5.1 Exercises.

3. Show that the point is on the unit circle.

$\left(\frac{3}{5}, -\frac{4}{5}\right)$

soln:

For a unit circle, $x^2+y^2=1$

$\therefore \left(\frac{3}{5}\right)^2 + \left(\frac{-4}{5}\right)^2 = \frac{9}{25} + \frac{16}{25} = \frac{25}{25} = 1$

5. $\left(\frac{3}{4}, -\frac{\sqrt{7}}{4}\right)$

soln.

$\left(\frac{3}{4}\right)^2 + \left(-\frac{\sqrt{7}}{4}\right)^2 = \frac{9}{16} + \frac{7}{16} = \frac{16}{16} = 1$

7 $\left(-\frac{\sqrt{5}}{3}, \frac{2}{3}\right)$

soln.

$\left(-\frac{\sqrt{5}}{3}\right)^2 + \left(\frac{2}{3}\right)^2 = \frac{5}{9} + \frac{4}{9} = \frac{9}{9} = 1$

Find the missing coordinates

9. $P\left(-\frac{3}{5}, ___\right)$ quadrant III

soln.

$x^2+y^2=1$

$\left(\frac{3}{5}\right)^2 + y^2 = 1$

$\frac{9}{25} + y^2 = 1$

$y^2 = 1 - \frac{9}{25} = \frac{16}{25}$.

$y = \frac{4}{5}$. But in Q(III) $y = -\frac{4}{5}$.

$\therefore P\left(-\frac{3}{5}, -\frac{4}{5}\right)$

11. $P(___, \frac{1}{3})$, in Quadrant II

soln:

$x^2 + y^2 = 1$

$\therefore x^2 + (\frac{1}{3})^2 = 1$

$\therefore x^2 + \frac{1}{9} = 1$

$x^2 = 1 - \frac{1}{9} = \frac{8}{9}$

$x = \frac{\sqrt{8}}{3}$ But in Q(II), $x = -\frac{\sqrt{8}}{3}$.

$\therefore P(-\frac{\sqrt{8}}{3}, \frac{1}{3})$ OR $(-\frac{2\sqrt{2}}{3}, \frac{1}{3})$

13. $P(___, -\frac{2}{7})$ in Q(IV)

soln.

$x^2 + y^2 = 1$

$x^2 + (-\frac{2}{7})^2 = 1$

$x^2 + \frac{4}{49} = 1$

$\therefore x^2 = 1 - \frac{4}{49} = \frac{45}{49}$ and $x = \frac{\sqrt{45}}{7}$ in Q(IV)

$\therefore P(\frac{\sqrt{45}}{7}, -\frac{2}{7})$

Find the reference number for:

37. (a) $t = \frac{4\pi}{3}$.

soln.

$\frac{4}{3}\pi - \pi = \frac{\pi}{3}$

(b) $t = \frac{5\pi}{3}$

soln

$\frac{5}{3}\pi - \pi = \frac{2}{3}\pi - \frac{\pi}{3}$

$2\pi - \frac{5}{3}\pi = \frac{\pi}{3}$

(c) $t = -\frac{7}{6}\pi$

soln.

$2\pi - \frac{7}{6}\pi = \frac{5}{6}\pi$

$\pi - \frac{5}{6}\pi = \frac{\pi}{6}$.

(d) $t = 3.5$

soln.

$3.5 - \pi = 3.5 - 3.14 \approx 0.36$

39.

(a) $t = \frac{5}{7}\pi$

soln.

$2\pi - \frac{5}{7} = \frac{2\pi}{7}$

(b) $t = -\frac{7\pi}{4}$

soln.

$\pi - \frac{7}{4}\pi = \frac{2\pi}{4}$

(c) $t = -3$.

soln.

$\pi - 3 = \frac{22}{7} - 3 \approx 0.14$

(d) $t = 5$.

