Homework Questions?

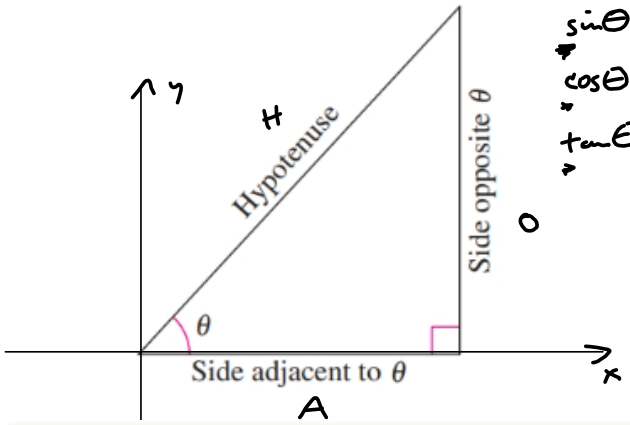
1.1#27 r =20, s = 8. Find theta

$s = r\theta$

$8 = 20\theta \rightarrow$

$\frac{2}{5} = \frac{4}{10} = \frac{8}{20} = \theta$

GET ROLLING ON THE WEBASSIGN. EITHER WIPE IT OUT OR ASK QUESTIONS.



$\sin\theta = \frac{y}{r} = \frac{O}{H}$;

$\cos\theta = \frac{x}{r} = \frac{A}{H}$;

$\tan\theta = \frac{y}{x} = \frac{O}{A}$;

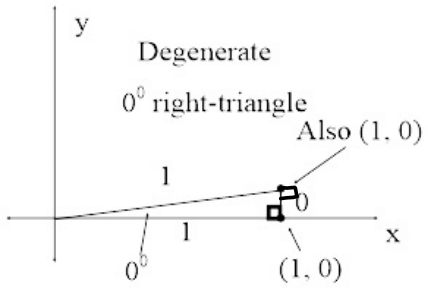
SOHCAHTOA
Mnemonic for Trig.

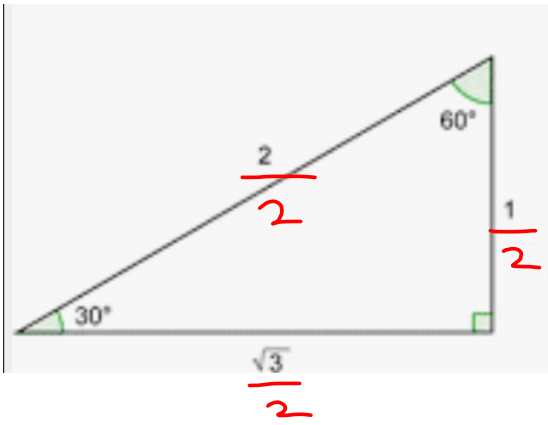
Sines, Cosines, and Tangents of Special Angles

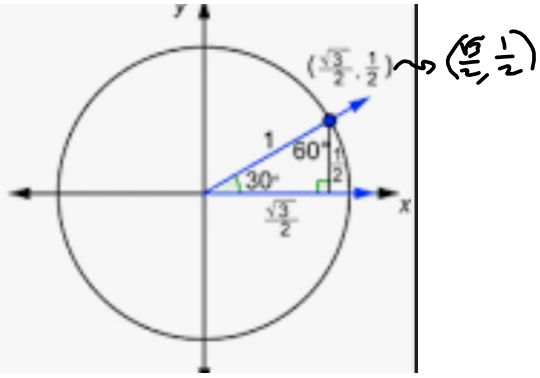
$$\sin 30° = \sin\frac{\pi}{6} = \frac{1}{2} \qquad \cos 30° = \cos\frac{\pi}{6} = \frac{\sqrt{3}}{2} \qquad \tan 30° = \tan\frac{\pi}{6} = \frac{\sqrt{3}}{3}$$

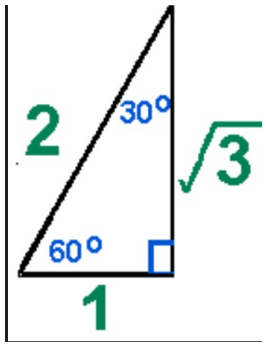
$$\sin 45° = \sin\frac{\pi}{4} = \frac{\sqrt{2}}{2} \qquad \cos 45° = \cos\frac{\pi}{4} = \frac{\sqrt{2}}{2} \qquad \tan 45° = \tan\frac{\pi}{4} = 1$$

