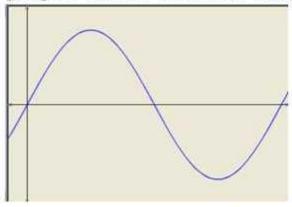
To obtain the graph of $y = 3\sin x$ we first draw the graph of $y = \sin x$ in the interval $[0,2\pi]$. The maximum and minimum values are 3 and -3 respectively.



We have,

$$y = 2 \, sir \left(x - \frac{\pi}{4} \right)$$

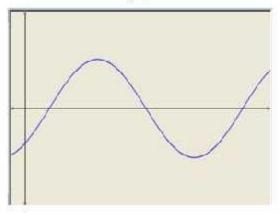
$$\Rightarrow \qquad (y-0) = 2\sin\left(x - \frac{\pi}{4}\right)$$

Shifting the origin at $\left(\frac{\pi}{4},C\right)$, we have

$$x = X + \frac{\pi}{4}$$
 and $y = Y + L$

Substituting these values in $(\tilde{\mathfrak{g}}$, we get

Thus we draw the graph of $Y=2\sin X$ and shift it by $\frac{\pi}{4}$ to the right to get the required graph.



$$y = 2\sin(2x - 1)$$

$$\Rightarrow (y-0) = 2\sin 2\left(x - \frac{1}{2}\right)$$

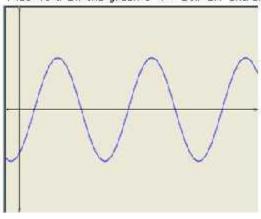
Shifting the origin at $\left(\frac{1}{2}, C\right)$, we have

$$x = x + \frac{1}{2}$$
 and $y = Y = 0$

Substituting these values in (i), we get

$$Y = 2 \sin 2X$$

Thus we draw the graph of Y = 2sin 2X and shift it by 1/2 to the right to get the required graph.



We have,

$$y = 3\sin(3x + 1)$$

$$\Rightarrow (y-0) = 3 \sin 3 \left(x + \frac{1}{5}\right)$$

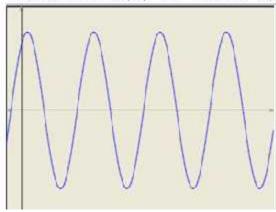
Shifting the crigin at $\left(-\frac{1}{3},0\right)$, we have

$$x - X - \frac{1}{3}$$
 and $y - Y + 0$

Substituting these values in (i), we get

$$Y = 3 \sin 3X$$

Thus we draw the graph of $Y = 3 \sin 3X$ and shift it by 1/3 to the left to get the required graph.



$$y = 3\sin\left(2x - \frac{\pi}{4}\right)$$

$$(y - C) = \sin 2\left(x - \frac{\pi}{8}\right)$$

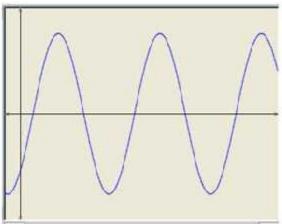
Shifting the orgin at $\left(\frac{\pi}{8}, 3\right)$, we have

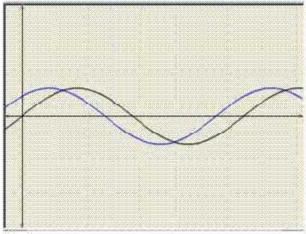
$$X = X + \frac{\pi}{8}$$
 and $y = Y + C$

Substituting these values in $\left(\dot{\eta}\right)$ we get

$$Y = 3 \sin 2X$$

Thus we craw the graph of $V=3\sin 2X$ and shift it by $\frac{\pi}{8}$ to the right to get the required graph.





$$\varphi = \sin\left(x + \frac{\pi}{4}\right)$$

$$\varphi = 0 - \sin\left(x - \frac{\pi}{4}\right)$$

Sh fting the origin at $\left(-\frac{\pi}{4},0\right)$, we obtain

$$x=X-\frac{\pi}{4},\ y=Y+0$$

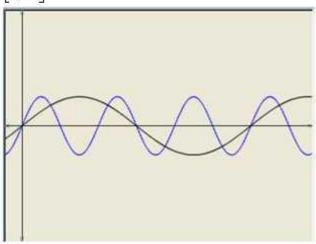
Substituting these values in (i), we get

$$Y = \sin X$$
.

