

4.2 - Translations of Sine and Cosine

Warmup

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Find the exact value.

$$1) \frac{\sin 1830^\circ + \cos(-1020^\circ)}{2}$$

$$\frac{1}{2}$$

$$2) \frac{4 \sin\left(\frac{5\pi}{3}\right) + 2 \cos 5070^\circ}{3}$$

$$-\frac{\sqrt{3}}{3}$$

$$3) \sin\left(-\frac{11\pi}{6}\right) + \sin(-300^\circ)$$

$$\frac{1 + \sqrt{3}}{2}$$

$$4) 8\left(\sin \frac{8\pi}{3}\right)(\cos(-240^\circ))$$

$$-2\sqrt{3}$$



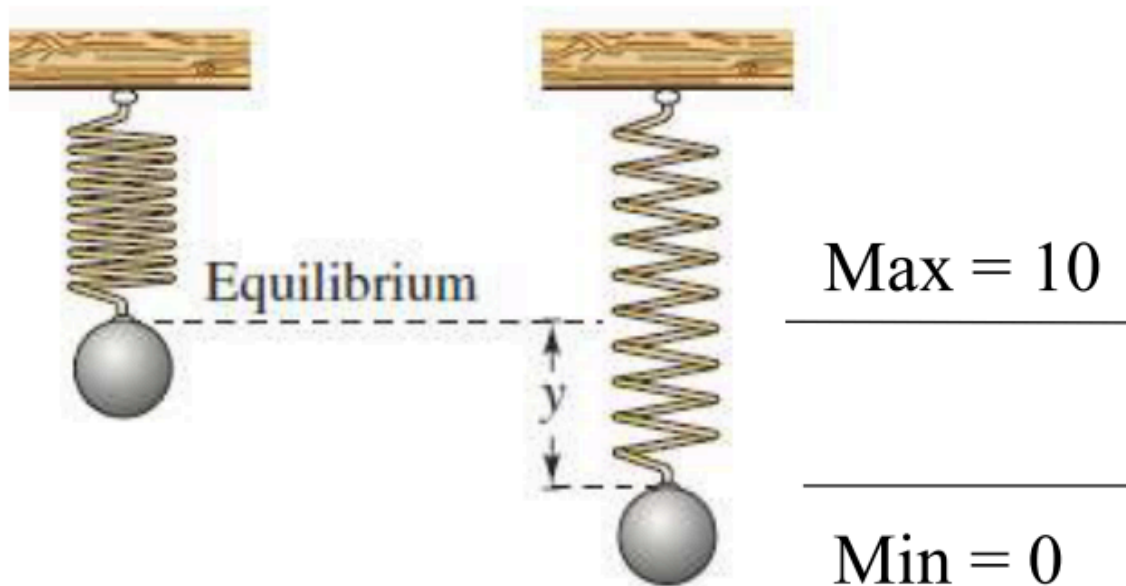
Trig Word Problems

4.2 - Translations of Sine and Cosine

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Practice

A mass on a spring is pulled down and then released. What is the equation of the height? One cycle is finished in 1.2 seconds.



$$h = ?\cos(?x) + ?$$

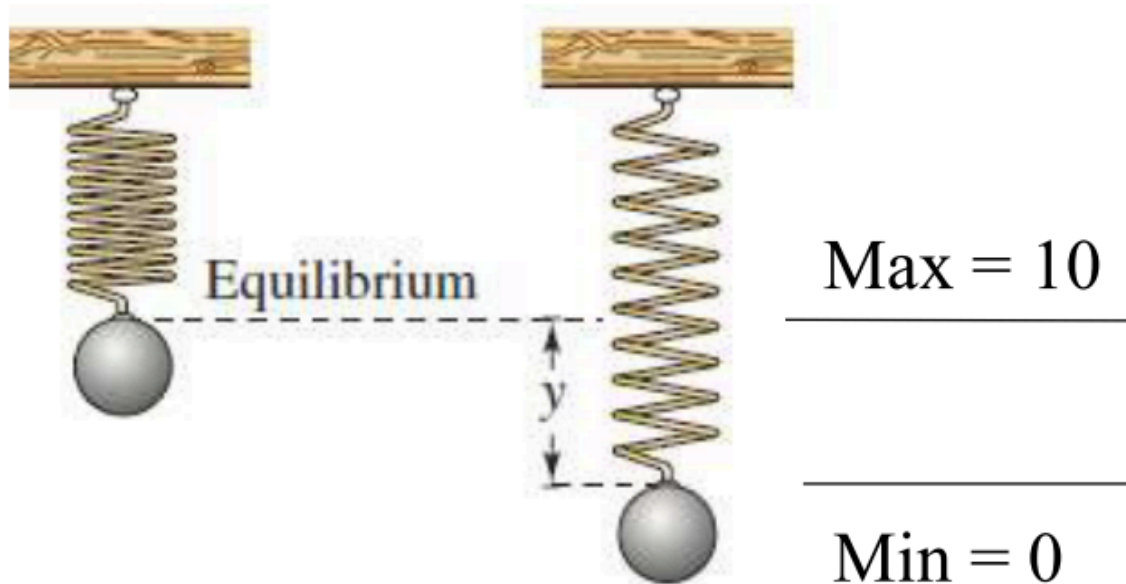
$$h = -5\cos\left(\frac{2\pi}{1.2}t\right) + 5$$

