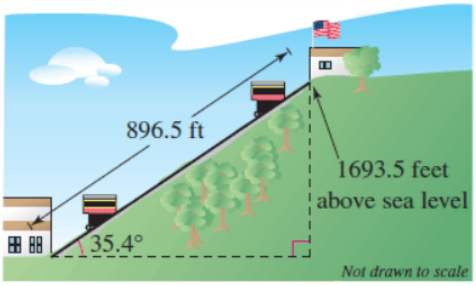
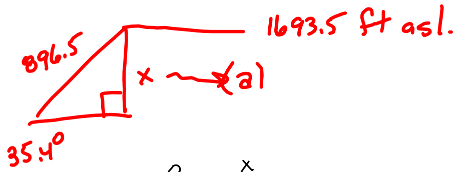
1. –/3 points LarTrig9 1.3.079. My Notes Ask Your Teacher

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.)





$\sin 35.4^\circ = \frac{x}{896.5}$

$x = 896.5 \sin 35.4^\circ$

$\approx 519.326 \approx x$

(a) Find the vertical rise of the inclined plane.

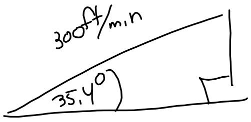
____ ft $\approx$ 519.3 ft

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

____ ft 1174.2 ft asl $\approx 1693.5 - 519.3 = 1174.2$

(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



x = vertical component of the 300 ft/min

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

173.784...

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

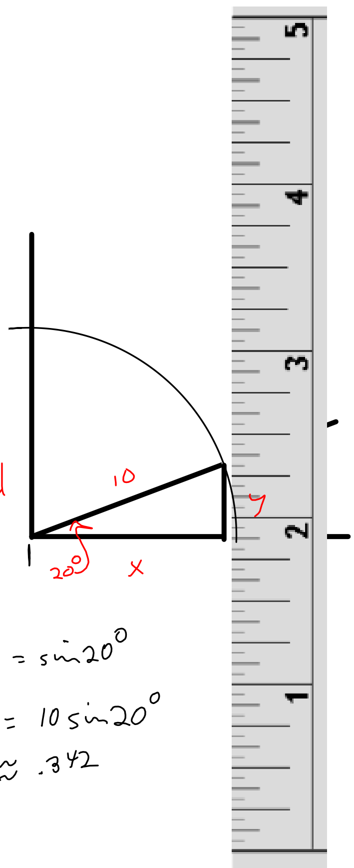
≈ 173.784

$\approx 173.8 \frac{ft}{min}$.

2. –/8 points LarTrig9 1.3.075. My Notes Ask Your Tea

Use a compass to sketch a quarter of a circle of radius 10 centimeters. Using a protractor, construct an angle of 20° 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 20° angle. (Round your answers to two decimal places.)

$x \approx$		$y \approx$	
sin 20° ≈	.9	csc 20° ≈	
cos 20° ≈		sec 20° ≈	
tan 20° ≈		cot 20° ≈	



Approx cos 20°

Measured

calculated

$.9 = \frac{9}{10} \approx \frac{x}{10} = \cos 20^\circ \approx .940$

$x = 10\cos 20^\circ$

≈ 9.4

My guess way 9.

$\frac{y}{10} = \sin 20^\circ$

$y = 10 \sin 20^\circ$

$\approx .342$

measured $y \approx 3.5$

$\sin 20^\circ \approx \frac{3.5}{10} = .35$

Approx $\sin 20^\circ$

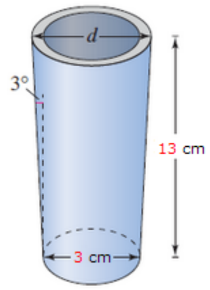
$10\cos 20^\circ \approx$ 9.39692620785908384054109277324731469936208134264464633090 2...

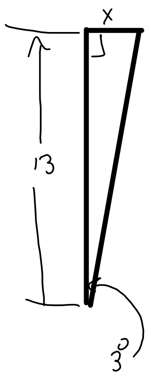
$10\sin 20^\circ \approx$ 3.42020143325668733044099614682259580763083367514160628465 0...

3. –/1 points LarTrig9 1.3.074.MI. My Notes Ask Your Teacher

A tapered shaft has a diameter of 3 centimeters at the small end and is 13 centimeters long (see figure). The taper is 3°. Find the diameter *d* of the large end of the shaft. (Round your answer to two decimal places.)

d = ☐ cm





The diameter at the top will be $2x + 3$

diam. @ bottom

How much added to diameter.

$\tan 3^\circ = \frac{x}{13}$

$\Rightarrow x = 13 \tan 3^\circ$

$\approx$ 0.681301130679535652504475718161796874394524061529315998154...

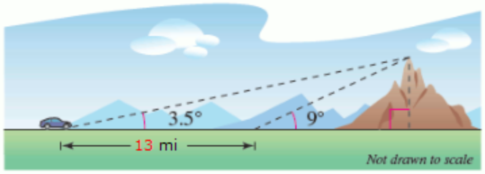
$\Rightarrow 2x \approx$ 1.362602261359071305008951436323593748789048123058631996309...

$\Rightarrow$ Diameter @ top is $3 + 1.36 \approx \boxed{4.36 \text{ cm}}$

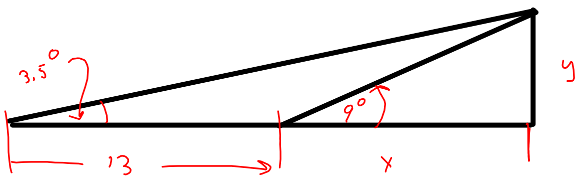
4. –/1 points LarTrig9 1.3.072.MI. My Notes Ask Your Teacher

In traveling across flat land, you notice 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°. Approximate the height of the mountain. (Round your answer to one decimal place.)

mi



This is pretty cool. Mostly just being clever with algebra.