Thus we draw the graph of $Y = \sin X$ and shift it by $\frac{\pi}{4}$ to the left to get the required graph.

(i)

To obtain the graph of $y = \sin 3x$ we first draw the graph of $y = \sin x$ in the interval $[0,2\pi]$ and then divide the x-coordinates of the points where it crosses x-axis by 3.



We have.

$$y - \cos\left(x - \frac{\pi}{4}\right)$$

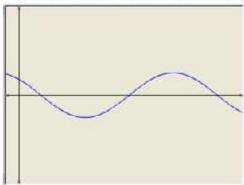
$$\Rightarrow y - \Gamma = \cos\left(x + \frac{\pi}{4}\right) \qquad --- 1$$

Stifting the origin at $\left(-\frac{\pi}{4},0\right)$, we obtain

$$Y-X-\frac{n}{4}\,,\ Y-Y+0$$

Substituting these values in (3), we get

hus we draw the graph of $Y = \cos X$ and shift it by $\frac{\pi}{4}$ to the left to get the required graph



wie dieve,

$$y = \cos\left(x - \frac{x^2}{4}\right)$$

$$\Rightarrow y - 0 - \cos\left(x - \frac{\pi}{4}\right) \qquad ---\left(\frac{x}{4}\right)$$

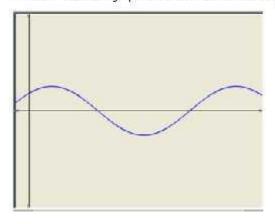
in fing the original $C = C\left(\frac{x}{4}, H\right)$, we notice

$$x = X + \frac{x}{4}, y = Y + 0$$

Substituting those values in ii), we get

$$Y = \cos X$$

Thus we draw the graph of r - $\cos x$ and shift they $\frac{\pi}{z}$ to the right to get the required graph .



W- hаон,

$$y=3\cos\left(2x-1\right)$$

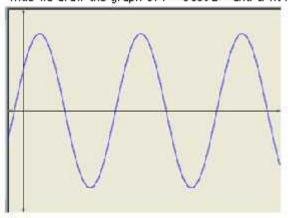
$$\Rightarrow \qquad \left(y_1 - C\right) = 3\cos 2\left(x_1 - \frac{1}{2}\right)$$

Shifting the crigin at $\left(\frac{1}{2},0\right)$, we have

$$x = X + \frac{1}{3}$$
 and $y = y + \frac{1}{3}$

Substituting these values in (i), we get

Thus we draw the graph of $Y = 3\cos 2X$ and shift it by 1/2 to the right to get the required graph.



we have,

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

$$\Rightarrow \qquad \gamma = 0 = 2\cos\left(x - \frac{\pi}{2}\right)$$

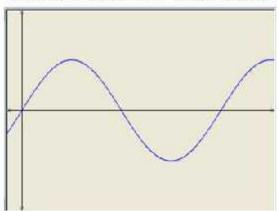
---(i)

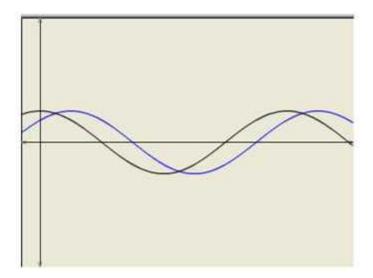
Shifting the origin at $\left(\frac{\pi}{2},0\right)$ we obtain

$$x=X+\frac{\pi}{2}\,,\ y=\gamma+C$$

Substituting these values in (i) , we get

Thus we draw the graph of $V=2\cos X$ and shift it by $\frac{u}{2}$ to the right to get the required graph.