4.2 - Translations of Sine and Cosine

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Practice

A mass on a spring is pulled down and then released. Within the first 5 seconds, how many times has it reached a height of 1.0 inches?



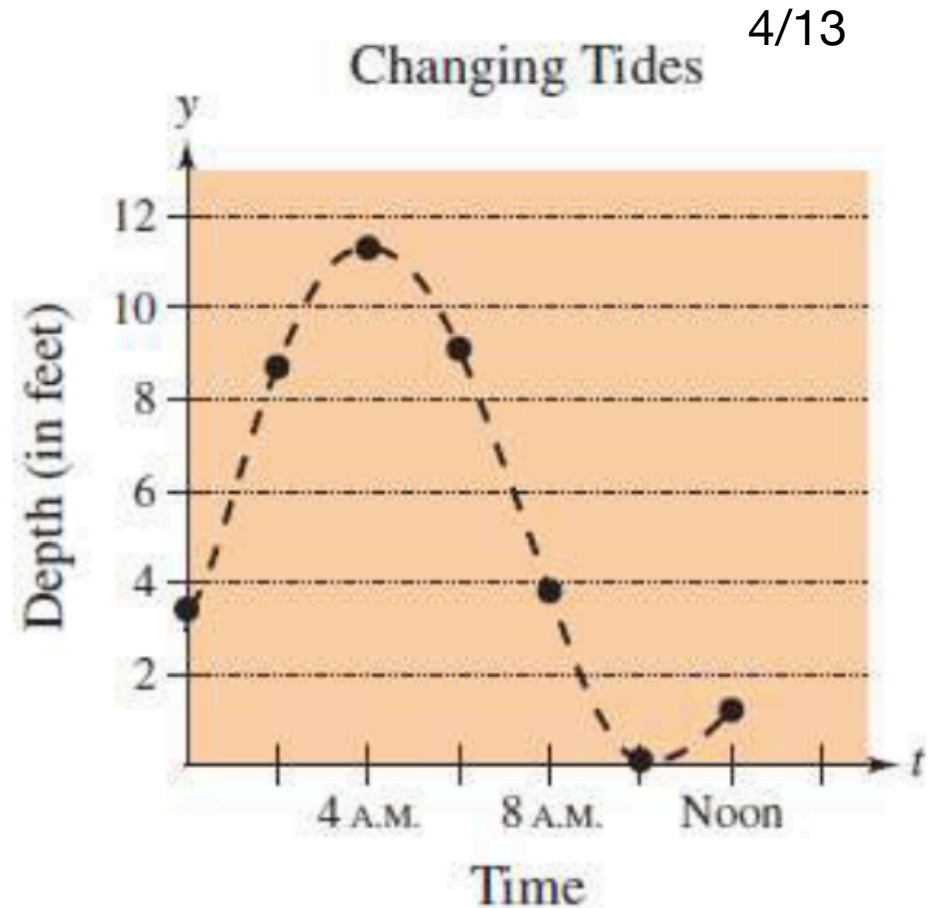
$$h = -5 \cos\left(\frac{2\pi}{1.2}t\right) + 5$$

