Vertical Transformations of Trig. Functions

Name: Key

Warm-up: Describe the transformation of each function.

1. $y = 3x^2$

V.d. 3

2. $y = \sqrt{x} + 6$

V.t. 6

3. $y = -4|x|$

reflect x-axis
V.d. 4

4. $y = -2 + x^2$

down 2

5. $= 2|x| - 1$

V.d. 2
V.t. -1

6. $y = 5\sqrt{x} + 4$

V.d. 5
V.t. 4

Objective: To understand how vertical dilations and translations affect the graphs of the sine and cosine functions

Transformation:

Vertical Dilation (amplitude):	**Vertical Translation** (sinusoidal axis/ midline/vertical shift):
If $a > 1$ - stretch the graph vertically If $0 < a < 1$ - shrink the graph vertically $y = a\sin x$	shift the entire graph up or down $y = \cos\theta + c$

Ex: Describe the transformation for each of the following:

a. $y = 3sin\theta$

V.d. 3

b. $y = cosx + 6$

V.t. 6

c. $y = -4cos\theta$

reflect x-axis
amplitude: 4

d. $y = -2 + sinx$

$y = -2$ sinusoidal axis

e. $y = 2cos\theta - 1$

amplitude: 2
sinusoidal axis: $y = -1$

f. $y = 5sinx + 4$

V.d. 5
V.t. 4

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Ex: Write an equation for either the sine or cosine function with the given transformation(s):

a. v.d. of 2

$y = 2\sin\theta$

b. v.t. of -5

$y = \cos x - 5$

c. amplitude of -4 and midline at y = 9

$y = -4\sin\theta + 9$

d. sinusoidal axis at y = -1

$y = \cos\theta - 1$

e. amplitude of -12

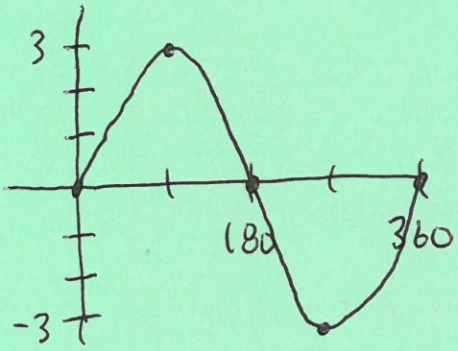
$y = -12\sin x$

f. v.d of 6 and v.t of 8

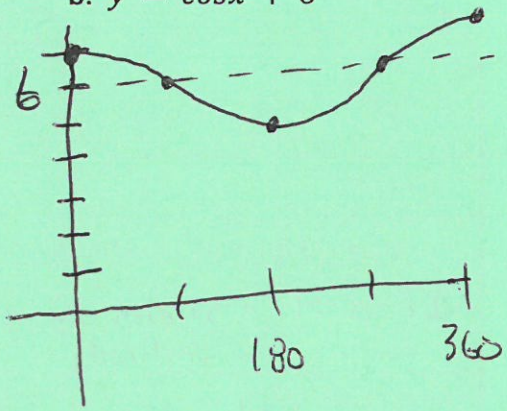
$y = 6\cos\theta + 8$

Ex: Graph the functions from above:

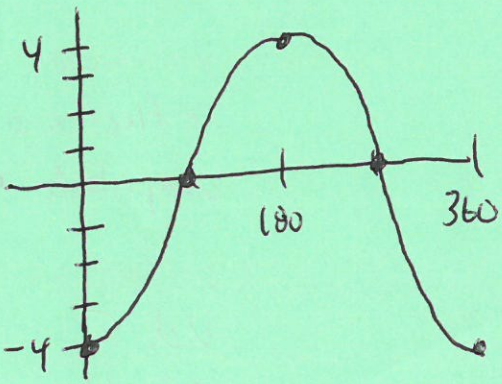
a. $y = 3sin\theta$



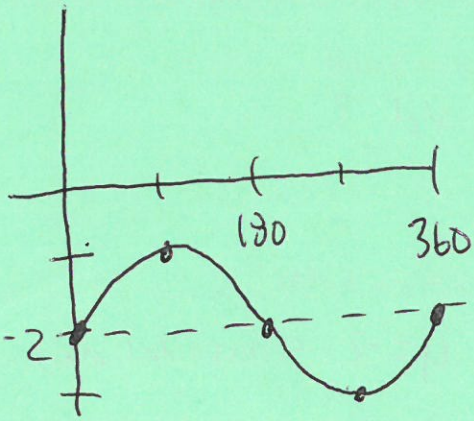
b. $y = cosx + 6$



c. $y = -4cos\theta$



d. $y = -2 + sinx$



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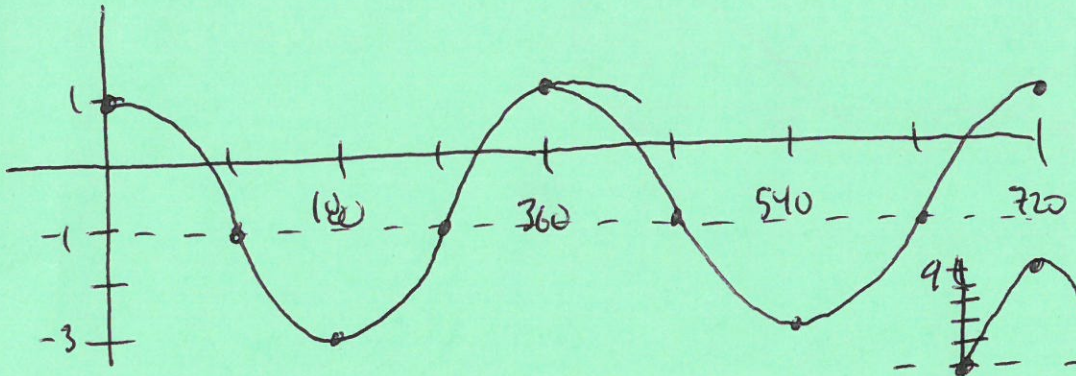
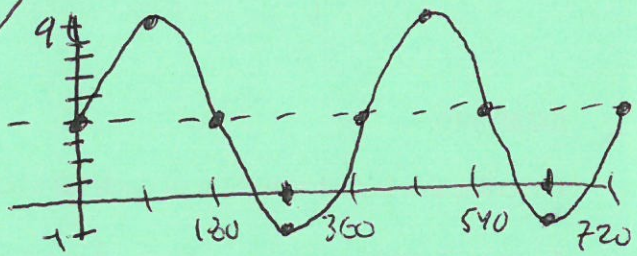
For e and f: sketch two cycles of the functions below

