Trigonometry

01. $r = 18cm$ $\quad \theta = 20°$

$\theta = \cancel{20} \times \frac{\pi}{\cancel{180}_9}$

$S = r\theta$

$S = 18 \times \frac{\pi}{9} = 2\pi = 2(3.142)$

$\boxed{S = 6.28 \text{ cm}}$ B cm

02. $\tan^2 45° - \cos^2 60° = A \sin 45° \cos 45° \tan 60°$

$(1)^2 - \left(\frac{1}{2}\right)^2 = A \frac{1}{\sqrt{2}} \frac{1}{\sqrt{2}} \sqrt{3}$

$1 - \frac{1}{4} = \frac{A}{2} \times \sqrt{3}$

$\frac{3}{\cancel{4}_2} = \frac{A}{\cancel{2}}$

$\frac{3}{2\sqrt{3}} = A$

$A = \frac{\sqrt{3}}{2} = \sin 60°$ A

03. $\cos^4\alpha - \sin^4\alpha$

$(\cos^2\alpha)^2 - (\sin^2\alpha)^2$

$(\cos^2\alpha - \sin^2\alpha)(\cos^2\alpha + \sin^2\alpha)$

$(\cos^2\alpha - \sin^2\alpha) \times 1$

$\cos^2\alpha - \sin^2\alpha$ B Ans

04. In Terms of $\sec\theta$ $\sin\theta$?

$\because \sin^2\alpha + \cos^2\alpha = 1$

$\cos^2\alpha = 1 - \sin^2\alpha$

$\sin^2\alpha = 1 - \cos^2\alpha$

$\sin^2\alpha = 1 - \frac{1}{\sec^2\alpha}$

$\sin^2\alpha = \frac{\sec^2\alpha - 1}{\sec^2\alpha}$

Taking $\sqrt{\ }$

$\sin\alpha = \frac{\sqrt{\sec^2\alpha - 1}}{\sec\alpha}$ D

5. All of these (All are fundamental Laws)

7. $\sin^2\frac{\pi}{6} + \sin^2\frac{\pi}{3} + \tan^2\frac{\pi}{4}$

$\left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 + (1)^2$

$\frac{1}{4} + \frac{3}{4} + 1 = \frac{1+3+4}{4}$

$\frac{8}{4} = 2$ (B) Ans.

8. $\sin(x-30^\circ) = \cos(2x-60^\circ)$ $x=?$

put option 'B'

$\sin(60^\circ - 30^\circ) = \cos(2\times 60^\circ - 60^\circ)$

$\frac{1}{2} = \cos 120^\circ$

$\frac{1}{2} = \frac{1}{2}$ (B) Ans.

6. $\tan\theta = \frac{8}{15}$

$\operatorname{cosec}^2\theta - \cot^2\theta = 1$

$\operatorname{cosec}^2\theta = 1 + \cot^2\theta$

$= 1 + \frac{1}{\tan^2\theta}$

$= 1 + \frac{1}{\left(\frac{8}{15}\right)^2}$

$= 1 + \frac{1}{\frac{64}{225}}$

$= 1 + \frac{225}{64}$

$\sqrt{\operatorname{cosec}^2\theta} = \sqrt{\frac{64+225}{64}} = \frac{17}{8}$

For IIIrd quadrant.

$\operatorname{cosec}\theta = -\frac{17}{8}$ (A)

9. $y = 1\cos\theta + 1\sin\theta$

Range $= \pm\sqrt{a^2+b^2}$ for

$y = a\cos\theta + b\sin\theta$

$a=1, \quad b=1$

$= \sqrt{1^2+1^2} = \sqrt{2}$

$[-\sqrt{2}, \sqrt{2}]$ (C) Ans

10. $\sin\left(\frac{\phi}{2}\right) = \frac{-1}{4}$

$\cos\phi = ?$

$\sin\frac{\phi}{2} = \sqrt{\frac{1-\cos\phi}{2}}$

sq. b.s

$\left(\frac{-1}{4}\right)^2 = \left(\sqrt{\frac{1-\cos\phi}{2}}\right)^2$

$\frac{1}{\cancel{16}\,8} = \frac{1-\cos\phi}{\cancel{2}}$

$\cos\phi = 1 - \frac{1}{8} = \frac{7}{8}$ D

11. $\cos(\alpha+\beta) = -1$

$\boxed{\alpha+\beta = \cos^{-1}(-1) = \pi}$

$\sin(2\alpha+\beta) = \sin\beta$

$\therefore \sin(360+\theta) = \sin\theta$

$\alpha+\beta = \pi$

$\beta = \pi - \alpha$

$\sin(\pi-\alpha)$

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

$\sin\alpha$ A

12. $\cos 100 + \sin 10^\circ$

$\cos(90^\circ + 10^\circ) + \sin 10^\circ$

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

$-\cancel{\sin 10^\circ} + \cancel{\sin 10^\circ}$

0

13. $\frac{\sin 3000^\circ}{\sin 1000^\circ} - \frac{\cos 3000^\circ}{\cos 1000^\circ}$

