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Class: 3Z1

Date: 15th Sep

MA304.5.2 – Trigonometric Graphs

At the end of this unit, you should be able to

- sketch the three standard graphs of sine, cosine and tangent
- understand and find the period and amplitude of trigonometric graphs

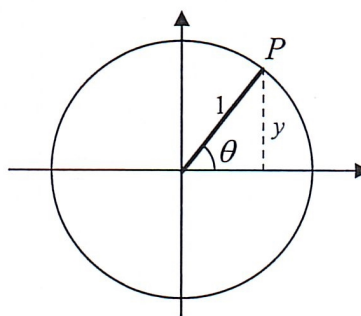
We will first look at the graphs of the three basic functions of trigonometric ratios.

Sine graph

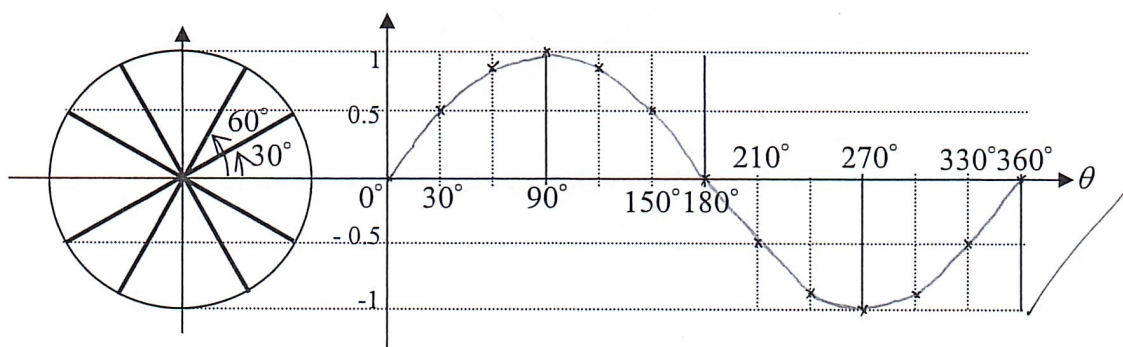
E1. Consider the unit circle (i.e. a circle with radius 1 unit).

(a) Express y in terms of θ .

$$y = \sin \theta.$$



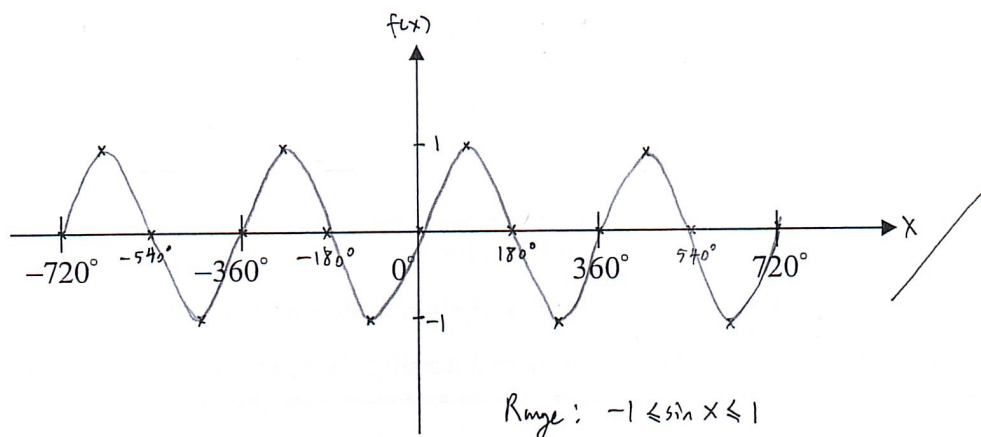
(b) As θ changes, so does the value of y . Trace out the *locus* of y in the diagram below.



(c) Describe the locus in full.

The locus oscillates between -1 and 1, with the amplitude of 1 and period of 2π .

