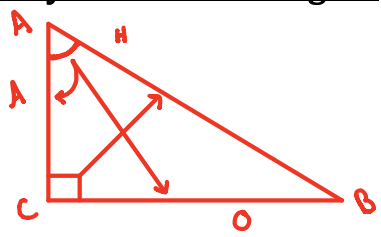
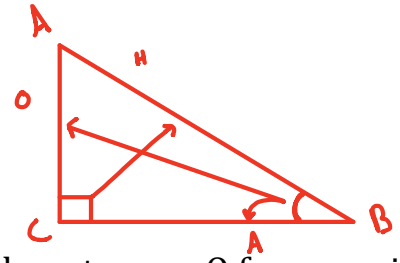
Math 2 Name: Key

Unit 5 Day 4 Notes – Solving Right Triangles Date: _____

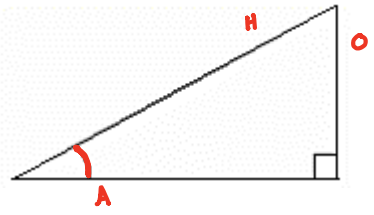
Two Ways to Label Triangles:



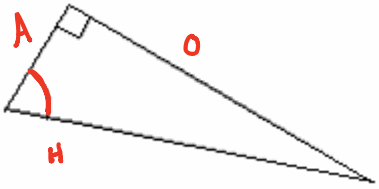


Practice: Label the triangles below using H for hypotenuse, O for opposite and A for adjacent. The reference angle is the one with the arc marking in it.

1)



2)



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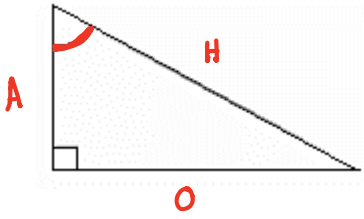
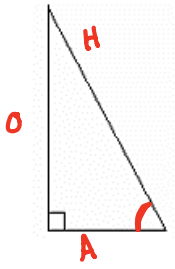
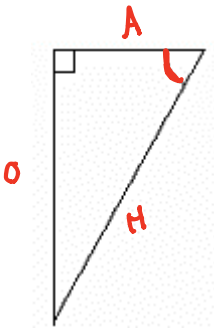


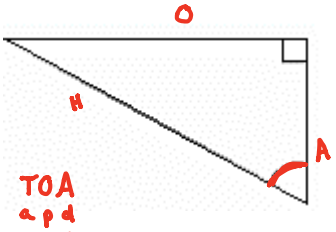
4)



5)

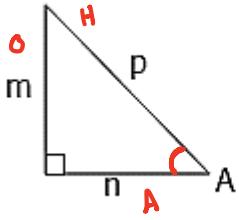


6)



SOH CAH TOA
i p y o d y a p d
n p p s j p n p j

7)

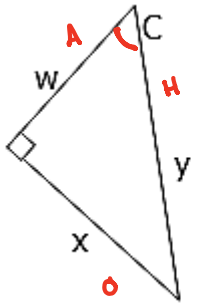


$\sin A = \frac{O}{H} = \frac{m}{p}$

$\cos A = \frac{A}{H} = \frac{n}{p}$

$\tan A = \frac{O}{A} = \frac{m}{n}$

8)

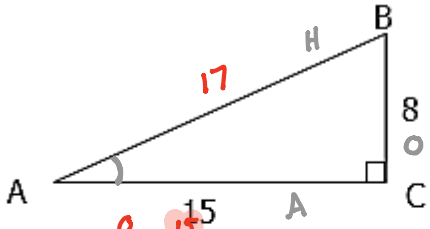


$\sin C = \frac{x}{y}$

$\cos C = \frac{w}{y}$

$\tan C = \frac{x}{w}$

9)



$15^2 + 8^2 = c^2$

$\sqrt{289} = \sqrt{c^2}$

$c = 17$

$\sin B = \frac{O}{H} = \frac{15}{17}$

$\cos B = \frac{A}{H} = \frac{8}{17}$

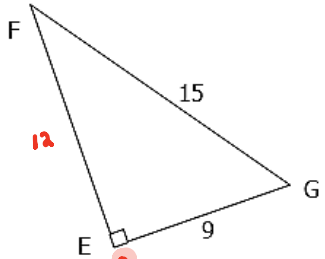
$\tan B = \frac{O}{A} = \frac{15}{8}$

$\sin A = \frac{O}{H} = \frac{8}{17}$

$\cos A = \frac{A}{H} = \frac{15}{17}$

$\tan A = \frac{O}{A} = \frac{8}{15}$

10)



