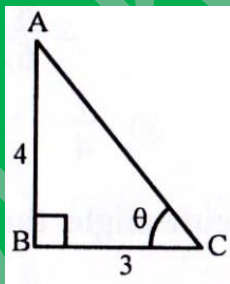
- a) i and ii b) i and iii
 c) ii and iii d) i, ii and iii

28. What is the value of $\sin^2(2\pi - \frac{\pi}{6})$?

[R.B.- 17]

- a) $-\frac{1}{4}$ b) $-\frac{1}{2}$
 c) $\frac{1}{4}$ d) $\frac{1}{2}$

29.



From the figure — [J.B.- 17]

- i. $\tan\theta = \frac{4}{3}$
 ii. $\cos\theta = \frac{3}{5}$
 iii. $\sin^2 \theta = \frac{16}{25}$

Which one of the following is correct?

- a) i and ii b) i and iii
 c) ii and iii d) i, ii and iii

30. If $\theta = 30^\circ$ then — [J.B.- 17]

- i. $\sin 2\theta = 2 \sin \theta \cdot \cos \theta$
 ii. $\sin^2 \theta + \cos^2 \theta = 1$
 iii. $\sec^2 \theta = 1 + \tan^2 \theta$

Which one of the following is correct?

- a) i and ii b) i and iii
 c) ii and iii d) i, ii and iii

31. If $A = 60^\circ$ and $B = 30^\circ$ then-

[J.B.- 17]

- i. $\sin 2B = 2 \sin B \cdot \cos B$
 ii. $\tan(A - b) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$
 iii. $\cos 2B = 2 \cos B - \sin B$

Which one of the following is correct?

- a) i and ii b) ii and iii
 c) i and iii d) i, ii and iii

Answer to the questions no. (32 – 33)

according to the given information.

$\sin A$ and $\cos A$ are opposite in sign

then where $\sin A = -\frac{2}{\sqrt{5}}$.

32. In which quadrant the angle A lie?

[Dj.B.- 17]

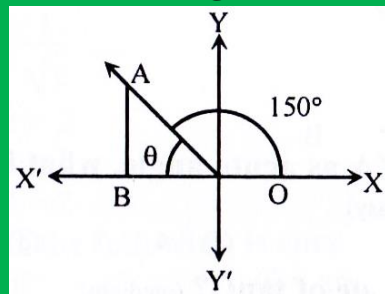
- a) First b) Second
 c) Third d) Fourth

33. What is the value of $\tan A$? [Dj.B.- 17]

- a) -2 b) $-\frac{1}{2}$
 c) $\frac{1}{2}$ d) 2

Answer to the questions no. (34 – 35)

from the following information:



34. What is the value of θ in circular system? [C.B.- 17]

- a) $\frac{\pi}{6}$ b) $\frac{\pi}{4}$
 c) $\frac{\pi}{3}$ d) $\frac{2\pi}{3}$

35. What is the value of $\cos\theta \tan\theta$?

[C.B.- 17]

- a) $\frac{3}{2}$ b) $\frac{1}{\sqrt{2}}$
 c) $\frac{\sqrt{3}}{2}$ d) $\frac{1}{2}$

Answer to the questions no. (36 – 37)

to the information given bellow:

In ΔABC , $AB = AC = 5$ cm, $AD \perp BC$ and $BC = 6$ cm.

36. Area of ΔABC in square cm?

[Ctg.B.- 17]

- a) 12 b) 13
c) 14 d) 15

37. If the angle between AB and AD is θ then $\tan\theta =$ What? [Ctg.B.- 17]

- a) $\frac{3}{4}$ b) $\frac{2}{3}$
c) $\frac{1}{2}$ d) $\frac{1}{3}$

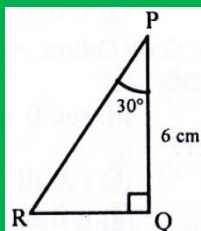
38. If $\cos\theta = \frac{4}{5}$ and θ is acute angle then $\operatorname{cosec}\theta =$ [Ctg.B.- 17]

- a) $\frac{3}{5}$ b) $\frac{2}{5}$
c) $\frac{5}{3}$ d) $\frac{5}{2}$

39. If $\sin 3A = \cos 3A$ then which one is the value of A? [Ctg.B.- 17]

- a) 15° b) 20°
c) 30° d) 40°

40.



