GCSE Maths – Algebra

Sketching Graphs - Exponential and Trigonometric (Higher Only)

Worksheet

WORKED SOLUTIONS

This worksheet will show you how to work out different types of sketching graph questions. Each section contains a worked example, a question with hints and then questions for you to work through on your own.

Section A

Worked Example

Sketch the graph of $y = 2^x$ between $x = -4$ and $x = 3$.

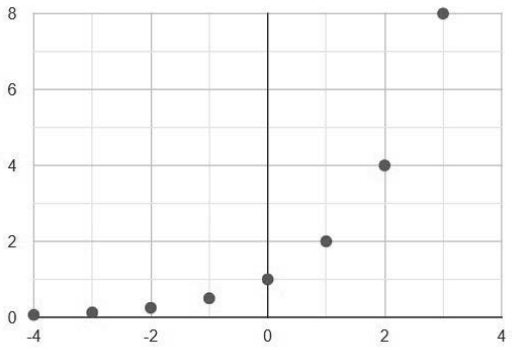
Step 1: Create a table of values for $-4 \leq x \leq 3$.

This requires substituting each value of x into the function $y = 2^x$ to find the corresponding y value.

x	-4	-3	-2	-1	0	1	2	3
$y = 2^x$	0.0625	0.125	0.25	0.5	1	2	4	8

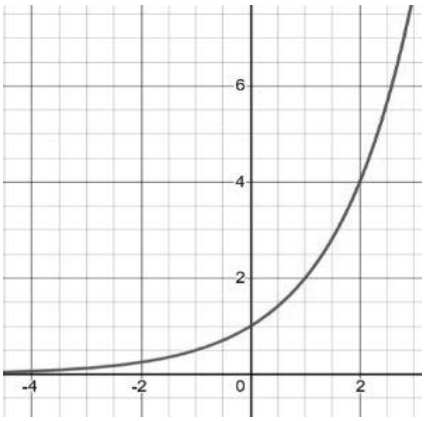
Step 2: Plot the points given by the table of values.

From the table, we have the points $(-4, 0.0625)$, $(-3, 0.123)$, $(-2, 0.25)$, $(-1, 0.5)$, $(0, 1)$, $(2, 4)$ and $(3, 8)$. Plotting these points, we obtain:



Step 3: Draw a smooth curve passing through all the points.

The curve should be drawn so it passes through each of the coordinate points.



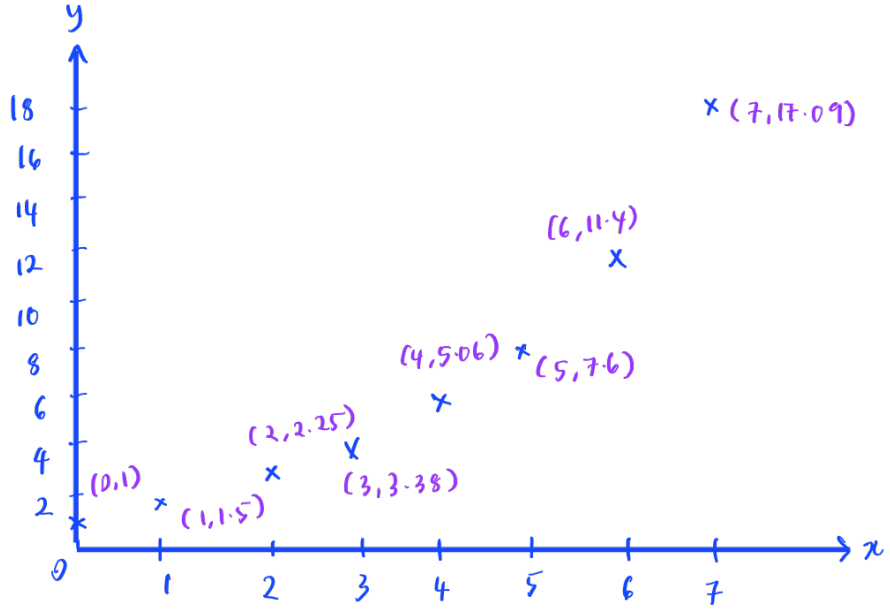
Guided Example

Sketch the graph of $y = 1.5^x$ between $x = 0$ and $x = 7$.