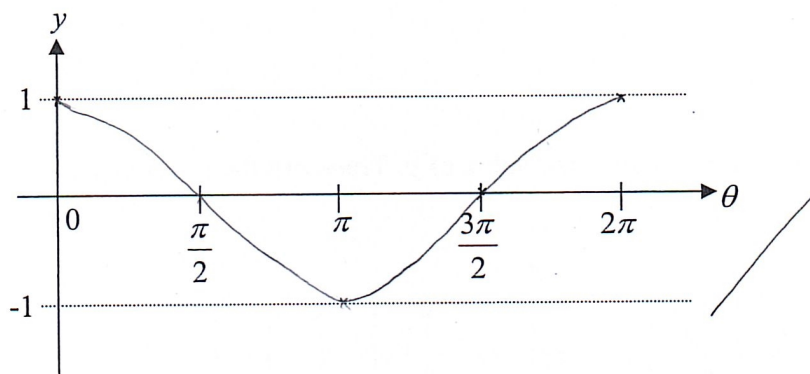
- (d) Sketch below the function $f: x \rightarrow \sin x$ for $-720^\circ \leq x \leq 720^\circ$. What is the corresponding range?



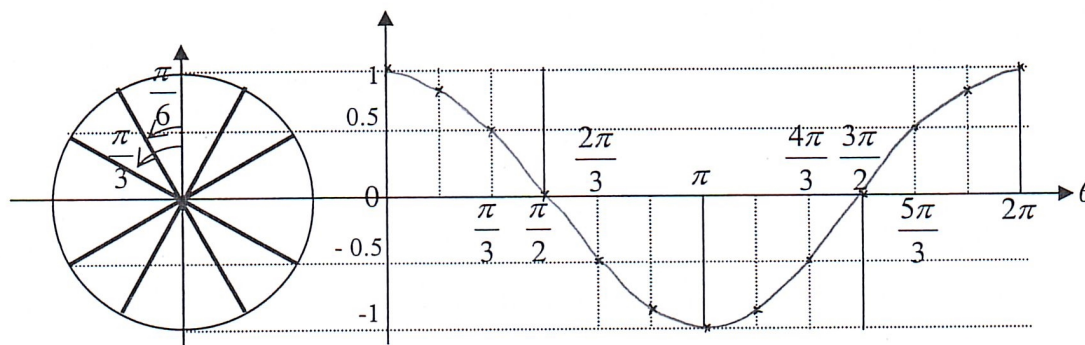
Cosine graph

E2. Sketch the graph of $y = \cos \theta$ for $0 \leq \theta \leq 2\pi$ using the table below.

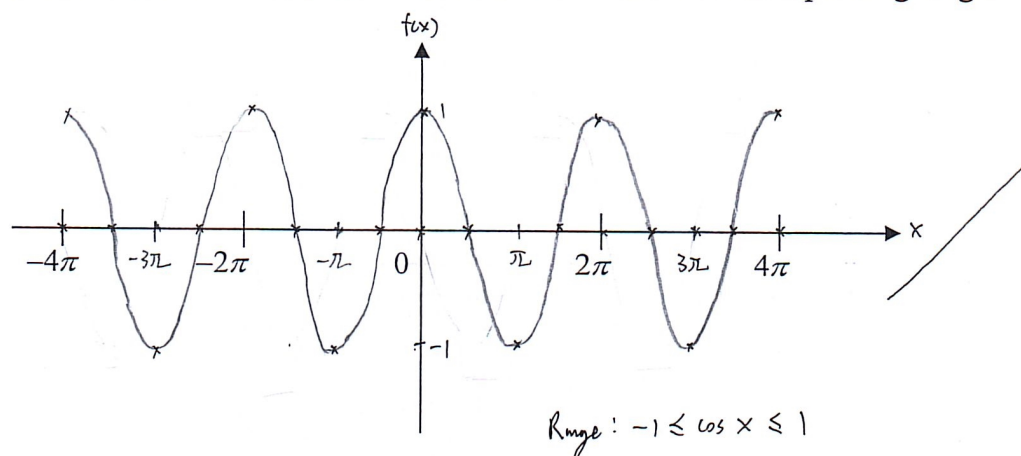
θ	0	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	π	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	2π
$\cos \theta$	1	$\frac{1}{2}$	0	$-\frac{1}{2}$	-1	$-\frac{1}{2}$	0	$\frac{1}{2}$	1



- (a) Using the unit circle, derive the graph of $y = \cos \theta$ in another way.

