

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

[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)

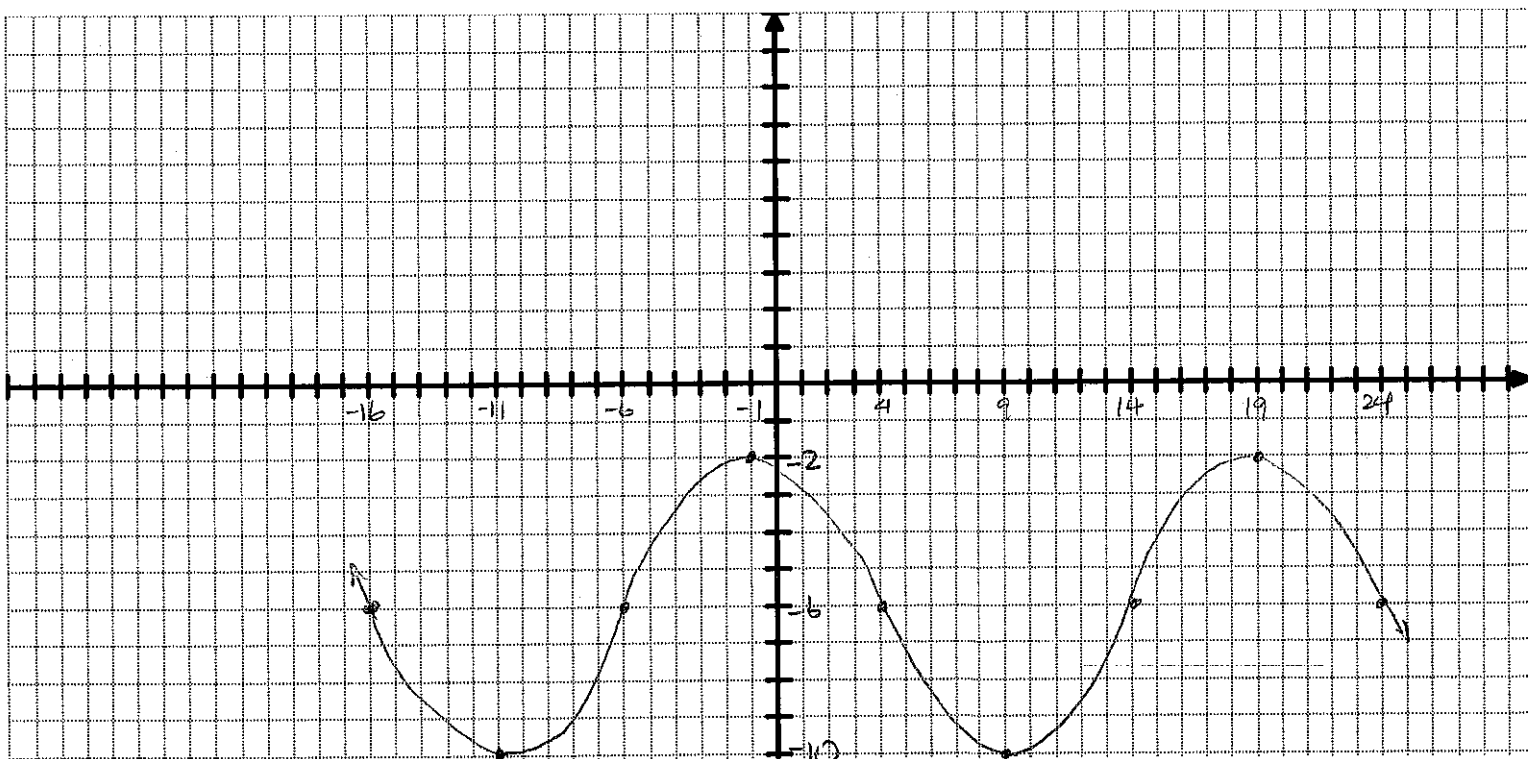
Point 7: (14 , -6)

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.