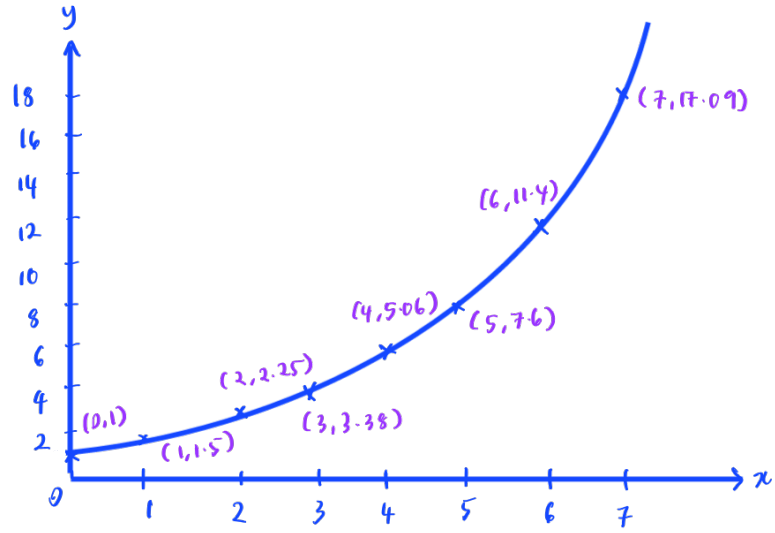
Step 1: Create a table of values for $0 \leq x \leq 7$.

x	0	1	2	3	4	5	6	7
$y = 1.5^x$	1	1.5	2.25	3.38	5.06	7.6	11.4	17.09

Step 2: Plot the points given by the table of values.



Step 3: Draw a smooth curve passing through all the points.

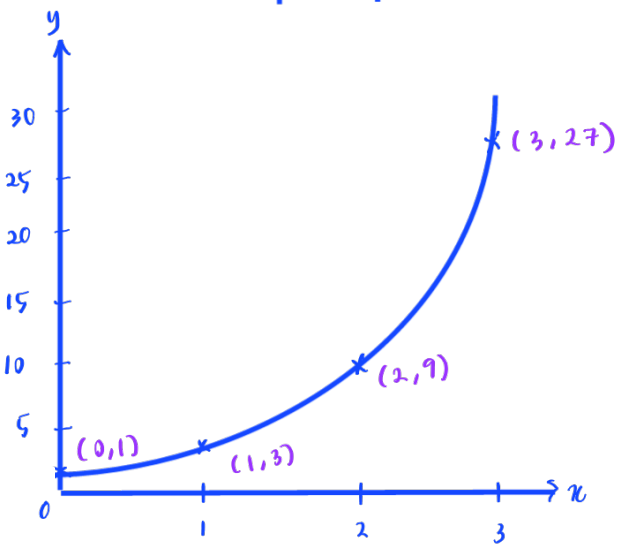


Now it's your turn!
If you get stuck, look back at the worked and guided examples.

1. Sketch graphs of the following functions:

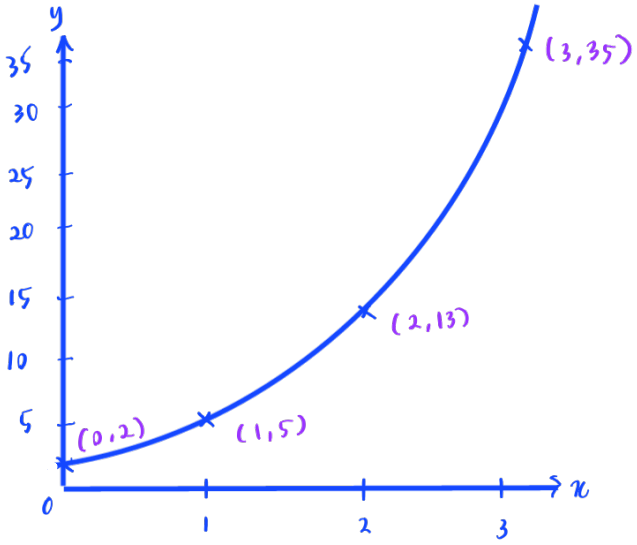
a) $y = 3^x$ between $x = 0$ and $x = 3$.