e. $y = 2cos\theta - 1$

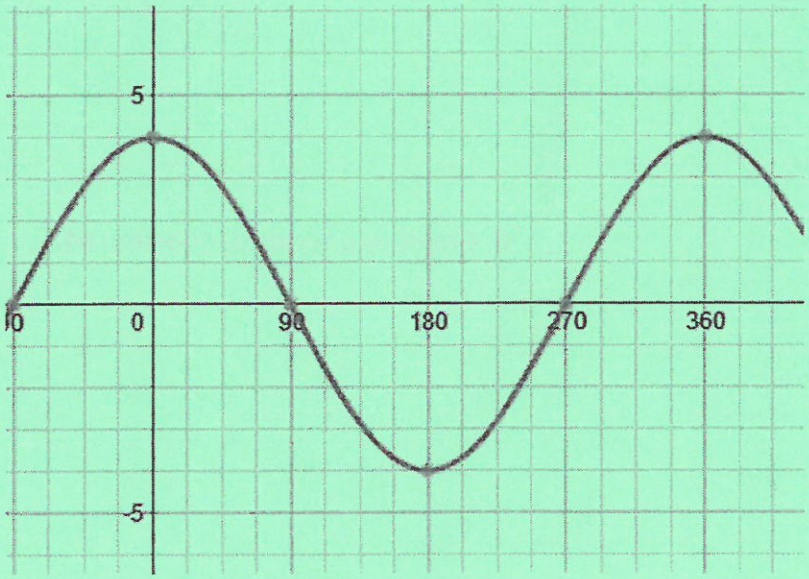


f. $y = 5sinx + 4$



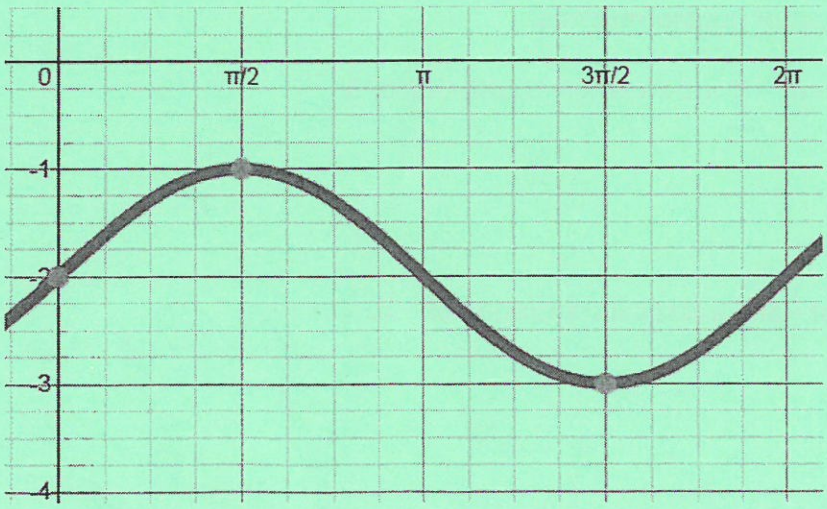
Ex. Write the equations for the given graphs:

a.



a. $y = 4\cos\theta$

b.



b. $y = \sin x - 2$

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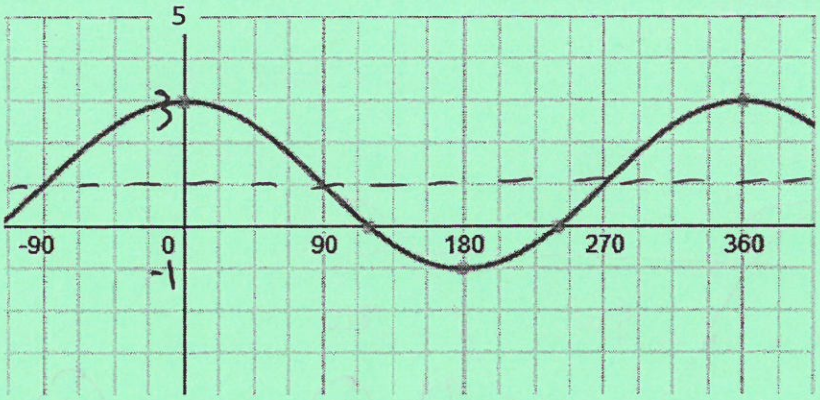
c.



c. $y = 2\cos\theta + 1$

Extension:

Describe the transformation of each function.

1. $y = 2\cos x$

2. $y = \frac{1}{2}\sin\theta - 1$

3. $y = -3\cos\theta + 4$

4. $y = -\frac{3}{4}\sin x + \frac{1}{4}$

5. Graph one cycle of question #1.

6. Graph two cycles of question #4.

Write an equation for each of the following set of transformations.

7. The cosine function with a vertical dilation of -2 and a vertical translation of 3.

8. The sine function with a vertical dilation of $\frac{1}{3}$ and a vertical translation of -2.