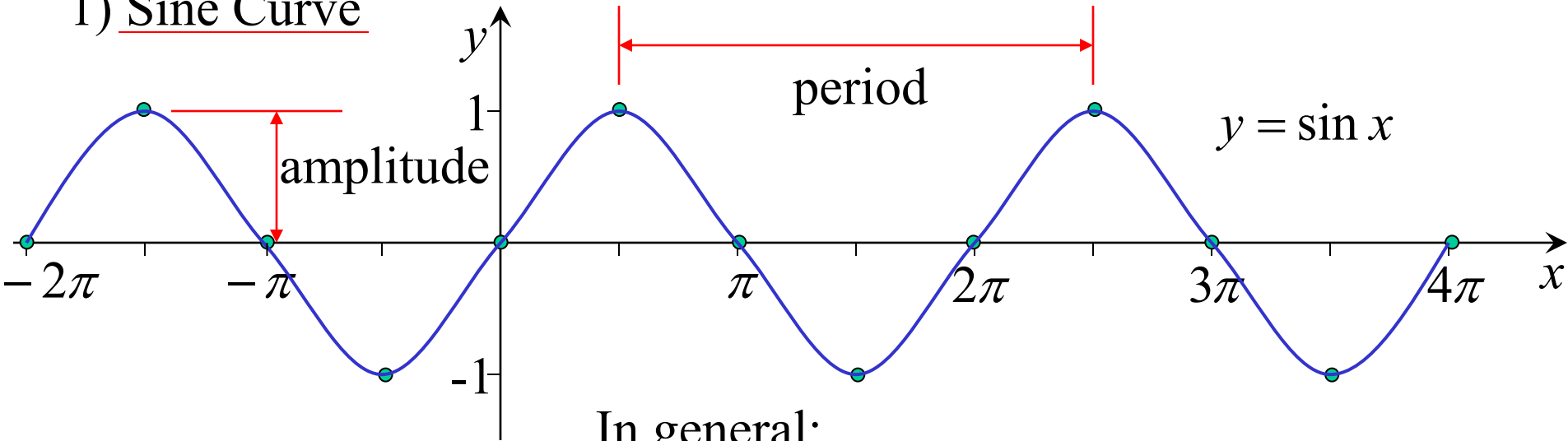


# Graphing Trig Functions

## 1) Sine Curve



In general;

domain : all real  $x$   
range :  $-1 \leq y \leq 1$

odd function  
 $\sin(-x) = -\sin x$

$$y = a \sin(bx - c)$$

$$\text{period} = \frac{2\pi}{b} \text{ units}$$

$$\text{amplitude} = a \text{ units}$$

$$\text{divisions} = \frac{\text{period}}{4}$$

$$\text{phase} = \frac{c}{b}$$

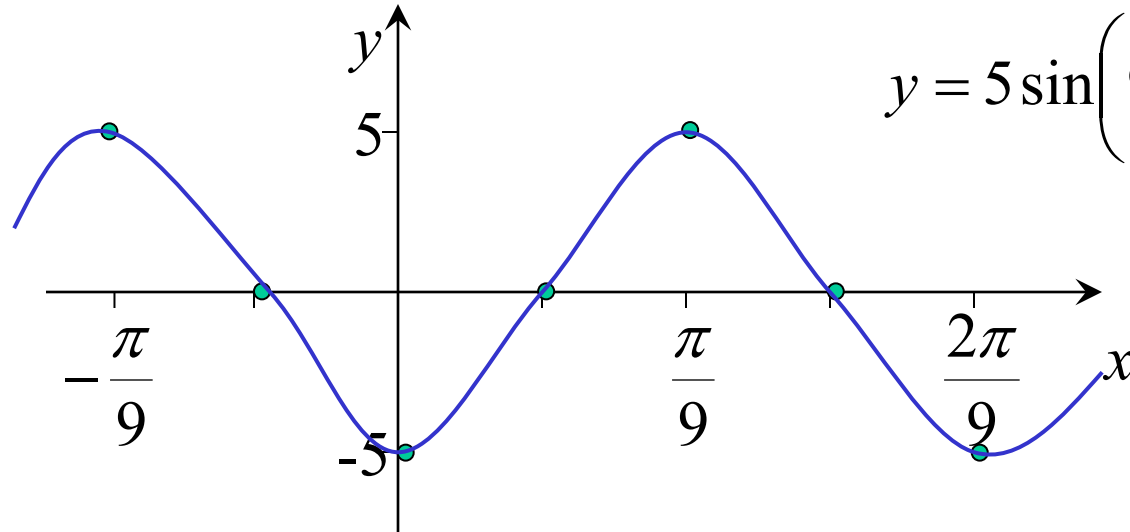
e.g.  $y = 5 \sin\left(9x - \frac{\pi}{2}\right)$

