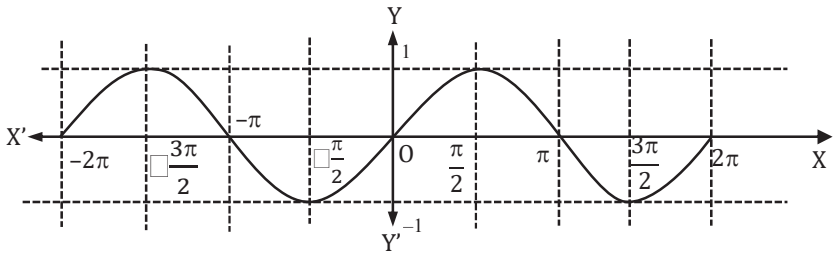
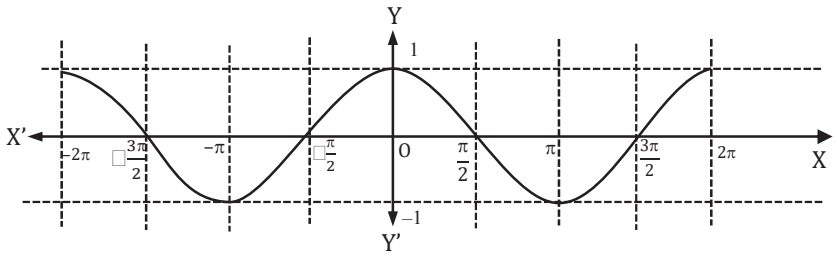
GRAPHS AND OTHER USEFUL DATA OF TRIGONOMETRIC FUNCTIONS

Transformation of the graphs of trigonometric functions

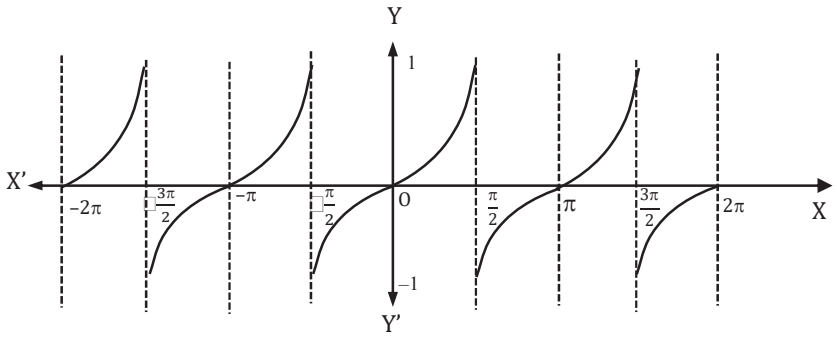
In our learning, we discovered that the values of sine (sin x) and cosine (cos x) start repeating after every 2π units. As a result, the values of cosecant (cosec x) and secant (sec x) follow the same pattern every 2π. Additionally, we found that tan (π + x) is equal to tan x, which means the values of tangent (tan x) repeat after every π units. Since cotangent (cot x) is the reciprocal of tangent, its values also follow this repetition pattern every π. By understanding these patterns in trigonometric functions, we can draw graphs to visualize their behavior.



