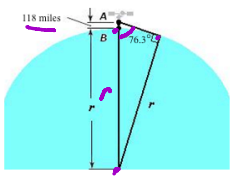
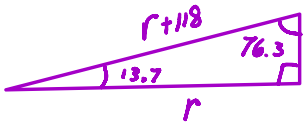
Period 4, Feb 11, 2025

The figure shows a satellite circling 118 miles above a planet. When the satellite is directly above point B, angle A measures 76.3°. Find the planet's radius.



The radius of the planet is approximately ☐ miles.
(Round to the nearest mile as needed.)

$76.3 + 90 + ? = 180$



$\sin 76.3 = \frac{r}{r+118}$

$(r+118)(.97154912) = \frac{r}{r+118}(r+118)$

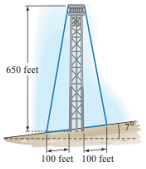
$0.97154912r + 114.6428 = r$

$-0.97154912r \qquad -0.97154912r$

$\frac{114.6428}{0.02845088} = \frac{0.02845088r}{0.02845088}$

$r = 4029.4496$

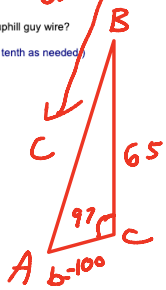
The figure shows a 650 foot tower on the side of a hill that forms a 7° angle with the horizontal. Find the length of each of the two guy wires that are anchored 100 feet uphill and downhill from the tower's base and extend to the top of the tower.



bigger than 650

Part (a) What is the length of the uphill guy wire?

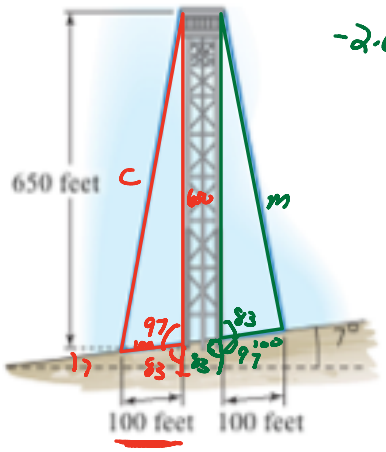
659.9 feet (Round to the nearest tenth as needed.)



$7 + 90 + ? = 180$

$? = 83$

$m^2 = 650^2 + 100^2 - 2 \cdot 650 \cdot 100 \cdot \cos 83$



$C^2 = a^2 + b^2 - 2ab\cos C$

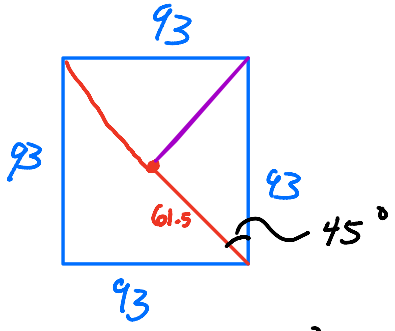
$C^2 = 650^2 + 100^2 - 2 \cdot 650 \cdot 100 \cdot \cos 97°$

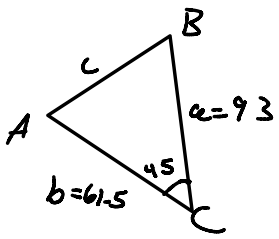
$C^2 = 432500 - 130000(-0.12187)$

$C^2 = 448343.1 \Rightarrow C = 669.58$

Suppose a certain baseball diamond is a square 93 feet on a side. The pitching rubber is located 61.5 feet from home plate on a line joining home plate and second base (the opposite point). How far is it from the pitching rubber to first base (the right point adjacent to home plate)?

The distance from the pitching rubber to first base is about ☐ feet.
(Round to the nearest tenth as needed.)





$C^2 = a^2 + b^2 - 2ab\cos C$

$C^2 = 93^2 + 61.5^2 - 2(93)(61.5)\cos 45$

$C^2 = 12431.25 - 11439\left(\frac{\sqrt{2}}{2}\right)$

Find c^2

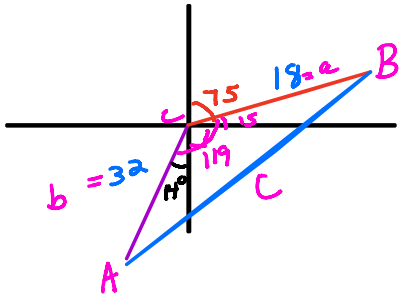
Two ships leave a harbor at the same time. One ship travels on a bearing S14°W at 16 miles per hour. The other ship travels on a bearing N75°E at 9 miles per hour. How far apart will the ships be after 2 hours?

