



3055 BA SANGAM COLLEGE

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Worksheet 8

School: Ba Sangam College

Year / Level: 13

Subject: Mathematics

Name of student: _____

Strand	4 – Trigonometry
Sub strand	4.2 - Trigonometric Graphs
Content Learning Outcome	Analyze and sketch trig functions

NOTES

(Yr 13 Mathematics Textbook Pg 88 – 90) Trigonometric Graphs

The general form is defined as

$$y = A \sin (Bx \pm C) \pm k \quad \text{or} \quad y = A \cos (Bx \pm C) \pm k$$

$y = A$

Sin
Cos

$(Bx \pm C)$

\pm

k

Amplitude: The height / distance + A means the graph is oriented as usual - A means that the graph is inverted	Shape: + A Sin - A Sin + A Cos - A Cos 	Period: B helps determine the <i>period</i> of the graph (the length of the interval needed for the graph of the function to start repeating itself). $period = \frac{360}{B}$ or $\frac{2\pi}{B}$	C shifts the <i>y</i> -axis or the graph by $\frac{C}{B}$ units. $+\frac{C}{B}$ shifts the <i>y</i> -axis to the right or the graph moves by $\frac{C}{B}$ units to the left. $-\frac{C}{B}$ shifts the <i>y</i> -axis to the left or the graph moves by $\frac{C}{B}$ units to the right	k shifts the <i>x</i> -axis or the graph by k units. + k shifts the <i>x</i> -axis down by k units or the graph moves up by k units - k shifts the <i>x</i> -axis up by k units or the graph moves down by k units
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Example 1

A trigonometric function is defined as $f(x) = 3 \sin (x + \frac{\pi}{4})$

- (i) Write the period of the function $f(x)$.
- ii) What is the amplitude of $f(x)$?
- iii) Sketch $f(x) = 3 \sin (x + \frac{\pi}{4})$ for $0 \leq x \leq 2\pi$
- iv) Write down the coordinates of the maximum point of $f(x)$ for $0 \leq x \leq 2\pi$

Solution

Compare with the general form

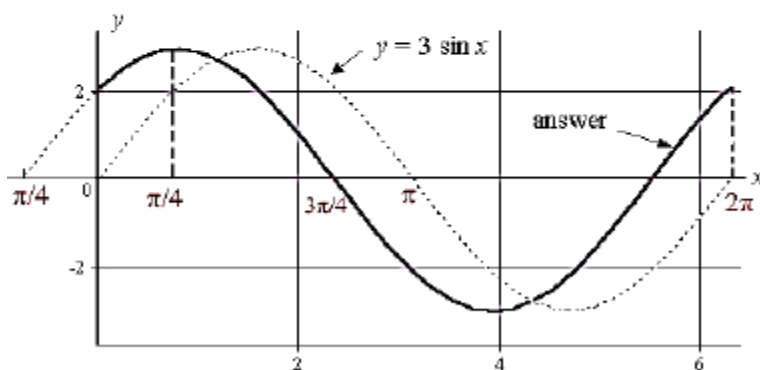
$$y = A \sin (Bx \pm C) \pm k$$

$$f(x) = 3 \sin \left(1x + \frac{\pi}{4} \right)$$

i. period = $\frac{2\pi}{B} = \frac{2\pi}{1} = 2\pi$

ii. amplitude: $A = 3$

iii. C: Shift the graph $\frac{\pi}{4}$ units to the left or Shift the y -axis by $\frac{\pi}{4}$ units to the right



iv. maximum point: reading from the graph, it turns at $x = \frac{\pi}{4}$ and $y = 3 \therefore \left(\frac{\pi}{4}, 3 \right)$

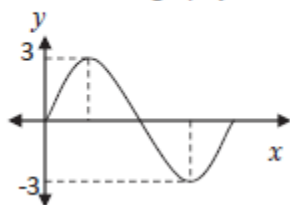
Example 2

Sketch $y = 3 \sin \left(x + \frac{\pi}{2} \right) + 3$ for $0 \leq x \leq 2\pi$

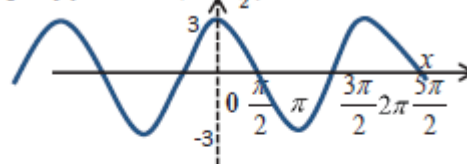
Solution

Method 1 – Sifting the axes

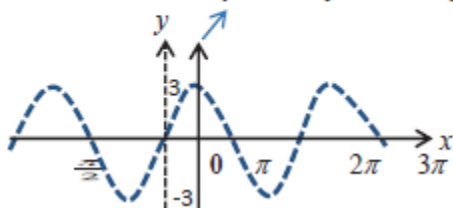
First sketch the basic graph $y = 3 \sin x$,



Graph of $y = 3 \sin \left(x + \frac{\pi}{2} \right)$.

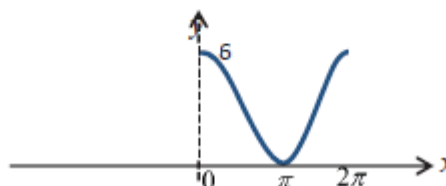


Then shift y -axis to right by $\frac{\pi}{2}$ to get $y = 3 \sin \left(x + \frac{\pi}{2} \right)$.
 y -axis shifts to the right



Finally shift x -axis down by 3 unit.

$$\therefore \text{graph of } y = 3 \sin \left(x + \frac{\pi}{2} \right) + 3$$



ACTIVITY

1. Sketch the following graphs for $0 \leq x \leq 2\pi$.

(4 marks each)

a. $y = 3 \sin x + 2$

b. $f(x) = 3 \sin \left(2x + \frac{\pi}{4} \right) - 1$

c. $f(x) = -3 \sin \left(x + \frac{\pi}{4} \right) + 1$

2. Sketch the following graphs for $0^\circ \leq x \leq 360^\circ$.

a. $y = 2 \cos x + 1$

b. $y = 2 \cos (x + 45^\circ) - 2$