GRADE 11

Trigonometry

WEBSITE NOTES

TOPIC: Trig functions and revision grade 10 trigonometry

- Basic graphs defined by $y = a\ sin\ x$, $y = a\ cos\ x$ and $y = tan\ x$ for $\quad \theta \in [-360^{0};360^{0}]$
- Investigate the effect of k and p on the graphs of the functions defined by:
  $y = sin\ (kx),\ y = cos\ (kx),\ y = tan\ (kx)$

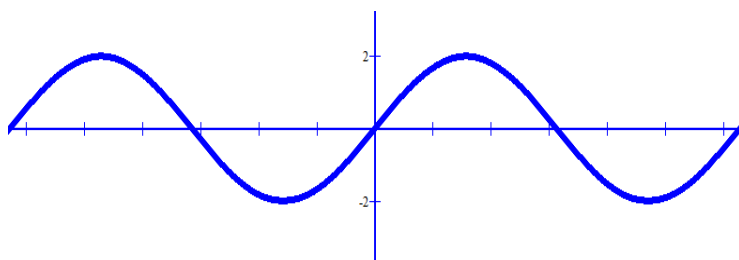- $y = sin(x + p),\quad y = cos(x + p),\ y = tan(x + p))$

Three basic Trig Functions are
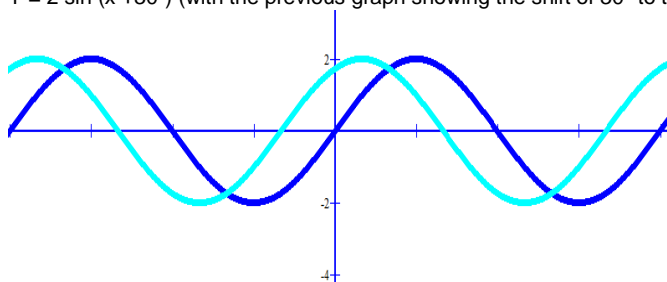
1. $y = a\ sin\ x$
2. $y = a\ cos\ x$
3. $y = tan\ x$

WHERE a REPRESENTS THE AMPLITUDE OF THE GRAPH OF SIN AND COS

Example 1

a. Y = 2 sin x

- Amplitude = 2
- Range [-2;2] – y-values
- Domain [-360⁰; 360⁰]
- Period
  for sin and cos
  (how many degrees it takes
  to complete a complete
  graph) $\dfrac{360°}{value\ in\ front\ of\ x}$
  IN THIS CASE THERE IS 1 BEFORE x BECAUSE THERE IS NO NUMBER SHOWN
  $$\dfrac{360°}{1} = 360°$$

b. Y = 2 sin (x +30⁰) (with the previous graph showing the shift of 30⁰ to the left.

Exercise 2

Consider the following Trig Functions and work out the period of each:

1. Y = sin 2x
2. Y = 2 cos 3x
3. Y= 3 cos 2x
4. Y = 2 tan 2x

- Period
  for sin and cos

  $\dfrac{360°}{value\ in\ front\ of\ x}$
  for tan
  $\dfrac{180°}{value\ in\ front\ of\ x}$

If f(x) = sin x

Function change	Shift	Example
f(x) + c	Shift the graph of f(x) up c units	F(x) = sin x + c
f(x) - c	Shift the graph of f(x) down c units	F(x) = sin x - c
f(x + c)	Shift the graph of f(x) left c units	F(x) = sin (x + c)
f(x - c)	Shift the graph of f(x) right c units	F(x) = sin (x - c)
-f (x)	Reflect the graph of f(x) about the x-axis	F(x) = - sin x
f (-x)	Reflect the graph of f(x) about the y-axis	F(x) = sin (-x)
f(c.x)	Compress the graph of f(x) horizontally by a factor of c. For Trig graphs it will decrease the period.	F(x) = sin (c.x)
c.f(x)	Stretch the graph of f(x) vertically by a factor of c. For Trig graphs it will increase the amplitude.	F(x) = c. sinx

Example 3

Given y = cos x, complete the following table:

Function change	Shift
f(x) + 3	
f(x) – 2	
f(x + 30^0)	
f(x - 45^0)	
-f (x)	
f (-x)	
f(2.x)	
3.f(x)	