In figure then what is the length of PR? [S.B.- 17]

- a) $2\sqrt{3}$ cm b) $4\sqrt{3}$ cm
c) $6\sqrt{3}$ cm d) 12 cm

41. What is the value of $\sec\left(2\pi - \frac{\pi}{4}\right)$?

[S.B.- 17]

- a) $-\sqrt{2}$ b) $-\frac{2}{\sqrt{3}}$
c) $\frac{2}{\sqrt{3}}$ d) $\sqrt{2}$

42. What is the value of $\cos\left(-\frac{25\pi}{6}\right)$?

[J.B.- 17]

- a) $\frac{2}{\sqrt{3}}$ b) $\frac{\sqrt{3}}{2}$
c) $\frac{1}{2}$ d) $\frac{1}{\sqrt{2}}$

43. What is the value of $\tan\left(\frac{-25\pi}{6}\right)$?

[B.B.- 17]

- a) -1 b) $-\frac{1}{\sqrt{3}}$
c) $\frac{1}{\sqrt{3}}$ d) 1

44. If $\cos\theta = -\frac{1}{2}$ and $\pi < \theta \leq \frac{3\pi}{2}$ then which one of the values of $\tan\theta$?

[B.B.- 16]

- a) $-\sqrt{3}$ b) $\frac{1}{\sqrt{3}}$
c) 1 d) $\sqrt{3}$

45. When $\cos\theta = \frac{\sqrt{3}}{2}$ then $\sin 3\theta =$ What? [B.B.- 16]

- a) 0 b) $\frac{\sqrt{3}}{2}$
c) $\frac{1}{2}$ d) 1

46. If $\cos\alpha = -\frac{\sqrt{3}}{2}$ while $\frac{\pi}{2} < \alpha < \pi$ then what is the value of α ? [S.B.- 16]

- a) $\frac{5\pi}{6}$ b) $\frac{2\pi}{3}$
c) $\frac{7\pi}{6}$ d) $\frac{4\pi}{3}$

47. If $P = \frac{\pi}{4}$ and $Q = \frac{3\pi}{4}$ then what is the value of $\cos(P + Q)$? [C.B.- 16]

- a) -1 b) 0
c) 0.5 d) 1

48. If $\sec\theta + \tan\theta = 5$ then $(\sec\theta - \tan\theta) =$ What? [R.B.- 15]

- a) -5 b) $-\frac{1}{5}$
c) $\frac{1}{5}$ d) 5

Creative Questions:

1. $x = a \cos \theta$ and $y = b \sin \theta$ [R.B.- 19]

- If $\frac{x}{y} = 1$ then determine the value of $\frac{a \sin \theta + b \cos \theta}{a \sin \theta - b \cos \theta}$.
- If $x - y = \sqrt{a^2 + b^2 - c^2}$ then prove that, $a \sin \theta + b \cos \theta - c = 0$.
- If $a = 3$ and $b = \sqrt{2}$ then solve the equation $x + y^2 = 3$, where $0 \leq \theta \leq 2\pi$.

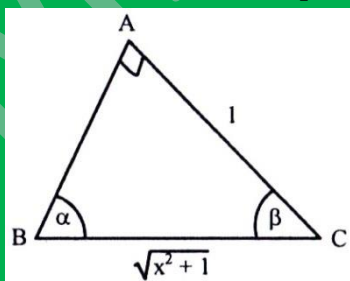
2. $P = 10 \sin^2 \alpha + 6 \cos^2 \alpha$ and $Q = \frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1}$ [J.B.- 19]

- If $\sin A = -\frac{1}{\sqrt{2}}$ then find the value of A, where $0 < A < \frac{3\pi}{2}$.
- If $P = 7$ then evaluate $\cot \alpha$, where $\frac{\pi}{2} < \alpha < \pi$.
- Prove that, $Q = \frac{1 + \sin \theta}{\cos \theta}$.

3. Musa Ebrahim saw that a hill subtends angle of $7'$ at point 540 kilometer from the foot of hill and write an equation is $x = \tan \theta + \sec \theta$. [R.B.- 17]

- Find the height of the hill.
- From the equation find the value of $\sin \theta = \frac{x^2 - 1}{x^2 + 1}$.
- From the equation if $x = 1$ then find the value of θ , where $0^\circ \leq \theta < 90^\circ$.

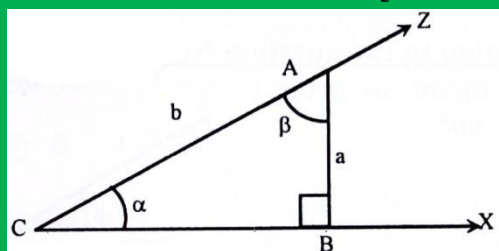
4. [D.B.- 16]



- Find the value of $\sin(\alpha + \beta) + \cos(\alpha + \beta)$.
- Considering the stem prove that, $(\sin \alpha - \cos \alpha)^2 = 1 - 2 \sin \alpha \cdot \cos \alpha$.
- If $x^2 + \frac{1}{x^2} = 2$ then find the value of α .

