

More Practice with Graphs & Equations of Sinusoids

<p>1. What is the domain and range of the cosine function? $D: (-\infty, \infty)$ $R: [-1, 1]$</p>	<p>2. What is the domain and range of the sine function? $D: (-\infty, \infty)$ $R: [-1, 1]$</p>
<p>3. What kind of function is the sine function? Odd, even or neither? Odd</p>	<p>4. What kind of function is the cosine function? Odd, even or neither? Even</p>
<p>5. State the amplitude, period, phase shift and vertical shift of the function $f(t) = -2\sin(3t - \pi/2) + 4$ Amp: 2 Pd: $2\pi/3$ P.S. $\rightarrow \frac{\pi}{6}$ V.S. $\uparrow 4$</p>	<p>6. State the amplitude, period, phase shift and vertical shift of the function $f(t) = 4\cos(\frac{1}{2}t - 4) - 6$ Amp: 4 P.S.: $\rightarrow 8$ Pd: $\frac{2\pi}{\frac{1}{2}} = 4\pi$ V.S.: $\downarrow 6$</p>
<p>7. State the amplitude, period, phase shift and vertical shift of the function $f(t) = \cos(4t + 3) - 12$ A: 1 Pd: $\frac{2\pi}{4} = \frac{\pi}{2}$ P.S.: $\leftarrow \frac{3}{4}$ V.S.: $\downarrow 12$</p>	<p>8. State the amplitude, period, phase shift and vertical shift of the function $f(t) = -\frac{1}{4}\sin(t + \pi) + 6$ Amp.: $\frac{1}{4}$ P.S.: $\leftarrow \pi$ Pd.: 2π V.S.: $\uparrow 6$</p>
<p>9. State the amplitude, period, phase shift and vertical shift of the function $f(t) = \frac{1}{2}\cos(\frac{1}{4}t) - 2$ Amp: $\frac{1}{2}$ P.S. None Pd: $\frac{2\pi}{\frac{1}{4}} = 8\pi$ V.S., $\downarrow 2$</p>	<p>10. State the amplitude, period, phase shift and vertical shift of the function $f(t) = -\sin(2t + \pi/2)$ Amp: 1 P.S.: $\leftarrow \frac{\pi}{4}$ Pd: $\frac{2\pi}{2} = \pi$ V.S.: None</p>

Review Trigonometry

(Graphs & Equations of Trigonometric Functions)

1) Graph at least two periods and show critical points:

$$y = -5 \cos(2x - \pi)$$

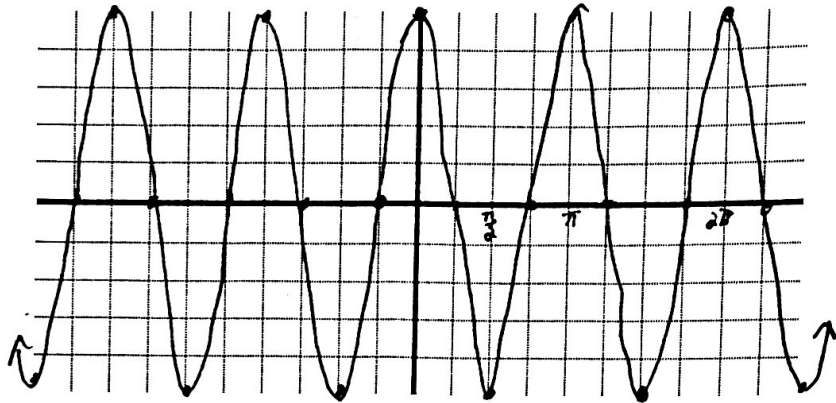
$$y = -5 \cos 2(x - \frac{\pi}{2})$$

Amp: 5

pd: π

V.S.: None

P.S.: $\rightarrow \frac{\pi}{2}$



2) Graph at least two periods and show critical points:

$$y = 3 \sin(0.5x - \pi) + 1$$

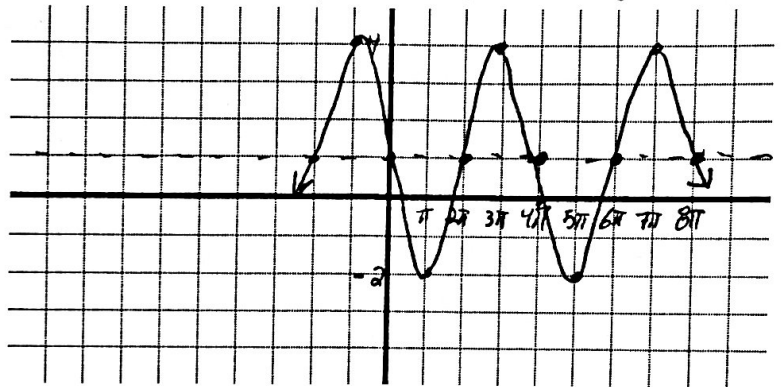
$$y = 3 \sin \frac{1}{2}(x - 2\pi) + 1$$