x	0	1	2	3
$y = 3^x$	1	3	9	27



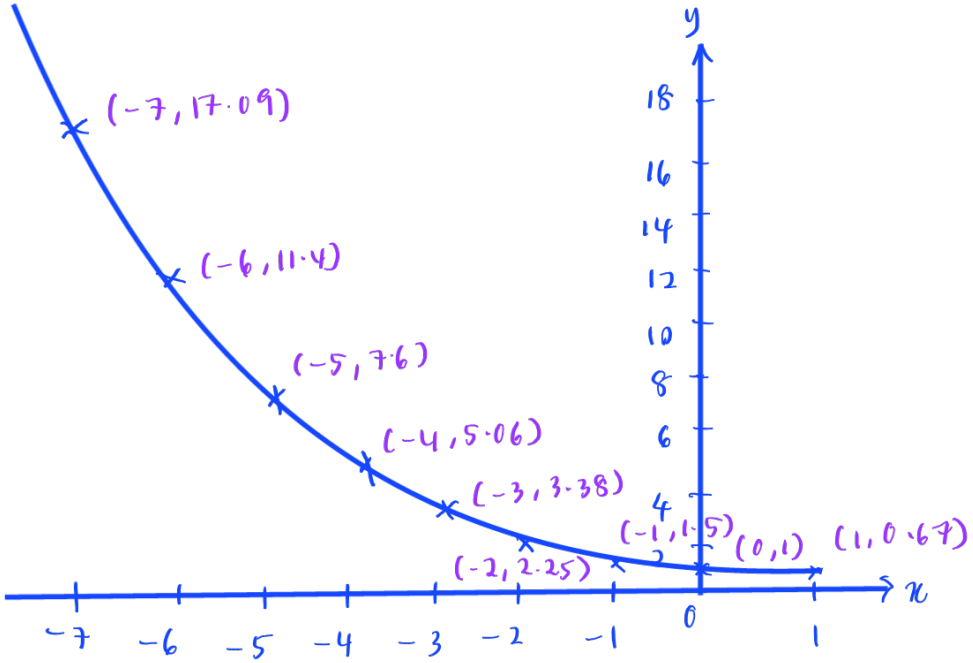
b) $y = 2^x + 3^x$ between $x = 0$ and $x = 3$.

x	0	1	2	3
$2^x + 3^x$	2	5	13	35



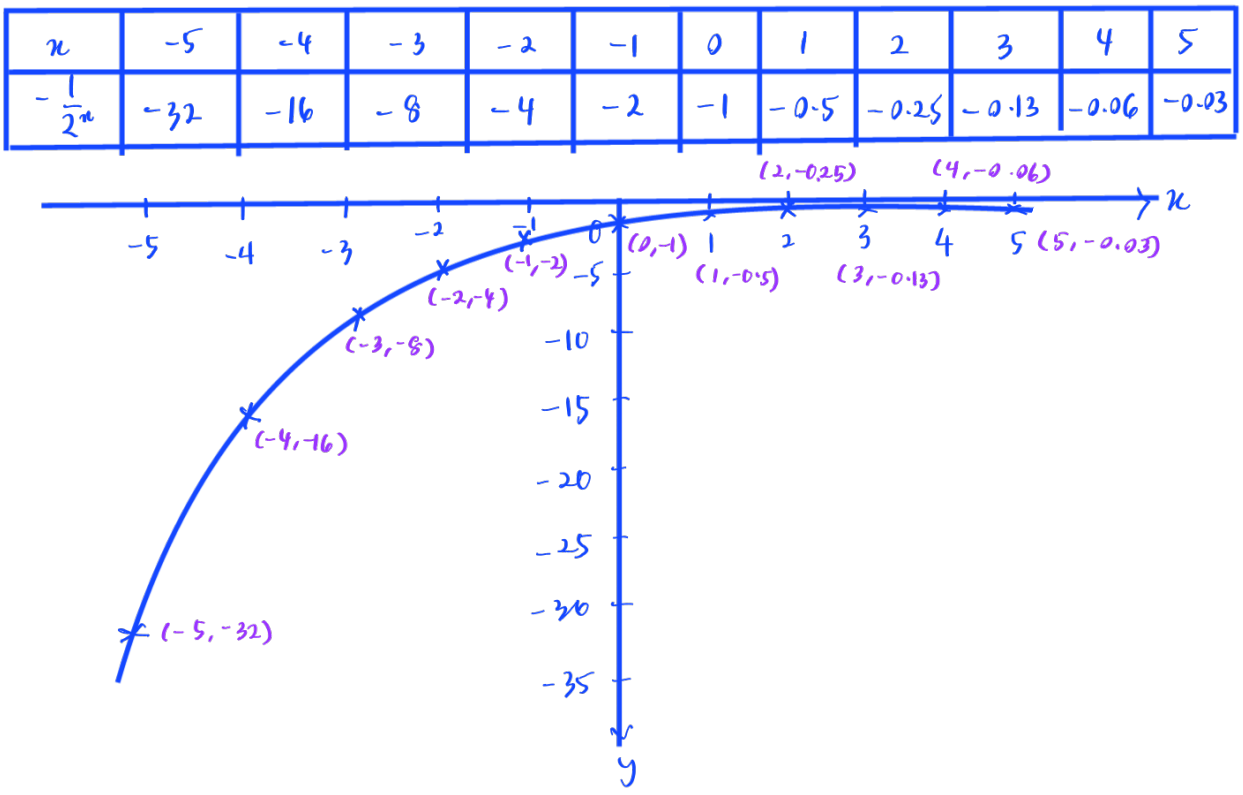
c) $y = \left(\frac{2}{3}\right)^x$ between $x = -7$ and $x = 1$.