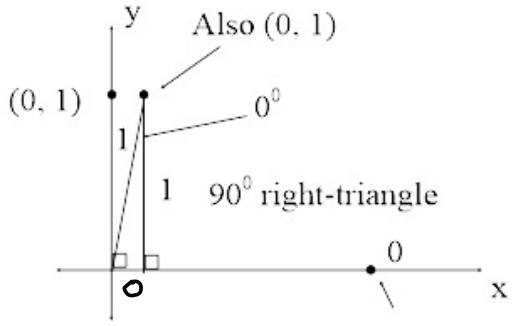
$$\sin 60° = \sin\frac{\pi}{3} = \frac{\sqrt{3}}{2} \qquad \cos 60° = \cos\frac{\pi}{3} = \frac{1}{2} \qquad \tan 60° = \tan\frac{\pi}{3} = \sqrt{3}$$




60°
2
1
30°
√3

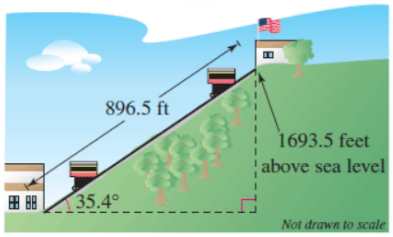

y
x
1
60°
30°
1/2
√3/2

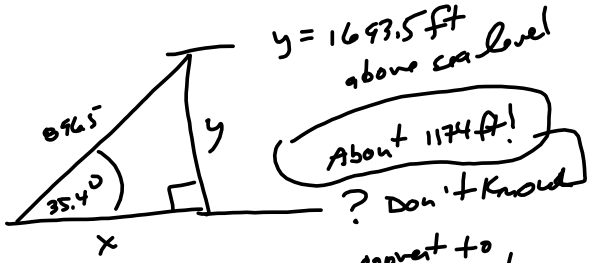

2
30°
√3
60°
1


y
Also (0, 1)
(0, 1)
0°
1
1
90° right-triangle
0
0
x

1. 0/3 points LarTrig10 1.3.075. [3881624]

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.

519.33 ft

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

1174.17 ft

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

173.78 ft/min

Need Help? Read It

$\frac{x}{896.5} = \cos(35.4^\circ)$ ← convert to radians!

$x = 896.5 \cos(35.4^\circ \cdot \frac{\pi}{180})$ Wolfram Alpha is set to radians.

$x \approx$ 730.76206887064886204639794909646460621747975884605262873502

$x \approx 730.76$ ft

(a) $\frac{y}{896.5} = \sin(35.4^\circ) \rightarrow y = 896.5 \sin(35.4^\circ)$

$\approx 519.326 \approx 519.33$ ft

(b) Subtract: $1693.5 - 519.33$

1693.5-519.325571005211575052789422569564788009139395974646859237 43

$\approx$ 1174.1744289947884249472105774304352119908606040253531407625 7

≈ 1174.17 ft

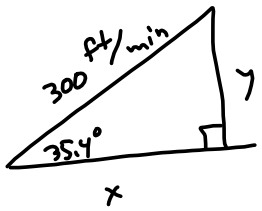
Don't round before the final step.

Don't use rounded numbers in calculations.

Keep the digits in your calculator as far as I can take them.

THEN round.

(c) The speed Triangle



Same deal, only use 300 instead of 896.5 ft.

$\theta = 35.4^\circ$

CALCULATOR NOTE: MAKE sure you're in the right mode. DEGREES or RADIANS

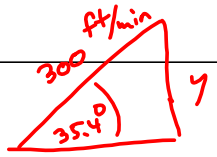
```
NORMAL FLOAT AUTO REAL DEGREE MP
896.5cos(35.4*π/180)
                  730.7620689
896.5cos(35.4)
                  730.7620689
```

Radians mode

Degrees mode

Handling 35.4° in the problem.

OOPS! Finish the last bit



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

$y = 300\sin(35.4^\circ)$

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

is the vertical component of the velocity in ft/min.

```
NORMAL FLOAT AUTO REAL DEGREE MP
896.5cos(35.4*π/180)
                  730.7620689
896.5cos(35.4)
                  730.7620689
300cos(35.4)
                  244.5383387
300sin(35.4)
                  173.7843517
```

... is the vertical component of the velocity, in feet per minute.

Can't read my writing very well.

