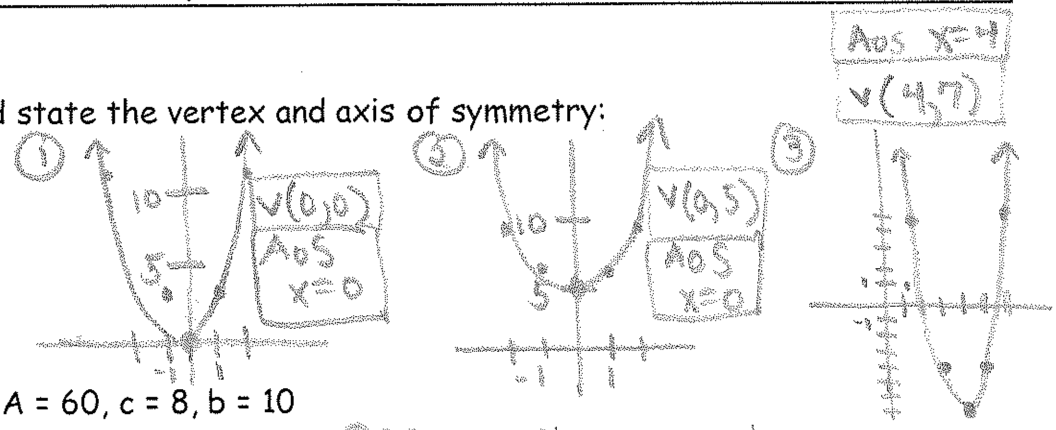
Day 11 Warm Up

Warm-up:

1. Graph the following and state the vertex and axis of symmetry:
   1. $y = 3x^2$
   2. $y = x^2 + 5$
   3. $y = 3(x-4)^2 - 7$



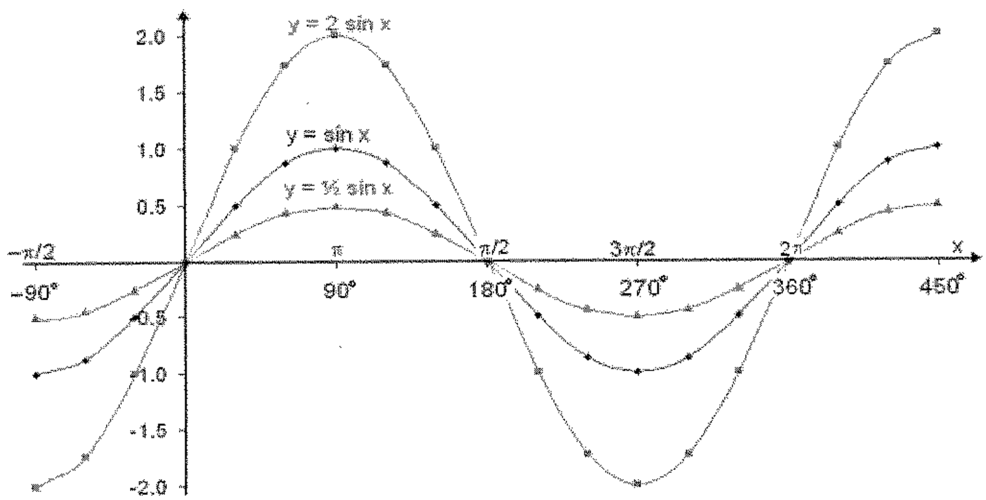
2. Solve the triangle if Angle A = 60, c = 8, b = 10

see work on next page

3. Solve the trigonometric equation: $2\tan(x)\sin(x) = 2\tan(x)$

see work on next page

Day 11 Notes: Amplitudes and Midlines of Trig Functions



How are y = sin(x), y = 2sin(x), and y = ½ sin(x) alike? How are they different?

alike • same x-intercepts (zeros)
• maximums and minimums at same x-values
• same periods (all 360°)

different • heights are different (amplitudes are different)

I. Amplitude

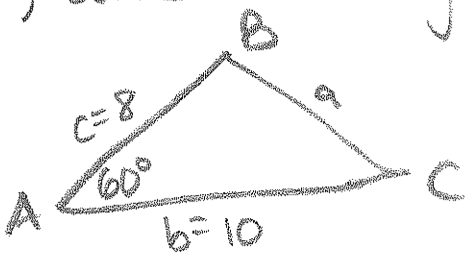
height of the graph from the midline

a. A graph in the form $y = a\sin(b(x-c)) + d$ or $y = a\cos(b(x-c)) + d$ has an amplitude of $|a|$.

b. The amplitude of a standard sine or cosine graph is 1. (because y = sin(x) and y = cos(x) have a = coefficient = 1 and |1| = 1)

Warm Up Trig Unit Day 11

2) Solve the triangle if $m\angle A = 60^\circ$, $c = 8$, $b = 10$



① $a^2 = b^2 + c^2 - 2bc\cos A$ (Think BIG)

$a^2 = 10^2 + 8^2 - 2(10)(8)\cos 60$

remember to type this part in together at once to follow order of operations !! :)