x	-7	-6	-5	-4	-3	-2	-1	0	1
$(2/3)^x$	17.09	11.4	7.6	5.06	3.38	2.25	1.5	1	0.67



d) $y = -\frac{1}{2^x}$ between $x = -5$ and $x = 5$.

x	-5	-4	-3	-2	-1	0	1	2	3	4	5
$-\frac{1}{2^x}$	-32	-16	-8	-4	-2	-1	-0.5	-0.25	-0.13	-0.06	-0.03



Section B

Worked Example

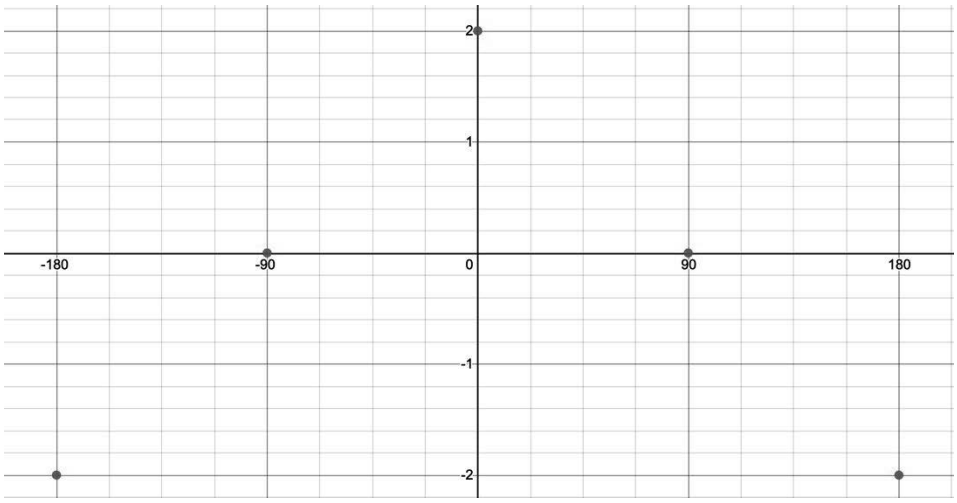
Sketch the graph of $y = 2\cos x$ between $x = -180^\circ$ and $x = 180°$.

Step 1: First, proceed by creating a table of values for key values of x. For trigonometric functions these are multiples of $90°$, across the range given.

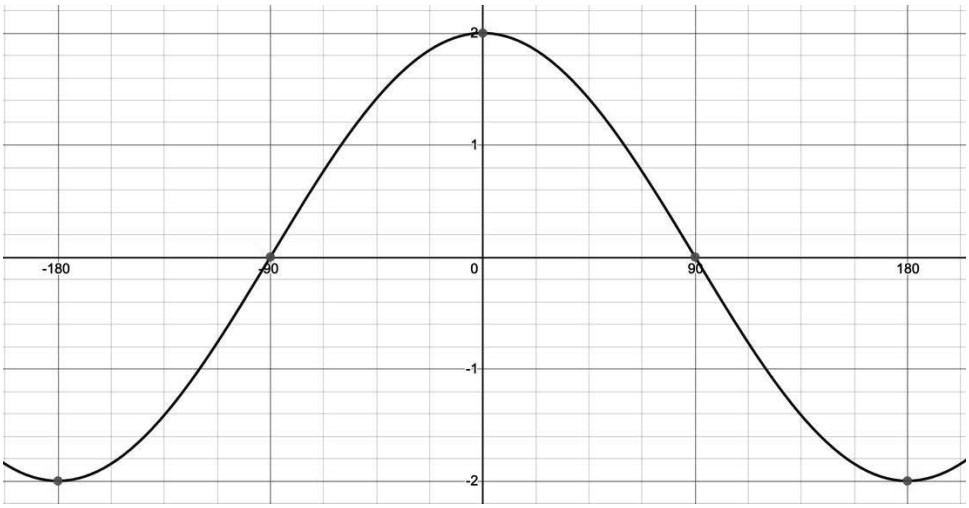
x	-180°	-90°	0°	90°	180°
$y = 2\cos x$	-2	0	2	0	-2

Step 2: Plot the points given by the table of values.