*4 * 2 + 1 or 9 times*

4.2 - Translations of Sine and Cosine

Practice

Find the equation of the tide height given the graph. Use a sine function to model the height. (Max = 11 ft)



$$h = 5.5 \sin \left(\frac{2\pi}{14}(t - 1) \right) + 5.5$$

4.2 - Translations of Sine and Cosine

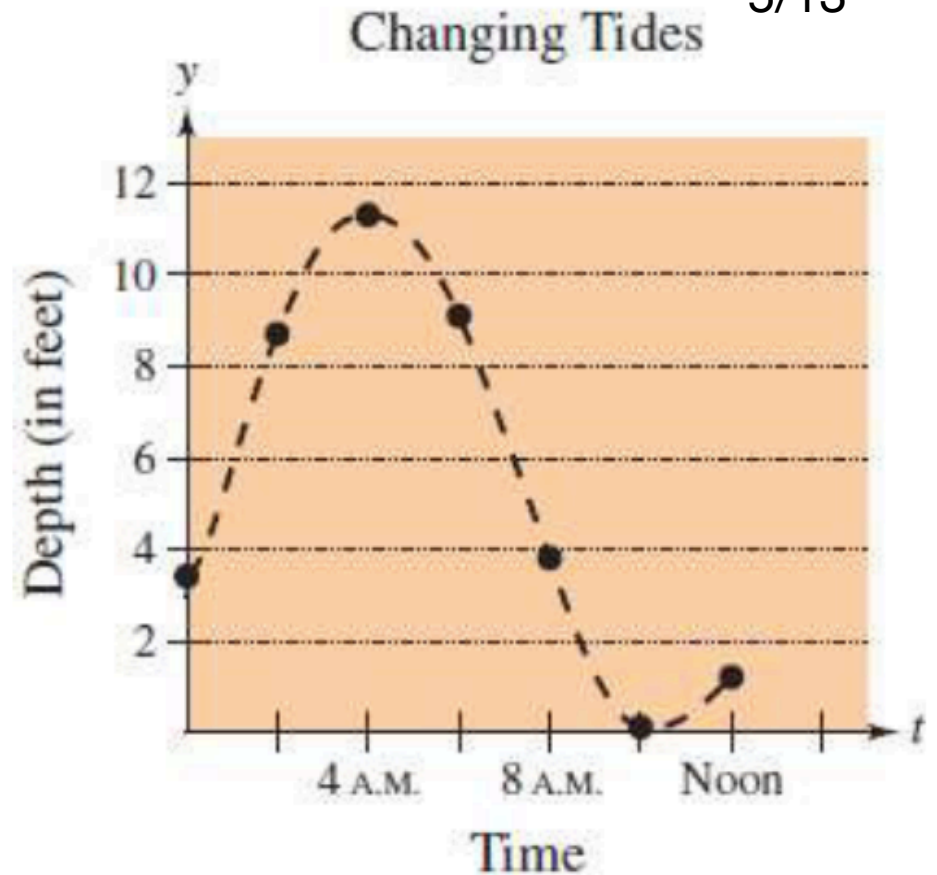
Practice

What is the tide height at 2 PM?

$$h = 5.5 \sin \left(\frac{2\pi}{14}(t - 1) \right) + 5.5$$

$$h \approx 6.1 \text{ ft}$$

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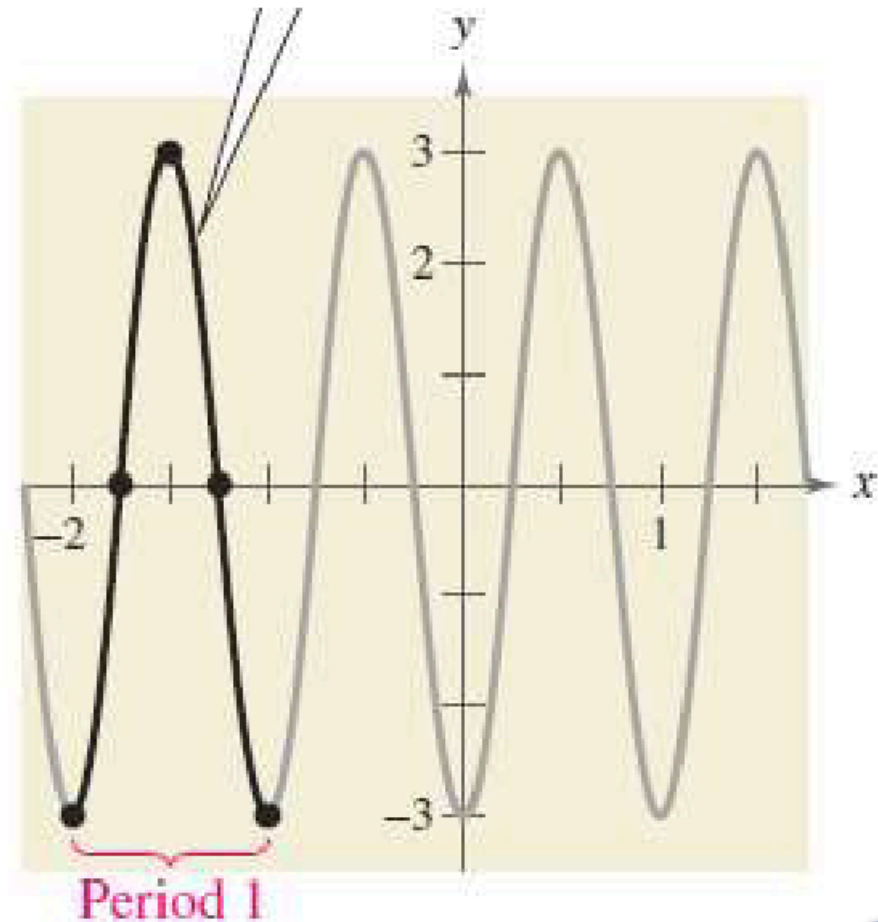
4.2 - Translations of Sine and Cosine