We have,

$$y = \cos 2\left(x - \frac{x}{4}\right)$$

$$\Rightarrow \qquad y - 0 = \cos 2\left(x - \frac{\pi}{4}\right) \qquad ---()$$

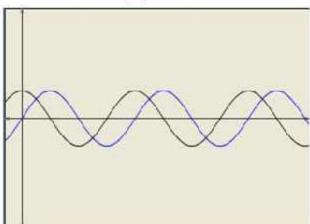
Shifting the origin at $\left(\frac{\pi}{4},\Pi\right)$, we obtain

$$\mathcal{X}=X+\frac{\pi}{4},\ y=Y+0$$

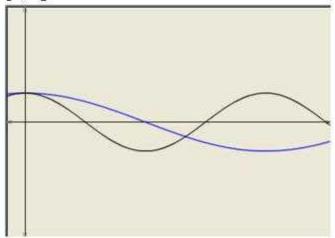
Substituting these values n (i), we get

$$Y = \cos 2X$$

Thus we draw the graph of $Y=\cos2X$ and shift it by $\frac{\pi}{4}$ to the right to get the required graph.



To obtain the graph of $y = \cos \frac{x}{2}$ we first draw the graph of $y = \cos x$ in the interval $[0,2\pi]$ and then divide the x-coordinates of the points where it crosses x-axis by 1/2.



We know that

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

We have,

$$y = \frac{1}{2} - \frac{1}{2}\cos 2x$$

$$\Rightarrow y - \frac{1}{2} - -\frac{1}{2}\cos 2x \tag{i}$$

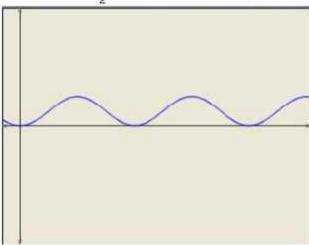
Shifting the origin at $\left(0, -\frac{1}{2}\right)$, we obtain

$$x=X,\ y=Y+\frac{1}{2}$$

Substituting these values in (i), we get

$$Y = -\frac{1}{2}\cos 2X.$$

Thus we draw the graph of $Y = \cos 2x$, adjust the maximum and minimum values to 1/2 and -1/2 and shift it by $\frac{1}{2}$ up to get the required graph.



We know that

$$y = \cos^2 x = \frac{1 + \cos 2x}{2} = \frac{1}{2} + \frac{1}{2}\cos 2x$$

We have,

$$y = \frac{1}{2} + \frac{1}{2}\cos 2x$$

$$\Rightarrow y - \frac{1}{2} = \frac{1}{2}\cos 2x \qquad ---(i)$$

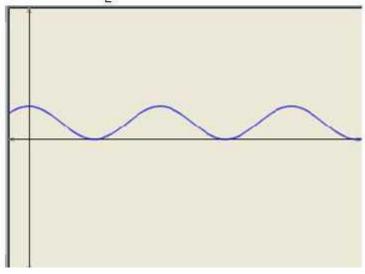
Shifting the origin at $\left(0, -\frac{1}{2}\right)$, we obtain

$$X = X, \ y = Y + \frac{1}{2}$$

Substituting these values in (i), we get

$$Y = -\frac{1}{2}\cos 2X$$

Thus we draw the graph of $Y=\omega s\,2X$, adjust the max mum and minimum values to 1/2 and -1/2 and shift it by $\frac{1}{2}$ down to get the required graph.



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

$$\Rightarrow y - 0 = \sin^2\left(x - \frac{\pi}{4}\right) \qquad ---(i$$

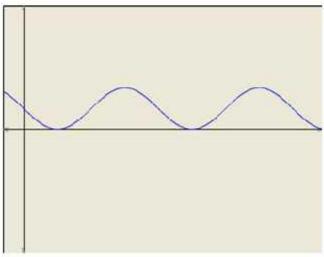
Shifting the crigin at $\left(\frac{\pi}{4}, J\right)$, we obtain

$$x=X+\frac{\pi}{4},\ y=Y+0$$

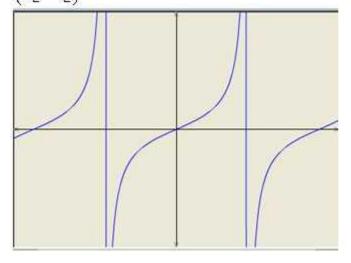
Substituting these values in (i), we get

$$Y = \sin^2 X$$

Thus we draw the graph of $Y=\sin^2 X$ and shift it by $\frac{\pi}{4}$ to the right to get the required graph.

