

# PC12 Trig Functions Practice Test

PreCalc 12

Trigonometric Functions Practice Test

Name: \_\_\_\_\_

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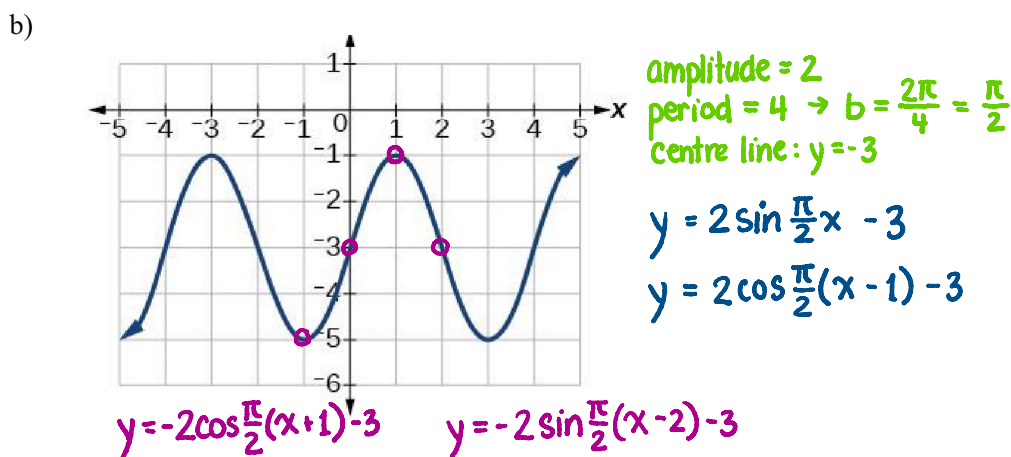
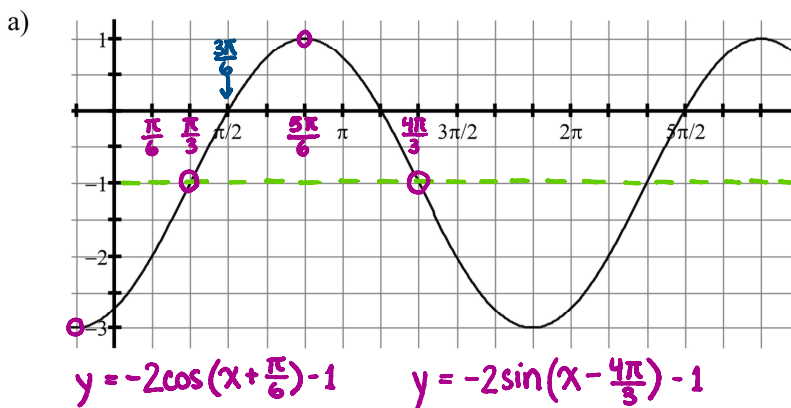
1. Complete the table. [8]

	$f(x) = 3 \cos \frac{1}{2}(x - \pi) + 1$	$f(x) = -7 \sin(4x + \pi) + 15$	$f(x) = -\tan(2x) - 6$
Amplitude	3	7	none ← always for tangent
Period	$\frac{2\pi}{1/2} = 4\pi$	$\frac{2\pi}{4} = \frac{\pi}{2}$	$\frac{\pi}{2}$
Phase shift	$\pi$	$4(x + \frac{\pi}{4}) - \frac{\pi}{4}$	none
Equation of centre line	$y = 1$	$y = 15$	$y = -6$
Range	$-2 \leq y \leq 4$	$8 \leq y \leq 22$	$y \in \mathbb{R}$ ← always for tangent