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

$\cos F = \frac{12}{15} = \frac{4}{5}$

$\tan F = \frac{9}{12} = \frac{3}{4}$

$\sin G = \frac{12}{15} = \frac{4}{5}$

$\cos G = \frac{9}{15} = \frac{3}{5}$

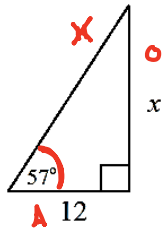
$\tan G = \frac{12}{9} = \frac{4}{3}$

Solving Right Triangles – Finding Missing Sides: → going to use sin, cos, & tan Trig func.

SOH	CAH	TOA
$\sin x = \frac{\text{opp.}}{\text{hyp.}}$	$\cos x = \frac{\text{adj.}}{\text{hyp.}}$	$\tan x = \frac{\text{opp.}}{\text{adj.}}$

Examples: Find x in each of the triangles below. Round your final answers to the nearest hundredth. (*Figures may not be drawn to scale.*)

a)



SOH CAH TOA

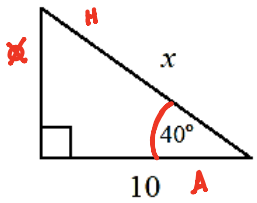
$\tan 57 = \frac{x}{12}$

$x = 12 \tan 57$

$x \approx 18.48$

$x \approx$ 18.48

b)



SOH CAH TOA

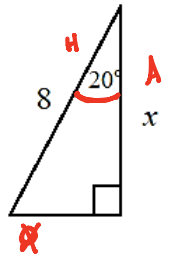
$\cos 40 = \frac{10}{x}$

$\frac{x \cos 40}{\cos 40} = \frac{10}{\cos 40}$

$x \approx 13.05$

$x \approx$ 13.05

c)



SOH CAH TOA

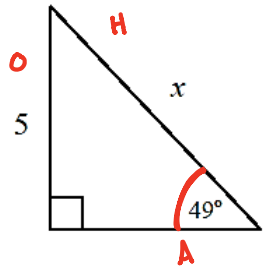
$\cos 20 = \frac{x}{8}$

$x = 8 \cos 20$

$x \approx 7.52$

$x \approx$ 7.52

d)



SOH CAH TOA

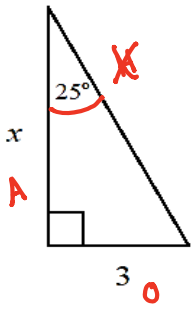
$\sin 49 = \frac{5}{x}$

$\frac{x \sin 49}{\sin 49} = \frac{5}{\sin 49}$

$x \approx 6.63$

$x \approx$ 6.63

e)



~~SOH~~ ~~CAH~~ TOA

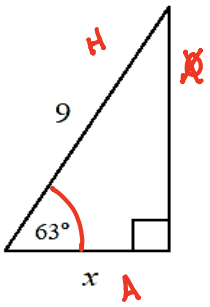
$\tan 25 = \frac{3}{x}$

$x = \frac{3}{\tan 25}$

$x \approx 6.43$

$x \approx$ 6.43

f)



~~SOH~~ CAH ~~TOA~~

$\cos 63 = \frac{x}{9}$

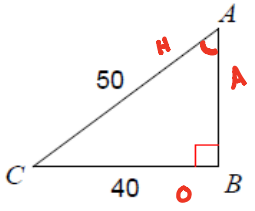
$x = 9 \cos 63$

$x \approx 4.09$

$x \approx$ 4.09

Solving Right Triangles – Finding Missing Angles: → going to use $\sin^{-1}$, $\cos^{-1}$, & $\tan^{-1}$ Inverse trig func.