5.

[C.B.- 16]

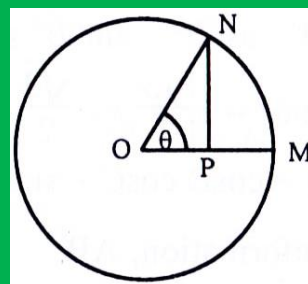


- Find the value of $\sec \alpha$.
- If $a = 1$ and $b = 2$ then prove that, $\cos 3\beta = 4 \cos^3 \beta - 3 \cos \beta$.
- If $a + \sqrt{b^2 - a^2} = \sqrt{2}b$ then find the value of β .

6. $P = a \cos \theta$ and $Q = b \sin \theta$. [J.B.- 16]

- Find the value of $\frac{P^2}{a^2} + \frac{Q^2}{b^2}$.
- If $P - Q = c$ prove that, $a \sin \theta + b \cos \theta = \pm \sqrt{a^2 + b^2 - c^2}$.
- If $a^2 = 3, b^2 = 7$ and $Q^2 + P^2 = 4$ then prove that, $\tan \theta = \pm \frac{1}{\sqrt{3}}$.

7.

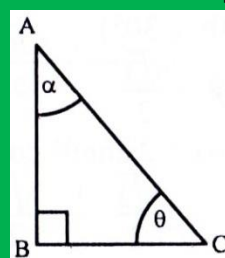


In the figure, O is the centre of a circle and $OM = \text{arc } MN$. [Dj.B.- 16]

- Express θ in degree.
- Prove that, θ is a constant angle.
- Determine for what value of θ then $\frac{PN}{ON} + \frac{OP}{ON} = \sqrt{2}$, where $0 < \theta < 2\pi$.

8.

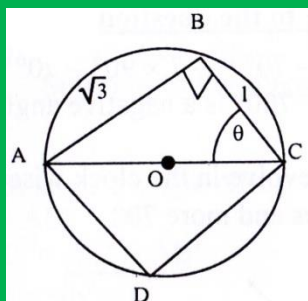
[Ctg.B.- 16]



- Find the quadrant in which -700° lie with figure.

- b) If $\left(\frac{AC}{BC}\right)^2 + \left(\frac{AB}{BC}\right)^2 = \frac{5}{3}$ then find the value of θ .
- c) According to the stem $\sin 2\alpha = 2\sin\alpha \cdot \cos\alpha = \frac{2\tan\alpha}{1 + \tan^2\alpha}$.

9.



ABCD is a cyclic quadrilateral with centre O of the circle ABCD.

[S.B.- 16]

- a) Find the value of θ in circular system.
- b) In ΔABC then show that, $\cos(B + C) = \cos B \cdot \cos C - \sin B \cdot \sin C$.
- c) What is the speed of the wheel if ABCD is a circular wheel and it revolve ten times in a second?

Exercise-8.3

Trigonometry

Creative Multiplication Choice Questions

1. If $\sin\theta = \frac{y}{x}$ then find the value of $\tan\left(\frac{3\pi}{2} - \theta\right)$. [My.B.- 20]

- a) $\frac{\sqrt{x^2 - y^2}}{y}$ b) $\frac{\sqrt{x^2 - y^2}}{x}$
 c) $\frac{y}{\sqrt{x^2 - y^2}}$ d) $\frac{x}{\sqrt{x^2 - y^2}}$

2. For any real value of θ . [My.B.- 20]

- i. $\sin 3\theta = 3\sin\theta - 4\sin^3\theta$
 ii. $\cos 2\theta = 2\cos^2\theta - 1$
 iii. $\cos 3\theta = 3\cos\theta - 4\cos^3\theta$

Which one of the following is correct?

- a) i and ii b) i and iii
 c) ii and iii d) i, ii and iii

3. If $\tan\theta = \frac{3}{4}$ and $\pi < \theta < \frac{3\pi}{2}$ then find the value of $\cos\theta$. [C.B.- 20]

- a) $-\frac{5}{4}$ b) $-\frac{4}{5}$
 c) $\frac{4}{5}$ d) $\frac{5}{4}$

4. In $\tan\theta = -\sqrt{3}$ and $\frac{\pi}{2} < \theta < 2\pi$ then θ will be – [Ctg.B.- 20]

- i. $\frac{2\pi}{3}$
 ii. $\frac{5\pi}{3}$
 iii. $\frac{3\pi}{2}$

Which one of the following is correct?

