

Let $y = -4 \sin\left(\frac{\pi}{10}x + \frac{8\pi}{5}\right) - 6$.

SCORE: ____ / 13 PTS

[a] Fill in the blanks. Simplify your answers.

Middle y - value = -6

Maximum y - value = -2
 $-6 + 4$

Minimum y - value = -10
 $-6 - 4$

Amplitude = 4
 $| -4 |$

Period = 20
 $\frac{2\pi}{\frac{\pi}{10}} = 2\pi \cdot \frac{10}{\pi}$

Phase shift = -16
 $\frac{\pi}{10}x + \frac{8\pi}{5} = 0 \rightarrow \frac{\pi}{10}x = -\frac{8\pi}{5} \rightarrow x = -\frac{8\pi}{5} \cdot \frac{10}{\pi} = -16$

[b] Find the coordinates for all points corresponding to the middle, top and bottom of the graph of the function for 2 complete periods, starting at the phase shift.



$\frac{1}{4}$ PERIOD = $\frac{1}{4}(20) = 5$

Point 1: (-16 , -6)

Point 2: (-11 , -10)

Point 3: (-6 , -6)

Point 4: (-1 , -2)

Point 5: (4 , -6)

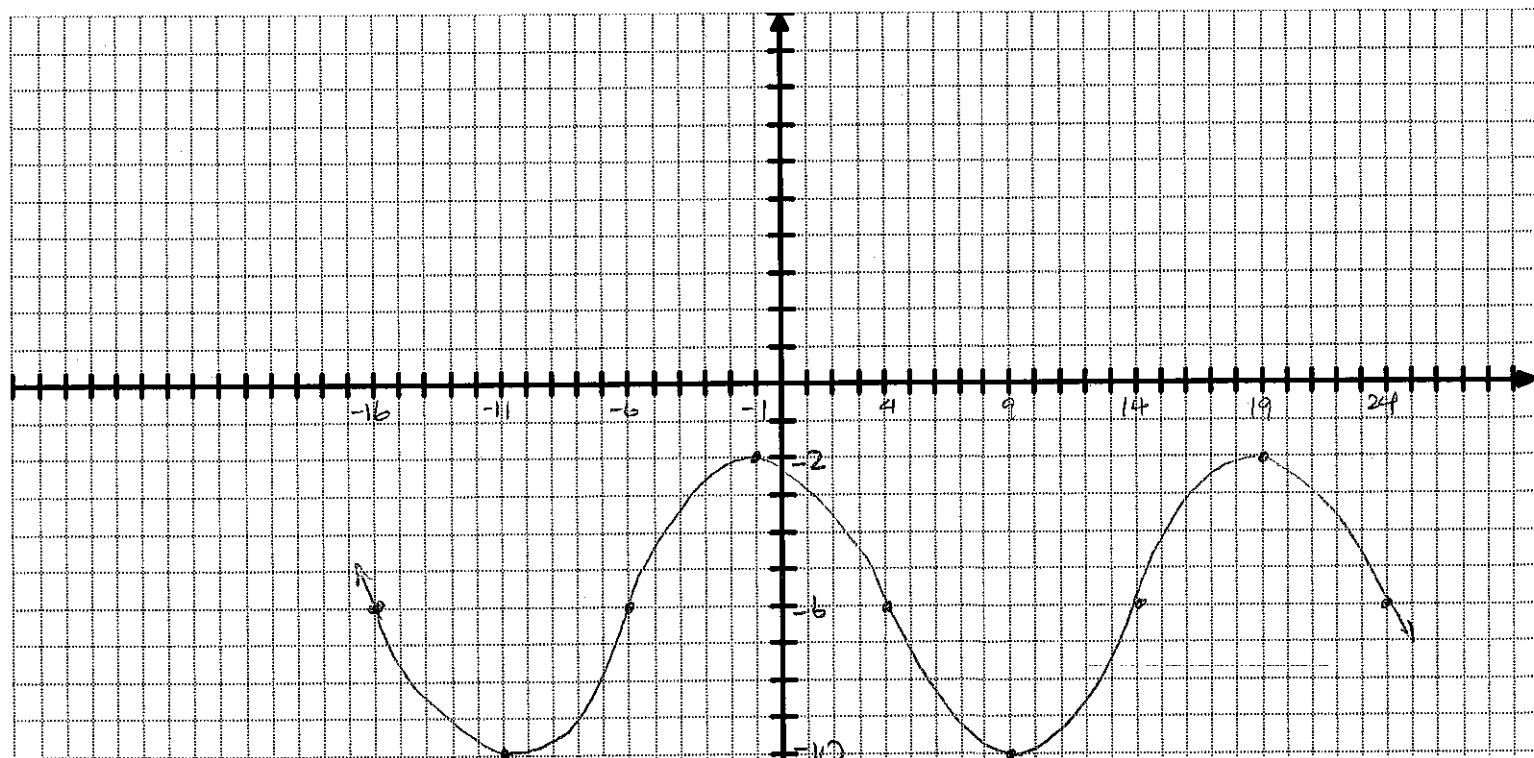
Point 6: (9 , -10)