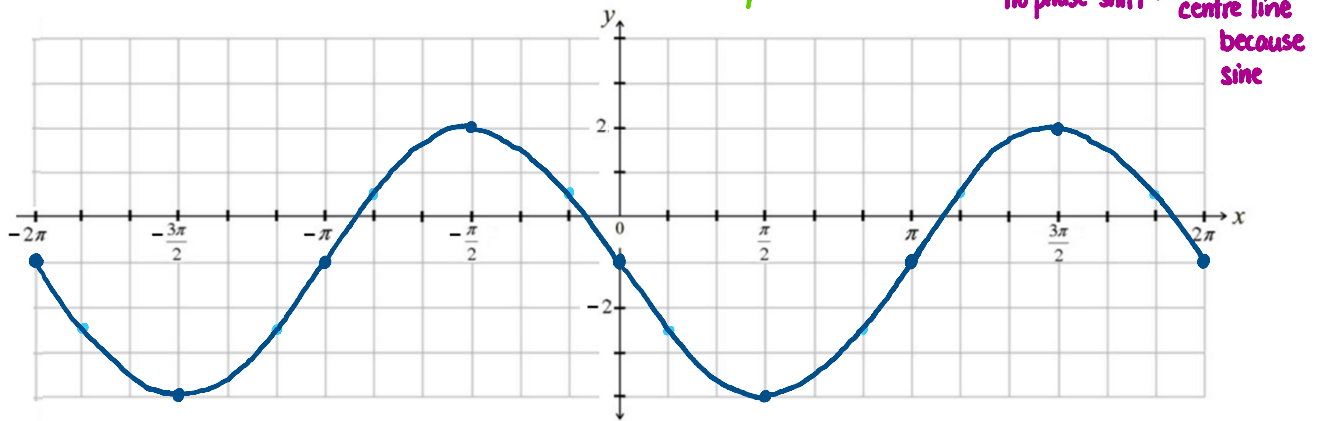
$$\begin{matrix} -3 \leq y \leq 3 \\ +1 \quad \quad +1 \end{matrix}$$

$$\begin{matrix} -7 \leq y \leq 7 \\ +15 \quad +15 \end{matrix}$$

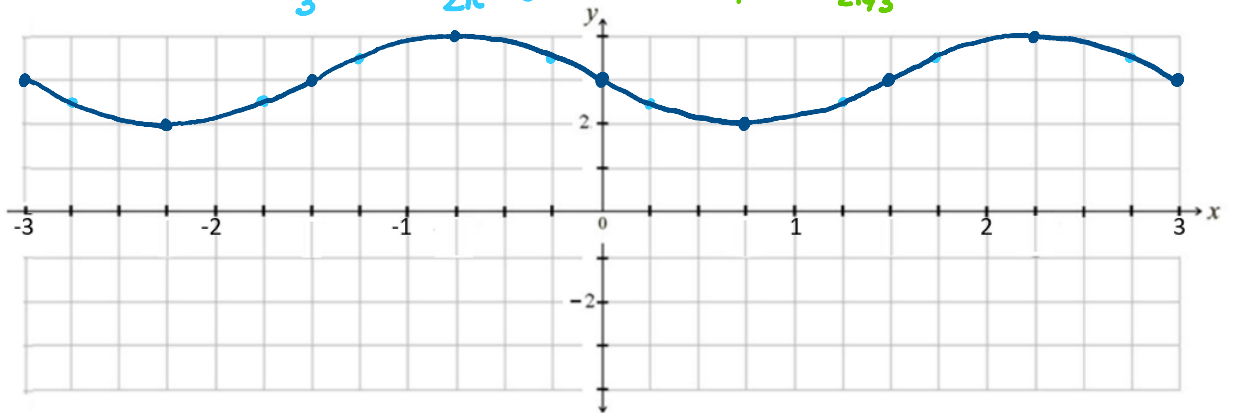
2. Write one sine equation and one cosine equation for each graph. [8]