- a) i and ii b) i and iii
 c) ii and iii d) i, ii and iii

5. $\cot\left(\frac{n\pi}{2} + \theta\right) = 1$ and $\theta = -\frac{\pi}{4}$ then what is the value of n? [J.B.- 20]

- a) 1 b) 2
 c) 4 d) 0

6. If $\theta = \frac{3\pi}{2}$ then – [J.B.- 20]

- i. $\cot\left(\theta + \frac{\pi}{3}\right) = -\sqrt{3}$
 ii. $\sin\left(\theta - \frac{\pi}{6}\right) = -\frac{\sqrt{3}}{2}$
 iii. $\operatorname{Cosec}\left(\theta - \frac{\pi}{6}\right) = \sqrt{2}$

Which one of the following is correct?

- a) i and ii b) i and iii
 c) ii and iii d) i, ii and iii

7. Which of the following is the value of $\cos^2\frac{\pi}{6} - \sin^2\frac{\pi}{6}$? [B.B.- 20]

- a) $\frac{1}{4}$ b) $\frac{1}{2}$
 c) 1 d) $\frac{5}{4}$

8. If $\sin A = \frac{\sqrt{3}}{2}$ and $0 < A < 2\pi$ then -

[D.B.- 19]

- i. $A = \frac{\pi}{3}$
 ii. $A = \frac{2\pi}{3}$
 iii. $A = \frac{4\pi}{3}$

Which one of the following is correct?

- a) i and ii b) ii and iii
 c) i and iii d) i, ii and iii

9. $\sin^2 \theta = \frac{1}{4}$ when $\pi \leq \theta \leq \frac{3\pi}{2}$ then

which is the value of θ ? [R.B.- 19]

- a) $\frac{\pi}{6}$ b) $\frac{5\pi}{6}$
 c) $\frac{7\pi}{6}$ d) $\frac{4\pi}{3}$

10. If $\sec \theta = 2$ and $\frac{3\pi}{2} < \theta < \pi$ then- [C.B.- 19]

- i. $\tan \theta = -\sqrt{3}$
 ii. $\sin \theta = -\frac{\sqrt{3}}{2}$
 iii. $\cos \theta = \frac{1}{2}$

Which one of the following is correct?

- a) i and ii b) ii and iii
 c) i and iii d) i, ii and iii

11. If $\tan \theta = -\sqrt{3}$, $\frac{\pi}{2} \leq \theta < \frac{3\pi}{2}$ then what is the value of θ ? [Dj.B.- 19]

- a) $\frac{\pi}{3}$ b) $\frac{2\pi}{3}$
 c) $\frac{4\pi}{3}$ d) $\frac{5\pi}{6}$

12. $\sin \theta = -\frac{1}{\sqrt{2}}$ then where $\sin \theta$ and $\cos \theta$ are of equal sign. In which quadrant does θ lie? [J.B.- 19]

- a) First b) Second
 c) Third d) Fourth

13. In which quadrant the angle (-980°) lie? [All B.- 18]

- a) First b) Second
 c) Third d) Fourth

14. What is the value of $(\sec^2 \frac{\pi}{3} + \sin^2 \frac{\pi}{4})$? [S.B.- 17]

- a) $\frac{2}{9}$ b) $\frac{1}{2}$
 c) $\frac{17}{4}$ d) $\frac{9}{2}$

15. $\sin^2(-\theta) + \cos^2(\theta) =$ What?

[B.B.- 17]

- a) -1 b) 0
 c) 1 d) Undefined

16. Find the value of $\cos^2 \frac{\pi}{3} - \sin^2 \frac{\pi}{4}$ is-

[D.B.- 16]

- a) $-\frac{1}{4}$ b) $-\frac{1}{2}$
 c) $\frac{1}{2}$ d) 1

17. What is the value of $\sin(120^\circ)$?

[D.B.- 16, 15]

- a) $\frac{\sqrt{3}}{2}$ b) $\frac{1}{2}$
 c) $\frac{1}{\sqrt{2}}$ d) $-\frac{1}{2}$

18. The angle 520° lies on which quadrant? [R.B.- 16]

- a) First b) Second
 c) Third d) Fourth

19. Which of the following is the value of $\sin(2\pi - \frac{\pi}{3})$? [R.B.- 16]

- a) $\frac{\sqrt{3}}{2}$ b) $\frac{1}{2}$
 c) $-\frac{\sqrt{3}}{2}$ d) $-\frac{1}{2}$