$a^2 = 84$

$\boxed{a = 9.2}$

② $\dfrac{\sin(60)}{9.2} = \dfrac{\sin(C)}{8}$ (short side 2nd with Law of Sines)

$\dfrac{8\sin(60)}{9.2} = \dfrac{9.2\sin C}{9.2}$

$.75311 = \sin C$

$\sin^{-1}(.75311)$

OR $\sin^{-1}(\text{Ans}) = \boxed{49^\circ = C}$

this is better

③ 180
− 60 A
− 49 C

$\boxed{71^\circ = B}$

(Subtract angles from 180°)

3) Solve the trig equation $2\tan(x)\sin(x) = 2\tan(x)$

$-2\tan(x) \quad -2\tan(x)$

$2\tan(x)\sin(x) - 2\tan(x) = 0$

$2\tan(x)(\sin(x) - 1) = 0$ factor out the GCF of $2\tan(x)$

set each factor $= 0$ and solve

$2\tan(x) = 0$	$\sin(x) - 1 = 0$
$\dfrac{2\tan(x)}{2} = \dfrac{0}{2}$	$\sin(x) - 1 = 0$ $+1 \quad +1$
$\tan(x) = 0$	$\sin(x) = 1$
$x = \tan^{-1}(0)$	$x = \sin^{-1}(1)$

$\boxed{x = 0^\circ, \quad x = 90^\circ}$

c. The amplitude of a sine or cosine graph can be found using the following formula:

$$\boxed{amp = \frac{|max - min|}{2} = |a|}$$

d. Find the amplitude for each of the following:

1. y = 3sinx $\quad amp = |a| = |3| = \boxed{3 = amp}$
   $y = a\sin(x)$
2. y = -4cos5x $\quad amp = |a| = |-4| = \boxed{4 = amp}$
   $y = a\cos(x)$
3. y = (1/3)sinx +5 $\quad amp = |a| = |1/3| = \boxed{1/3 = amp}$
   $y = a\sin(x) + 5$

II. Midline

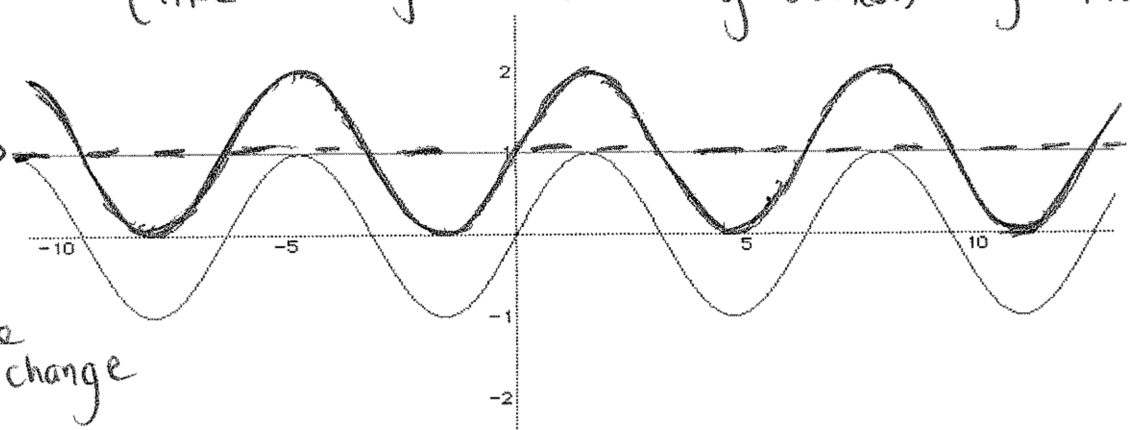
a. The midline is the line that "cuts the graph in half" or passes through the middle of the graph
b. The midline is halfway between the max and min
c. The midline can be found using the following formula:

$$\boxed{\text{midline is at } y = \frac{max + min}{2} \text{ or}} \quad y = min + amp$$

like midpoint, to find the middle you do an average

d. When there is no vertical shift, the midline is always $y = 0$.
(like for $y = \sin(x)$ or $y = 2\sin(x)$ or $y = \sin(3x)$)

Note: midline moved up 1 BUT amplitude did not change



III. Period

a. A period is the length of one cycle.
b. y=sin(x) has a period of 360°.
c. y=cos(x) has a period of 360°.
d. y=tan(x) has a period of 180°.
e. When f(x) = Asin(Bx) the formula for period is:

$$\boxed{Period = \frac{360°}{|B|} = \underbrace{\frac{2\pi}{|B|}}}$$

this one is in radians... which is not a focus in Math 2

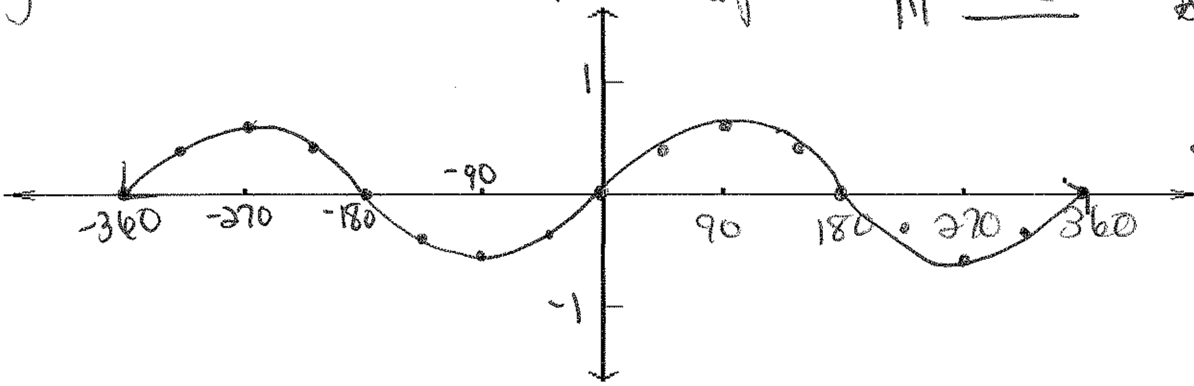
Graph 1 period in the positive direction + negative direction

4. $y = 0.5 \sin(x)$ Amplitude: 0.5   Midline: $y=0$

$y = a\sin(x)$ amp $= |0.5|$ per $= \frac{360}{|1|} = 360°$

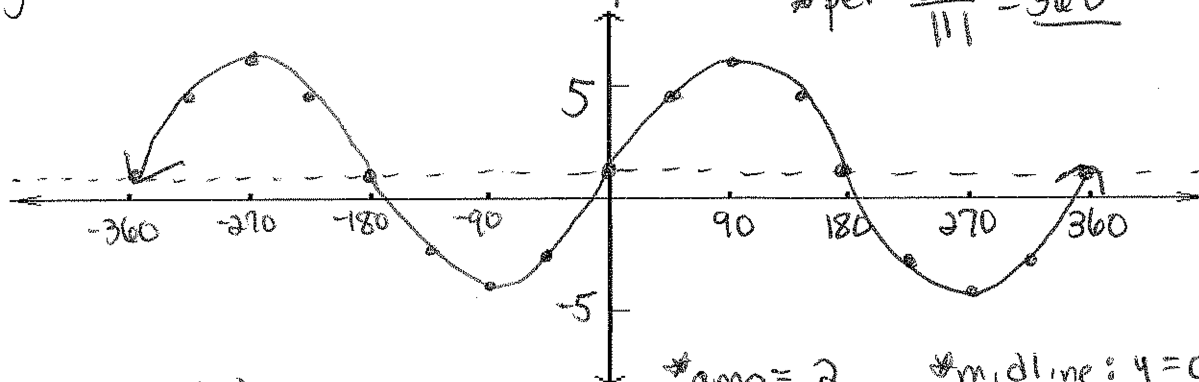
always find the period first!

label your axes!



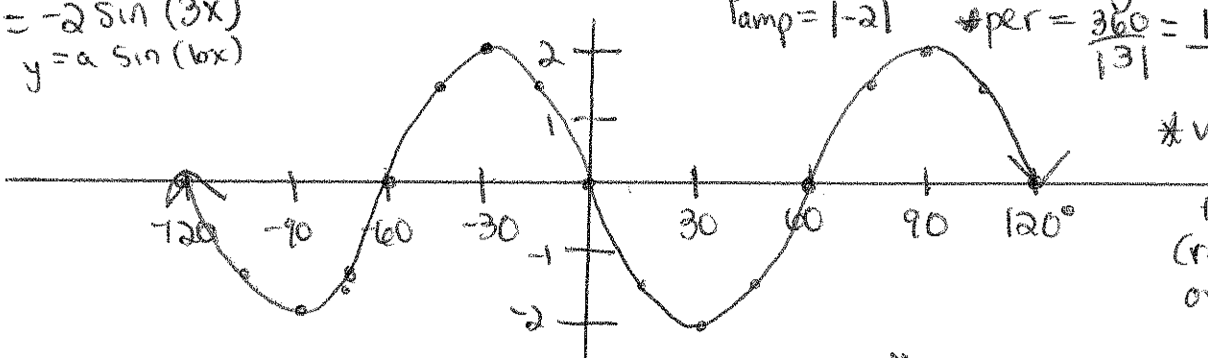
5. $y = 5 \sin(x) + 1$ Amplitude: 5   Midline: $y=1$

$y = a\sin(bx-c)+d$ amp $= |5|$ per $= \frac{360}{|1|} = 360°$



6. $y = -2\sin(3x)$ amp $= 2$ midline: $y=0$

$y = a\sin(bx)$ amp $= |-2|$ per $= \frac{360}{|3|} = 120°$



valley then hill due to $-2=a$ (reflected over x-axis)

7. $y = \cos(2x) + 1$ amp $= 1$ midline: $y=1$

$y = a\cos(bx)+d$ amp $= |1|$ per $= \frac{360}{|2|} = 180°$