Amp: 3

pd: 4π

V.S.: $\uparrow 1$

P.S.: $\rightarrow 2\pi$



$\frac{9}{1}$
+

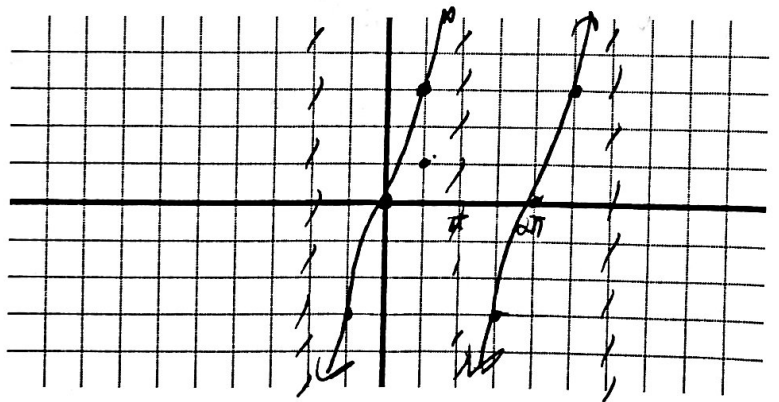
3) Graph at least two periods, show critical points:

$$y = 3 \tan(\frac{1}{2}x) \quad \frac{\pi}{\frac{1}{2}} = 2\pi$$

pd: 2π

V.S.: None

P.S.: None



4) Graph at least two periods, show critical point:

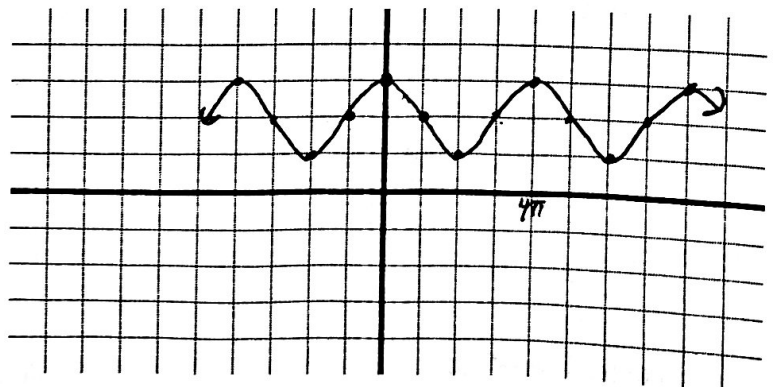
$$y = \cos(\frac{1}{2}x) + 2$$

Amp: 1

pd: 4π

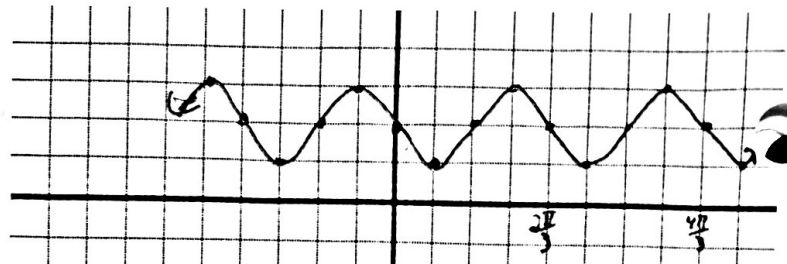
V.S.: $\uparrow 2$

P.S.: —



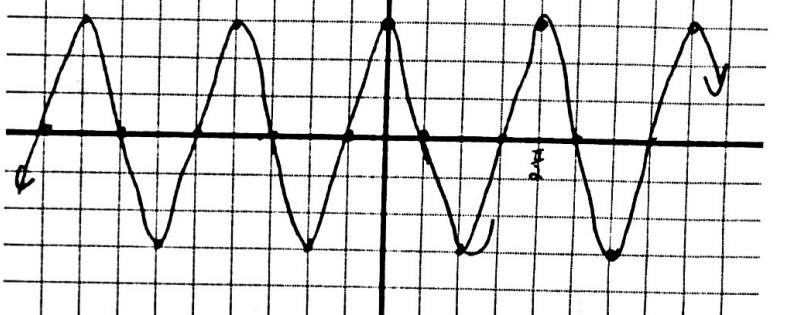
5) Graph at least two periods and show critical points: $y = -\sin(3x) + 2$

