Trig Graphs

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1 Introduction

Sketch the following graphs:

1. $y = \sin x, 0 \leq x \leq 360$.
2. $y = \cos x, 0 \leq x \leq 360$.
3. $y = \tan x, 0 \leq x \leq 180$.

What are their maximum and minimum values? What are their *amplitudes*? What is the *period* of each?

2 Changing the amplitude

Sketch the following graphs: (Hint: check the values of y at *important points*.)

1. $y = 2\sin x, 0 \leq x \leq 360$.
2. $y = 3\cos x, 0 \leq x \leq 360$.
3. $y = -4\sin x, 0 \leq x \leq 360$.

What effect does the variable a have whenever you draw a graph of the form $y = a\sin x$ or $y = a\cos x$? What happened when a was negative? What is their maximum and minimum values? What are their *amplitudes*?

Without explanation, write down the amplitudes of the following graphs:

1. $y = 6\cos x$.
2. $y = -70\sin 3x$.
3. $y = \tan x$.

3 Changing the period

Sketch the following graphs: (Hint: check the values of y at *important points*.)

1. $y = \sin 2x, 0 \leq x \leq 360$.
2. $y = \cos 3x, 0 \leq x \leq 360$.
3. $y = \tan 2x, 0 \leq x \leq 180$.

What effect does the variable b have whenever you draw a graph of the form $y = \sin bx$, $y = \cos bx$ or $y = \tan bx$? How many waves did you draw in each compared to what the regular graph has? What are their *periods*?

Without explanation, write down the periods of the following graphs:

1. $y = \sin 4x$.
2. $y = \cos 5x$.
3. $y = 5 \sin 60x$.
4. $y = \tan 20x$.

4 Shifting vertically

Sketch the following graphs: (Hint: check the values of y at *important points*.)

1. $y = \sin x + 1, 0 \leq x \leq 360$.
2. $y = \cos x - 2, 0 \leq x \leq 360$.
3. $y = \tan x + 1, 0 \leq x \leq 360$.

What effect does the variable c have whenever you draw a graph of the form $y = \sin x + c$, $y = \cos x + c$ or $y = \tan x + c$? Did the graph fundamentally change? What are the maximums and minimums of each graph? Without explanation, write down the maximum and minimum values of the following graphs:

1. $y = \sin x + 3$.
2. $y = \sin x - 3$.
3. $y = \cos x + 5$.
4. $y = \cos x - 4$.
5. $y = \tan x + 2$.

5 Shifting horizontally

Sketch the following graphs: (Hint: check the values of y at *important points*.)

1. $y = \sin(x - 90), 0 \leq x \leq 360$.
2. $y = \sin(x + 90), 0 \leq x \leq 360$.
3. $y = \cos(x - 45), 0 \leq x \leq 360$.
4. $y = \cos(x + 60), 0 \leq x \leq 360$.
5. $y = \tan(x - 90), 0 \leq x \leq 180$.

What effect does the variable b have whenever you draw a graph of the form $y = \sin(x + b), y = \cos(x + b)$ or $y = \tan(x + b)$? Did the graph fundamentally change? When b is positive, what direction does the graph move? How about when b is negative?

6 Putting it all together

The goal here is to be able to sketch graphs of the form $y = a \sin bx + c$ etc where $(a, b, c) \in \mathbb{R}^3$. Sketch the following:

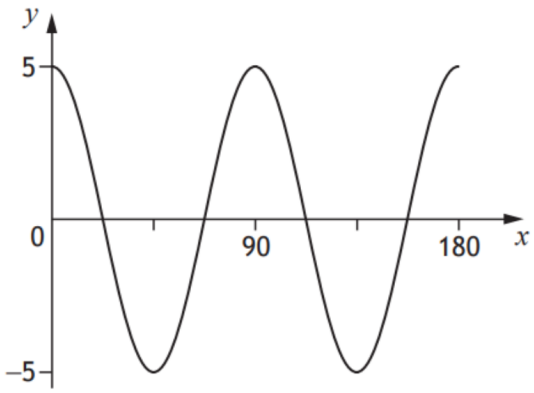
1. $y = \sin 2x + 1, 0 \leq x \leq 360$.
2. $y = -\cos 3x, 0 \leq x \leq 360$.
3. $y = 5 \sin x + 3, 0 \leq x \leq 360$.

Now all of them together:

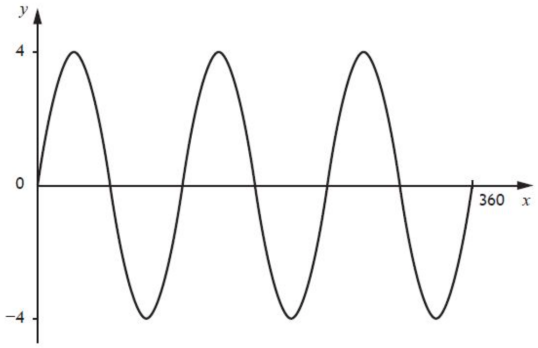
1. $y = 2 \sin 2x + 1, 0 \leq x \leq 360$.
2. $y = 3 \cos 2x - 1, 0 \leq x \leq 360$.
3. $y = -\sin 3x + 1, 0 \leq x \leq 360$.
4. $y = 2 \cos(x + 90) + 1, 0 \leq x \leq 360$.

7 Sample Questions

1. The diagram below shows a graph of the form $y = a\cos bx + c$. State the values of (a, b, c).



2. The diagram below shows a graph of the form $y = a\sin bx + c$. State the values of (a, b, c).



3. The diagram below shows the graph $y = 3\cos(x + 45)$. The graph has a minimum turning point at A. State the coordinates of A.