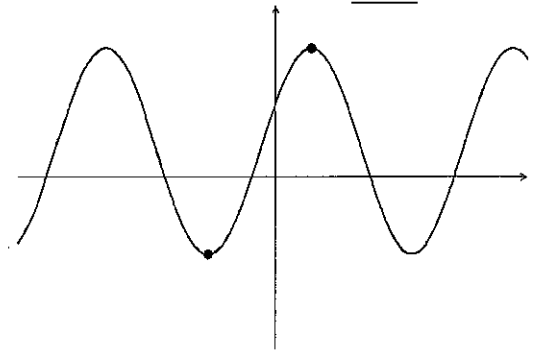
You do NOT need to label each tick mark on each axis, only the ones you found in [b].



SCORE: ___ / 7 PTS

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

NOTE: The coordinates of the two points highlighted are $(-\frac{3\pi}{7}, -4)$ and $(\frac{\pi}{7}, 9)$.



[a] Middle y -value = $\frac{5}{2}$
 $\frac{9 + (-4)}{2}$

[b] Amplitude = $\frac{13}{2}$
 $\frac{9 - (-4)}{2}$

[c] Phase shift = $-\frac{3\pi}{7}$ or $\frac{\pi}{7}$

[d] Period = $\frac{8\pi}{7} = \frac{2\pi}{B} \rightarrow \frac{4}{8}B = \frac{7}{14} \rightarrow B = \frac{7}{4}$
 $\frac{1}{2}P = \frac{\pi}{7} - (-\frac{3\pi}{7}) = \frac{4\pi}{7} \rightarrow P = \frac{4\pi}{7} \cdot 2$

[e] An equation of the graph is $y = -\frac{13}{2} \cos \frac{7}{4}(x + \frac{3\pi}{7}) + \frac{5}{2}$ or $\frac{13}{2} \cos \frac{7}{4}(x - \frac{\pi}{7}) + \frac{5}{2}$
 IF PHASE SHIFT = $-\frac{3\pi}{7}$ IF PHASE SHIFT = $\frac{\pi}{7}$

These questions are about the non-sinusoidal trigonometric functions.

SCORE: ___ / 10 PTS

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

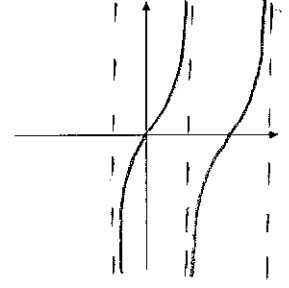
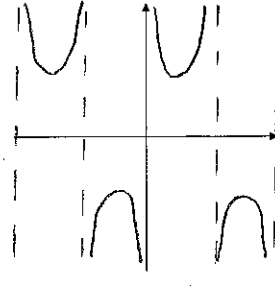
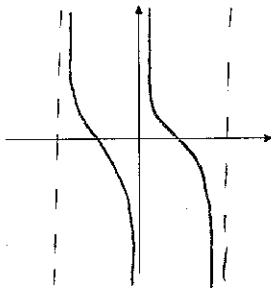
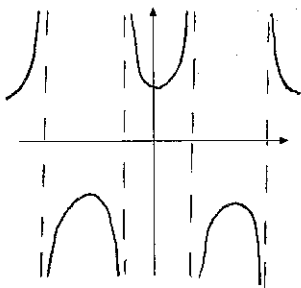
NOTE: You only need to get the general position and shape correct. Do NOT plot points.

$y = \sec x$

$y = \cot x$

$y = \csc x$

$y = \tan x$



[b] Fill in the blanks.

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

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

[3] The domain of $y = \csc x$ is $x \neq n\pi, n \in \mathbb{Z}$.

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

[5] The equations of the vertical asymptotes of $y = \tan x$ are $x = \frac{\pi}{2} + n\pi, n \in \mathbb{Z}$.

[6] The period of $y = \cot x$ is π .