Amp: 1 pd: $\frac{2\pi}{3}$
 V.S.: $\uparrow 2$ P.S.: —



6) Graph at least two periods and show critical points: $y = 3\cos(4x)$ $\frac{2\pi}{4}$

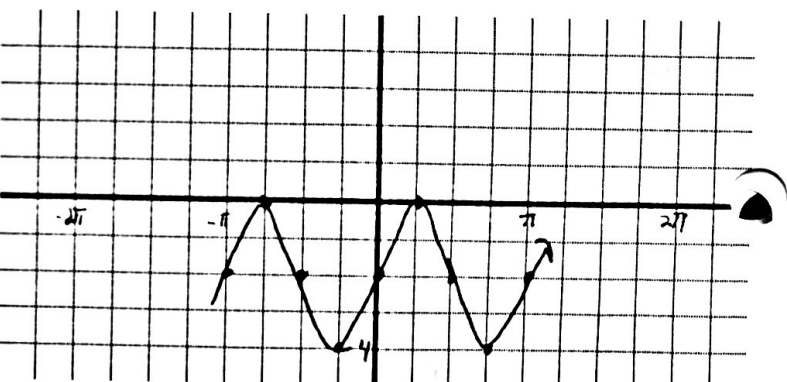
Amp: 3 pd: $\frac{\pi}{2}$
 V.S.: None P.S.: None



7) Graph at least two periods and show critical points: $y = -2\sin(2x + \pi) - 2$

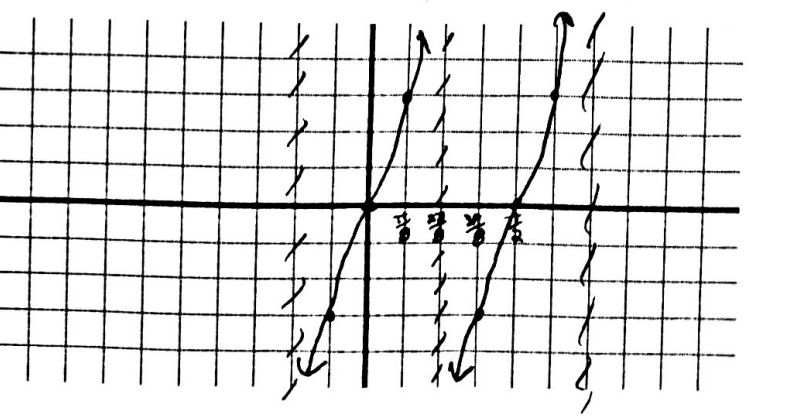
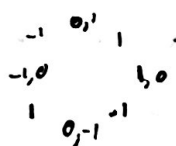
Amp: 2 pd: π
 V.S.: $\downarrow 2$ P.S.: $\leftarrow \frac{\pi}{2}$

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



8) Graph at least two periods, & show asymptotes: $y = 3\tan[2(x - \pi)]$

pd: $\frac{\pi}{2}$
 V.S.: None H.S.: $\rightarrow \pi$



9) Describe the transformations of a basic trigonometric function which would result in the function below:

a) $y = -3\cos(x + 3) - 5$
 reflect over x
 Amp: 3 pd: 2π
 $\leftarrow 3$
 $\downarrow 5$

b) $y = 0.7\sin(3x - 4) + 1$ $y = .7\sin\left[3\left(x - \frac{4}{3}\right)\right] + 1$
 Amp: .7
 pd: $\frac{2\pi}{3}$
 35 $\rightarrow \frac{4}{3}$
 $\uparrow 1$

10) Construct a sinusoidal function using the information given: (this means give an equation)

- a) A cosine curve with reflected over x-axis, vertically stretched by a factor of 3, horizontally stretched by a factor of 2 and shifted left 4 units.

$$y = -3 \cos \frac{1}{2}(x+4)$$

- b) A sine curve reflected over the y-axis, vertically shrunk by a factor of 1/3, horizontally stretched by a factor of 3, and shifted up 7 units.