From the table, we have the points $(-180, -2)$, $(-90, 0)$, $(0, 2)$, $(90, 0)$, *and* $(180, -2)$. *Plotting these points, we obtain:*



Step 3: Draw a smooth curve passing through all the points.



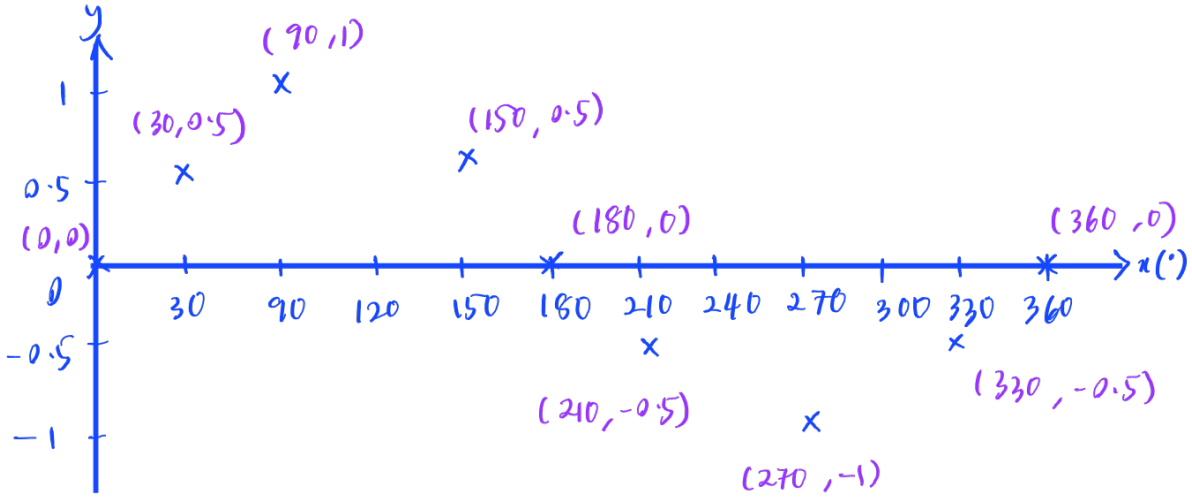
Guided Example

Sketch the graph of $y = \sin x$ between $x = 0°$ and $x = 360°$.

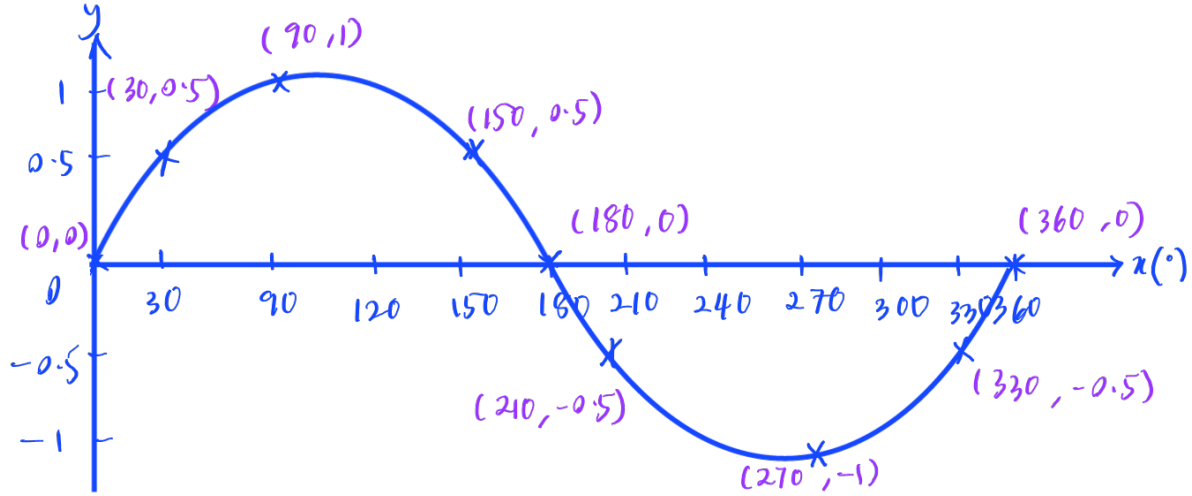
Step 1: Create a table of values for the key values of x.

x	$0°$	$30°$	$90°$	$150°$	$180°$	$210°$	$270°$	$330°$	$360°$
$\sin x$	0	0.5	1	0.5	0	-0.5	-1	-0.5	0

Step 2: Plot the points given by the table of values.