$30^\circ = \frac{\pi}{6}$, $45^\circ = \frac{\pi}{4}$, $60^\circ = \frac{\pi}{3}$, $90^\circ = \frac{\pi}{2}$, $180^\circ = \pi$, $270^\circ = \frac{3\pi}{2}$

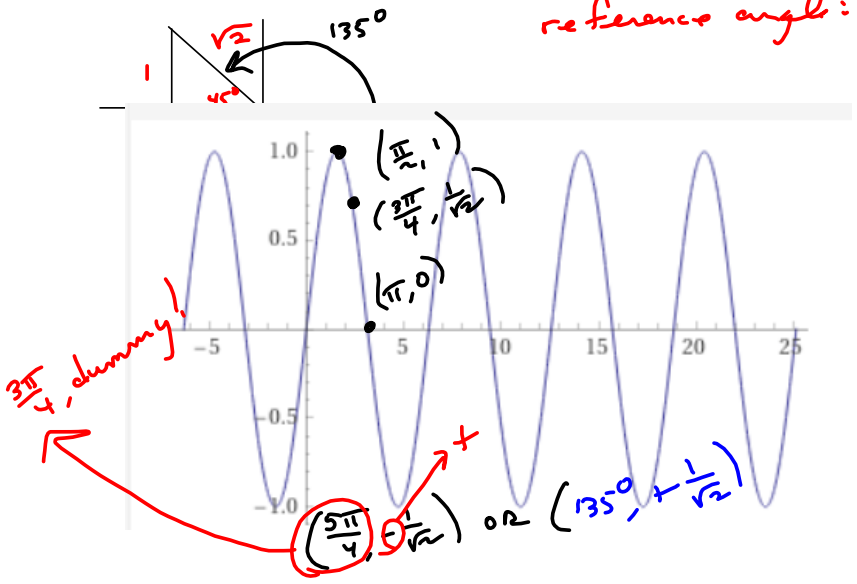
All via $\frac{\pi}{180^\circ}$ or $\frac{180^\circ}{\pi}$

Section 1.4, we generalize this to any angle, not angles between 0 and 90 degrees.

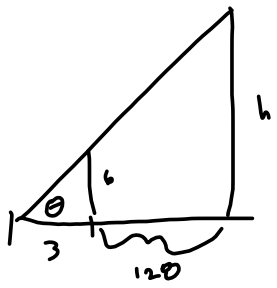
$\frac{3\pi}{4}$, idiot.

$\sin(135^\circ) = \sin\left(\frac{3\pi}{4}\right) = \frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$ in simplified radical form.

reference angle: $\theta' = 45^\circ$



#5 §1.3



Find h

$\frac{h}{131} = \tan\theta$

Similar Triangles

$\tan\theta = 2$

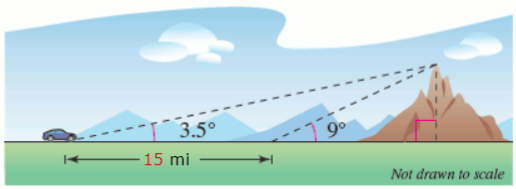
So $\frac{h}{131} = 2 \Rightarrow$ $h = 262$

4. 0/1 points LarTrig10 1.3.068.MI. [3881448]

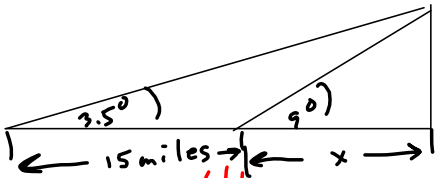
In traveling across flat land, you see a mountain directly in front of you. Its angle of elevation (to the peak) is 3.5°. After you drive 15 miles closer to the mountain, the angle of elevation is 9° (see figure). Approximate the height of the mountain. (Round your answer to one decimal place.)

1.5 mi

1.3 #4



Solution or Explanation



Not 5!!!

Let h = ht. of mtn. (in miles)

$\tan(3.5^\circ) = \frac{h}{x+5}$ AND $\tan(9^\circ) = \frac{h}{x}$

$\tan(3.5^\circ)(x+5) = h = \tan(9^\circ)\,x$ (h = h)

$\Rightarrow \quad a(x+5) = h = bx$, where $a = \tan(3.5^\circ)$, $b = \tan(9^\circ)$

So $a(x+5) = bx$ Solve for x.

$ax + 5a = bx$

$ax - bx = -5a$

$x(a-b) = -5a$

$x = \frac{-5a}{a-b} = \frac{-5\tan(3.5^\circ)}{(\tan(3.5^\circ) - \tan(9^\circ))} \approx 3.145519187$

-15, not -5!

$\frac{h}{x} = \tan(9^\circ) \rightarrow h = x\tan(9^\circ)$

$\approx .498201296$

≈ oops! used '5' instead of '15'