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

$\tan 9^\circ = \frac{y}{x}$

$13\tan 3.5^\circ + x\tan 3.5^\circ = y$

$x = \frac{y}{\tan 9^\circ}$

$x = \frac{y - 13\tan 3.5^\circ}{\tan 3.5^\circ}$

$x = x$, so

$\frac{y - 13\tan 3.5^\circ}{\tan 3.5^\circ} = \frac{y}{\tan 9^\circ}$

Let $a = \tan 3.5^\circ$

$b = \tan 9^\circ$

Then

$\frac{y - 13a}{a} = \frac{y}{b}$

$\Rightarrow b(y - 13a) = ay$

$\Rightarrow by - 13ab = ay$

$\Rightarrow by - ay = 13ab$

$\Rightarrow y(b-a) = 13ab$

$\Rightarrow y = \frac{13ab}{b-a}$

$= \frac{13(\tan 3.5^\circ)(\tan 9^\circ)}{\tan 9^\circ - \tan 3.5^\circ}$

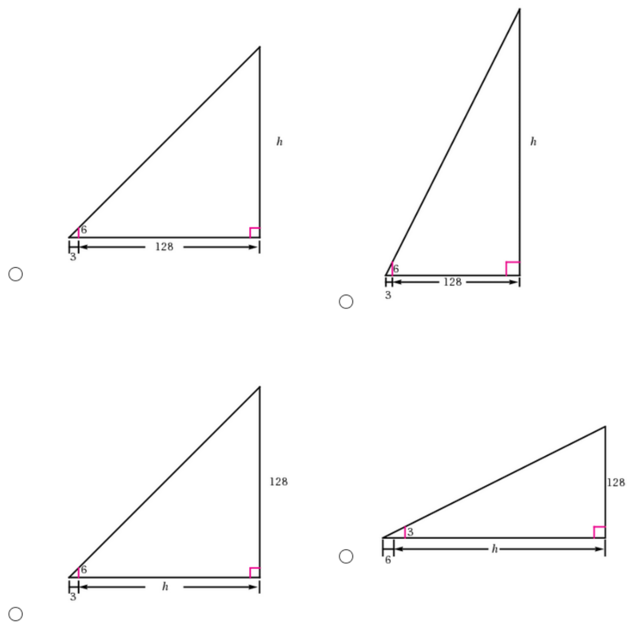
$\approx$ 1.29532... miles.

$\approx$ 6839.31... feet above the plane.

5. –/3 points LarTrig9 1.3.068. My Notes Ask Your Teacher

A six-foot person walks from the base of a broadcasting tower directly toward the tip of the shadow cast by the tower. When the person is 128 feet from the tower and 3 feet from the tip of the shadow, the person's shadow starts to appear beyond the tower's shadow.

(a) Draw a right triangle that gives a visual representation of the problem. Show the known quantities of the triangle and use a variable to indicate the height of the tower.



(b) Use a trigonometric function to write an equation involving the unknown quantity h.

(b) Use a trigonometric function to write an equation involving the unknown quantity h.

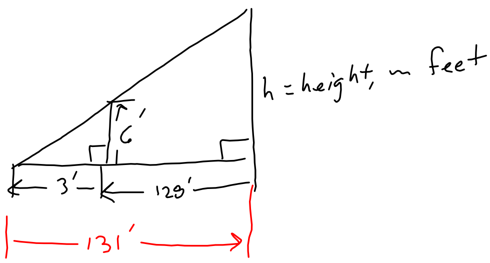
$\tan\theta = \frac{6}{3} = \square = \frac{h}{131}$

(c) What is the height of the tower?

$\square$ ft

$\frac{h}{131} = 2$

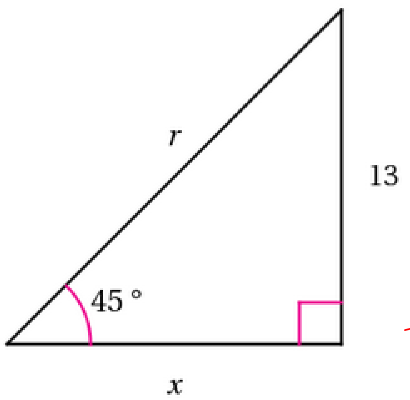
$\boxed{h = 262 \text{ ft}}$



6. –/1 points LarTrig9 1.3.066.

Find the exact values of x and r.

$(x, r) = (\ 13,\ 13\sqrt{2}\ )$



$\frac{13}{x} = \tan 45^\circ = 1$

$\boxed{13 = x}$

$\frac{13}{r} = \sin 45^\circ$

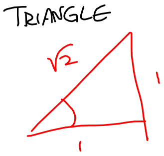
$13 = r \sin 45^\circ$

$r \sin 45^\circ = 13$

$r = \frac{13}{\sin 45^\circ} = \frac{13}{\frac{1}{\sqrt{2}}} = 13\sqrt{2}$

MEMORIZE

45-45 Right TRIANGLE



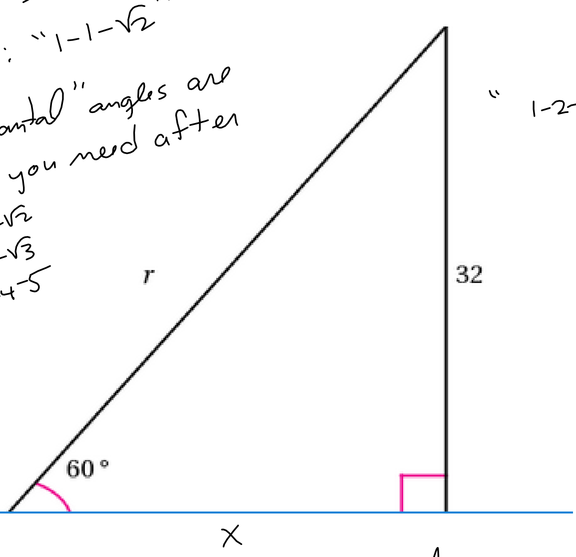
7. –/1 points LarTrig9 1.3.065.