20. What is the value of $\cos(2\pi + \frac{\pi}{6})$ is - [J.B.- 16]

- a) $-\frac{\sqrt{3}}{2}$ b) $-\frac{1}{\sqrt{3}}$
 c) $\frac{\sqrt{3}}{2}$ d) $\frac{1}{\sqrt{2}}$

21. In which quadrant -240° angle is located? [D.B.- 15]

- a) 1st b) 2nd
 c) 3rd d) 4th

22. $12\sin^2 \theta - 14\sin \theta + 4 = 0$ then $\theta =$ What? $[0 < \theta < \frac{\pi}{2}]$ [D.B.- 15]

- a) 0° b) 30°
 c) 45° d) 60°

23. $\tan(-1140^\circ) =$ What? [R.B.- 15]

- a) $-\sqrt{3}$ b) $-\frac{1}{\sqrt{3}}$
 c) $\frac{1}{\sqrt{3}}$ d) $\sqrt{3}$

24. If $\sin \theta + \cos \theta = \sqrt{2}$ then $\theta =$ What? [R.B.- 15]

- a) 30° b) 45°
 c) 60° d) 90°

25. In which quadrant lies the angle -230° ? [C.B.- 15]

26. What is the value of $\cos(-330^\circ)$? [C.B.- 15]
- a) 1st b) 2nd
c) 3rd d) 4th

- a) $\frac{-\sqrt{3}}{2}$ b) $\frac{-1}{2}$
c) $\frac{1}{2}$ d) $\frac{\sqrt{3}}{2}$

27. Which one is true? [Ctg.B.- 15]

- a) $\sin\left(-\frac{\pi}{6}\right) = \sin\frac{\pi}{6}$
b) $\tan\left(-\frac{\pi}{6}\right) = \tan\frac{\pi}{6}$
c) $\cos\left(-\frac{\pi}{6}\right) = \cos\frac{\pi}{6}$
d) $\operatorname{cosec}\left(-\frac{\pi}{6}\right) = \operatorname{cosec}\frac{\pi}{6}$

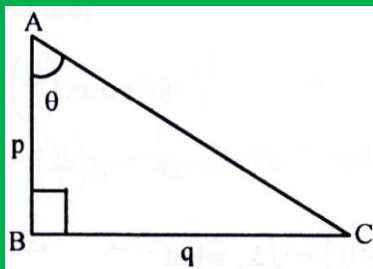
28. If $\sin\theta = \frac{-\sqrt{3}}{2}$, $0 < \theta < \frac{3\pi}{2}$ then what is the value of θ ? [J.B.- 15]

- a) $\frac{5\pi}{3}$ b) $\frac{4\pi}{3}$
c) $\frac{2\pi}{3}$ d) $\frac{\pi}{3}$

29. The angle -665° lies on which quadrant? [J.B.- 15]

- a) First b) Second
c) Third d) Fourth

30.



From the figure – [S.B.- 15]

- i. $\tan\theta = \frac{p}{q}$
ii. $\cos\theta = \frac{p}{\sqrt{p^2 + q^2}}$
iii. $\sin\theta = \frac{q}{\sqrt{p^2 + q^2}}$

Which one of the following is correct?

- a) I b) i and iii
c) ii and iii d) i, ii and iii

31. If $\sin\theta = \frac{b}{a}$ ($a > b > 0$) then – [C.B.- 15]

- i. $\tan\theta = \frac{b}{\sqrt{a^2 - b^2}}$
ii. $\cot\theta = \frac{\sqrt{a^2 - b^2}}{b}$
iii. $\sec\theta = \frac{\sqrt{a^2 - b^2}}{a}$

Which one of the following is correct?

- a) i and ii b) i and iii

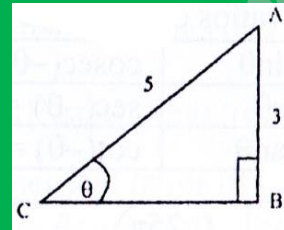
32. If $\sin\theta + \cos\theta = 1$ then $\theta =$ What? [S.B.-15]

- i. 0°
ii. 30°
iii. 90°

Which one of the following is correct?