$\frac{\sin 3000 \cos 1000 - \cos 3000 \sin 1000}{\sin 1000 \cos 1000^\circ}$

$\sin\alpha\cos\beta - \cos\alpha\sin\beta = \sin(\alpha-\beta)$

$\frac{\sin(3000-1000)}{\sin 1000^\circ \cos 1000^\circ}$

$\frac{(\sin 2000^\circ) \times 2}{2(\sin 1000^\circ \cos 1000^\circ)}$

$\sin 2\theta = 2\sin\theta\cos\theta$

$\frac{2\sin 2000}{\sin 2(1000)} = \frac{2\sin 2000}{\sin 2000}$

2

C

(14) $3\sin p + 4\cos p = r\sin(p+\theta)$

$r = \sqrt{(3)^2 + (4)^2}$

$r = \sqrt{9+16} = 5$

(A)

(18) $y = 2 + 3\cos(4x+9)$

$y = \frac{2\pi}{4}$

$y = \frac{\pi}{2}$ (D)

(15) (D) $\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$

(19) $f(x) = 3\sin^2 5x$.

$\sin^2 x = \frac{1-\cos 2x}{2}$

$\sin^2 5x = \frac{1-\cos 10x}{2}$

Period $= \frac{2\pi}{10} = \frac{\pi}{5}$

(B) Ans.

(16) $\sin 28^\circ < \cos 23^\circ$

because there graph has Inverse values. (C)

Ans

(17) $y = 3 + 2(\tan)(x-9)$

$y = \pi$ (Period)

(D)

(20) $y = \tan 3x$

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

(D) $y = \sec 6x$

$p = \frac{\cancel{2}\pi}{\cancel{6}3}$

(D) Ans

(21) $y = \cos 2x$

when cross x-axis $y=0$

$0 = \cos 2x$

$2x = \cos^{-1}(0)$

$2x = \frac{\pi}{2}$

$x = \frac{\pi}{4}$ (B)

(23) $\sin y = \frac{\sqrt{3}}{2}$

$y = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right) = 60^\circ$

$y = 180^\circ - 60^\circ = 120^\circ$

(D)

(25) $3\sin\alpha = 6\sin\beta = 2\sqrt{3}\sin\gamma$

$3\sin\alpha = 6\sin\beta$, $6\sin\beta = 2\sqrt{3}\sin\gamma$

$\frac{a}{b} = \frac{\sin\alpha}{\sin\beta} = \frac{\cancel{6}2}{\cancel{3}}$, $\frac{\cancel{6}3}{\cancel{2}\sqrt{3}} = \frac{\sin\gamma}{\sin\beta}$

$a:b = 2:1$, $\frac{3}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sin\gamma}{\sin\beta}$

(A) $\frac{\sqrt{3}}{1} = \frac{c}{b}$ $a:b:c = 2:1:\sqrt{3}$

(22) $x = \sin x$

Put option B

$0 = \sin 0$

$0 = 0$

(B) Ans

(24) (C) Ans b/c

$a\sin\beta = b\sin\alpha$

$\frac{a}{\sin\alpha} = \frac{b}{\sin\beta}$

(26) $\alpha = 90^\circ$ $\sin^2\beta + \sin^2\gamma = ?$

$\alpha + \beta + \gamma = 180^\circ$

$90^\circ + \beta + \gamma = 180^\circ$

$\beta + \gamma = 90^\circ$

$\boxed{\beta = 90 - \gamma}$

$\sin^2(90-\gamma) + \sin^2\gamma$

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

$\cos^2\gamma + \sin^2\gamma$

1

(B) Ans

(27) $b = 2 \qquad \beta = 30^\circ$

$$R = \frac{b}{2\sin\beta}$$

$$R = \frac{2}{2\sin 30^\circ}$$

$$R = \frac{2}{\cancel{2}\left(\frac{1}{\cancel{2}}\right)} = 2\text{ cm}$$

(28) $a = 6\text{ cm} \qquad \alpha = 60^\circ$

$$R = \frac{a}{2\sin\alpha}$$

$$R = \frac{6}{2\sin 60^\circ}$$

$$R = \frac{6}{\cancel{2}\left(\frac{\sqrt{3}}{\cancel{2}}\right)} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$R = \frac{2\cancel{6}\sqrt{3}}{\cancel{3}}$$