Find the exact values of x and r.

$(x, r) = \left(\boxed{\frac{32\sqrt{3}}{3}, \frac{64\sqrt{3}}{3}} \right)$

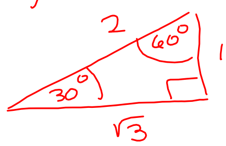
45-45 : "1-1-$\sqrt{2}$"

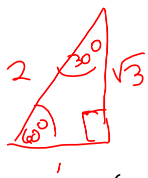
"Quadrantal" angles are all you need after
1-1-$\sqrt{2}$
1-2-$\sqrt{3}$
3-4-5



MEMORIZE!

60-30 right triangle : "1-2-$\sqrt{3}$"



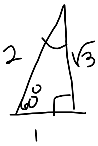


$\frac{32}{r} = \frac{\sqrt{3}}{2} \Rightarrow r = \frac{(32)(2)}{\sqrt{3}}$

$= \frac{64}{\sqrt{3}}$

$= \left(\frac{64}{\sqrt{3}}\right)\left(\frac{\sqrt{3}}{\sqrt{3}}\right) = \boxed{\frac{64\sqrt{3}}{3}}$

$\frac{32}{x} = \tan 60^\circ$



$\frac{32}{x} = \sqrt{3}$

$\frac{32}{\sqrt{3}} = x = \boxed{\frac{32\sqrt{3}}{3}}$

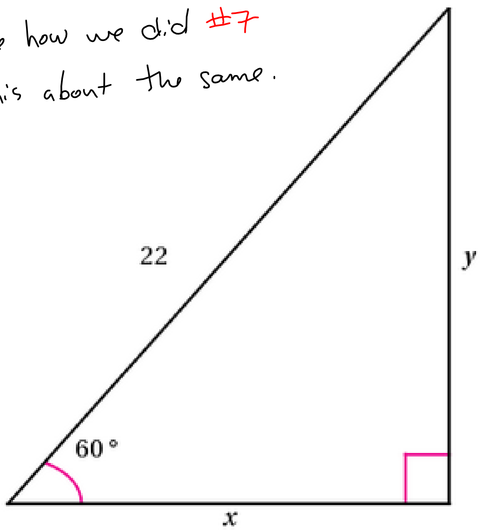
8. –/1 points LarTrig9 1.3.063.

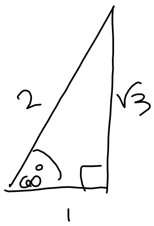
Find the exact values of x and y.

$(x, y) = (\quad)$

See how we did #7

This is about the same.





$\cos 60^\circ = \frac{x}{22}$

$x = 22 \cos 60^\circ$

$= 22\left(\frac{1}{2}\right) = \boxed{11 = x}$

$\sin 60^\circ = \frac{\sqrt{3}}{2} = \frac{y}{22} \implies$

$y = \frac{22\sqrt{3}}{2} = \boxed{11\sqrt{3} = y}$

9. –/4 points LarTrig9 1.3.062.

Find the values of θ in degrees $(0° < \theta < 90°)$ and radians $(0 < \theta < \pi/2)$ without using a calculator.

(a) $\cot \theta = \sqrt{3}$

$\theta =$ $\boxed{30^\circ}$ degrees

$\theta =$ $\boxed{\frac{\pi}{6}}$ radians

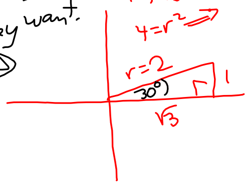
This pic is what they want.

Two pics for $\cot \theta = \sqrt{3}$

$1^2 + \sqrt{3}^2 = r^2$

$4 = r^2 \Rightarrow$

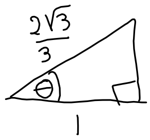
QI

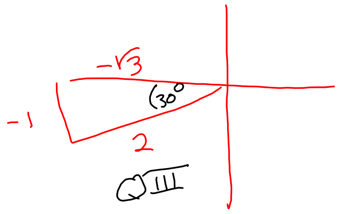


(b) $\sec \theta = \frac{2\sqrt{3}}{3}$

$\theta =$ $\boxed{30^\circ}$ degrees

$\theta =$ $\boxed{\frac{\pi}{6}}$ radians





10. –/4 points LarTrig9 1.3.061.

Find each value of θ in degrees ($0° < \theta < 90°$) and radians ($0 < \theta < \pi/2$) without using a calculator.