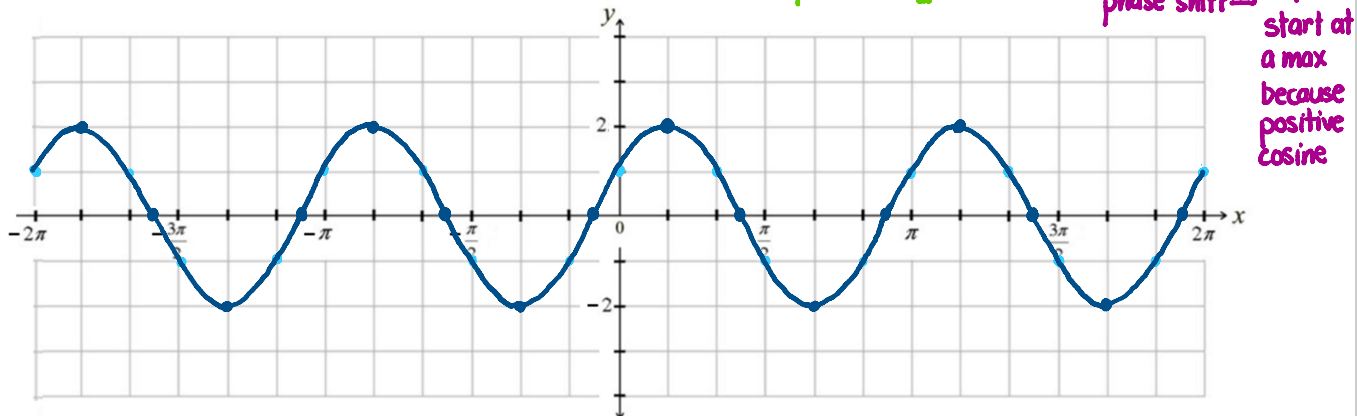
3. Sketch the graph of  $y = -3 \sin x - 1$  for  $-2\pi \leq \theta \leq 2\pi$ . [3]  $-4 \leq y \leq 2$  starting point @  $(0, -1)$   
 period =  $2\pi$  no phase shift  $\uparrow$  centre line  $\uparrow$  because sine



4. Sketch the graph of  $y = -\sin\left(\frac{2\pi}{3}x\right) + 3$  for  $-3 \leq \theta \leq 3$ . [3]  $2 \leq y \leq 4$  starting point @  $(0, 3)$   
 period:  $\frac{2\pi}{2\pi/3} = 3$   $2\pi \div \frac{2\pi}{3} = 2\pi \times \frac{3}{2\pi} = 3$



5. Sketch the graph of  $y = 2 \cos\left(2\left(x - \frac{\pi}{6}\right)\right)$  for  $-2\pi \leq \theta \leq 2\pi$ . [3]  $-2 \leq y \leq 2$  starting point @  $\left(\frac{\pi}{6}, 2\right)$   
 period:  $\frac{2\pi}{2} = \pi$  phase shift  $\uparrow$  start at a max because positive cosine



6. Passengers get onto a Ferris wheel at a minimum height. The wheel has a radius of 15 m and its centre is 18 m above the ground. It takes 20 seconds for the wheel to make one complete turn. Determine an equation which represents the height,  $h$  metres, in terms of time,  $t$  seconds, of a person from the time they get on. [2]

-cosine

amplitude = 15

centre line

$$\begin{aligned} \text{period} &= 20 \\ b &= \frac{2\pi}{20} = \frac{\pi}{10} \end{aligned}$$

\* if given max & min heights then...

$$\text{amplitude} = \frac{\text{max} - \text{min}}{2}$$

$$\text{centre line} = \frac{\text{max} + \text{min}}{2}$$

$$h(t) = -15 \cos \frac{\pi}{10} t + 18$$

What is the maximum height of a person on this ride? [1]

$$18 + 15 = 33 \text{ m}$$

7. The depth of water at a seaport reaches a maximum of 16 m at 3:00 am. Approximately 6.2 hours later, it reaches a minimum depth of 4 m. Write an equation representing the depth of water,  $d$  metres, at time  $t$ . [4]

phase shift = 3

half cycle  $\rightarrow$  period

= 12.4

$$\text{amplitude} = \frac{16 - 4}{2} = 6 \quad \text{centre line} = \frac{16 + 4}{2} = 10$$

$$b = \frac{2\pi}{12.4} = \frac{\pi}{6.2}$$

$$d(t) = 6 \cos \frac{\pi}{6.2} (t - 3) + 10$$

What is the depth of water at 2:45pm? (Hint: Your  $t$  value should be in 24 hour time and converted to decimal form.) [2]

$$\begin{aligned} &\hookrightarrow 14:45 \\ &\frac{45}{60} = 0.75 \end{aligned} \quad \left. \vphantom{\frac{45}{60}} \right\} t = 14.75$$

$$\begin{aligned} d(14.75) &= 6 \cos \frac{\pi}{6.2} (14.75 - 3) + 10 \\ &= 6 \cos \left( \frac{11.75\pi}{6.2} \right) + 10 \\ &\doteq 15.68 \text{ m} \end{aligned}$$