(C) Ans

(29) $a = 5, \quad b = 5\sqrt{3}, \quad c = 10$

$$H^2 \stackrel{?}{=} b^2 + p^2$$

$$(10)^2 = (5)^2 + (5\sqrt{3})^2$$

$$100 = 100$$

$$\Delta = \frac{1}{2}\, b \times h$$

$$= \frac{1}{2}(5)(5\sqrt{3})$$

$$= \frac{25\sqrt{3}}{2}$$

(B) Ans

(30). $\sin^{-1}\left(\frac{1}{2}\right)$

$$\alpha = \sin^{-1}\left(\frac{1}{2}\right)$$

$$\sin\alpha = \frac{1}{2}$$

$$\boxed{\alpha = 30^\circ} \text{ or } \frac{\pi}{6}$$

(A) ans

$\tan^{-1}\left(\frac{5}{12}\right)$

Let,

$\alpha = \tan^{-1}\left(\frac{5}{12}\right)$

$\tan\alpha = \frac{5}{12} = \frac{P}{B}$

$\sin\alpha = \frac{P}{H} = \frac{5}{\sqrt{12^2+5^2}} = \frac{5}{\sqrt{169}}$

$\sin\alpha = \frac{5}{13}$

$\alpha = \sin^{-1}\left(\frac{5}{13}\right)$ (B) A

(33) $\sin\left[\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right]$

$\sin\left[\frac{\pi}{3} - \left(-\frac{\pi}{3}\right)\right]$

$\sin\left(\frac{2\pi}{3}\right) = 1/2$ (D) An

(32) $\operatorname{cosec}^2\alpha = \frac{4}{3}$

$\sin^2\alpha = \frac{3}{4}$

$\sqrt{}$ Oub.S

$\sqrt{\sin^2\alpha} = \sqrt{\frac{3}{4}}$

$\sin\alpha = \pm\frac{\sqrt{3}}{2}$; $\sin\alpha = -\frac{\sqrt{3}}{2}$

$\sin\alpha = \frac{\sqrt{3}}{2}$, $\alpha = -60^\circ$

$\alpha = 60^\circ$ or 120° , $\alpha = 240^\circ$

(D) All.

(34) $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{1}{5}\right)$

$\tan^{-1}A + \tan^{-1}B = \tan^{-1}\left(\frac{A+B}{1-AB}\right)$

$= \tan^{-1}\left(\frac{\frac{1}{4}+\frac{1}{5}}{1-\frac{1}{4}\times\frac{1}{5}}\right)$

$= \tan^{-1}\frac{\frac{9}{\cancel{20}}}{\frac{19}{\cancel{20}}}$

(A) ans

(35) $(1-\cos^2\theta)(1+\cot^2\theta)$

$\sin^2\theta \times \operatorname{cosec}^2\theta$

$\cancel{\sin^2\theta} \times \frac{1}{\cancel{\sin^2\theta}}$

1

(36) $\sec\theta = \frac{6}{5}$ $0 \le \theta \le 2\pi$ $\sin\theta =$

$\cos\theta = \frac{5}{6}$

$\cos^2\theta + \sin^2\theta = 1$

$\sin^2\theta = 1 - \cos^2\theta$

$\sin^2\theta = 1 - \left(\frac{5}{6}\right)^2$

$\sin^2\theta = \frac{36-25}{36} = \frac{11}{36}$

$\sin\theta = \sqrt{\frac{11}{36}}$ (D)

(37) $\sin\theta + \operatorname{cosec}\theta = 2$

$\sin^2\theta + \operatorname{cosec}^2\theta = ?$

$(\sin\theta + \operatorname{cosec}\theta)^2 = (2)^2$

$\sin^2\theta + 2\sin\theta\operatorname{cosec}\theta + \operatorname{cosec}^2\theta = 4$

$\sin^2\theta + 2\cancel{\sin\theta}\left(\frac{1}{\cancel{\sin\theta}}\right) + \operatorname{cosec}^2\theta = 4$

$\boxed{\sin^2\theta + \operatorname{cosec}^2\theta = 4-2 = 2}$

(A)

(38) $\cot\theta > 0$ and $\operatorname{cosec} < 0$

III rd quadrant

(39) $\sec\theta \tan\theta < 0$

Both product is Negative
so in IInd quadrat

(40) -1035°

you can

$$\begin{array}{r} 1035 \\ 720 \\ \hline 315 \end{array}$$

-315° left

which is in 1st quadrant.