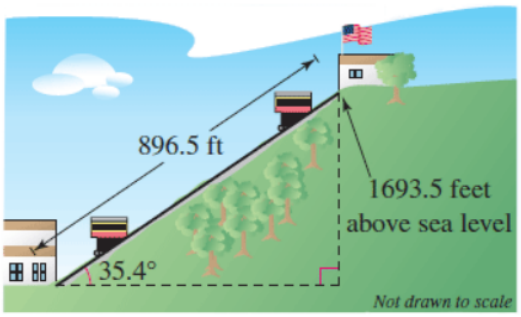
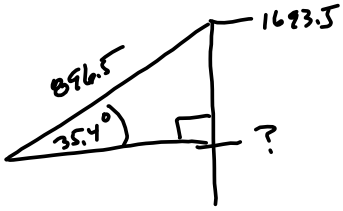
Today, Section 1.2 Demo on Unit Circle

1.3 - Apparently the exercises are randomly ordered. That's unfortunat. I suggest you skip over until you find more basic exercises.

Section 1.3 #1 (#79 in Text)

The Johnstown Inclined Plane in Pennsylvania is one of the longest and steepest hoists in the world. The railway cars travel a distance of 896.5 feet at an angle of approximately 35.4°, rising to a height of 1693.5 feet above sea level. (Round your answers to two decimal places.)





(a) Find the vertical rise of the inclined plane.
[ ] ft

(b) Find the elevation of the lower end of the inclined plane.
[ ] ft

(c) The cars move up the mountain at a rate of 300 feet per minute. Find the rate at which they rise vertically.
[ ] ft/min

Make sure you're in degrees mode for this one!

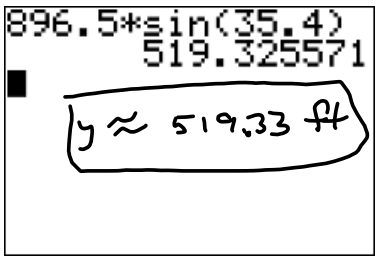
(a)

$r = \sqrt{x^2+y^2}$

$\sin 35.4^\circ = \frac{y}{r}$

$r \sin 35.4^\circ = y$

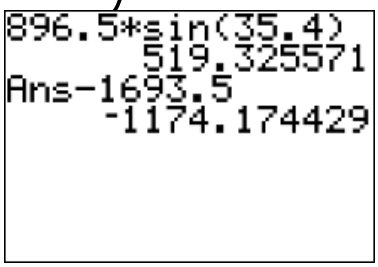
$896.5 \sin 35.4^\circ = y$



Don't round before calculation!

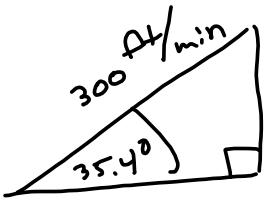
(b) 1693.5 − 519.325571 ≈ 1174.17 ft ≈ Elev. @ base

Don't use rounded #s in any calculations.



So, 11.74.17 is approximate elevation at bottom of mt.

$\frac{\Delta r}{\Delta t} = \frac{dr}{dt} = 300 \frac{ft}{min}$



$\frac{dy}{dt} = \frac{\Delta y}{\Delta t}$ = change in y with respect to time = ?

$$\frac{\frac{\Delta y}{\Delta t}}{\frac{\Delta r}{\Delta t}} = \frac{\frac{\Delta y}{\Delta t}}{300} = \sin 35.4^\circ$$

```
896.5*sin(35.4)
        519.325571
Ans-1693.5
       -1174.174429
300sin(35.4
        173.7843517
```

$\frac{\Delta y}{\Delta t} = 300 \sin(35.4^\circ)$

$\approx 173.78 \frac{ft}{min}$

$\approx$ rate of change in height per minute.

If you look at the video listing here:

https://harryzaims.com/public_html/122/videos/chapter-01/1-3/videos/

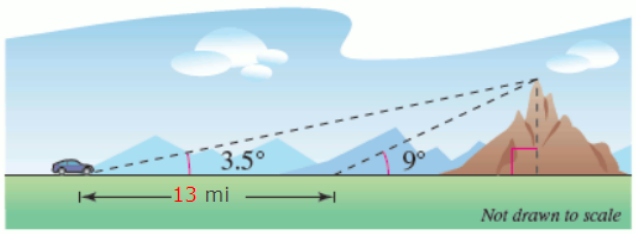
You'll get a better handle on the order in which to work the exercises.

That was the point of the 1.3-New videos, but they didn't make it into this semester's homework assignment.