$$y = \frac{1}{3} \sin \left[\left(\frac{1}{3} \right) x \right] + 7$$

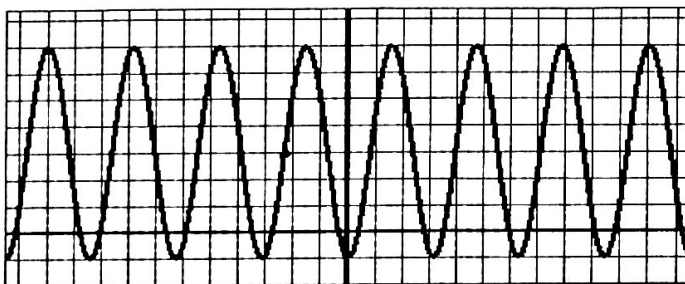
- c) Maximum located at (3, 1) & minimum located at (4, -7).

Amp 4 $\downarrow 3$ $\rightarrow 3$ $Pd = 2$

$$y = 4 \cos \pi(x-3) - 3 \quad \frac{2\pi}{b} = 2 \quad b = \pi$$

- d) This is a cosine function graphed in a window $[-4\pi, 4\pi]$ by $[-2, 8.3]$

$Pd = \pi$
 $\frac{2\pi}{b} = \pi$
 $b = 2$
 $A = 4$



- 11) Find $\sec \theta$ given that the terminal side of θ passes through the point (5, -7)

$$\sec \theta = \frac{\sqrt{74}}{5}$$

$$\frac{5}{\sqrt{74}}$$

- 12) Given that $\csc \theta = 2$ and $\cos \theta > 0$ find θ and $\cos \theta$.

$$\theta = \frac{\pi}{6} \quad \cos \theta = \frac{\sqrt{3}}{2}$$

$$\sin \theta = \frac{1}{2}$$

$$\frac{\sqrt{3}}{2} > \frac{1}{2}$$

- 13) Give the exact value for each expression:

- a) $\tan(330^\circ)$ b) $\cos(7\pi/3)$

$$-\frac{1}{\sqrt{3}}$$

$$\frac{1}{2}$$

- c) $\sin(-7\pi/6)$

$$-\frac{\sqrt{3}}{2}$$

- d) $\sec(-135^\circ)$

$$\frac{1}{\cos(-135^\circ)} = \frac{1}{-\frac{\sqrt{2}}{2}} = -\frac{2}{\sqrt{2}}$$

- e) $\cot(7\pi/4)$

$$-1$$

- f) $\sin(270^\circ)$

$$-1$$

- g) $\cos(2\pi)$

$$1$$

- h) $\tan(\pi/2)$

$$\text{Und}$$

- i) $\csc(-3\pi/2)$

$$\frac{1}{\sin} = 1$$

- j) $\cot(5\pi/2)$

$$0$$

- 14) Find $\cos \theta$ & $\sin \theta$ given that the side of θ passes through the point (-3, -4)

$$\cos \theta = \frac{-3}{5} \quad \& \quad \sin \theta = \frac{-4}{5}$$

$$\frac{-3}{5}$$

- 15) Given that $\sec \theta = -6/5$ and $\sin \theta < 0$ find $\tan \theta$ and $\cos \theta$.

$$\tan \theta = \frac{\sqrt{11}}{5} \quad \cos \theta = \frac{-5}{6}$$

$$\frac{-5}{6}$$

16) $\cos^{-1}(\cos(3\pi/4)) = \frac{3\pi}{4}$

17) $\sin^{-1}(\tan(\pi/4)) = \frac{\pi}{2}$

18) Find a positive and a negative angle co-terminal with 70° . $(+) \frac{430}{\pm 360}$ & $(-) \frac{-290}{\pm 360}$

19) Find the length of an arc with central angle of 45° and a radius of 7 in.

$$\frac{\pi}{4} \quad s = r\theta$$

$$s = 7\left(\frac{\pi}{4}\right)$$

$$s = \frac{7\pi}{4} \text{ in}$$

20) Find the radius of a circle with a central angle of $6\pi/7$ intercepting an arc of length π cm.

$$s = \pi$$

$$\theta = \frac{6\pi}{7} \quad s = r\theta$$

$$\frac{\pi}{\frac{6\pi}{7}} = r \quad \frac{7}{6} = r \cdot \frac{6\pi}{7} \cdot \frac{7}{6\pi}$$

$$r = \frac{7}{6} \text{ cm}$$

21) Mr. Smith is taking the backpacking club on a hike. From where he is standing the angle of elevation to the top of the mountain is 65° . Another student is standing 25ft away, and from where she is standing the angle of elevation is 50° . How tall is the mountain?

