RD Sharma Solutions Class 11 Maths Chapter 6 Ex 6.3

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Chapter 6 Graphs of Trigonometric Functions Ex 6.3 Q1

We know that

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

We have,

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

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

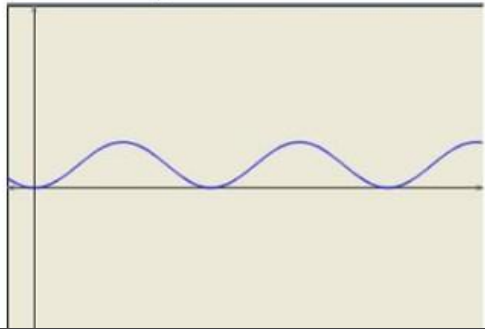
Shifting the origin at $\left(0, -\frac{1}{2}\right)$, we obtain

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

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.



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Chapter 6 Graphs of Trigonometric Functions Ex 6.3 Q2

We know that

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

We have,

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

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

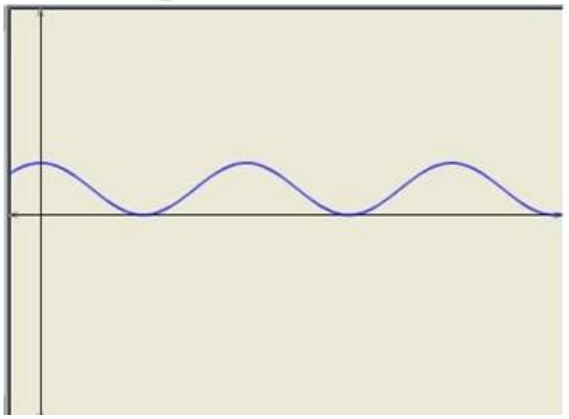
Shifting the origin at $\left(0,-\frac{1}{2}\right)$, we obtain

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

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 $\frac{1}{2}$ down to get the required graph.



Chapter 6 Graphs of Trigonometric Functions Ex 6.3 Q3

We have,

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

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

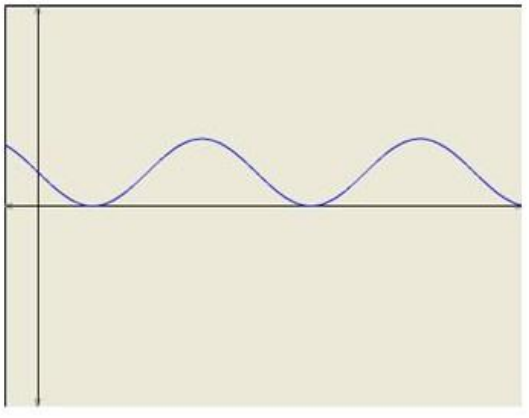
Shifting the origin at $\left(\frac{\pi}{4},0\right)$, we obtain

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

Substituting these values in (i), we get

$$Y = \sin^2 X.$$

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.



Chapter 6 Graphs of Trigonometric Functions Ex 6.3 Q4

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.

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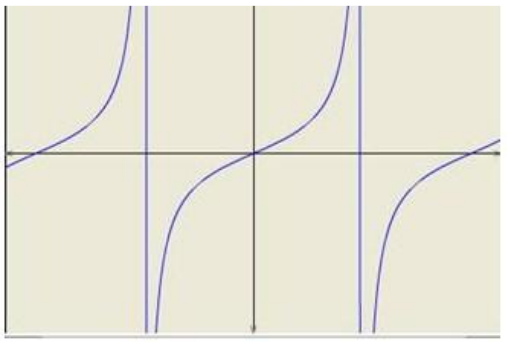
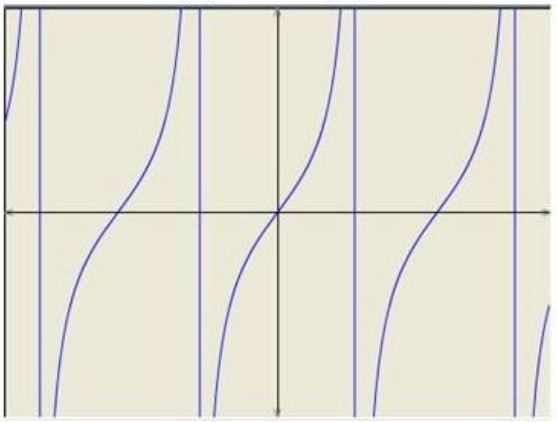