- a) i and ii b) i and iii
c) ii and iii d) i, ii and iii

In view of the given figure answer the questions No. (33 – 34):



33. $\sin A + \cos C =$ What? [Ctg.B.- 15]

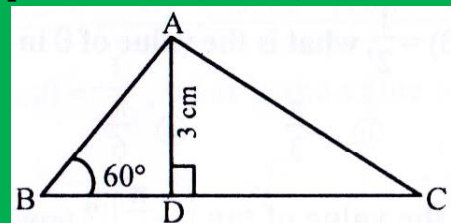
- a) $\frac{3}{4}$ b) $\frac{4}{5}$
c) $\frac{3}{4}$ d) $\frac{3}{5}$

34. Which one is the value of $\cot\theta$?

[Ctg.B.- 15]

- a) $\frac{4}{3}$ b) $\frac{5}{4}$
c) $\frac{3}{4}$ d) $\frac{3}{5}$

In view of the given figure answer the questions No. (35 – 36):



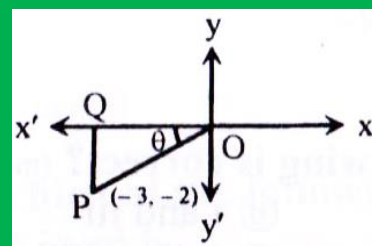
In $\triangle ABC$, $\angle A = 90^\circ$

35. $BD =$ What? [S.B.- 15]

- a) $\frac{1}{\sqrt{3}}$ b) $\sqrt{3}$
c) $2\sqrt{3}$ d) $3\sqrt{3}$

36. $AC =$ What? [S.B.- 15]

- a) $\frac{3}{2}$ cm b) $2\sqrt{3}$ cm
c) $3\sqrt{2}$ mc d) 6 cm



Answer to the question No. (37 – 38) from the above figure:

37. In ΔPOQ , $\tan \theta =$ What? [B.B.- 15]

- a) $-\frac{3}{2}$ b) $-\frac{2}{3}$
 c) $\sqrt{3}$ d) $\frac{2}{3}$

38. In ΔPOQ , $\cot\theta + \operatorname{cosec}^2\theta =$ What? [B.B.- 15]

- a) $-\frac{19}{4}$ b) $-\frac{7}{4}$
 c) $\frac{7}{4}$ d) $\frac{19}{4}$

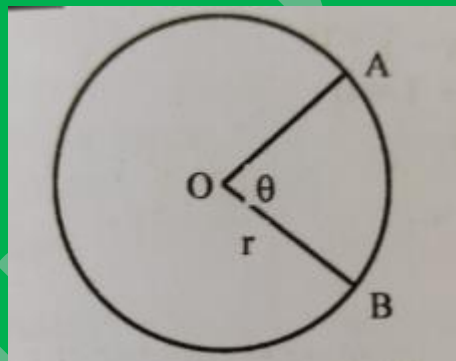
Creative Questions:

1. $P = 3\tan^2\theta - 4\sqrt{3}\sec\theta + 7$ and $Q = 15\sin^2A + 2\cos A$ where A is acute angle.

[D.B.- 20]

- a) Express $30^{\circ}15'36''$ into radian.
 b) If $P = 0$ and $0 < \theta < 2\pi$ then find the value of θ .
 c) If $Q = 7$ then find the value of $\tan A$.

2.



- a) Show that: $\cos\frac{17\pi}{10} + \cos\frac{13\pi}{10} + \cos\frac{9\pi}{10} + \cos\frac{\pi}{10} = 0$.
 b) If $\theta = 60^{\circ}$ and $r = 50$ km then find the time to go from A to B with speed 5 km/hour.
 c) From an equation with the sum of square of \cot and cosec ratio of θ angle equal to 3 then solve the equation, where $0 < \theta < 2\pi$.

3. If $f(x) = \cos x$ then – [R.B.- 20]

- a) If $\tan\theta = \frac{3}{4}$ then find the value of $\operatorname{cosec}\theta$.
 b) If $f(\theta) + f(\frac{\pi}{2} - \theta) = \sqrt{2}$ then determine the value of θ , where $0^{\circ} \leq \theta \leq \frac{\pi}{2}$.
 c) If $f(\frac{\pi}{2} - \theta) + f(\theta) = \sqrt{2}f(\theta)$ then prove that, $f(\theta) - f(\frac{\pi}{2} - \theta) = \sqrt{2}f(\frac{\pi}{2} - \theta)$.

4. $\sqrt{3}\sin x - \cos x = P$ and $\cot(\frac{3\pi}{2} - B) = Q$.

[Dj.B.- 20]

- a) An arc makes an angle 30° of circle with radius 10 cm. Find the length of the arc.
 b) If $Q = \sqrt{3}$ then prove that, $\cos 3B = 4\cos^3 B - 3\cos B$.

c) If $P = 2$ and $0 \leq x \leq 2\pi$ then find the value of x .