Step 3: Draw a smooth curve passing through all the points.



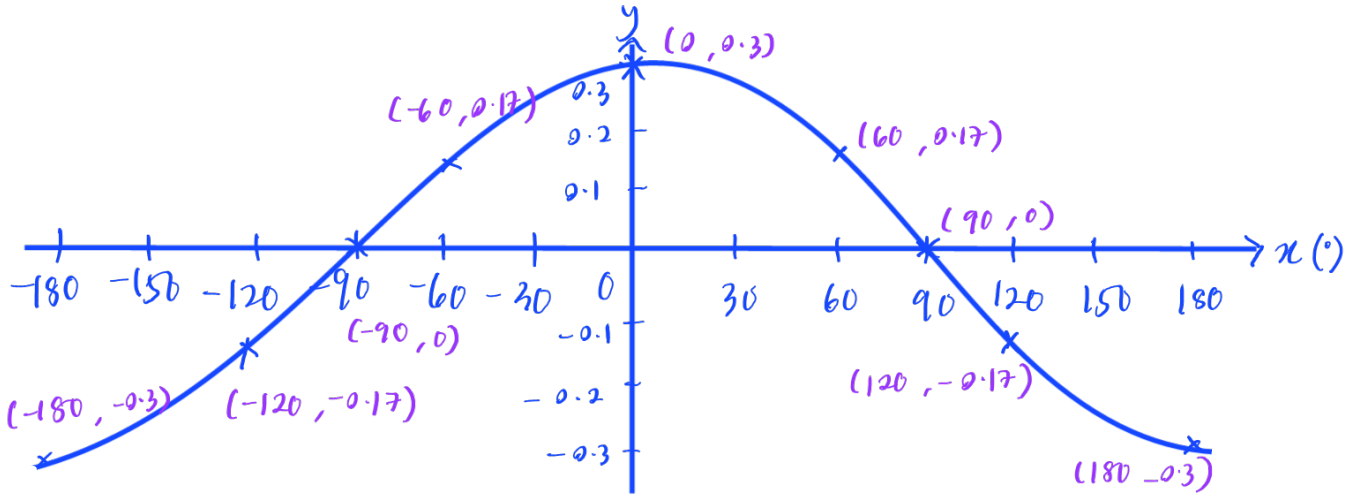
Now it's your turn!

If you get stuck, look back at the worked and guided examples.

2. Sketch the following graphs within the given ranges:

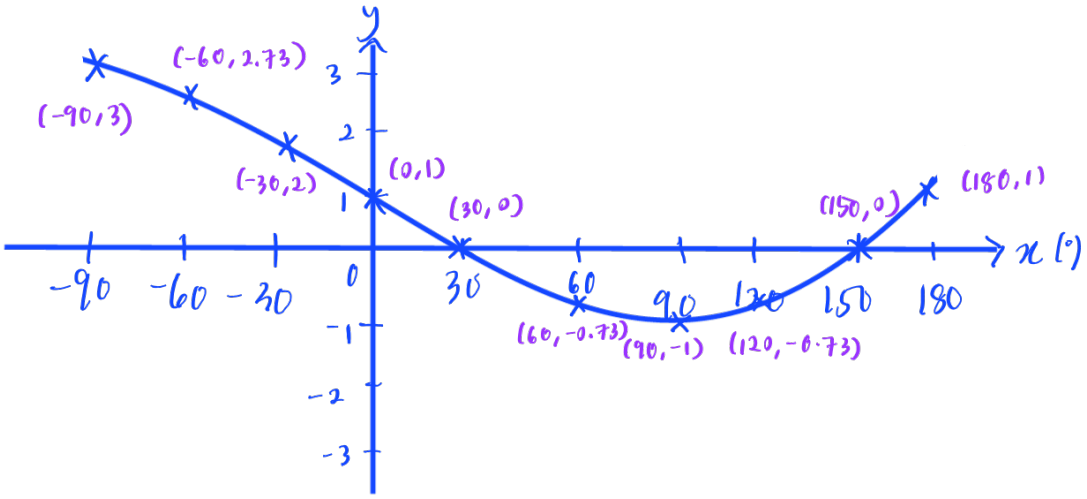
a) $y = \frac{1}{3}\cos x$ between $x = -180°$ and $x = 180°$.