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Practice

Given the graph on the right, find the cosine function. The dark portion was originally $[0, 2\pi)$. Only reflection on X and any translation is allowed.

$$y = -3 \cos(2\pi(x + 2))$$



4.2 - Translations of Sine and Cosine

Practice

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One particular July 4th in Galveston, TX, high tide occurred at 9:36 A.M. At that time the water at the end of the 61st Street Pier was 2.7 meters deep. Low tide occurred at 3:48 P.M., at which time the water was only 2.1 meters deep. Assume that the depth of the water is a sinusoidal function of time with a period of half a lunar day (about 12 hours 24 minutes).

Find the cosine equation to represent this function of depth $d(t)$ (in meters) versus time (in hours).

$$d(t) = 0.3 \cos\left(\frac{\pi}{6.2}(t - 9.6)\right) + 2.4$$

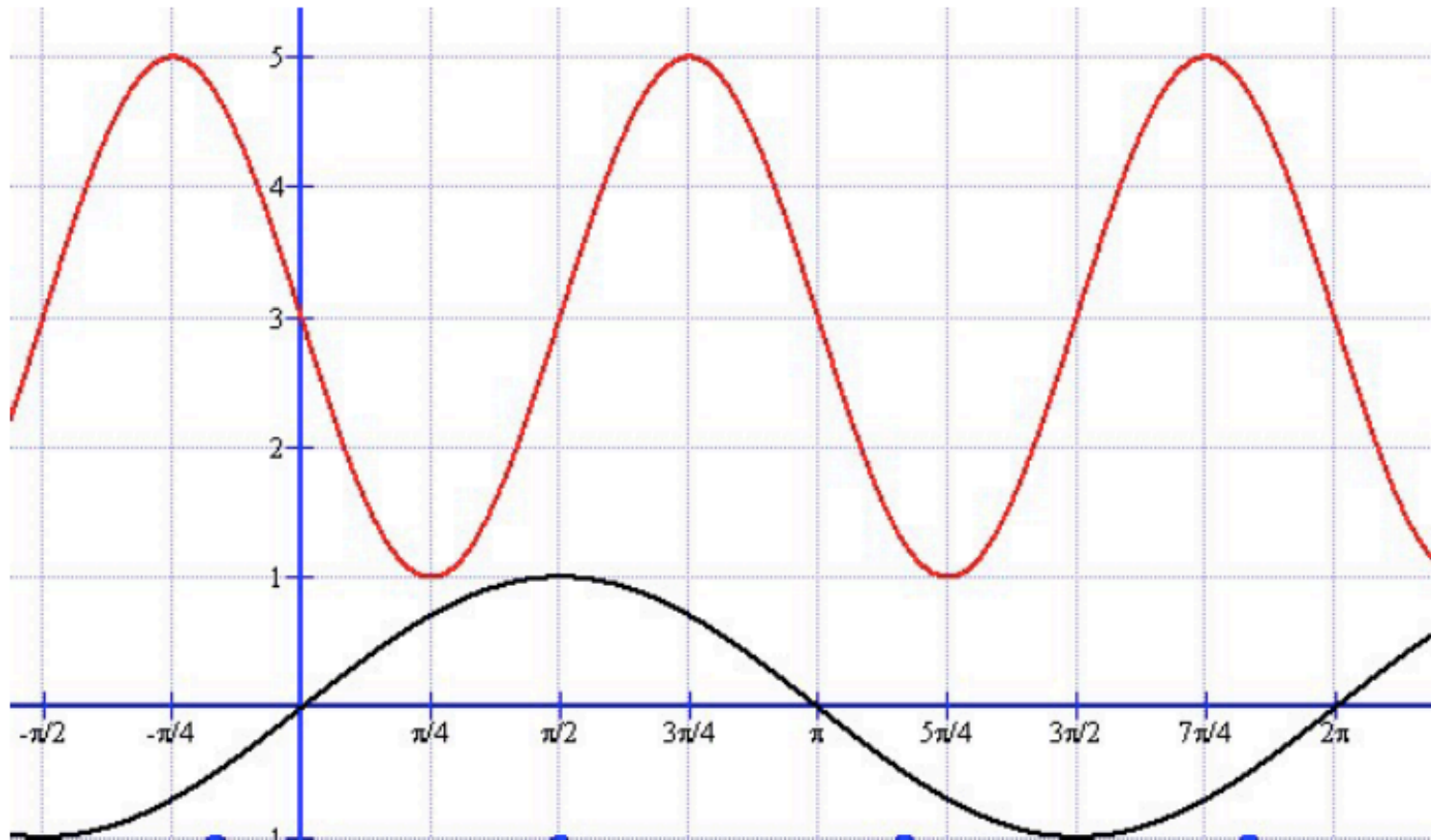


Graphing Sine and Cosine

4.1 - Graphing Sine and Cosine

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Write a sine function for red graph