$2\pi - 5 = \frac{44}{7} - 5 \approx 1.28$.

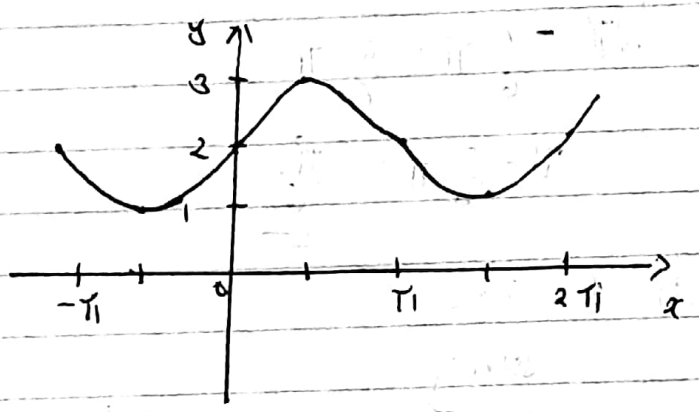
5.3 EXERCISES

Graphing:

5. $2 + \sin x$.

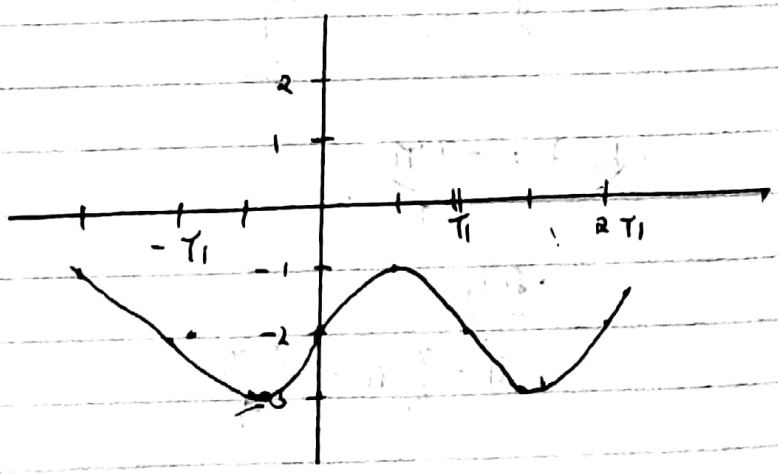
soln.

x	$\sin x$	$2 + \sin x$
0	0	2
$-\pi/2$	-1	1
$\pi/2$	1	3
π	0	2
$\frac{3}{2}\pi$	-1	1
$-\frac{3}{2}\pi$	1	3
2π	0	2



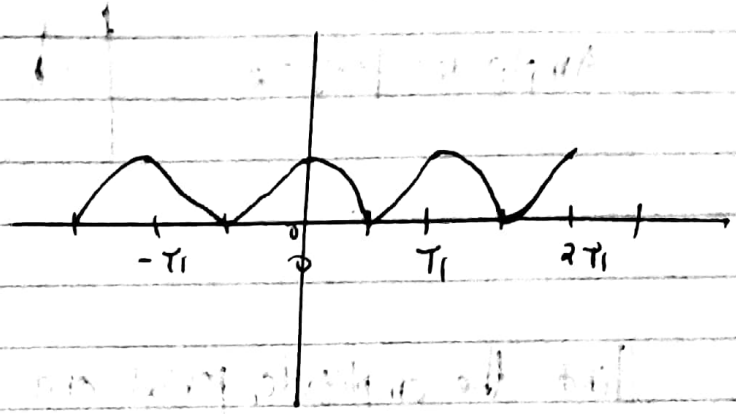
9. $f(x) = -2 + \sin x$.

x	$\sin x$	$-2 + \sin x$
0	0	-2
$-\pi/2$	-1	-3
$\pi/6$	1	-1
π	0	-2
$-\pi$	0	-2
$\frac{3}{2}\pi$	-1	-3
$-\frac{3}{2}\pi$	1	-1
2π	0	-2



