Geometry: 9.9 – Intro To Trigonometry

SOH ~ CAH ~ TOA!

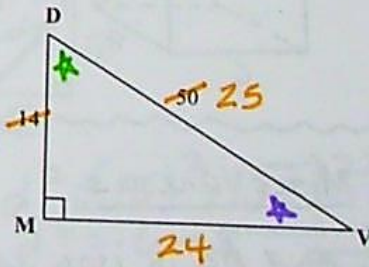| Sine:	Cosine:	Tangent:
Opposite	Adjacent	Opposite
Hypotenuse	Hypotenuse	Adjacent
$\sin\angle P = \dfrac{opp}{hyp}$	$\cos\angle P = \dfrac{adj}{hyp}$	$\tan\angle P = \dfrac{opp}{adj}$

Hypotenuse
Opposite leg
Adjacent leg
P
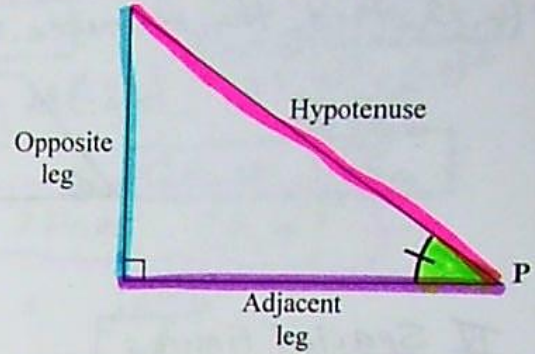
1. Find the three trigonometric ratios for $\angle D$ and $\angle V$.

$$\frac{14}{7} \qquad \frac{x}{24} \qquad \frac{50}{25}$$

$\sin (soh) \dfrac{o}{h}$ $\sin \angle D = \dfrac{24}{25}$ $\sin \angle V = \dfrac{7}{25}$

$\cos (cah) \dfrac{a}{h}$ $\cos \angle D = \dfrac{7}{25}$ $\cos \angle V = \dfrac{24}{25}$

$\tan (toa) \dfrac{o}{a}$ $\tan \angle D = \dfrac{24}{7}$ $\tan \angle V = \dfrac{7}{24}$

D
50   25
7   14
M   24   V

2. Find the $\tan\angle S$.

TOA

$\tan \angle S = \dfrac{opp}{adj}$

$= \dfrac{8}{\sqrt{161}}$

$\dfrac{8}{\sqrt{161}} \cdot \dfrac{\sqrt{161}}{\sqrt{161}}$

$\boxed{\tan \angle S = \dfrac{8\sqrt{161}}{161}} \approx 0.6305$

T
15   8
S   H
$\sqrt{161}$

$SH = \sqrt{15^2 - 8^2}$
$= \sqrt{225 - 64}$
$= \sqrt{161}$

12
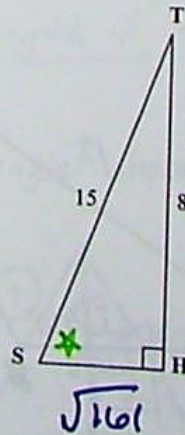
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9.9-9.10 Solving Right Triangle using Trigonometric Ratios

1. If $\angle D$ is the reference angle of $\triangle$ DOG, label the 3 sides using the words *opposite, adjacent,* and *hypotenuse.*

adj hypotenuse opp
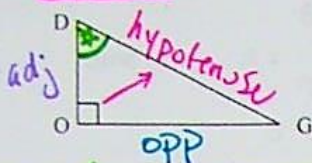
2. If $\angle W$ is the reference angle of $\triangle$ WXZ, label the 3 sides using the words *opposite, adjacent,* and *hypotenuse.*
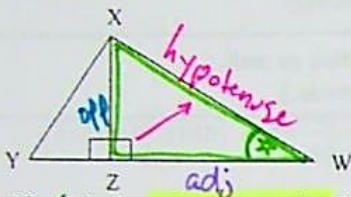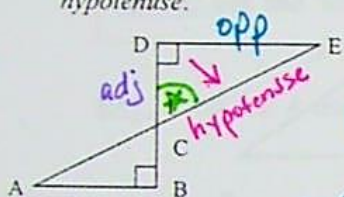
off hypotenuse adj

3. If $\angle 1$ is the reference angle of $\triangle$ DEC, label the 3 sides using the words *opposite, adjacent,* and *hypotenuse.*
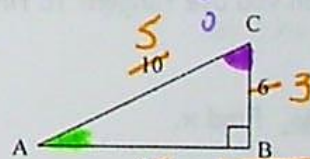
adj opp hypotenuse
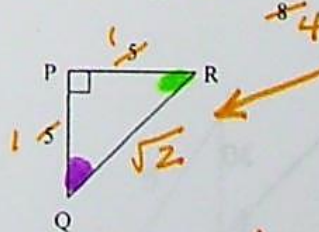
soh   cah   toa

Sin⁰⁰⁰   cos⁰⁰⁰   tan⁰⁰⁰

FIRST if reduce possible

4a. Express each trigonometric function as a ratio in <u>simplest form</u>.