$$y = 2 \sin\left(2\left(x + \frac{\pi}{2}\right)\right) + 3$$

4.1 - Graphing Sine and Cosine

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Graph the function

$$y = 2 \sin\left(-2x + \frac{\pi}{2}\right) + 2$$

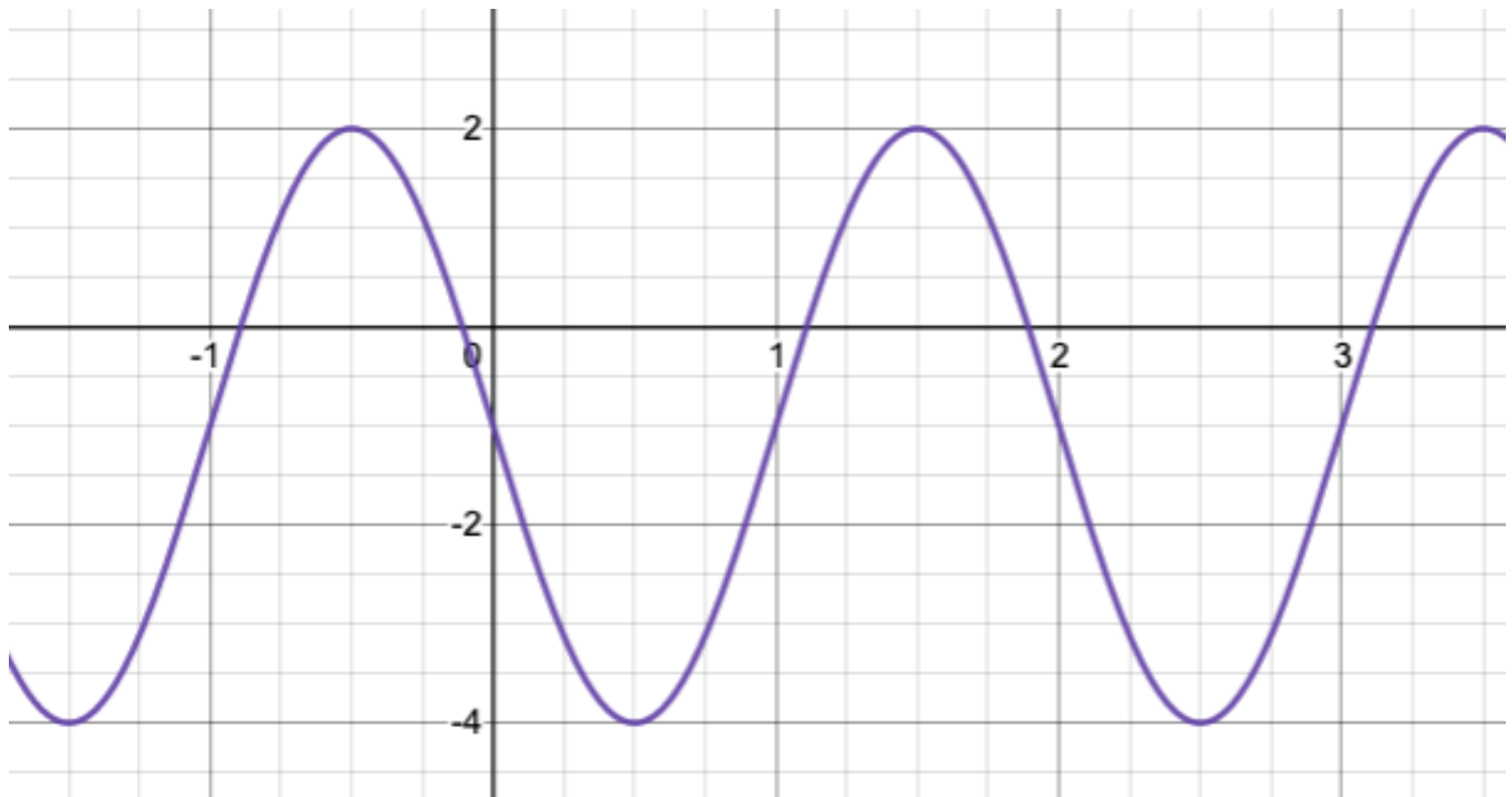


4.1 - Graphing Sine and Cosine

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Graph the function

$$y = 3 \cos\left(\pi x + \frac{\pi}{2}\right) - 1$$

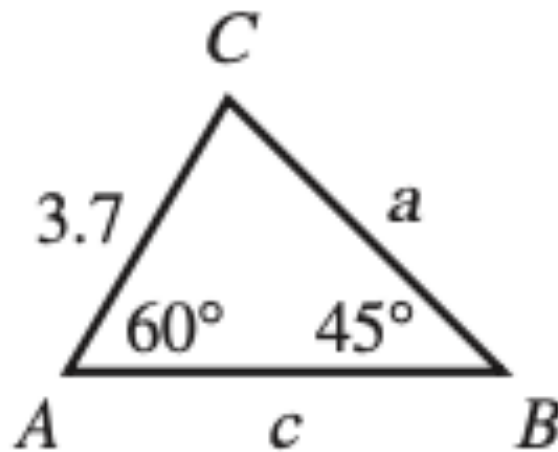


Law of Sines

7.1 - Law of Sines

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Solve the triangle



$$C = 75^\circ$$

$$a = 4.53$$

$$c = 5.05$$

7.1 - Law of Sines