(a) $\csc \theta = \sqrt{2}$

$\theta =$ 45^{0} degrees

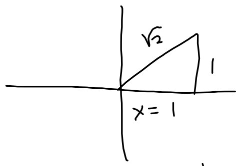
$\theta =$ $\frac{\pi}{4}$ radians

(b) $\sin \theta = \frac{\sqrt{3}}{2}$

$\theta =$ 60^{0} degrees

$\theta =$ $\frac{\pi}{3}$ radians

Keeps things in QI



$x^2 + 1^2 = \sqrt{2}^2 \Rightarrow$

$x^2 = 2 - 1 = 1$

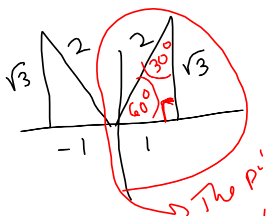
$x = \pm 1$, is $+1$, for pic

$\csc\theta = \sqrt{2} = \frac{hyp}{opp} = \frac{\sqrt{2}}{1}$

$\sin\theta = \frac{opp}{hyp}$

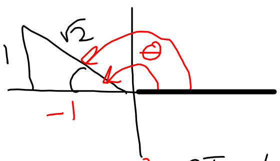
$\csc\theta = \sqrt{2}$

$\theta = \arccos(\sqrt{2}) = \cos^{-1}(\sqrt{2})$



The pic for $0 \leq \theta \leq \frac{\pi}{2}$

Another pic for $\csc\theta = \sqrt{2}$



Here, $\theta = 135^{0} = \frac{3\pi}{4}$ radians Also gives $\csc\theta = \sqrt{2}$

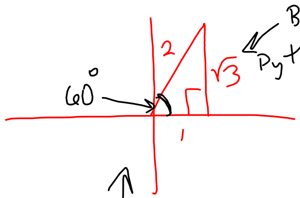
11. –/4 points LarTrig9 1.3.059.

Find each value of θ in degrees ($0° < \theta < 90°$) and radians ($0 < \theta < \pi/2$) without using a calculator.

(a) $\sec\theta = 2$

$\theta =$ $\boxed{60^\circ}$ degrees

$\theta =$ $\boxed{\frac{\pi}{3}}$ radians



By Pythagorus OR

$x^2+1^2=2^2$
$x^2=3$
$x=\pm\sqrt{3} \to +\sqrt{3}$

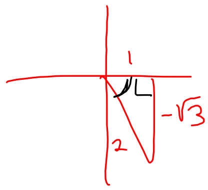
$0<\theta<90^\circ$ picture

(b) $\cot\theta = 1$

$\theta =$ $\boxed{45^\circ}$ degrees

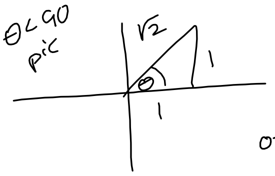
$\theta =$ $\boxed{\frac{\pi}{4}}$ radians

$(45)\left(\frac{\pi}{180}\right)=\frac{\pi}{4}$

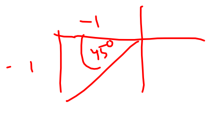


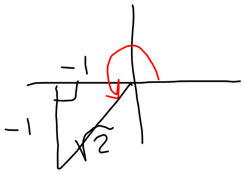
The other pic for $\sec\theta=2$ (i.e. $\cos\theta=\frac{1}{2}$)

$0<\theta<90$ pic



other pic:





12. –/1 points LarTrig9 1.3.056.

Use trigonometric identities to transform the left side of the equation into the right side ($0 < \theta < \pi/2$).

$$\frac{\tan\beta + \cot\beta}{\tan\beta} = \frac{\tan\beta}{\tan\beta} + \frac{\cot\beta}{\tan\beta}$$

$$= 1 + \boxed{}$$

$$= \csc^2\beta$$

Pythag. ID's

$$\sin^2\theta + \cos^2\theta = 1$$

$$\tan^2\theta + 1 = \sec^2\theta$$

$$\cot^2\theta + 1 = \csc^2\theta$$

$$\ldots = 1 + \frac{\frac{\cos\beta}{\sin\beta}}{\frac{\sin\beta}{\cos\beta}} = 1 + \left(\frac{\cos\beta}{\sin\beta}\right)\left(\frac{\cos\beta}{\sin\beta}\right)$$

$$= 1 + \frac{\cos^2\beta}{\sin^2\beta} = 1 + \left(\frac{\cos\beta}{\sin\beta}\right)^2$$

$$= \boxed{1 + (\cot\beta)^2}$$

$$= 1 + \cot^2\beta = \csc^2\beta$$

13. –/2 points LarTrig9 1.3.055.

Use trigonometric identities to transform the left side of the equation into the right side ($0 < \theta < \pi/2$).

$$\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta} = \csc\theta\sec\theta$$

$$\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta} = \frac{\sin^2\theta + \boxed{\cos^2\theta}}{\cos\theta\sin\theta}$$

$$= \frac{1}{\boxed{\cos\theta\sin\theta}}$$

$$= \csc\theta\sec\theta$$

$$= \left(\frac{\sin\theta}{\cos\theta}\right)\left(\frac{\sin\theta}{\sin\theta}\right) + \left(\frac{\cos\theta}{\sin\theta}\right)\left(\frac{\cos\theta}{\cos\theta}\right)$$

$$= \frac{\sin^2\theta + \cos^2\theta}{\cos\theta\sin\theta} = \frac{1}{\cos\theta\sin\theta}$$

$$= \frac{1}{\cos\theta}\cdot\frac{1}{\sin\theta} = \sec\theta\csc\theta$$

14. –/1 points LarTrig9 1.3.054.

Use trigonometric identities to transform the left side of the equation into the right side ($0 < \theta < \pi/2$).

$$\sin^2\theta - \cos^2\theta = \sin^2\theta - \left(1 - \left(\boxed{\sin^2\theta}\right)\right)$$

$$= 2\sin^2\theta - 1$$

$$= \sin^2\theta - (1 - \sin^2\theta)$$

$$= \sin^2\theta - 1 + \sin^2\theta$$

$$= \boxed{2\sin^2\theta - 1}$$

$$\sin^2\theta + \cos^2\theta = 1$$

$$\Rightarrow \cos^2\theta = 1 - \sin^2\theta$$

15. –/1 points LarTrig9 1.3.052.

