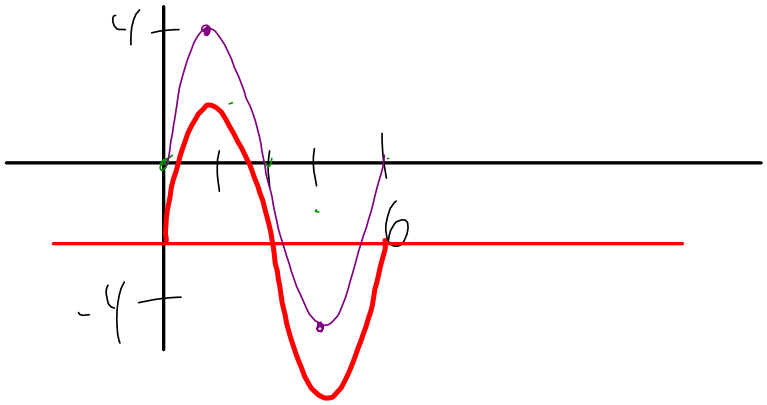
Ch. 6 Review work: pp. 404-405 #1 – 3, 6, 8 – 10, 12, 13

Study for the Unit 6 Summative!!

p. 404 Lesson 6.2

3. Sketch the graph of a sinusoidal function that has a period of 6, an amplitude of 4, and whose equation of the axis is $y = -2$.



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6. A ship is docked in port and rises and falls with the waves. The function $d(t) = 2\sin(30t)^\circ + 5$ models the depth of the propeller, $d(t)$, in metres at t seconds. Graph the function using a graphing calculator, and answer the following questions.

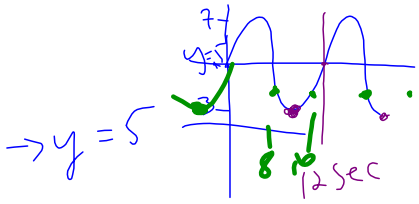
a) What is the period of the function, and what does it represent in this situation?

b) If there were no waves, what would be the depth of the propeller?

c) What is the depth of the propeller at $t = 5.5$ s?

d) What is the range of the function?

e) Within the first 10 s, at what times is the propeller at a depth of 3 m?



a) period $= \frac{360}{|k|}$ $\left\{ k = \frac{360^\circ}{\text{period}} \right.$

$= \frac{360^\circ}{30}$

$= 12$ sec

∴ the time to rise + fall each time

d) $R: \{d \in \mathbb{R} \mid 3 \le d \le 7\}$

e) $d(t) = 2\sin(30t)^\circ + 5$ $\left\{ 0 \le t \le 10, \; d = 3 \right.$

$3 = 2\sin(30t) + 5$

$3 - 5 = 2\sin(30t)$

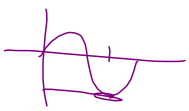
$-2 = 2\sin 30t$

$\frac{-2}{2} = \sin 30t$

$-1 = \sin 30t$

let $w = 30t$

$\sin w = -1$



∴ $w = 270$

∴ $270 = 30t$

$t = 9$

c) $t = 5.5$

$d(5.5) = 2\sin(30(5.5)) + 5$

$= 2\sin(165) + 5$

$\doteq 5.517$

$\doteq 5.52$

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8. Each sinusoidal function has undergone one transformation that may have affected the period, amplitude, or equation of the axis of the function. In each case, determine which characteristic has been changed. If one has, indicate its new value.

a) $y = \sin x - 3$ → Eq of A → now $y = -3$

b) $y = \sin(4x)$ → h.c. by a factor of 4 → period = 90°

c) $y = 7\cos x$ → amp is 7

d) $y = \cos(x - 70^\circ)$ ↳ N.C.