5. If $p\sin\theta + q\cos\theta = r$ and $\tan\alpha = x - \sec\alpha$ then – [C.B.- 20]

- Express in degree the angle between the minute hand and hour hand of a clock when it is 8 : 30.
- Prove that, $p\cos\theta - q\sin\theta = \pm \sqrt{p^2 + q^2 - r^2}$.
- If $x = 2\cos\alpha$ then find the value of α , where $0 < \alpha < 2\pi$.

6. If $A = \tan\theta + \sec\theta$ then – [Ctg.B.- 20]

- If $\cos\alpha = -\frac{1}{\sqrt{2}}$ and $\frac{\pi}{2} < \alpha < \pi$ then find the value of α .
- If $A = x$, then prove that, $\sec\theta = \left(\frac{x}{2} + \frac{1}{2x}\right)$.
- If $A = \sqrt{3}$ then find the values of θ , where $0 \leq \theta \leq 2\pi$.

7. If $M = \operatorname{cosec}\theta + \cot\theta$ and $N = 2\cos^2\theta + 3\sin\theta$ then – [S.B.- 20]

- Express $36'9''$ in radians.
- If $N = 3$ then find the value of θ , where $0 < \theta < \pi$.
- If $M = p$ then prove that, $\sec\theta = \frac{p^2 + 1}{p^2 - 1}$.

8. If $A = \sec\alpha + \tan\alpha$ and $B = \cot^2\theta + \operatorname{cosec}^2\theta$ then – [J.B.- 20]

- Determine in which quadrant do the angle -840° lie draw the picture.
- Show that, $(A^2 - 1)\operatorname{cosec}\alpha = A^2 + 1$.
- If $B = \frac{5}{3}$ then find the value of θ , where $0 < \theta < 2\pi$.

9. If $P = \operatorname{cosec}x + \cot x$ and $Q = 13\sin\theta - 5$ then – [B.B.- 20]

- If $\sin\theta = -\frac{\sqrt{3}}{2}$ where $\frac{\pi}{2} < \theta < \frac{3\pi}{2}$ then find the value of θ .
- Prove that, $\operatorname{cosec}x = \frac{1 + P^2}{2P}$.

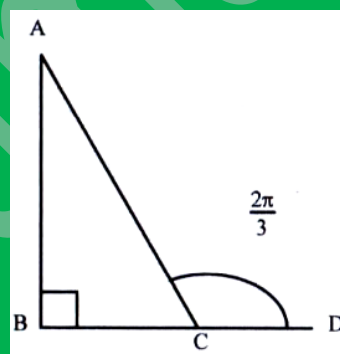
c) If $Q = 0$ and $\sin\theta$ is positive and $\cos\theta$ is negative then find the value of $\frac{\tan\theta - \sec(-\theta)}{\cot\theta - \operatorname{cosec}(-\theta)}$.

10. $\tan\theta = a$, $\sec\theta = b$ and $\frac{\cos\theta}{1 - \sin\theta} = c$.

[D.B.- 19]

- The measures of the three angles of a triangle are in the ratio 5 : 6 : 7. Express the smallest angle in radians.
- Prove that, $\frac{a+b-1}{a-b+1} = c$.
- If $c = \sqrt{3}$ then find the value of θ , where $0 < \theta \leq 2\pi$.

11. (i)



(ii) $2\sin\alpha \cos\alpha + 1 = 2\cos\alpha + \sin\alpha$ [Dj.B.- 19]

- If $\cos\theta = -\frac{4}{5}$ and $0 < \theta < \pi$ then find the value of $\tan\theta$.
- Prove that, $\cot(A + C) = \frac{\cot A \cot C - 1}{\cot C + \cot A} + \cot B$.
- Find the solution of the equation given in (ii), where $0 \leq \alpha \leq 2\pi$.

12. $X = \frac{\cot A + \operatorname{cosec}A - 1}{\cot A - \operatorname{cosec}A + 1}$ and $Y = \cot A - \operatorname{cosec}A$. [C.B.- 19]

- If $A = \frac{2\pi}{3}$ then find the value of Y .
- Prove that, $XY = -1$.
- If $Y = (\sqrt{3})^{-1}$ and $0 \leq A \leq 2\pi$ then find the value of A .

13. $M = \tan\theta$, $N = \sec\theta$ and $P = \sin\theta$.

[S.B.- 19]

- Given that the radius of the Earth is 6440 km. What is distance of two places

on the surface of the earth which subtend an angle of 7° at the centre of the Earth?

- b) Prove that, $\frac{1-M-N}{N-M-1} = \sqrt{\frac{1+P}{1-P}}$.
- c) If $P^2N - \frac{1}{N} = 1$ then find the value of θ , where $0 \leq \theta \leq 2\pi$.

