

Unit 3 (4.4) Vertical Transformations of Trig. Functions

Warm-up: Describe the transformation of each function.

1. $y = 3x^2$

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

3. $y = -4|x|$

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

5. $y = 2|x| - 1$

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

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

$$y = A \sin B (\theta - C) + D \quad y = A \cos B (\theta - C) + D$$

<u>Transformation:</u>	
“A” <u>Vertical Dilation</u> (amplitude):	“D” <u>Vertical Translation</u> (sinusoidal axis/ midline/vertical shift):

Ex: Describe the transformation for each of the following:

a. $y = 3\sin\theta$

b. $y = \cos x + 6$

c. $y = -4\cos\theta$

d. $y = \sin x - 2$

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

f. $y = 5\sin x + 4$

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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

b. v.t. of -5

c. reflection, amplitude of 4,
and midline at $y = 9$

d. sinusoidal axis at $y = -1$

e. amplitude of 12
reflection

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

Ex: Graph the functions from above:

a. $y = 3\sin\theta$

b. $y = \cos x + 6$

c. $y = -4\cos\theta$

d. $y = \sin x - 2$

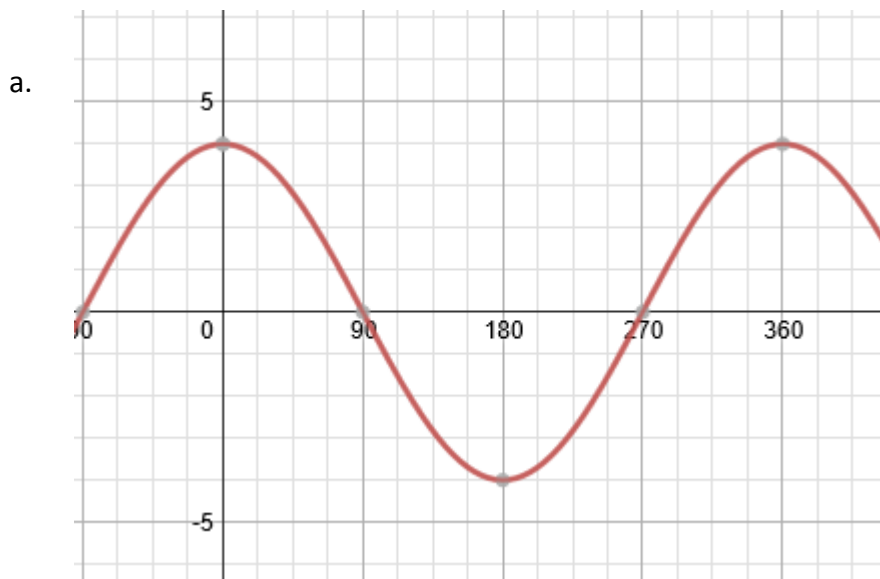
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For e and f: sketch two cycles of the functions below

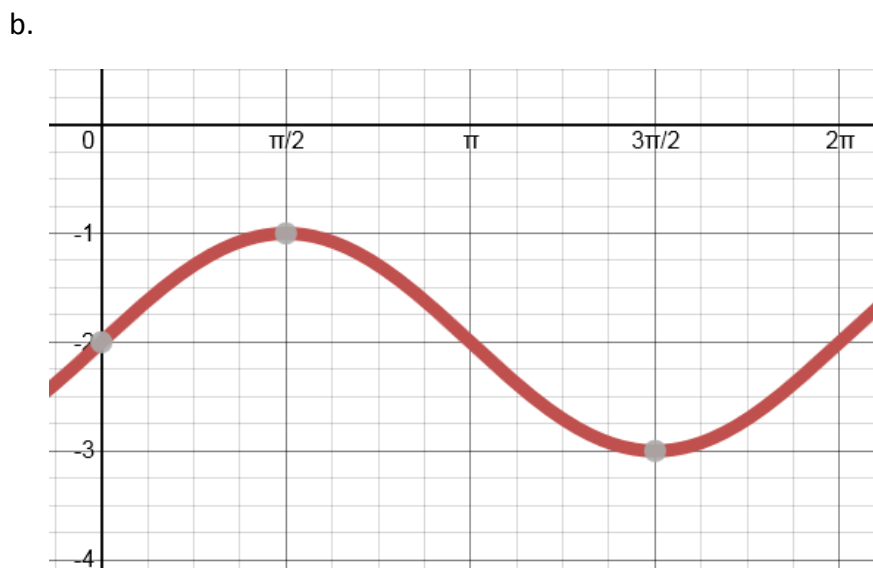
e. $y = 2\cos\theta - 1$

f. $y = 5\sin x + 4$

Ex. Write the equations for the given graphs:



a. _____



b. _____

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c. _____

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, reflection, and a vertical translation of 3.

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