32 miles

after 2 hours

18 miles

The distance is approximately 43.7 miles. (Round to the nearest tenth as needed.)



$14 + 90 + 15 = 119$

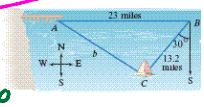
$c^2 = 18^2 + 32^2 - 2\cdot 18\cdot 32\cdot\cos 119$

$c^2 = 1348 - 1152(-0.48481)$

$c^2 = 1348 + 558.5$

$c^2 = 1906.5 \Rightarrow c = 43.66$

You are on a fishing boat that leaves its pier and heads east. After traveling for 23 miles, there is a report warning of rough seas directly south. The captain turns the boat and follows a bearing of S30°W for 13.2 miles.



a. At this time, how far are you from the boat's pier?
b. What bearing could the boat have originally taken to arrive at this spot?

$\frac{\sin A}{13.2} = \frac{\sin 60}{19.99}$

$\frac{\sin A}{13.2} = 0.043322932 \Rightarrow \sin A = 0.57196$

$A = 34.88$

a. You are about ☐ miles from the pier. (Round to the nearest tenth as needed.)

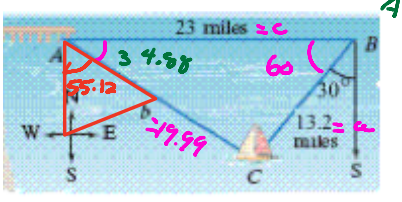
$b^2 = 13.2^2 + 23^2 - 2(13.2)(23)\cos 60$

$b^2 = 174.24 + 529 - 303.6$

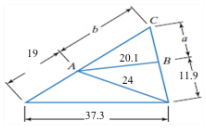
$b^2 = 399.64$

$b = 19.99$

S 55.12 E



Use the figure to solve triangle ABC. Round lengths of sides to the nearest tenth and angle measures to the nearest degree.



Find the angles of triangle ABC.

A ≈ ☐° (Round to the nearest degree as needed.)

B ≈ ☐° (Round to the nearest degree as needed.)

C ≈ ☐° (Round to the nearest degree as needed.)

$a^2 = b^2 + c^2 - 2bc\cos A$

$37.3^2 = 24^2 + 19^2 - 2 \cdot 24 \cdot 19 \cos A$

$1391.29 = 576 + 361 - 912\cos A$

$1391.29 = 937 - 912\cos A$

$-937 \quad -937$

$454.29 = -912\cos A$

$-912 \quad -912$

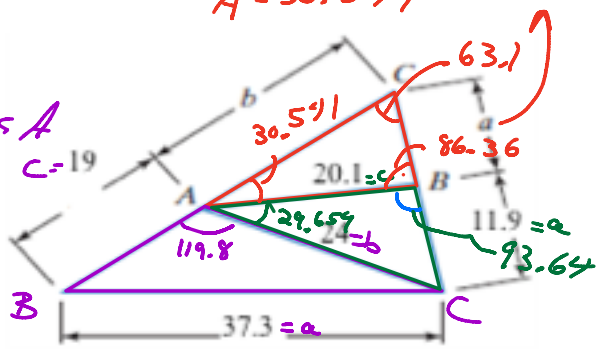
$-0.498 = \cos A$

$119.8 = A$

$A + 29.659 + 119.8 = 180$

$A = 30.541$

$\frac{\sin 30.541}{a} = \frac{\sin 29.659}{20.1}$



$11.9^2 = 24^2 + 20.1^2 - 2 \cdot 24 \cdot 20.1 \cos A$

$141.61 = 576 + 404.01 - 964.8\cos A$

$-838.4 = -964.8\cos A$

$0.868988 = \cos A$

$29.659 = A$

$b^2 = a^2 + c^2 - 2ac\cos B$

$24^2 = 11.9^2 + 20.1^2 - 2(11.9)(20.1)\cos B$

$576 = 141.61 + 404.01 - 478.38\cos B$

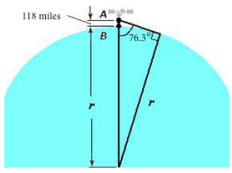
$30.38 = -478.38\cos B$

$-478.38 \quad -478.38$

$\cos B = -0.0635$

$B = 93.64$

The figure shows a satellite circling 118 miles above a planet. When the satellite is directly above point B, angle A measures 76.3°. Find the planet's radius.



The radius of the planet is approximately ☐ miles.

(Round to the nearest mile as needed.)