Use trigonometric identities to transform the left side of the equation into the right side ($0 < \theta < \pi/2$).

$$(1 + \cos\theta)(1 - \cos\theta) = 1 - \left(\boxed{\cos^2\theta}\right) = 1 - \cos^2\theta = \sin^2\theta$$

$$= \sin^2\theta$$

Special Products From Intermediate Algebra

$(a+b)(a-b) = a^2 - b^2$ } Difference of 2 squares

$(a+b)(a+b) = a^2 + 2ab + b^2$
$(a-b)(a-b) = a^2 - 2ab + b^2$ } Binomial Square

16. –/1 points LarTrig9 1.3.051.

Use trigonometric identities to transform the left side of the equation into the right side ($0 < \theta < \pi/2$).

$$(1 + \sin\theta)(1 - \sin\theta) = \cos^2\theta$$

$$(1 + \sin\theta)(1 - \sin\theta) = 1 - \left(\boxed{\sin^2\theta}\right)$$

$$= \cos^2\theta$$

17. –/1 points LarTrig9 1.3.050.

Use trigonometric identities to transform one side of the equation into the other ($0 < \theta < \pi/2$).

$$\cot\theta \sin\theta = \left(\boxed{} \right) \sin\theta$$

$$= \cos\theta$$

$$= \frac{\cos\theta}{\cancel{\sin\theta}} \cancel{\sin\theta} = \cos\theta$$

18. –/6 points LarTrig9 1.3.001.

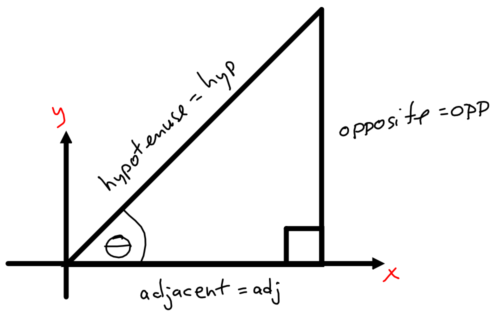
Match each trigonometric function with its right triangle definition.

(a) sine

- $\frac{\text{hypotenuse}}{\text{adjacent}}$
- $\frac{\text{adjacent}}{\text{opposite}}$
- $\frac{\text{hypotenuse}}{\text{opposite}}$
- $\frac{\text{adjacent}}{\text{hypotenuse}}$
- $\frac{\text{opposite}}{\text{hypotenuse}}$

18. –/6 points LarTrig9 1.3.001.

Match each trigonometric function with its right triangle definition.



$$\sin\theta = \frac{opp}{hyp} = \frac{y}{r} \qquad \csc\theta = \frac{1}{\sin\theta} = \frac{r}{y}$$

$$\cos\theta = \frac{adj}{hyp} = \frac{x}{r} \qquad \sec\theta = \frac{1}{\cos\theta} = \frac{r}{x}$$

$$\tan\theta = \frac{opp}{adj} = \frac{y}{x} \qquad \cot = \frac{x}{y} = \frac{1}{\tan\theta}$$

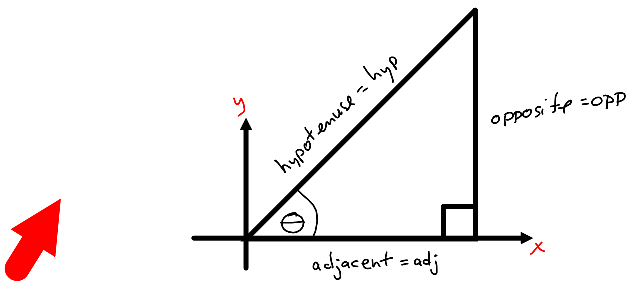
sohcahtoa

19. –/3 points LarTrig9 1.3.002.

Fill in the blanks.

Relative to the acute angle θ, the three sides of a right triangle are the ---Select--- side, the ---Select--- side, and the ---Select--- .

opposite adjacent hypotenuse



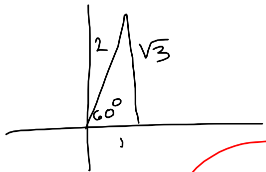
20. –/1 points LarTrig9 1.3.003.

Fill in the blank.

Cofunctions of ---Select--- angles are equal.

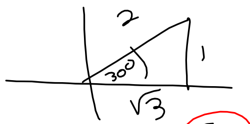
complementary

sine cosine



$\sin 60^\circ = \frac{\sqrt{3}}{2}$

complementary angle is 30°



$\cos 30^\circ = \frac{\sqrt{3}}{2}$

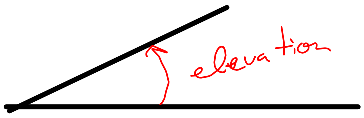
21. –/2 points LarTrig9 1.3.004. My Notes Ask Your Te

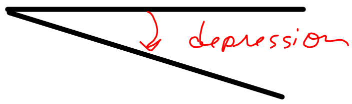
Fill in the blanks.

An angle that measures from the horizontal upward to an object is called the angle of ---Select--- , whereas an angle that measures from the horizontal downward to an object is called the angle of ---Select--- .

elevation

depression





22. –/6 points LarTrig9 1.3.005.

Find the exact values of the six trigonometric functions of the angle θ shown in the figure. (Use the Pythagorean Theorem to find the third side of the tria

sin θ = $= \frac{9}{15} = \frac{3}{5}$

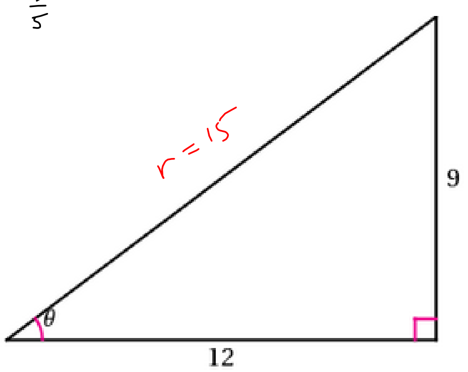
cos θ = $= \frac{4}{5}$

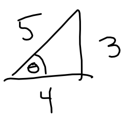
tan θ = 3/4

csc θ = 5/3

sec θ = 5/4

cot θ = 4/3





Pythagorus for the 3rd side, which, for this one, is the hypotenuse.