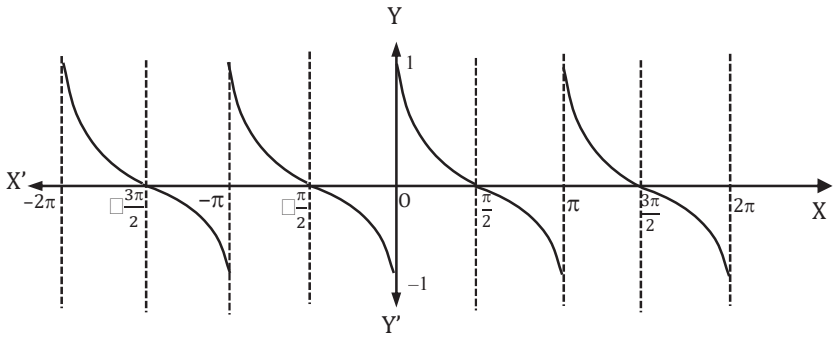
y = sinx



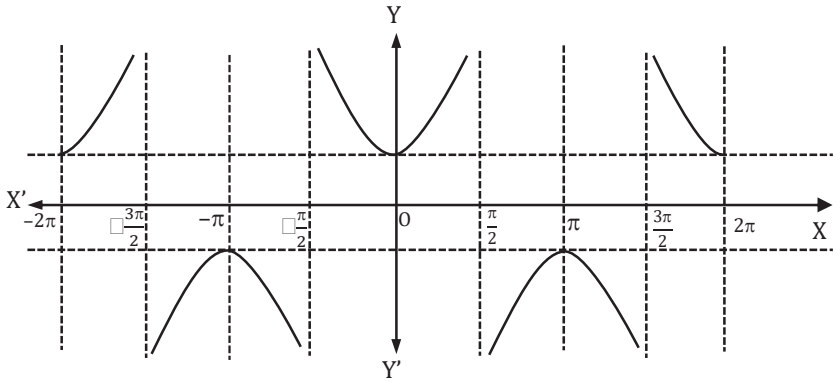
y = cosx



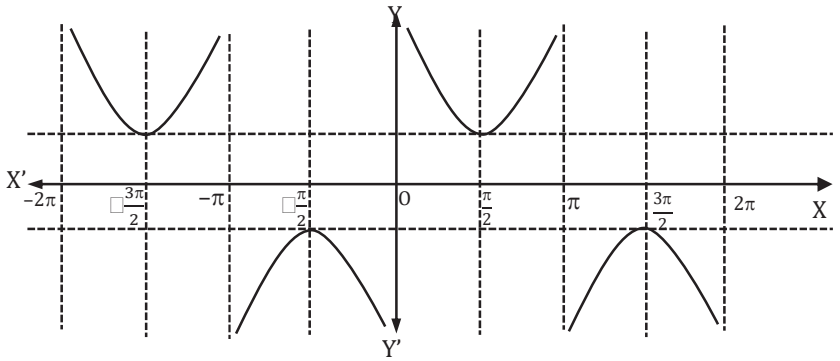
y = tanx



y = cotx



y = secx



y = cosecx

From the above graphs, we can draw the following conclusions.

	I - quadrant	II - quadrant	III - quadrant	IV - quadrant
sin	Increases from 0 to 1	Decreases from 1 to 0	Decreases from 0 to -1	Increases from -1 to 0
cos	Decreases from 1 to 0	Decreases from 0 to -1	Increases from -1 to 0	Increases from 0 to 1
tan	Increases from 0 to ∞	Increases from –∞ to 0	Increases from 0 to ∞	Increases from -∞ to 0
cot	Decreases from ∞ to 0	Decreases from 0 to -∞	Decreases from ∞ to 0	Decreases from 0 to -∞
sec	Increases from 1 to 8	Increases from –∞ to -1	Decreases from –1 to –∞	Decreases from ∞ to 1
cosec	Decreases from ∞ to 1	Increases from 1 to ∞	Increases from –∞ to -1	Decreases from 1 to –∞

In the above table, the statement tan x increases from 0 to ∞ (infinity) for $0 < x < \frac{\pi}{2}$ simply means that tan x increases as x increases for $0 < x < \frac{\pi}{2}$ and assumes arbitrarily large positive values as x approaches to $\frac{\pi}{2}$. Similarly, to say that cosec x decreases from –1 to –∞ (minus infinity) in the fourth quadrant means that cosec x decreases for $x \in (\frac{3\pi}{2}, 2\pi)$ and assumes arbitrarily large negative values as x approaches to 2π. The symbols ∞ and – ∞ simply specify certain types of behavior of functions and variables.