period =  $\frac{2\pi}{9}$  units

amplitude = 5 units

divisions =  $\frac{\pi}{18}$

shift =  $\frac{\pi}{18}$  to right



## 2) Cosine Curve

$$y = a \cos(bx - c)$$

even function

$$\cos(-x) = \cos x$$

$$\text{period} = \frac{2\pi}{b} \text{ units}$$

$$\text{amplitude} = a \text{ units}$$

$$\text{divisions} = \frac{\text{period}}{4}$$

$$\text{phase} = \frac{c}{b}$$

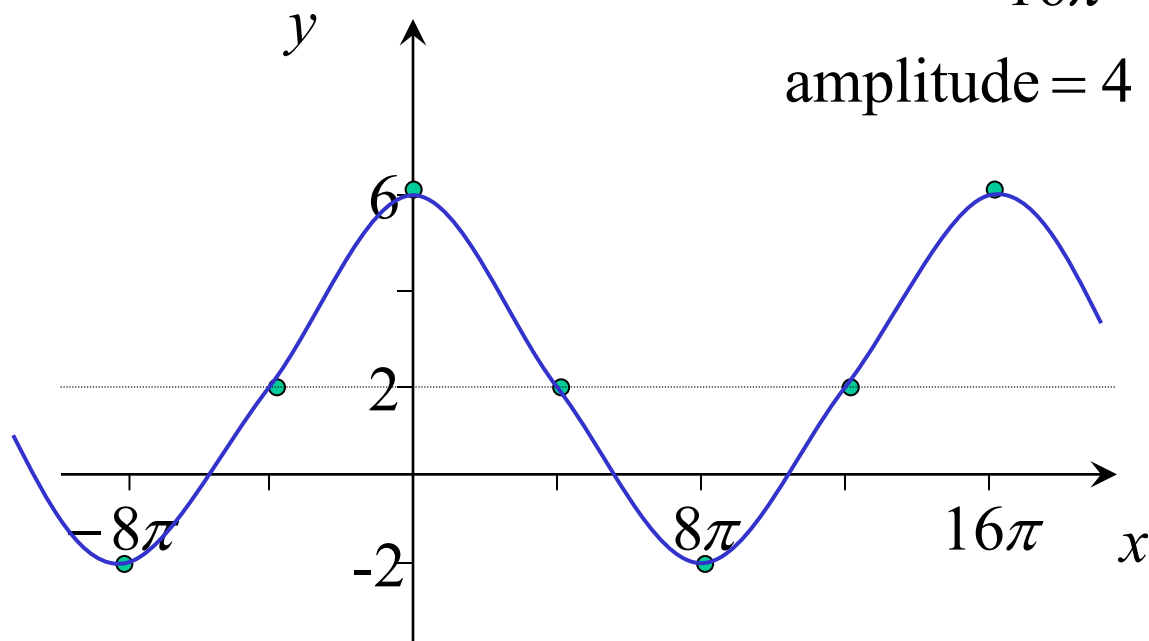
e.g.  $y = -4 \cos\left(\frac{x}{8} + \pi\right) + 2$  period =  $\frac{2\pi}{\frac{1}{8}}$