SOH	CAH	TOA
$\sin x = \frac{O}{H}$	$\cos x = \frac{A}{H}$	$\tan x = \frac{O}{A}$



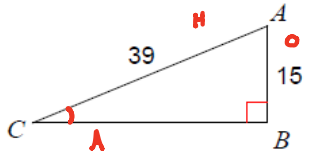
SOH ~~CAH~~ ~~TOA~~

$\sin A = \frac{40}{50}$

$\sin^{-1}\left(\frac{40}{50}\right)$

$A = 53^\circ$

$C = 90 - 53 = 37^\circ$



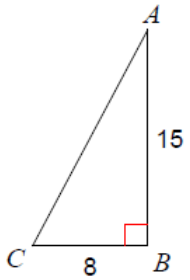
SOH ~~CAH~~ ~~TOA~~

$\sin C = \frac{15}{39}$

$\sin^{-1}\left(\frac{15}{39}\right)$

$C = 23^\circ$

$A = 90 - 23 = 67^\circ$



$A = 28^\circ$

$C = 62^\circ$

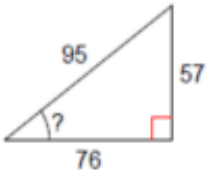
HW (5/14)

1.

s. 67°
t. 47°
u. 21°
v. 69°

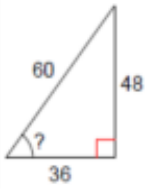
2.

e. 51°
f. 31°
g. 37°
h. 53°



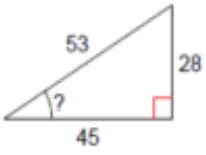
3.

r. 53°
s. 37°
t. 41°
u. 39°



4.

j. 62°
k. 28°
l. 32°
m. 50°

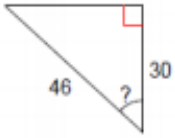


5.

a. 22°
b. 66°
c. 68°
d. 24°

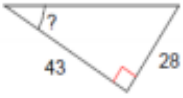
6.

m. 49°
n. 33°
o. 47°
p. 57°



7.

s. 24°
t. 57°
u. 59°
v. 33°



8.

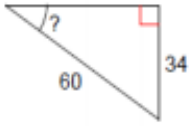
q. 67°
r. 65°
s. 25°
t. 23°

9.

n. 19°
o. 72°
p. 18°
q. 71°

10.

f. 17°
g. 30°
h. 14°
i. 35°

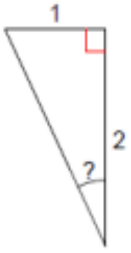


11.

n. 27°
o. 30°
p. 60°
q. 63°

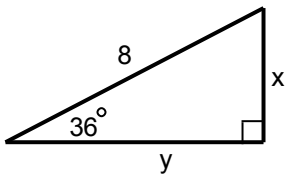
12.

d. 60°
e. 27°
f. 63°
g. 30°

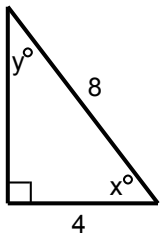


Unit 5 Day 4 CW/HW

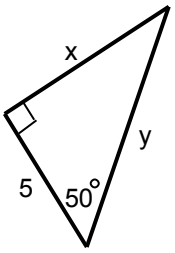
1.
x ≈ _____
y ≈ _____



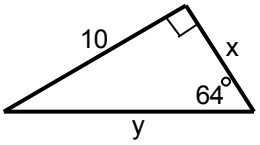
2.
x ≈ _____
y ≈ _____



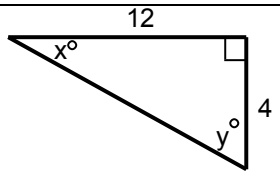
3.
x ≈ _____
y ≈ _____



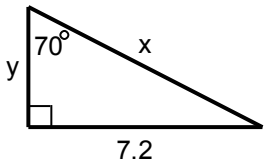
4.
x ≈ _____
y ≈ _____



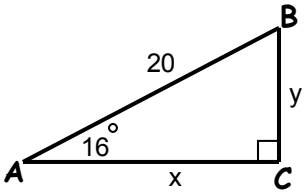
5.
x ≈ _____
y ≈ _____



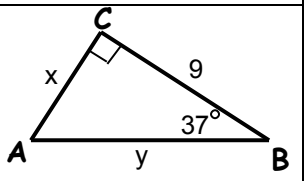
6.
x ≈ _____
y ≈ _____



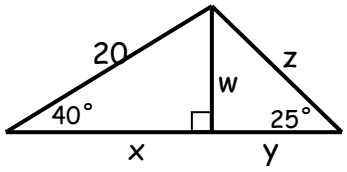
7.
x ≈ _____
y ≈ _____
m∠B=_____



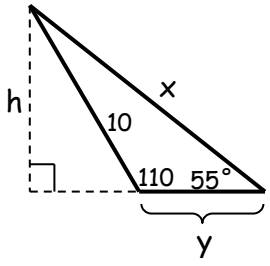
8.
x ≈ _____
y ≈ _____
m∠A=_____



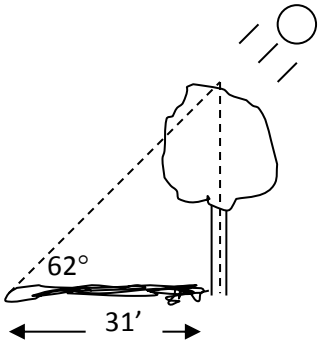
9.
w ≈ _____
x ≈ _____
y ≈ _____
z ≈ _____



10.
h ≈ _____
x ≈ _____
y ≈ _____

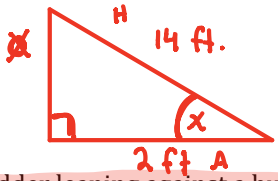


11. How tall is the tree?



12. A man who is 6 feet tall is flying a kite. The kite string is 75 feet long. If the angle that the kite string makes with the line horizontal to the ground is 35°, how far above the ground is the kite?

13. A ladder 14 feet long rests against the side of a building. The base of the ladder rests on level ground 2 feet from the side of the building. What angle does the ladder form with the ground?

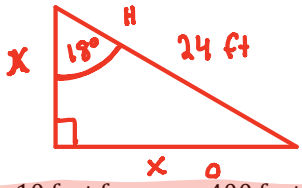


~~SOH~~ ~~CAH~~ ~~TOA~~

$\cos x = \frac{2}{14}$ $\quad x = 82^\circ$

$\cos^{-1}\left(\frac{2}{14}\right)$

14. A 24-foot ladder leaning against a building forms an 18° angle with the side of the building. How far is the base of the ladder from the base of the building?

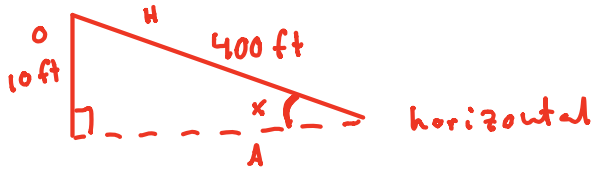


SOH ~~CAH~~ ~~TOA~~

$\frac{\sin 18}{1} = \frac{x}{24}$ $\quad x \approx 7.4$ ft.

$x = 24 \sin 18$

15. A road rises 10 feet for every 400 feet along the pavement (not the horizontal). What is the measurement of the angle the road forms with the horizontal?

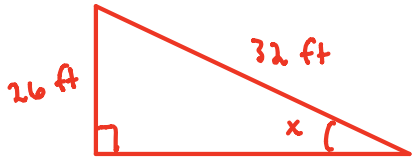


SOH ~~CAH~~ ~~TOA~~

$\sin x = \frac{10}{400}$ $\quad x = 1^\circ$

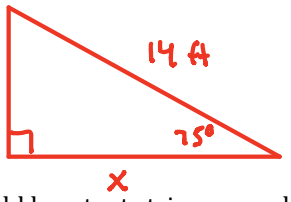
$\sin^{-1}(10/400)$

16. A 32-foot ladder leaning against a building touches the side of the building 26 feet above the ground. What is the measurement of the angle formed by the ladder and the ground?



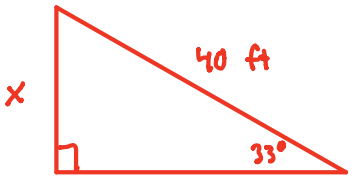
$x = 54^\circ$

17. The directions for the use of a ladder recommend that for maximum safety, the ladder should be placed against a wall at a 75° angle with the ground. If the ladder is 14 feet long, how far from the wall should the base of the ladder be placed?



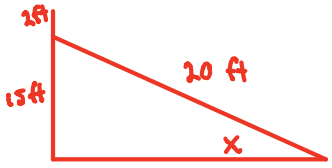
$x \approx 3.6$ ft.

18. A kite is held by a taut string pegged to the ground. The string is 40 feet long and makes a 33° angle with the ground. Supposing that the ground is level, find the vertical distance from the ground to the kite.



$x \approx 21.8$ ft.

19. A wire anchored to the ground braces a 17-foot pole. The wire is 20 feet long and is attached to the pole 2 feet from the top of the pole. What angle does the wire make with the ground?



$x = 49^\circ$

20. A jet airplane begins a steady climb of 15° and flies for two ground miles. What was its change in altitude?

$x \approx .54$ mi