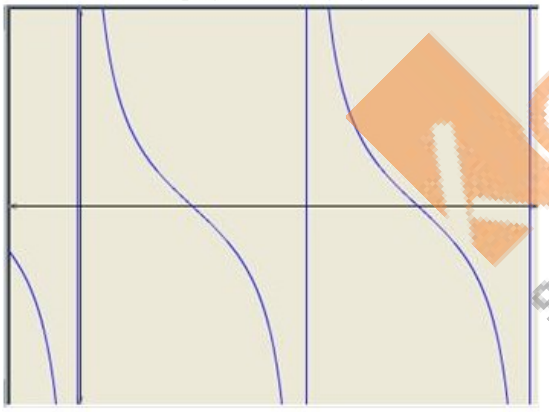
Chapter 6 Graphs of Trigonometric Functions Ex 6.3 Q5

To obtain the graph of $y = 2\tan 3x$ 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 3. We then stretch the graph vertically by a factor of 2.



Chapter 6 Graphs of Trigonometric Functions Ex 6.3 Q6

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.



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Chapter 6 Graphs of Trigonometric Functions Ex 6.3 Q7

We have,

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

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

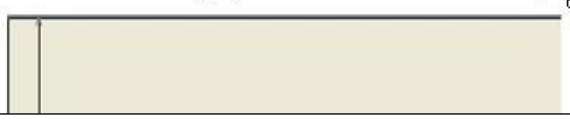
Shifting the origin at $\left(\frac{\pi}{6}, 0\right)$, we obtain

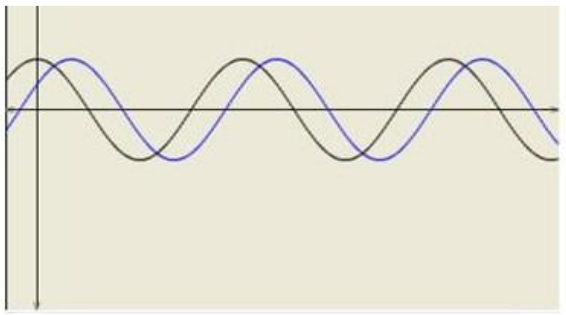
$$x = X + \frac{\pi}{6}, \; y = Y + 0$$

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.





Chapter 6 Graphs of Trigonometric Functions Ex 6.3 Q8

We know that

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

We have,

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

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

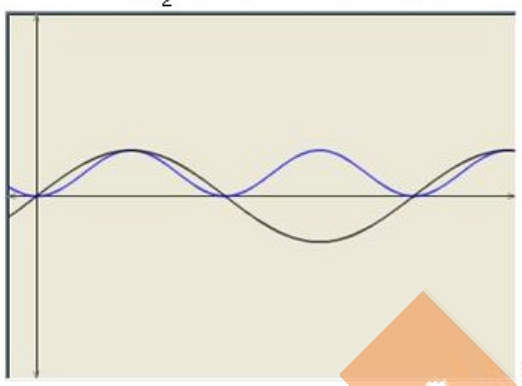
Shifting the origin at $\left(0, -\frac{1}{2}\right)$, we obtain

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

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.



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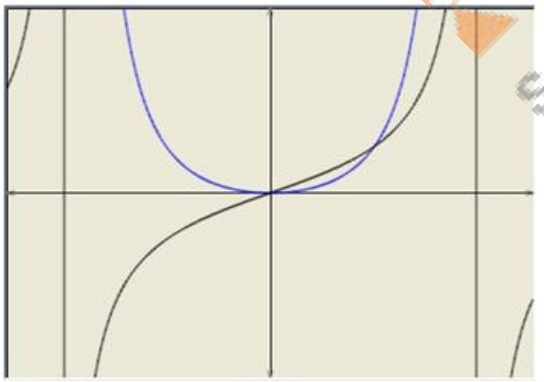
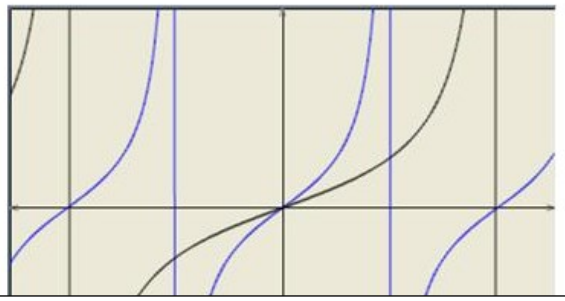
Chapter 6 Graphs of Trigonometric Functions Ex 6.3 Q9



Chapter 6 Graphs of Trigonometric Functions Ex 6.3 Q10



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