$$\text{divisions} = 4\pi$$

shift =  $8\pi$  to left, 2 up,  
upside down

$$= 16\pi$$

$$\text{amplitude} = 4$$



$$y = -4 \cos\left(\frac{x}{8} + \pi\right) + 2$$

### 3) Tangent Curve

$$y = a \tan(bx - c)$$

odd function

$$\tan(-x) = -\tan x$$

$$\text{period} = \frac{\pi}{b} \text{ units}$$

$$\text{divisions} = \frac{\text{period}}{2}$$

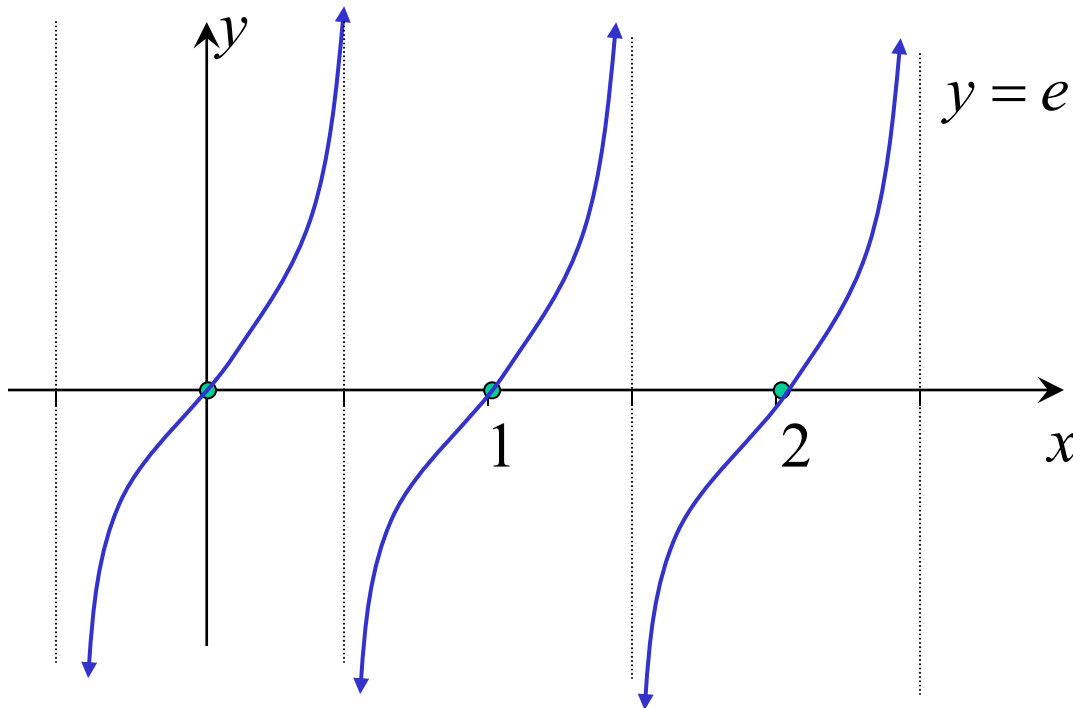
$$\text{phase} = \frac{c}{b}$$

e.g.  $y = e \tan(\pi x - 2\pi)$

$$\text{period} = \frac{\pi}{\pi} = 1$$

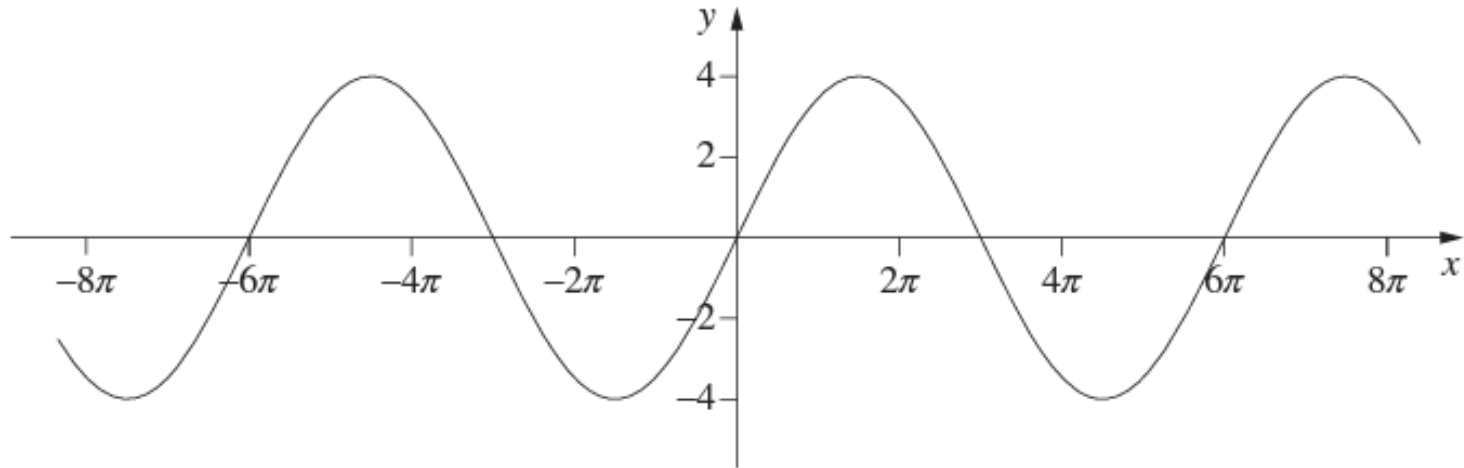
$$\text{divisions} = \frac{1}{2}$$

shift = 2 to right



## Advanced HSC 2022 Q14

The graph of  $y = k\sin(ax)$  is shown



What are the values of  $k$  and  $a$ ?

Amplitude is 4

$$\therefore k = 4$$

Period is  $6\pi$

$$\therefore \frac{2\pi}{a} = 6\pi$$

$$a = \frac{1}{3}$$

$$\underline{a = \frac{1}{3} \text{ and } k = 4}$$

**Exercise 3J; 1 to 5 (ii),  
6, 7b, 8b, 10, 11b,  
13, 14, 16, 19**