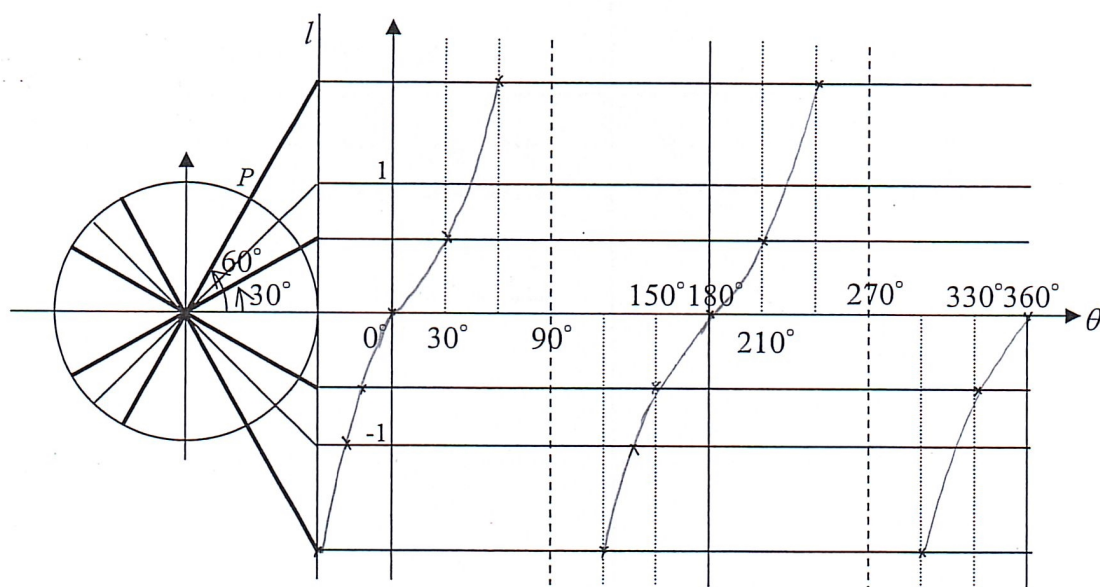


(b) Draw the function $f : x \rightarrow \cos x$ for $-4\pi \leq x \leq 4\pi$. What is the corresponding range?

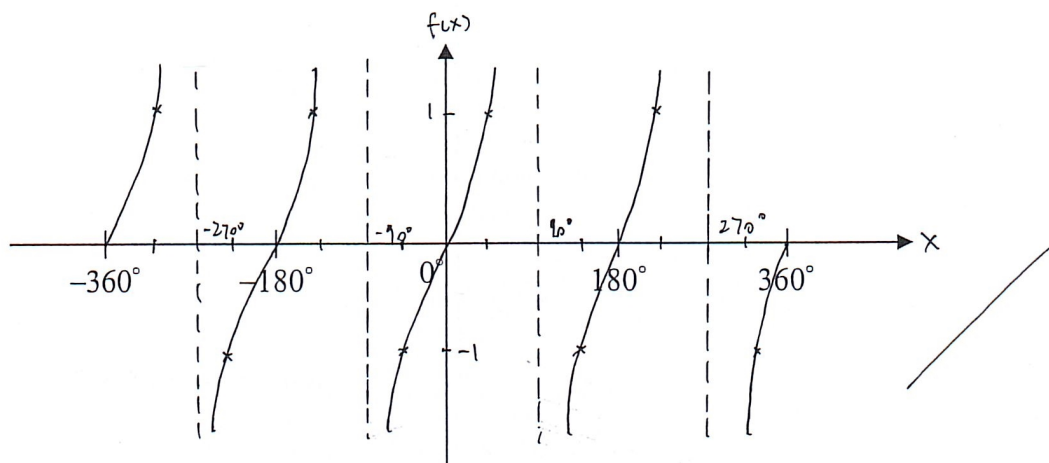


Tangent graph

E3. Consider the following diagram, where a ray from the origin to point P extend towards a line l . Plot the points for the special angles and connect the points with a smooth curve.



P1. Draw the function $f: x \rightarrow \tan x$ for $-360^\circ \leq x \leq 360^\circ$. What is the corresponding range?



P2. Compare the sine, cosine and tangent graphs. List the similarities and differences between them.

Similarities	Differences
They are periodic.	Tangent graphs have an infinite range. Sine and cosine graphs have a range of $-1 \leq \sin(x) / \cos(x) \leq 1$ Tangent graphs have asymptotes. Period is different.