x	$-180°$	$-120°$	$-90°$	$-60°$	$0°$	$60°$	$90°$	$120°$	$180°$
$\frac{1}{3}\cos x$	-0.3	-0.17	0	0.17	0.3	0.17	0	-0.17	-0.3



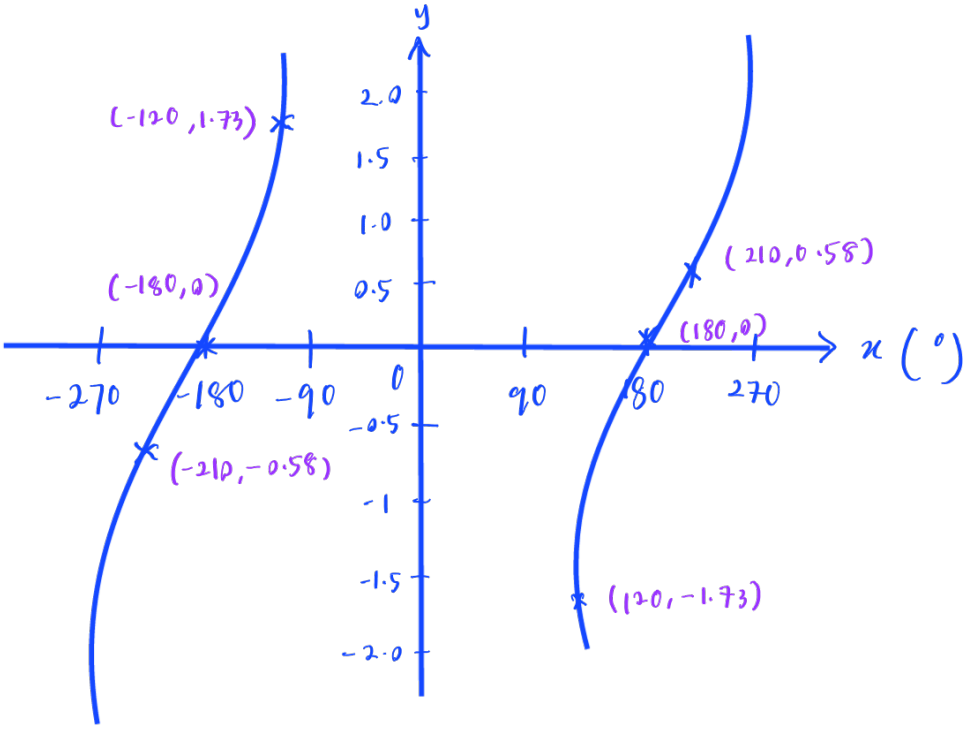
b) $y = -2\sin x + 1$ between $x = -90°$ and $x = 180°$.

x	$-90°$	$-60°$	$-30°$	0	$30°$	$60°$	$90°$	$120°$	$150°$	$180°$
$-2\sin x + 1$	3	2.73	2	1	0	-0.73	-1	-0.73	0	1



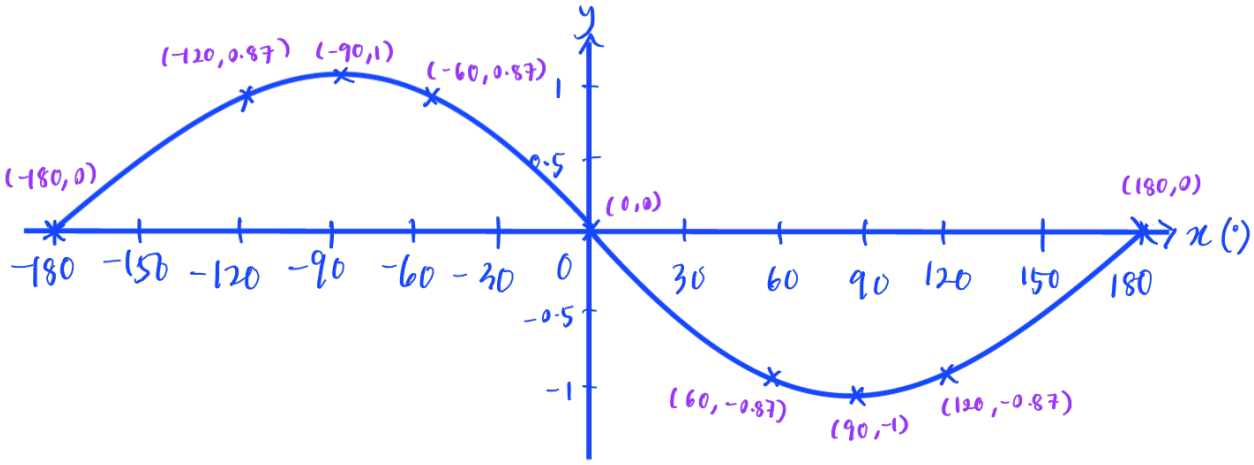
c) $y = \tan x$ between $x = -270°$ and $x = 270°$.