$r^2 = 9^2 + 12^2$

$= 81 + 144$

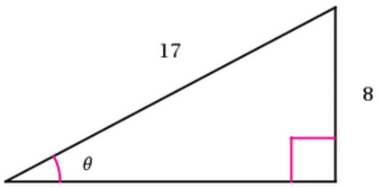
$= 225 = r^2 \longrightarrow$

$r = \pm\sqrt{225} = \pm 15$

we choose $r > 0$, always

23. –/6 points LarTrig9 1.3.006. My

Find the exact values of the six trigonometric functions of the angle θ shown in the figure. (Use the Pythagorean Theorem to find the third side of the triangle.)



$X = 15$

$\sin\theta = \frac{8}{17}$ $\csc\theta = \frac{17}{8}$

$\cos\theta = \frac{15}{17}$ $\sec\theta = \frac{17}{15}$

$\tan\theta = \frac{8}{15}$ $\cot\theta = \frac{15}{8}$

Pythagorus says

$x^2 + 8^2 = 17^2$

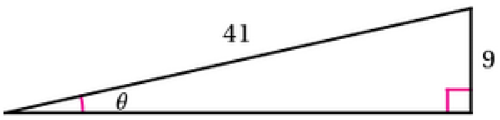
$x^2 = 289 - 64 = 225$

$x = \pm 15 \longrightarrow \boxed{x = 15}$

$$\begin{array}{r} {}^{4}17 \\ 17 \\ \hline 119 \\ 170 \\ \hline 289 \end{array} = 17^2$$

24. –/6 points LarTrig9 1.3.007. My

Find the exact values of the six trigonometric functions of the angle θ shown in the figure. (Use the Pythagorean Theorem to find the third side of the triangle.)



$x = 40$

$\sin\theta = \frac{9}{41} \Rightarrow \csc\theta = \frac{41}{9}$

$\cos\theta = \frac{40}{41} \Rightarrow \sec\theta = \frac{41}{40}$

$\tan\theta = \frac{9}{40} \Rightarrow \cot\theta = \frac{40}{9}$

Pythagorus says

$x^2 + 9^2 = 41^2 \Rightarrow$

$x^2 = 41^2 - 9^2$

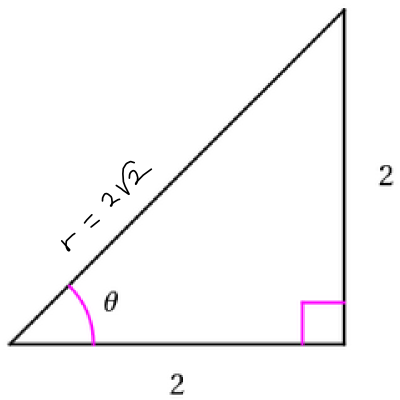
$= 1681 - 81$

$= 1600 \Rightarrow$

$x = \pm 40 \longrightarrow x = 40$

25. –/6 points LarTrig9 1.3.008. My

Find the exact values of the six trigonometric functions of the angle θ shown in the figure. (Use the Pythagorean Theorem to find the third side of the triangle.)



$r^2 = 2^2 + 2^2$

$= 4 + 4$

$= 8 \Longrightarrow$

$r = \pm\sqrt{8} = \sqrt{8}$ (Assume positive)

$= \sqrt{2 \cdot 2 \cdot 2} = 2\sqrt{2}$

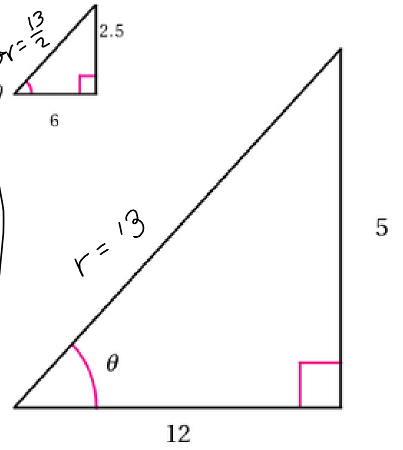
$\sin\theta = \frac{2}{2\sqrt{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$ $\qquad \csc\theta = \sqrt{2}$

$\cos\theta = \frac{2}{2\sqrt{2}} = \frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}}$ $\qquad \sec\theta = \sqrt{2}$

$\tan\theta = \frac{2}{2} = 1$ $\qquad \cot\theta = 1$

26. –/13 points LarTrig9 1.3.009.

Find the exact values of the six trigonometric functions of the angle θ for each of the two triangles.



$6^2 + 2.5^2 =$
$= 36 + 6.25$
$= 42.25$
$= 42 + \frac{1}{4}$
$= \frac{168}{4} + \frac{1}{4}$
$= \frac{169}{4} \Rightarrow r = \frac{13}{2}$

It All Dee Same!

THEY ARE SIMILAR TRIANGLES

$5^2 + 12^2 = 25 + 144 = 169$

& $\sqrt{169} = 13$

Smaller triangle		Larger triangle		
sin θ =	$5/13$	sin θ =		$\frac{5}{13} = \frac{opp}{hyp}$
cos θ =	$12/13$	cos θ =		$\frac{12}{13}$
tan θ =	$5/12$	tan θ =		$\frac{5}{12}$

27. –/5 points LarTrig9 1.3.013. My Notes Ask Yo

Sketch a right triangle corresponding to the trigonometric function of the acute angle θ. Use the Pythagorean Theorem to determine the third side and then find the other five trigonometric functions of θ.