14. $A = 15\cos^2\alpha + 2\sin\alpha$, $\frac{\pi}{2} < \alpha < \pi$, and $B = 3\sin^2\theta + 5\cos^2\theta$. [B.B.- 19]

- a) Prove that, Radian angle is a constant angle.
- b) Find the value of $\cot\alpha$ if $A = 7$.
- c) Find the value of θ where $B = 4$.

15. $P = \tan\theta + \sec\theta$ and $Q = \cot^2\theta + \operatorname{cosec}^2\theta$. [All B.- 18]

- a) Determine the value of $\sec\theta - \tan\theta$.
- b) Show that, $\cos\theta = \frac{2p}{p^2+1}$.
- c) If $Q = 3$ then solve the given equation where $0 < \theta < 2\pi$.

16. $\sin A + \cos A = P$ and $Q = \sec\theta - \tan\theta$. [D.B.- 17]

- a) Express $32'4''$ in radians.
- b) If $P = 1$ then prove that, $\sin A - \cos A = \pm 1$.
- c) Find the value of θ where as $Q = (\sqrt{3})^{-1}$ (Where θ is acute angle).

17. $A = \sec\theta + \tan\theta$ and $B = \cos\left(-\frac{25\pi}{6}\right)$. [C.B.- 17]

- a) Find the value of B .
- b) If $A = x$, then show that, $\sin\theta = \frac{x^2-1}{x^2+1}$.
- c) Find the value of θ when $A = \sqrt{3}$ and $0 < \theta < 2\pi$.

18. If $\cot\theta + \operatorname{cosec}\theta = m$ then [C.B.- 17]

- a) Find the value of $\operatorname{cosec}\theta - \cot\theta$.
- b) If $m = 2$ then show that, $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \frac{1 + \sin\theta}{\cos\theta}$.

- c) If $m = \sqrt{3}$ then find the value of $0 \leq \theta \leq 2\pi$.

19. If $f(x) = \sin x$ then - [S.B.- 17]

- a) Find the length of the arc which subtends an angle 60° at the centre of a circle with radius 5 cm.
- b) If $af(\theta) + bf\left(\frac{\pi}{2} - \theta\right) = c$ then prove that, $af\left(\frac{\pi}{2} - \theta\right) + bf(\theta) = \pm\sqrt{a^2 + b^2 - c^2}$.
- c) Solve: $f(x) + f\left(\frac{\pi}{2} - x\right) = \sqrt{2}$ where $0 \leq x \leq 2\pi$.

20. If $7\sin^2\theta + 3\cos^2\theta = p$ - [J.B.- 17]

- a) If $\theta = \frac{\pi}{4}$ find the value of P .
- b) If $P = 4$ then prove that, $\cot\theta = \pm\sqrt{3}$.
- c) If $P = 6$ and $0 < \theta < 2\pi$ find the possible value of θ .

21. $A = x\cos\theta$ and $B = y\sin\theta$, where $0 < \theta < 2\pi$. [B.B.- 17]

- a) Find the value of $\frac{A^2}{x^2} + \frac{B^2}{y^2}$.
- b) If $A + B = Z$ Prove that, $x\sin\theta - y\cos\theta = \pm\sqrt{x^2 + y^2 - z^2}$.
- c) If $x^2 = 3, y^2 = 7$ and $A^2 + B^2 = 4$ then find the value of θ .

22. Suppose $P = \frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1}$ and $Q = \sec\theta + \tan\theta$. [B.B.- 16]

- a) If $\tan 10x = \cot 5x$ then find the value of x .
- b) Show that, $P = Q$.
- c) If $Q = \sqrt{3}$ and $0 < \theta < 2\pi$ then find the value of θ .

Basic Information:



- ❖ Bartholomeo Pitiscus (1561 – 1613) was a Trigonometrician, Astronomer and Theologian of 16th century.
- ❖ He is the first person who used the word “Trigonometry” in his famous article “Trigonometria : sive de solutione triangulorum tractatus brevis et perspicuus”.
- ❖ He developed the trigonometric table of Rheticus.



- Ancient Mathematician (Hipparchus, 180 BC – 25 BC) first

using trigonometric table solved the series of ‘arc’ and ‘chord’.

- For this he is called the Father of Trigonometry.
- Using the Claudius and Ptolemy table, he extracted many important information.
- His contribution is not limited to Trigonometry only, using his knowledge he also contributed in Astronomy in 135 BC he discovered the list of Stars.