x	-270	-210	-180	-120	-90	0	90	120	180	210	270
$\tan x$	–	-0.58	0	1.73	–	0	–	-1.73	0	0.58	–



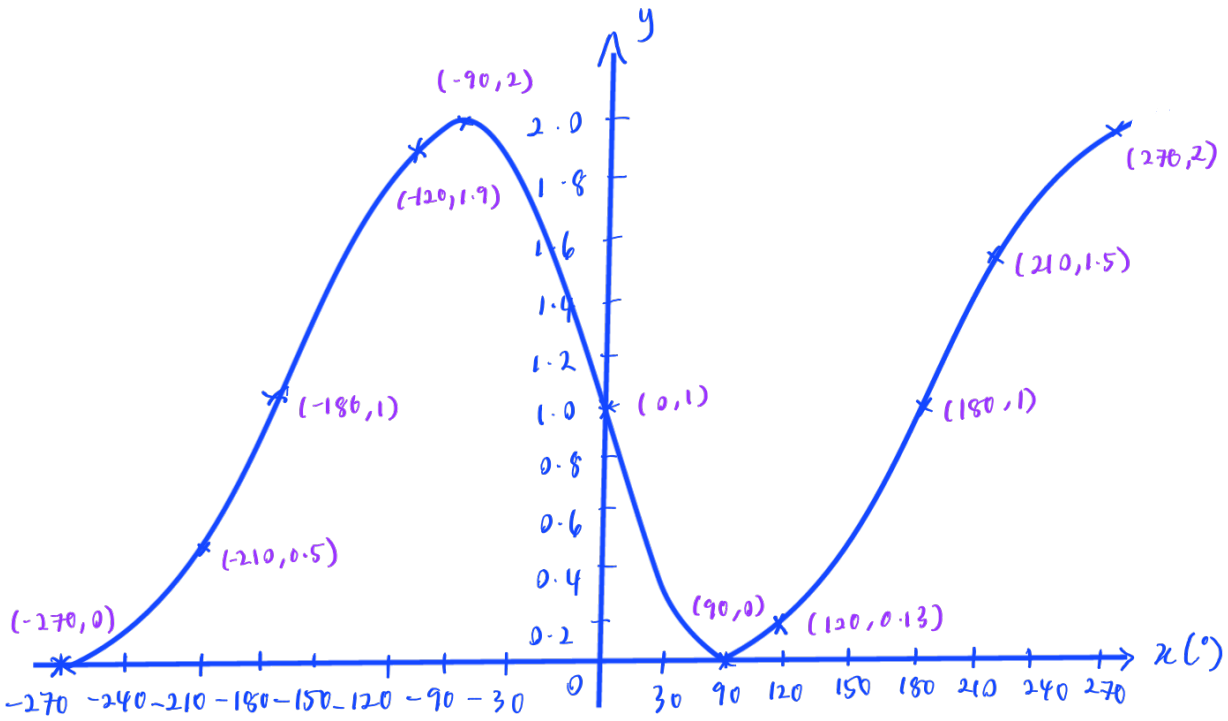
d) $y = \cos(x + 90°)$ between $x = -180°$ and $x = 180°$.

x	-180°	-120°	-90°	-60°	0°	60°	90°	120°	180°
$\cos(x+90°)$	0	0.87	1	0.87	0	-0.87	-1	-0.87	0



e) $y = 1 - \sin x$ between $x = -270°$ and $x = 270°$.

x	-270	-210	-180	-120	-90	0	90	120	180	210	270
$1-\sin x$	0	0.5	1	1.9	2	1	0	0.13	1	1.5	2



f) $y = \sin(-x + 90°)$ between $x = -180°$ and $x = 180°$.

x	-180°	-120°	-90°	-30°	0	30	90	120	180
$\sin(-x+90°)$	-1	-0.5	0	0.87	1	0.87	0	-0.5	-1