Point 7: (14 , -6)

Point 8: (19 , -2)

Point 9: (24 , -6)

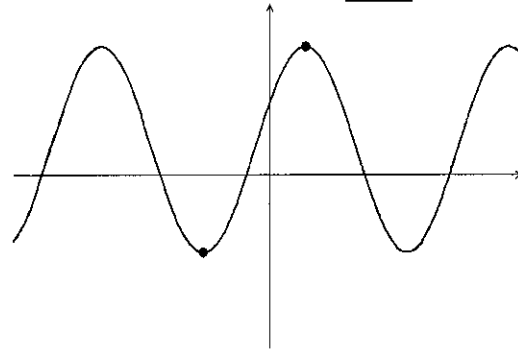
[c] On the graph paper below, sketch a detailed graph of 2 complete periods of the function using the information from [b]. You must label all x - and y - values from [b] on the appropriate axes below, and you must use a consistent scale for each axis. **You do NOT need to label each tick mark on each axis, only the ones you found in [b].**



Fill in the blanks regarding the graph on the right (**NOT DRAWN TO SCALE**). Simplify your answers.

SCORE: ____ / 7 PTS

NOTE: The coordinates of the two points highlighted are $(-\frac{4\pi}{5}, -3)$ and $(\frac{2\pi}{5}, 6)$.



[a] Middle y -value = $\frac{6+(-3)}{2} = \frac{3}{2}$

[b] Amplitude = $\frac{6-(-3)}{2} = \frac{9}{2}$

[c] Phase shift = $-\frac{4\pi}{5}$ or $\frac{2\pi}{5}$

[d] Period = $\frac{12\pi}{5} = \frac{2\pi}{B} \rightarrow 12\pi B = 10\pi \rightarrow B = \frac{5}{6}$
 $\frac{1}{2}P = \frac{2\pi}{5} - (-\frac{4\pi}{5}) = \frac{6\pi}{5} \rightarrow P = \frac{6\pi}{5} \cdot 2$

[e] An equation of the graph is $y = -\frac{9}{2} \cos \frac{5}{6}(x + \frac{4\pi}{5}) + \frac{3}{2}$ OR $\frac{9}{2} \cos \frac{5}{6}(x - \frac{2\pi}{5}) + \frac{3}{2}$
 IF PHASE SHIFT = $-\frac{4\pi}{5}$ IF PHASE SHIFT = $\frac{2\pi}{5}$

These questions are about the non-sinusoidal trigonometric functions.

SCORE: ____ / 10 PTS

[a] Sketch 2 periods of the graphs of the following functions.

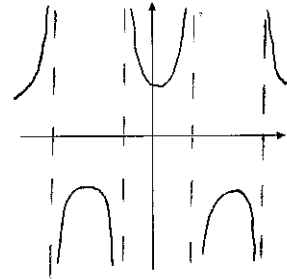
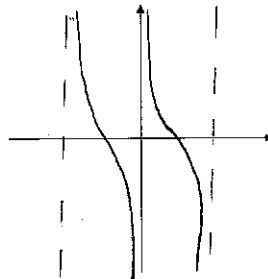
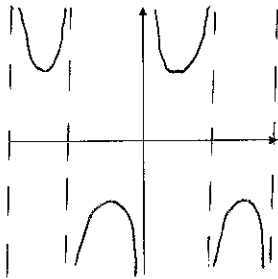
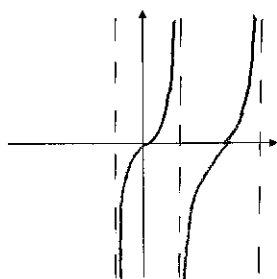
NOTE: You only need to get the general position and shape correct. Do NOT plot points.

$y = \tan x$

$y = \csc x$

$y = \cot x$

$y = \sec x$



[b] Fill in the blanks.

[1] As $x \rightarrow \pi^-$, $\csc x \rightarrow \infty$.

[2] As $x \rightarrow -\frac{3\pi}{2}^+$, $\sec x \rightarrow -\infty$.

[3] The range of $y = \sec x$ is $(-\infty, -1] \cup [1, \infty)$.

[4] The domain of $y = \tan x$ is $x \neq \frac{\pi}{2} + n\pi, n \in \mathbb{Z}$.

[5] The period of $y = \cot x$ is π .

[6] The equations of the vertical asymptotes of $y = \csc x$ are $x = n\pi, n \in \mathbb{Z}$.