(17) $h(x) = |\cos x|$:

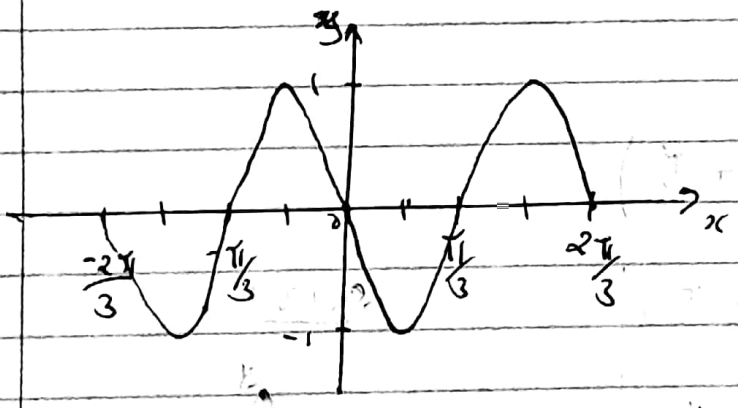
x	$\cos x$	$\lvert\cos x\rvert$
$-\frac{3}{2}\pi$	0	0
$-\pi$	-1	1
$-\pi/2$	0	0
0	1	1
$\pi/2$	0	0
π	-1	1
$\frac{3}{2}\pi$	0	0
2π	1	1



21 $y = -\sin 3x$.

Period $= \frac{2\pi}{k} = \frac{2\pi}{3}$ Amplitude $= |-1| = 1$

sketch:

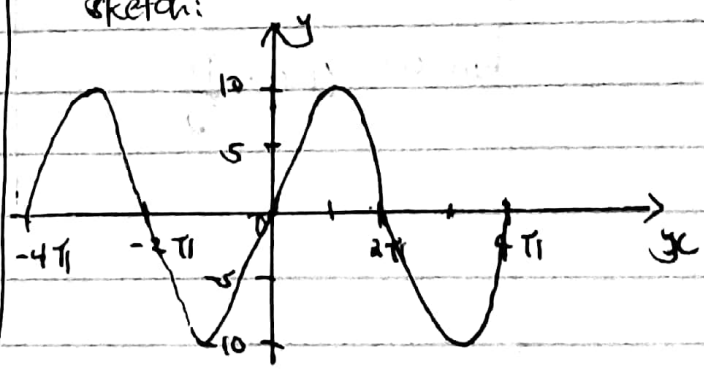


25. $y = 10 \sin \frac{1}{2}x$.

period: $\frac{2\pi}{\frac{1}{2}} = 2\pi \times 2 = 4\pi$

Amplitude $= |10| = 10$.

sketch:

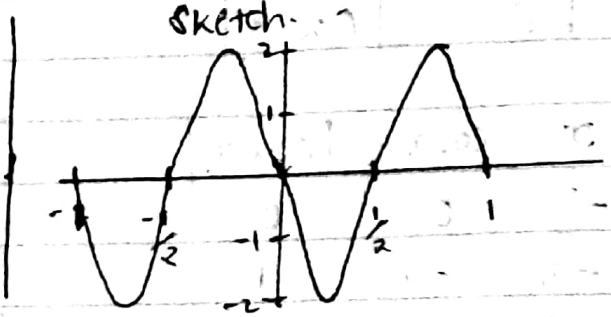


29. $y = -2\sin 2\pi x$

Period: $\frac{2\pi}{2\pi} = 1$

Amplitude: $|-2| = 2$.