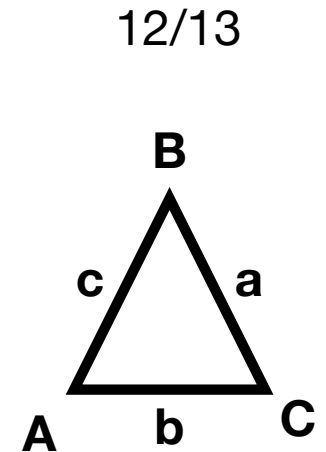
1. Solve the triangle

$$A = 40^\circ, B = 30^\circ, b = 10$$

$$C = 110^\circ$$

$$a \approx 12.86$$

$$c \approx 18.79$$



2. Solve the triangle

$$A = 32^\circ, a = 17, b = 11$$

$$B \approx 128^\circ$$

$$C \approx 20^\circ$$

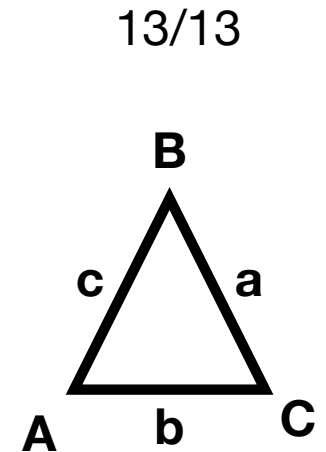
$$b \approx 25.28$$

7.1 - Law of Sines

1. Solve the triangle

$$A = 36^\circ, a = 2, b = 7$$

No triangle!!!



2. Solve the triangle

$$A = 64^\circ, a = 16, b = 17$$

$$B_1 \approx 72.74^\circ$$

$$C_1 \approx 43.26^\circ$$

$$c_1 \approx 12.20$$

$$B_2 \approx 180 - 72.74^\circ = 107.26^\circ$$

$$C_2 \approx 8.74^\circ$$

$$c_2 \approx 2.71$$