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Review Part 2:

Evaluate the following trigonometric functions.

1. $\sin\left(\frac{\pi}{6}\right) = \frac{1}{2}$

2. $\cos\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}$

3. $\tan\left(\frac{\pi}{3}\right) = \sqrt{3}$

4. $\cos\left(\frac{2\pi}{3}\right) = -\frac{1}{2}$

5. $\cot\left(\frac{5\pi}{6}\right) = \frac{\sqrt{3}}{2}$

6. $\csc\left(\frac{3\pi}{4}\right) = \frac{2}{\sqrt{2}}$

7. $\tan\left(-\frac{\pi}{6}\right) = -\frac{1}{\sqrt{3}}$

8. $\sin\left(-\frac{5\pi}{6}\right) = -\frac{1}{2}$

9. $\sec\left(-\frac{3\pi}{4}\right) = -\frac{2}{\sqrt{2}}$

10. $\sin\left(\frac{\pi}{2}\right) = 1$

11. $\cos\left(\frac{\pi}{2}\right) = 0$

12. $\tan\left(\frac{\pi}{2}\right) = \text{Und}$

Find two values of θ in degrees ($0^\circ \leq \theta < 360^\circ$) for the following angles.

13. $\sin \theta = \frac{\sqrt{2}}{2}$
 $\frac{\pi}{4} \quad \frac{3\pi}{4}$

14. $\cos \theta = \frac{1}{2}$
 $\frac{\pi}{3} \quad \frac{5\pi}{3}$

15. $\tan \theta = \sqrt{3}$
 $\frac{\pi}{3} \quad \frac{4\pi}{3}$

16. $\sin \theta = -\frac{1}{2}$
 $\frac{5\pi}{6} \quad \frac{7\pi}{6}$

17. $\tan \theta = -1$
 $\frac{3\pi}{4} \quad \frac{7\pi}{4}$

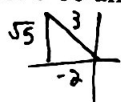
18. $\cos \theta = -\frac{\sqrt{3}}{2}$
 $\frac{5\pi}{6} \quad \frac{7\pi}{6}$

19. Let θ be an angle in quadrant II such that $\sin \theta = \frac{1}{4}$. Find the following.

a. $\cos \theta = -\frac{\sqrt{15}}{4}$

b. $\tan \theta = -\frac{1}{\sqrt{15}}$

20. Let θ be an angle in quadrant II such that $\cos \theta = -\frac{2}{3}$. Find the following.



a. $\sin \theta = \frac{\sqrt{5}}{3}$

b. $\tan \theta = \frac{\sqrt{3}}{-2}$

21. Let θ be an angle in quadrant III such that $\tan \theta = \frac{3}{5}$. Find the following.

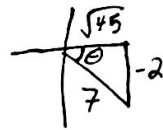
a. $\sin \theta = \frac{-3}{\sqrt{34}}$

b. $\cos \theta = \frac{-5}{\sqrt{34}}$

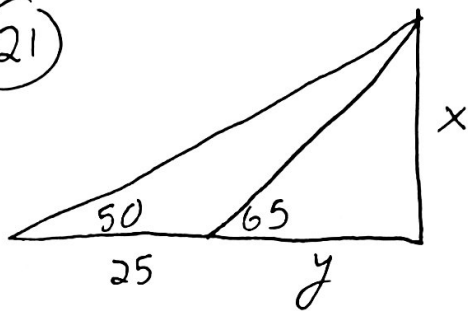
22. Let θ be an angle in quadrant IV such that $\sin \theta = -\frac{2}{7}$. Find the following.

a. $\cos \theta = \frac{\sqrt{45}}{7}$

b. $\tan \theta = \frac{-2}{\sqrt{45}}$



(21)



$$\tan 65 = \frac{x}{y}$$

$$y = \frac{x}{\tan 65}$$

$$\tan 50 = \frac{x}{y+25}$$

$$y+25 = \frac{x}{\tan 50}$$

$$y = \frac{x}{\tan 50} - 25$$

$$\frac{x}{\tan 65} = \frac{x}{\tan 50} - 25$$

$$\frac{x}{\tan 65} - \frac{x}{\tan 50} = -25$$

$$x \left(\frac{1}{\tan 65} - \frac{1}{\tan 50} \right) = -25$$

$$x = \frac{-25}{\frac{1}{\tan 65} - \frac{1}{\tan 50}} \approx 67.1 \text{ ft.}$$