$\tan\theta = \frac{5}{12}$

$\sin\theta =$ $5/13$

$\cos\theta =$ $12/13$

$\csc\theta =$ $13/5$

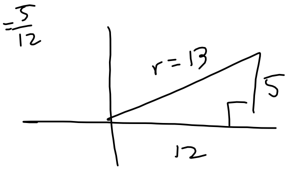
$\sec\theta =$ $13/12$

$\cot\theta =$ $12/5$

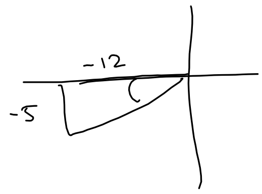
This is same as #26, almost!

When they say acute angle, they want this picture: $(0 < \theta < 90°)$

$\tan\theta = \frac{5}{12}$



other $\tan\theta = \frac{5}{12}$



28. –/5 points LarTrig9 1.3.014. My Notes Ask

Sketch a right triangle corresponding to the trigonometric function of the acute angle θ. Use the Pythagorean Theorem to determine the third side and then find the other five trigonometric functions of θ.

$\cos\theta = \frac{3}{4}$

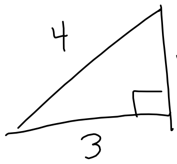
$\sin\theta = $ $\frac{\sqrt{7}}{4}$

$\tan\theta = $ $\frac{\sqrt{7}}{3}$

$\csc\theta = $ $4/\sqrt{7} = \frac{4\sqrt{7}}{7}$

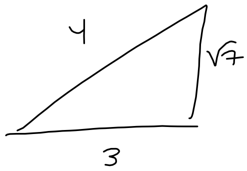
$\sec\theta = $ $\frac{4}{3}$

$\cot\theta = $ $\frac{3}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}} = \frac{3\sqrt{7}}{7}$



$y = \pm\sqrt{4^2 - 3^2} = \pm\sqrt{16-9} = \pm\sqrt{7}$

$3^2 + y^2 = 4^2$



29. −/5 points LarTrig9 1.3.017. My Notes Ask

Sketch a right triangle corresponding to the trigonometric function of the acute angle θ. Use the Pythagorean Theorem to determine the third side and then find the other five trigonometric functions of θ.

$\sin\theta = \frac{1}{6}$

$\cos\theta = \frac{\sqrt{35}}{6}$

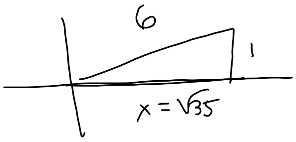
$\tan\theta = \frac{1}{\sqrt{35}} = \frac{\sqrt{35}}{35}$

$\csc\theta = \frac{6}{1} = 6$

$\sec\theta = \frac{6}{\sqrt{35}} = \frac{6\sqrt{35}}{35}$

$\cot\theta = \frac{\sqrt{35}}{1} = \sqrt{35}$

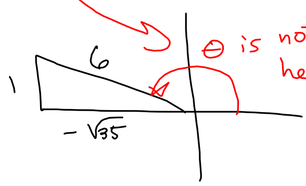
$\sin\theta = \frac{1}{6}$



$x = \sqrt{6^2 - 1^2}$

$= \sqrt{35}$

Other $\sin\theta = \frac{1}{6}$ pic:



θ is not acute, here.

30. –/5 points LarTrig9 1.3.020. My Notes Ask

Sketch a right triangle corresponding to the trigonometric function of the acute angle θ. Use the Pythagorean Theorem to determine the third side and then find the other five trigonometric functions of θ.

$\csc\theta = 8$

$\sin\theta =$ $\frac{1}{8}$

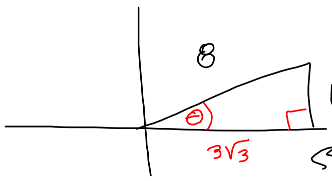
$\cos\theta =$ $\frac{3\sqrt{3}}{8}$

$\tan\theta =$ $\frac{1}{3\sqrt{3}} = \frac{\sqrt{3}}{3\cdot 3} = \frac{\sqrt{3}}{9}$

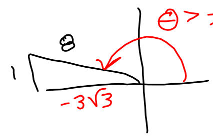
$\sec\theta =$ $\frac{8}{3\sqrt{3}} = \frac{8\sqrt{3}}{9}$

$\cot\theta =$ $3\sqrt{3}$

$\csc\theta = 8$, i.e., $\sin\theta = \frac{1}{8}$



$\sqrt{64-1} = \sqrt{63} = \sqrt{9\cdot 3} = 3\sqrt{3}$



$\theta > \frac{\pi}{2}$ (not acute)

31. –/2 points LarTrig9 1.3.032.

Use a calculator to evaluate each function. Round your answers to four decimal places. (Be sure the calculator is in the correct mode.)

(a) tan 22.5°

0.414214... ≈ $\boxed{.4142}$

Make sure calculator is in degrees mode.

(b) cot 67.5°

.4142

co-func. of complementary angle

$22.5° + 67.5° = 90°$

32. –/2 points LarTrig9 1.3.033.

Use a calculator to evaluate each function. Round your answers to four decimal places. (Be sure the calculator is in the correct mode.)

(a) sin 33.45°

0.550481... ≈ .5505

(b) csc 33.45°

1.8142

$\boxed{\csc\theta = \frac{1}{\sin\theta}}$

for calculators that don't have "csc" keys.