$\tan 21 = \frac{h}{480}$

$480 \cdot 0.383864 = \frac{h}{480} \cdot 480$

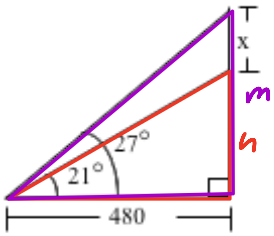
$184.255 = h$

$\tan 27 = \frac{m}{480}$

$0.5095 = \frac{m}{480}$

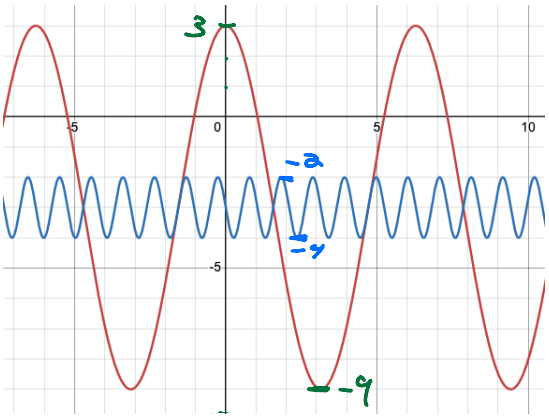
$244.572 = m$

Find the length x to the nearest whole number.



$x \approx \square = 244.572 - 184.255$ keep going

(Do not round until the final answer. Then round to the nearest whole number.)



1. $y = 6\sin\left(x + \frac{\pi}{2}\right) - 3$

2. $y = \sin 6\left(x + \frac{\pi}{2}\right) - 3 = \sin(6x + 3\pi) - 3$

period $\frac{6x}{6} = \frac{2\pi}{6}$

$x = \pi/3$ = N.P.

-10

y's [-10, 10]

Determine the range of each of the following functions. Then give a viewing rectangle, or window, that shows two periods of the function's graph.

a. $f(x) = 6\sin\left(x + \frac{\pi}{2}\right) - 3$ Period $= 2\pi$

b. $f(x) = \sin 6\left(x + \frac{\pi}{2}\right) - 3$

Shift Down 3 Left $\frac{\pi}{2}$

a. The range of $f(x) = 6\sin\left(x + \frac{\pi}{2}\right) - 3$ is $[-9,3]$.

(Simplify your answer. Type your answer in interval notation.)

What would be an appropriate viewing rectangle to show two periods of the function?

- A. $\left[0, 4\pi, \frac{\pi}{2}\right]$ by [0, ~~10~~, 1]
- ✔ B. $\left[-\frac{\pi}{2}, \frac{7\pi}{2}, \frac{\pi}{2}\right]$ by $[-9,3,1]$
- C. $\left[-\frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{2}\right]$ by $[-10,10,2]$
- D. $\left[\frac{\pi}{2}, \frac{5\pi}{2}, \frac{\pi}{2}\right]$ by [−4, ~~−2~~, 1]

Left $\frac{\pi}{2}$ Period $= \frac{2\pi}{3}$

b. The range of $f(x) = \sin 6\left(x + \frac{\pi}{2}\right) - 3$ is $[-4,-2]$.

Down 3

(Simplify your answer. Type your answer in interval notation.)

What would be an appropriate viewing rectangle to show two periods of the function?

$\frac{2\pi}{3}$

- A. $\left[0, \frac{\pi}{3}, \frac{\pi}{2}\right]$ by [−~~10~~, 10, 2]
- B. $\left[0, 4\pi, \frac{\pi}{\ }\right]$ by [0, ~~10~~, 1]

Use a graphing utility to graph the following function. Use a viewing rectangle that shows the graph for at least two periods.

$y = \frac{1}{5}\tan(\pi x + 2)$

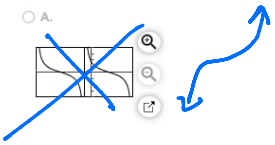
SHIFT $\pi x + 2 = 0$, LEFT $x = -2/\pi$

$x = 2$

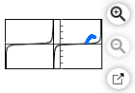
FLATTEN

Choose the correct graph below. Use a viewing rectangle that shows the graph for two periods, that is, $\left[\frac{-\pi-4}{2\pi}, \frac{3\pi-4}{2\pi}, 1\right]$ by $[-1, 1, 0.25]$.

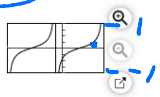
A.



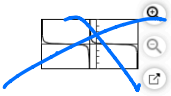
B.



C.



D.



$\pi x = \pi$ ← normal period

$x = 1$ ← new period