$\frac{o}{h}$ $\sin \angle A = \frac{3}{5}$ $\sin \angle C = \frac{4}{5}$

$\frac{a}{h}$ $\cos \angle A = \frac{4}{5}$ $\cos \angle C = \frac{3}{5}$

$\frac{o}{a}$ $\tan \angle A = \frac{3}{4}$ $\tan \angle C = \frac{4}{3}$

4b.

$\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$\sin \angle R = \frac{\sqrt{2}}{2}$ $\sin \angle Q = \frac{\sqrt{2}}{2}$

$\cos \angle R = \frac{\sqrt{2}}{2}$ $\cos \angle Q = \frac{\sqrt{2}}{2}$

$\tan \angle R = \frac{1}{1}$ $\tan \angle Q = \frac{1}{1}$

4c.

$\sin \angle L = \frac{\sqrt{3}}{2}$ $\sin \angle N = \frac{1}{2}$

$\cos \angle L = \frac{1}{2}$ $\cos \angle N = \frac{\sqrt{3}}{2}$

$\tan \angle L = \sqrt{3}$ $\tan \angle N = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{3}$

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

45	45	90
1	1	$\sqrt{2}$

30	60	90
1	$\sqrt{3}$	2

16

$$\text{sin} \quad \text{cos} \quad \text{tan}$$
$$S = \frac{o}{h} \quad C = \frac{a}{h} \quad T = \frac{o}{a}$$

4d.

$\frac{o}{h}$ $\sin \angle F = \frac{4}{5}$ $\sin \angle O = \frac{3}{5}$

$\frac{a}{h}$ $\cos \angle F = \frac{3}{5}$ $\cos \angle O = \frac{4}{5}$

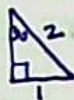$\frac{o}{a}$ $\tan \angle F = \frac{4}{3}$ $\tan \angle O = \frac{3}{4}$

F (4, 3)

5   3

3-4-[5]

O (0,0)   4   D   x

4e.

$\frac{o}{h}$ $\sin \angle U = \frac{9}{41}$ $\sin \angle S = \frac{40}{41}$

$\frac{a}{h}$ $\cos \angle U = \frac{40}{41}$ $\cos \angle S = \frac{9}{41}$

$\frac{o}{a}$ $\tan \angle U = \frac{9}{40}$ $\tan \angle S = \frac{40}{9}$

U (9, 40)

41   40

9-40-[41]

S   9   T   x
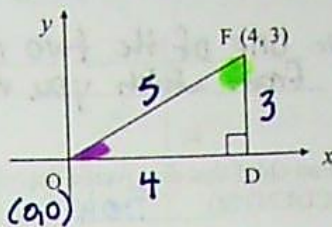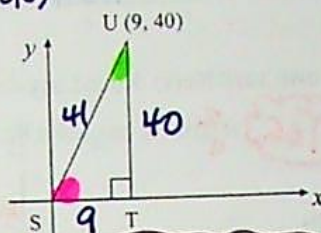
5. Evaluate with a scientific calculator. Round any decimal answers to the nearest _tenth_.

a. $x = 4\sin 30°$ $4\left(\frac{1}{2}\right)$ a. **2**

b. $x = 17\cos 56°$ b. **9.5**

c. $x = 3\tan 22°$ c. **1.2**

P. 424 — Trig Table of Ratios

6. Solve for x. Round any decimal answers to the nearest _tenth_.

a. $\sin 38° = \frac{x}{8}$ $x = 8(\sin 38)$

$8(.6157) = \left(\frac{x}{8}\right)8$

$\boxed{4.9 \approx x}$

b. $\cos 71° = \frac{x}{2}$ $x = 2(\cos 71)$

$.3256 = \frac{x}{2}$

$2(.3256) = x$

$\boxed{0.7 \approx x}$

c. $\tan 15° = \frac{x}{30}$ $x = 30(\tan 15)$

$.2679 = \frac{x}{30}$

$30(.2679) = x$

$\boxed{80 \approx x}$

Cah
$\frac{a}{h}$

d. $\cos 45° = \frac{x}{5}$

$\frac{\sqrt{2}}{2} = \frac{x}{5}$

$.7071 = \frac{x}{5}$

$.7071x = 5$

$\frac{.7071}{.7071} \quad \frac{.7071}{.7071}$

$\boxed{x \approx 7.1}$

Soh

e. $\tan 45° = \frac{18}{x}$

$1 = \frac{18}{x}$

$\boxed{x = 18}$

f. $\sin 60° = \frac{12}{x}$

$.8660 = \frac{12}{x}$

$x = \frac{12}{.8660}$

$\boxed{x \approx 13.9}$

g. $\sin x° = 0.586$

table ÷ 36

$\frac{\sin x}{\sin} = \frac{0.586}{\sin}$

$x = \sin^{-1}(0.586)$

$\boxed{x \approx 36°}$

$\approx 35.9°$

h. $\cos x° = \frac{4}{9}$ (0.4)

$\frac{\cos x}{\cos} = \frac{0.4444}{\cos}$

$x = \cos^{-1}(0.4444)$

$\boxed{x \approx 64°}$

$\approx 63.6°$

17

i. $\tan x° = 25/20$

$\tan x = \frac{5}{4}$

$\tan x = 1.25$

$x = \tan^{-1}(1.25)$

$\boxed{x \approx 51°}$

$\approx 51.3°$