Reciprocal relationship between sine & cosecant, tangent & cotangent cosine and secant.

1.81419... via $\frac{1}{\sin\theta}$

1.81419... via $\csc\theta$

33. –/2 points LarTrig9 1.3.034.

Use a calculator to evaluate each function. Round your answers to four decimal places. (Be sure the calculator is in the correct angle mode.)

(a) cot 81.09° $= \frac{1}{\tan(81.09°)} \approx 0.156775... \approx \boxed{.1568}$

(b) sec 81.09° $= \frac{1}{\cos(81.09°)} \approx 6.45649... \approx \boxed{6.4565}$

34. –/2 points LarTrig9 1.3.035.

Use a calculator to evaluate each function. Round your answers to four decimal places. (Be sure the calculator is in the correct angle mode.)

(a) cos(8° 46' 30'') $\approx .9883$

(b) sec(8° 46' 30'') ≈ 1.0118

Conversion factors for minutes & seconds.
"1 degree is kinda like an hour."

$\frac{60 \text{ minutes}}{1 \text{ degree}} = \frac{60'}{1 \text{ degree}}$ $\frac{60''}{1'} = \frac{60 \text{ seconds}}{1 \text{ minute}}$

You can convert all at once, with

$8^\circ 46' 30'' = \left(8 + \frac{46}{60} + \frac{30}{3600}\right)^\circ$

0.988295040035869360167475900944764552790967095465276235112...

1.011843588695644792352620296342873199484188947534481502945...

Check w/ $\frac{1}{\cos\theta}$ & $\sec\theta$

1.011843588695644792352620296342873199484188947534481502946...

35. –/2 points LarTrig9 1.3.038.

Use a calculator to evaluate each function. Round your answers to four decimal places. (Be sure the calculator is in the correct angle mode.)

(a) sec 55° 12' 14" $= \sec\left(55 + \frac{12}{60} + \frac{14}{3600}\right) \approx \boxed{1.7524}$

(b) cos 55° 12' 14" $= \cos\left(55 + \frac{12}{60} + \frac{14}{3600}\right) = \frac{1}{\text{previous ans}} \approx .5707$

1.7523635782223781267967285077152778537773156266771953388849...

0.5706578317579584961744637112757831033083658288493721136 87...

36. –/4 points LarTrig9 1.3.041.

Use the given function values and the trigonometric identities to find the indicated trigonometric functions.

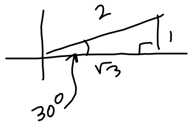
$\sin 60° = \frac{\sqrt{3}}{2}$, $\cos 60° = \frac{1}{2}$

cofunctions on complementary angles

I'll draw pics, b/c that's how you do 'em, from scratch.

(a) sin 30°

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



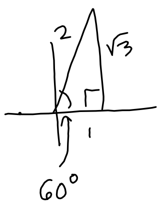
(b) cos 30°

$\boxed{\frac{\sqrt{3}}{2}}$

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

(c) tan 60°

$\boxed{\sqrt{3}}$



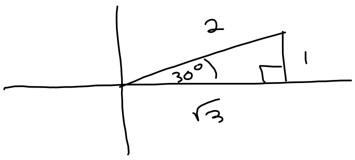
(d) cot 60°

$\boxed{\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}}$

37. –/4 points LarTrig9 1.3.042.

Use the given function values and the trigonometric identities to find the indicated trigonometric functions.

$\sin 30° = \frac{1}{2}$, $\tan 30° = \frac{\sqrt{3}}{3}$



(a) $\csc 30° = \frac{1}{\sin 30°}$

$\boxed{2}$

(b) $\cot 60° = \frac{1}{\tan 60°}$

$\boxed{\frac{\sqrt{3}}{3}}$

(c) $\cos 30°$

$\boxed{\frac{\sqrt{3}}{2}}$

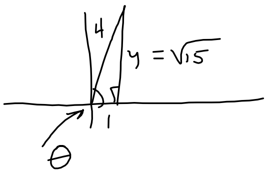
(d) $\cot 30°$

$\boxed{\sqrt{3}}$

38. –/4 points LarTrig9 1.3.043.

Use the given function value and the trigonometric identities to find the indicated trigonometric functions. $(0° \le \theta \le 90°, 0 \le \theta \le \pi/2)$

$\cos\theta = \frac{1}{4}$



$4^2 - 1^2 = y^2$

$15 = y^2$

$\pm\sqrt{15} = y$

$\sqrt{15} = y$ is pos. from pic.

(a) $\sin\theta$

$\frac{\sqrt{15}}{4}$

(b) $\tan\theta$

$\sqrt{15}$

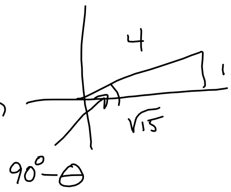
(c) $\sec\theta$

4

(d) $\csc(90° - \theta)$

4

co-secant of complementary angle



39. –/4 points LarTrig9 1.3.045.

Use the given function value and the trigonometric identities to find the indicated trigonometric functions. (0° ≤ α ≤ 90°, 0 ≤ α ≤ π/2)

cot α = 9

(a) tan α

$\frac{1}{9}$

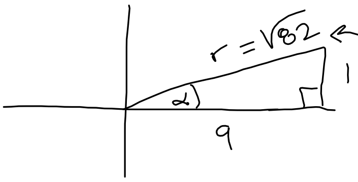
(b) csc α

$\sqrt{82}$

(c) cot(90° − α)

(d) cos α

$\frac{1}{9}$



$r^2 = 9^2 + 1^2$

$= 82 \Rightarrow$

$r = \pm\sqrt{82}$

$r = \sqrt{82}$ is pos.

$2 \,\underline{)\, 82}$

41

41 is prime.