In traveling across flat land, you see a mountain directly in front of you. Its angle of elevation (to the peak) is 3.5°. After you drive 13 miles closer to the mountain, the angle of elevation is 9° (see figure). Approximate the height of the mountain. (Round your answer to one decimal place.)

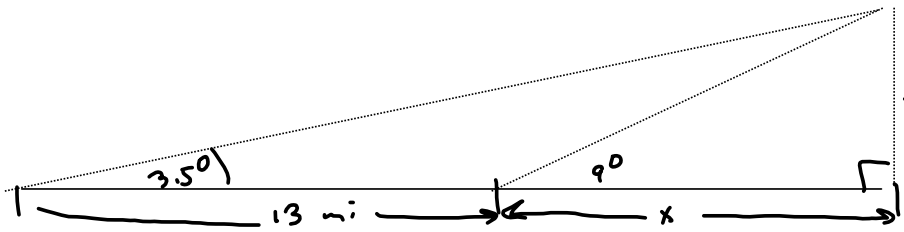
_____ mi

1.3 #4



See next page for my flub-and-fix!

Let y = ht of mountain (miles) & x = Distance from 2nd sighting to the mountain (mi)



tan!

$\frac{y}{13+x} = \sin(3.5^\circ)$ & $\frac{y}{x} = \sin(9^\circ)$ (tan)

$= A$ $= B$

$y = A(13+x)$ & $y = Bx$

$= 13A + Ax$

No, your OTHER tangent!

$y = y$

$13A + Ax = Bx$ solve for x:

$Ax - Bx = -13A$

$(A-B)x = -13A$

$x = \frac{-13A}{A-B} = \frac{-13\sin(3.5^\circ)}{\sin(3.5^\circ) - \sin(9^\circ)}$ (tan)

$= \frac{13\sin(3.5^\circ)}{\sin(9^\circ) - \sin(3.5^\circ)} \approx 8.320210867 \approx x$

Now, $y = A(13+x)$ (tan)

$\approx \sin(3.5^\circ)(13 + 8.320210867)$ ← 8.320210867

≈ 1.301567736 mi. $\approx y$

```
13sin(3.5)/(sin(
9)-sin(3.5)
      8.320210867
sin(3.5)*(13+Ans
)
      1.301567736
```

These should all be tangents, you nitwit!

```
      3.51616894
13tan(3.5)/(tan(
9)-tan(3.5))
      8.178349886
tan(3.5)*(13+Ans
)
      1.29532337
```

8.178349886

There's my 1.3mi!

For small values of θ

$\sin\theta \approx \tan\theta$

Use a compass to sketch a quarter of a circle of radius 10 centimeters. Using a protractor, construct an angle of 25° in standard position (see figure). Drop a perpendicular line from the point of intersection of the terminal side of the angle and the arc of the circle. By actual measurement, calculate the coordinates (x, y) of the point of intersection and use these measurements to approximate the six trigonometric functions of a 25° angle. (Round your answers to two decimal places.)

$x \approx$ 9.00 cm $\quad y \approx$ 4.00 cm

sin 25° ≈		csc 25° ≈	
cos 25° ≈		sec 25° ≈	
tan 25° ≈		cot 25° ≈	

Section 1.3 #2 (#75 in text)

$\sin 25^\circ = \frac{y}{r} \approx 9/10$

Cheat it!

$r = 10$

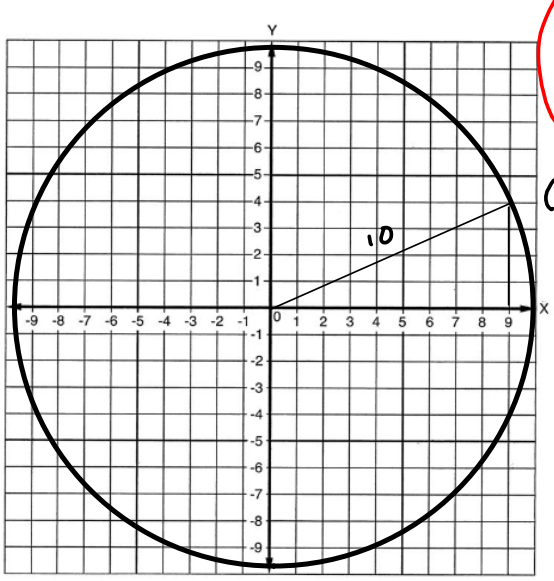
$\theta = 25^\circ$

$\frac{x}{r} = \cos 25^\circ$

$x = r\cos 25^\circ$

$= 10\cos 25^\circ$

$y = \ldots 10\sin 25^\circ$



$\sqrt{4^2+9^2} = \sqrt{16+81}$

$= \sqrt{97} \approx r$

(9, 4)

$r = 10$!