Trigonometry : 1 : Answers

1) $3\sin x = 2$

$\sin x = \frac{2}{3}$

$\alpha = 41.8^\circ$

Sin +ve 1st + 2nd

$x = 41.8^\circ, 138.2^\circ$

2) $4\cos x + 1 = 0$

$\cos x = -\frac{1}{4}$

$\alpha = 75.5^\circ$

Cos -ve 2nd + 3rd

$x = 104.5^\circ, 255.5^\circ$

3) $0 = 7 + 4\tan x$

$\frac{-7}{4} = \tan x$

$\alpha = 60.3^\circ$

tan -ve 2nd + 4th

$x = 119.7^\circ, 299.7^\circ$

4) $\sqrt{2}\sin x = -1$

$\sin x = -\frac{1}{\sqrt{2}}$

$\alpha = 45^\circ$

Sin -ve 3rd + 4th

$x = 225^\circ, 315^\circ$

5) $0.2\cos x = \frac{1}{20}$

$\cos x = \frac{1}{4}$

$\alpha = 75.5^\circ$

Cos +ve 1st + 4th

$x = 75.5^\circ, 284.5^\circ$

6) $\tan(x+10^\circ) = -1$

$\alpha = 45^\circ$

tan -ve 2nd + 4th

$x + 10^\circ = 135^\circ, 315^\circ$

$x = 125^\circ, 305^\circ$

7) $\sin(x-20^\circ) = 0.5$

$\alpha = 30^\circ$

Sin +ve 1st + 2nd

$x - 20^\circ = 30^\circ, 150^\circ$

$x = 50^\circ, 170^\circ$

8) $\cos 2x = -0.5$

$\alpha = 60^\circ$

Cos -ve 2nd + 3rd

$2x = 120^\circ, 240^\circ, 480^\circ, 600^\circ$

$x = 60^\circ, 120^\circ, 240^\circ, 300^\circ$

9) $4\tan 2x = 8$

$\tan 2x = 2$

$\alpha = 63.4^\circ$

tan +ve 1st + 3rd

$2x = 63.4^\circ, 243.4^\circ, 423.4^\circ, 603.4^\circ$

$x = 31.7^\circ, 121.7^\circ, 211.7^\circ, 301.7^\circ$

10) $\sin(2x+20^\circ) = \frac{1}{2}$

$\alpha = 30^\circ$

Sin +ve 1st + 2nd

$2x+20^\circ = 30^\circ, 150^\circ, 390^\circ, 510^\circ$

$2x = 10^\circ, 130^\circ, 370^\circ, 490^\circ$

$x = 5^\circ, 65^\circ, 185^\circ, 245^\circ$

11) $\cos(2x-40^\circ) = -\frac{1}{2}$

$\alpha = 60^\circ$

Cos -ve 2nd + 3rd

$2x-40^\circ = 120^\circ, 240^\circ, 480^\circ, 600^\circ$

$2x = 160^\circ, 280^\circ, 520^\circ, 640^\circ$

$x = 80^\circ, 140^\circ, 260^\circ, 320^\circ$

12) $\tan(2x-10^\circ) = \sqrt{3}$

$\alpha = 60^\circ$

tan +ve 1st and 3rd

$2x-10^\circ = 60^\circ, 240^\circ, 420^\circ, 600^\circ$

$2x = 70^\circ, 250^\circ, 430^\circ, 610^\circ$

$x = 35^\circ, 125^\circ, 215^\circ, 305^\circ$

13) $2\sin(2x+50^\circ) = -\sqrt{3}$

$\sin(2x+50^\circ) = -\frac{\sqrt{3}}{2}$

$\alpha = 60^\circ$

Sin -ve 3rd + 4th

$2x+50^\circ = 240^\circ, 300^\circ, 600^\circ, 660^\circ$

$2x = 190^\circ, 250^\circ, 550^\circ, 610^\circ$

$x = 95^\circ, 125^\circ, 225^\circ, 305^\circ$

14) $2\cos(2x-30^\circ) = \sqrt{3}$

$\cos(2x-30^\circ) = \frac{\sqrt{3}}{2}$

$\alpha = 30^\circ$

Cos +ve 1st + 4th

$2x-30^\circ = 30^\circ, 330^\circ, 390^\circ, 690^\circ$

$2x = 60^\circ, 360^\circ, 420^\circ, 720^\circ$

$x = 30^\circ, 180^\circ, 210^\circ, 360^\circ$

15) $5\tan(2x-70^\circ) + \sqrt{2} = 0$

$\tan(2x-70^\circ) = -\frac{\sqrt{2}}{5}$

$\alpha = 15.8^\circ$

tan -ve 2nd + 4th

$2x-70^\circ = 164.2^\circ, 344.2^\circ, 524.2^\circ, 704.2^\circ$

$2x = 234.2^\circ, 414.2^\circ, 594.2^\circ, 774.2^\circ$ ← Too BIG

$x = 117.1^\circ, 207.1^\circ, 297.1^\circ$

1) $\sin(2x + 50^\circ) = 0.9$ $\quad 0^\circ$ to 180°

$\alpha = 64.1^\circ$

Sin +ve 1st and 2nd

$2x + 50^\circ = 64.1^\circ, 115.9^\circ, 424.1^\circ$

$2x = 14.1^\circ, 65.9^\circ, 374.1^\circ$

$x = 7.1^\circ, 33.0^\circ, 187.1^\circ$ TOO BIG

2) $\cos\left(\frac{x}{2} - 10^\circ\right) = \frac{-\sqrt{3}}{2}$ $\quad 0^\circ$ to 720°

$\alpha = 30^\circ$

Cos -ve 2nd + 3rd

$\frac{x}{2} - 10^\circ = 150^\circ, 210^\circ, 510^\circ$

$\frac{x}{2} = 160^\circ, 220^\circ, 520^\circ$

$x = 320^\circ, 440^\circ, 1040^\circ$

ok TOO BIG

$\therefore x = 320^\circ, 440^\circ$

3) $\tan(2x - 30^\circ) = \frac{\sqrt{3}}{3}$ $\quad -180^\circ \leq x \leq 180^\circ$

$\alpha = 30^\circ$

tan +ve 1st + 3rd

$2x - 30^\circ = 30^\circ, 210^\circ, 390^\circ, 570^\circ, -330^\circ, -150^\circ$ (-360, -360)

$2x = 60^\circ, 240^\circ, 420^\circ, 600^\circ, -300^\circ, -120^\circ$

$x = 30^\circ, 120^\circ, 210^\circ, 300^\circ, -150^\circ, -60^\circ$

$\therefore x = -150^\circ, -60^\circ, 30^\circ, 120^\circ$

4) $\sin(3x + 80^\circ) = \sqrt{3}/2$

$\alpha = 60^\circ$

Sin +ve 1st + 2nd

$3x + 80^\circ = 60^\circ, 120^\circ, 420^\circ, 480^\circ, 780^\circ, 840^\circ, -300^\circ, -240^\circ, -660^\circ, -600^\circ$ (-360, -360, -360, -360)

$3x = -20^\circ, 40^\circ, 340^\circ, 400^\circ, 700^\circ, 760^\circ, -380^\circ, -320^\circ, -740^\circ, -680^\circ$

$x = -6.7^\circ, 13.3^\circ, 113.3^\circ, 133.3, -126.7^\circ, -106.7^\circ$

ALL OTHERS are outside range