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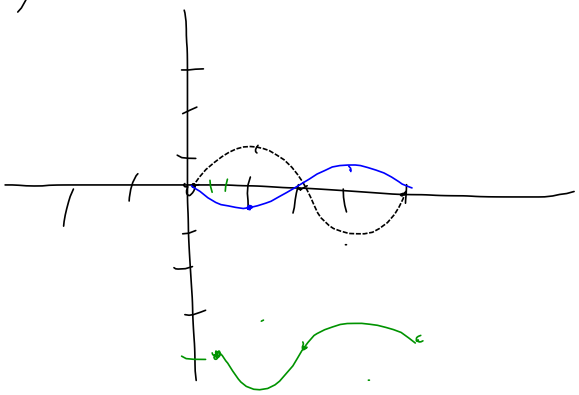
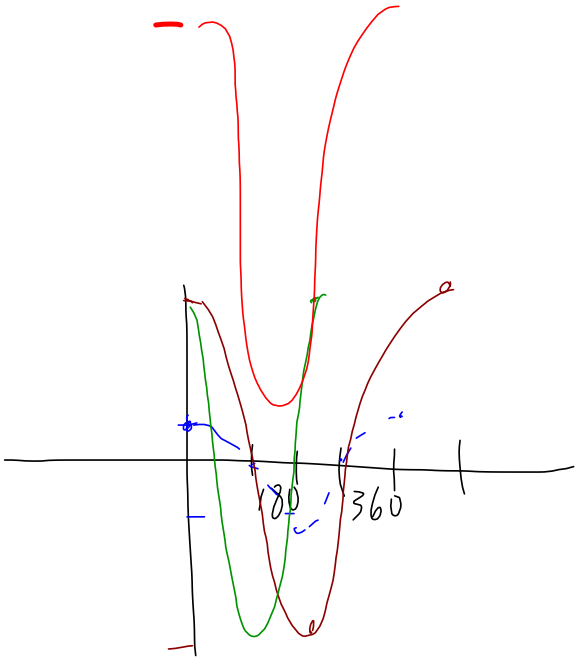
9. Use transformations to graph each function for $0° \le x \le 360°$.

a) $y = 5\cos(2x) + 7$

b) $y = -0.5\sin(x - 30°) - 4$

b)





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13. Meagan is sitting in a rocking chair. The distance, $d(t)$, between the wall and the rear of the chair varies sinusoidally with time t. At $t = 1$ s, the chair is closest to the wall and $d(1) = 18$ cm. At $t = 1.75$ s, the chair is farthest from the wall and $d(1.75) = 34$ cm.

a) What is the period of the function, and what does it represent in this situation?
b) How far is the chair from the wall when no one is rocking in it?
c) If Meagan rocks back and forth 40 times only, what is the domain of the function?
d) What is the range of the function in part (c)?
e) What is the amplitude of the function, and what does it represent in this situation?
f) What is ~~the~~ an equation of the sinusoidal function?
g) What is the distance between the wall and the chair at $t = 8$ s?

→ 1.5 sec
↳ 1 complete rock

$c = \frac{34+18}{2}$

→ $\frac{34+18}{2} = \frac{52}{2} = 26$ cm

$\{d \in \mathbb{R} \mid 18 \le d \le 34\}$

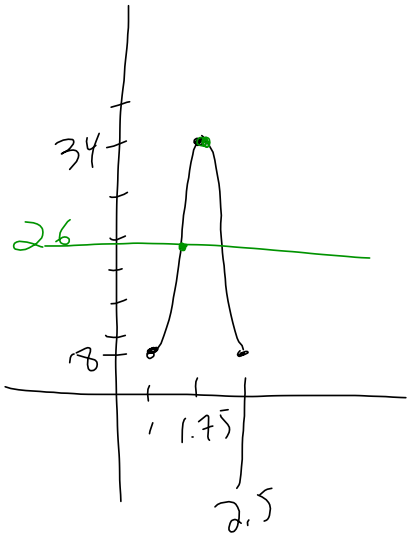
$k = \frac{360}{1.5}$

$= 240$

$a = \frac{34-18}{2}$

$= \frac{16}{2}$

$= 8$ cm



$d(t) = -8\cos(240(t-1)) + 26$

$d = 8\sin(240(t-1.375)) + 26$ → distance from resting position.

forward or backward

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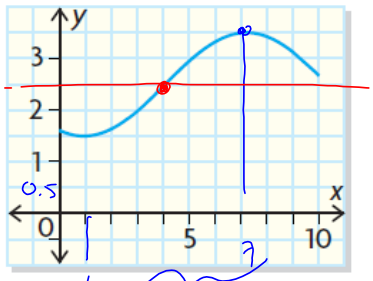
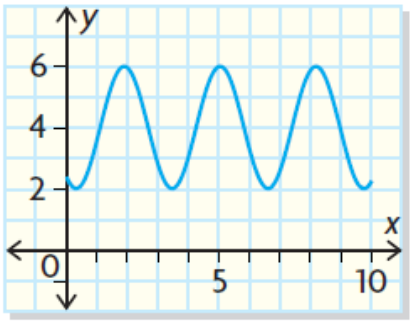
12. Determine the sine function $y = a \sin k(\theta - d) + c$ for each graph.

a)



b)



$a = \frac{\max - \min}{2}$

$= \frac{3.5 - 1.5}{2}$

$= \frac{2}{2}$

$= 1$

$c = \frac{\max + \min}{2}$

$= \frac{3.5 + 1.5}{2}$

$= \frac{5}{2}$

$= 2.5$

$\frac{1}{2}$ cycle $= 6$

$\therefore$ whole period $= 12$

$\therefore k = \frac{360}{12}$

$= 30$

$y = 1 \sin(30(x-4)) + 2.5$