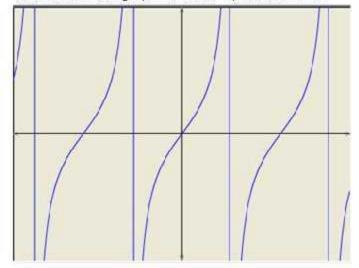


To obtain the graph of $y = \tan 2x$ we first draw the graph of $y = \tan x$ in the interval $\left(-\frac{\pi}{2}, -\frac{\pi}{2}\right)$ and then divide the x-coordinates of the points where it crosses x-axis by 2.

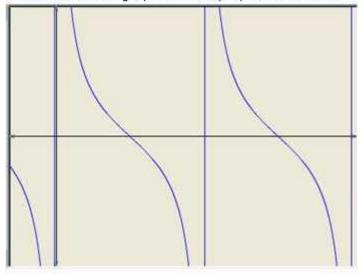


Q5

To obtain the graph of y=2 tan 3x we have craw the graph of y=tan x in the interval $\begin{pmatrix} \pi & \pi \\ 2 & \xi \end{pmatrix}$ and their divide the x-coordinates of the points where it crosses x-axis by 3. We then stratch the graph vertically by a factor of 2.



To obtain the graph of $y = 2 \cot 2x$ we first draw the graph of $y = \cot x$ in the interval $(0,\pi)$ and then divide the x-coordinates of the points where it crosses x-axis by 2. We then stretch the graph vertically by a factor of 2.



We have,

$$y = \cos 2\left(x - \frac{\pi}{6}\right)$$

$$y - 0 = \cos 2\left(x - \frac{\pi}{6}\right)$$
---(i)

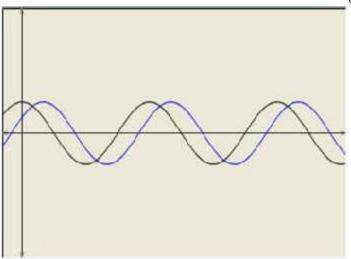
Shifting the origin at $\left(\frac{\pi}{6},0\right)$, we obtain

$$x=X+\frac{\pi}{6}\,,\ y=Y+0$$

Substituting these values in (i), we get

$$Y = \cos 2X$$

Thus we draw the graph of $Y = \cos 2x'$ and shift it by $\frac{\pi}{6}$ to the right to get the required graph.



We know that

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

We have,

$$y = \frac{1}{2} - \frac{1}{2} \cos 2x$$

$$\Rightarrow \qquad y - \frac{1}{2} = -\frac{1}{2} \cos 2x \qquad ---(i)$$

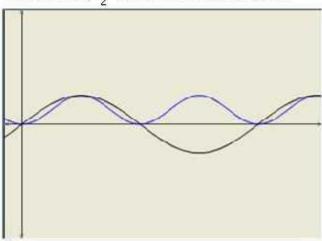
Shifting the origin at $\left(C, -\frac{1}{2}\right)$, we obtain

$$X = X, \ y = Y + \frac{1}{2}$$

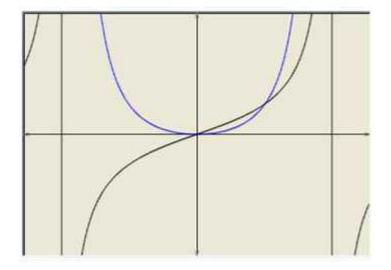
Substituting these values in (i), we get

$$Y = -\frac{1}{2}\cos 2X.$$

Thus we draw the graph of $Y = \cos 2X$, adjust the maximum and minimum values to 1/2 and 1/2 and shift it by $\frac{1}{2}$ up to get the required graph.



Q9



Q10

