> Answer the questions in the spaces provided. **Show all of your work and circle the answer you would like to have graded for each question.**

Name: _____ key _____

1. Determine the amplitude, period, frequency, phase shift, and vertical shift for each of the following functions:

a.) $-3\csc(\pi + \frac{\pi}{2}x) + 4;$

$A = -3$ $B = \frac{\pi}{2}$ $D = 4$

$C = -\pi$

amplitude $= |A| = |-3| = \boxed{3.}$

period $= \frac{2\pi}{|B|} = \frac{2\pi}{\frac{\pi}{2}} = \boxed{4.}$

frequency $= \frac{1}{\text{period}} = \boxed{\frac{1}{4}.}$

phase shift $= \frac{C}{B} = \frac{-\pi}{\frac{\pi}{2}} = \boxed{-2.}$

vertical shift $= D = \boxed{4.}$

b.) $\frac{1}{3}\tan(-2x - \frac{\pi}{4}) - 1.$

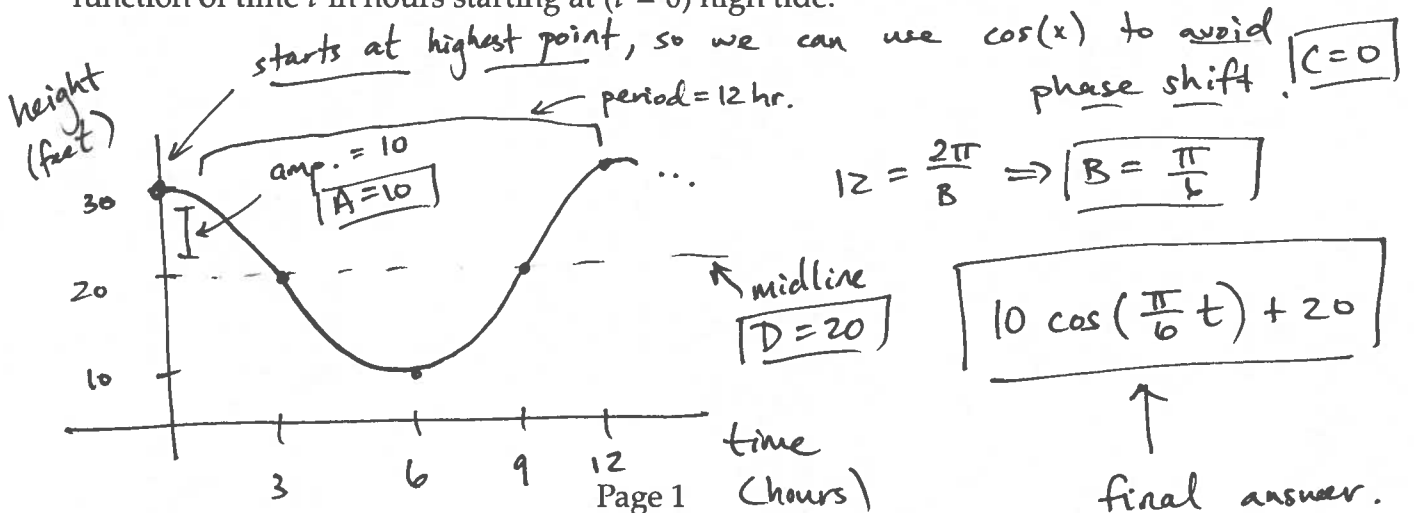$A = \frac{1}{3}$ $B = -2$

$C = \frac{\pi}{4}$ $D = -1$

amp. $= \boxed{\frac{1}{3}.}$

period $= \frac{\pi}{|B|} = \boxed{\frac{\pi}{2}.}$
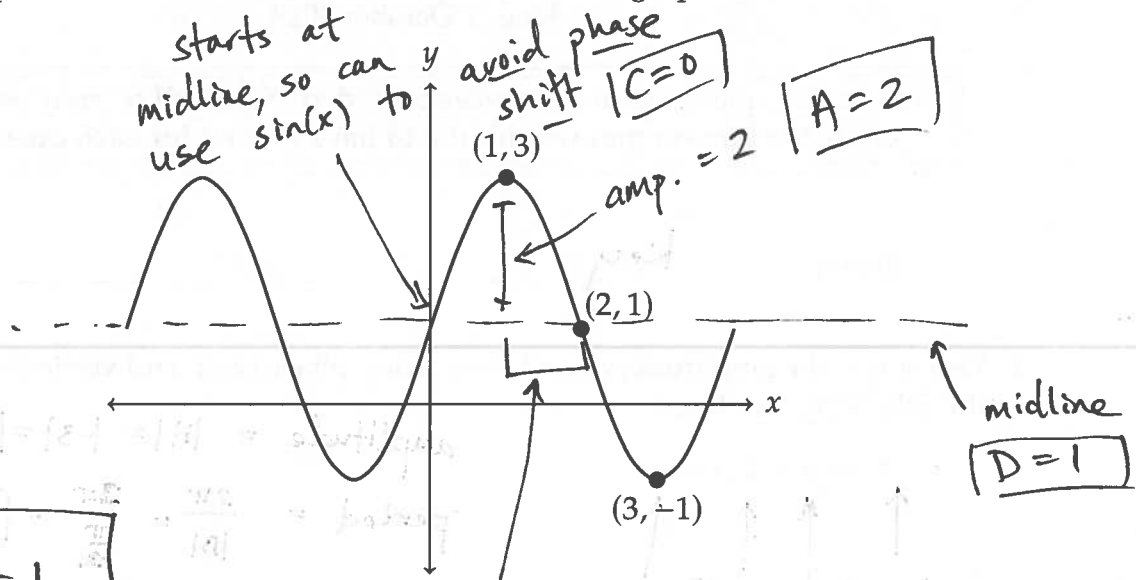
frequency $= \frac{1}{\pi/2} = \boxed{\frac{2}{\pi}.}$

phase shift $= \frac{\pi/4}{-2} = \boxed{\frac{-\pi}{8}.}$

vertical shift $= \boxed{-1.}$

2. You are visiting a beach with poles sticking out of the water that allow you to measure the water level. At high tide the water level is 30 feet. Exactly 6 hours later it is low tide and the water level is 10 feet. Model the height of the water level in feet as a function of time t in hours starting at $(t = 0)$ high tide.

starts at highest point, so we can use $\cos(x)$ to avoid phase shift. $\boxed{C = 0}$

period $= 12$ hr.

amp. $= 10$ $\boxed{A = 10}$

$12 = \frac{2\pi}{B} \Rightarrow \boxed{B = \frac{\pi}{6}}$

midline $\boxed{D = 20}$

$\boxed{10\cos\left(\frac{\pi}{6}t\right) + 20}$

final answer.

height (feet)

time (hours)

3. Give an equation in the form $A\sin(Bx - C) + D$ for the graph shown below:

starts at midline, so can use $\sin(x)$ to avoid phase shift! $\boxed{C=0}$

y

(1,3)

amp. $= 2$

$\boxed{A=2}$

(2,1)

$\boxed{2\sin\left(\frac{\pi}{2}x\right) + 1}$

x

midline

$\boxed{D=1}$

(3,−1)

↑

final answer

one quarter of the period

So period is 4

$4 = \dfrac{2\pi}{B} \Rightarrow B = \boxed{\dfrac{\pi}{2}}$