Sketch:



Find the amplitude, period and horizontal shift and graph

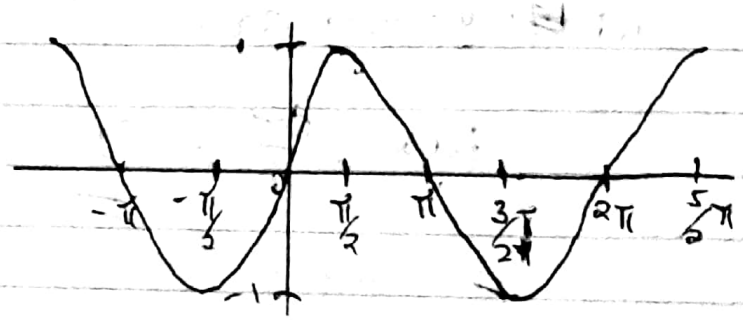
33 $y = \cos\left(x - \frac{\pi}{2}\right)$

amplitude: 1

Period: $\frac{2\pi}{1} = 2\pi$

horizontal shift: $\frac{\pi}{2}$.

Sketch:



37. $y = -4\sin 2\left(x + \frac{\pi}{2}\right)$

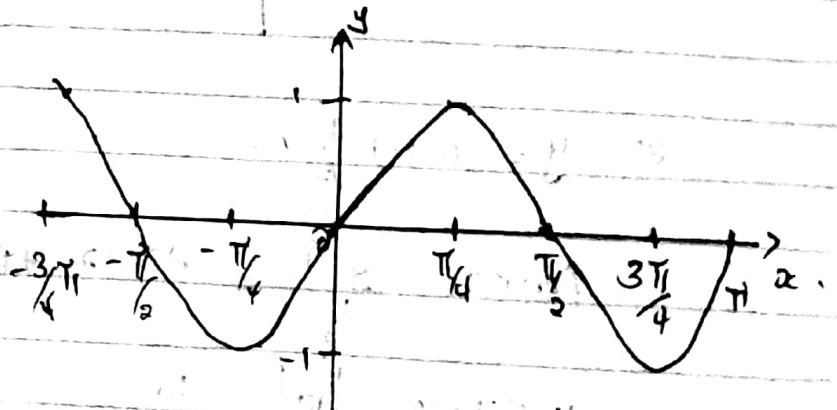
$\Leftrightarrow y = -4\sin(2x + \pi)$

∴ Amplitude: $|-4| = 4$

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

horizontal shift: $-\frac{\pi}{2}$.

Sketch:



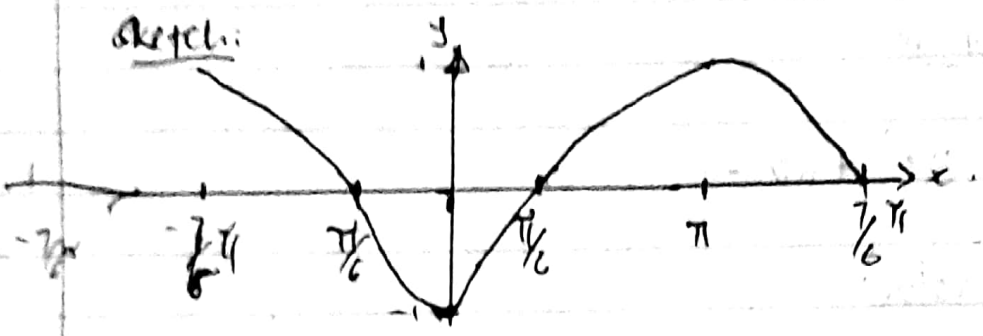
41. $y = \frac{1}{10} - \frac{1}{10}\cos\left(2x - \frac{\pi}{3}\right)$

Amplitude: $\left|-\frac{1}{10}\right| = \frac{1}{10}$.

period: $\frac{2\pi}{2} = \pi$

horizontal shift: $\frac{\pi/3}{2} = \frac{\pi}{6}$.

sketch:



45. $y = \sin(\pi + 3x)$

Amplitude: 1

period: $\frac{2\pi}{3}$

horizontal shift: $-\frac{\pi}{3}$.

sketch:

