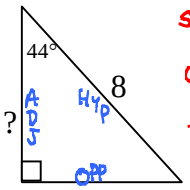
Sec 4.1 – Recursion Models
Right Triangle Trigonometry

Name:

1. Find the requested unknown side of the following triangles.

a.



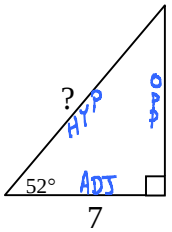
$\sin\theta = \frac{O}{H}$ $\cos\theta = \frac{A}{H}$ $\tan\theta = \frac{O}{A}$

STEP #1: LABEL
STEP #2: HAVE: H, WANT: A } USE COSINE
STEP #3: $\frac{\cos 44}{1} \times \frac{A}{8}$ (DEGREE)
$A = 8\cos 44$

8*cos(44) 5.754718403

$A \approx 5.75$

b.

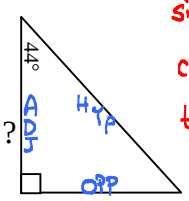


STEP #1: LABEL
STEP #2: HAVE: A, WANT: H } USE COSINE
STEP #3: $\frac{\cos 52}{1} \times \frac{7}{H}$
$\frac{7}{\cos 52} = \frac{H\cancel{\cos 52}}{\cancel{\cos 52}}$

7/cos(52) 11.36988472

$H \approx 11.37$

c.



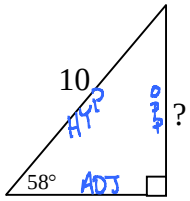
$\sin\theta = \frac{O}{H}$ $\cos\theta = \frac{A}{H}$ $\tan\theta = \frac{O}{A}$

STEP #1: LABEL
STEP #2: HAVE: OP, WANT: A } USE TANGENT
STEP #3: $\frac{\tan 44}{1} \times \frac{9}{A}$
$\frac{9}{\tan 44} = \frac{A\cdot\tan 44}{\tan 44}$

9/tan(44) 9.319772824

$A \approx 9.32$

d.

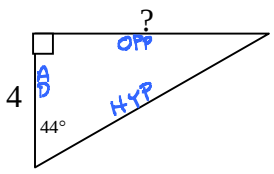


STEP #1: LABEL
STEP #2: HAVE: H, WANT: OP } USE SINE
STEP #3: $\frac{\sin 58}{1} \times \frac{x}{10}$
$x = 10\sin 58$

10sin(58) 8.480480962

$OP \approx 8.48$

e.

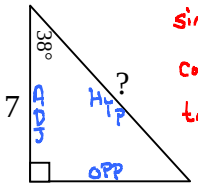


STEP #1: LABEL
STEP #2: HAVE: ADJ, WANT: OPP } USE TANGENT
STEP #3: $\frac{\tan 44}{1} \times \frac{x}{4}$
$x = 4\tan 44$

4*tan(44) 3.862755099

$OP \approx 3.86$

f.



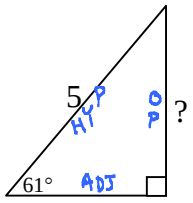
$\sin\theta = \frac{O}{H}$ $\cos\theta = \frac{A}{H}$ $\tan\theta = \frac{O}{A}$

STEP #1: LABEL
STEP #2: HAVE: A, WANT: H } USE COSINE
STEP #3: $\frac{\cos 38}{1} \times \frac{7}{H}$
$\frac{7}{\cos 38} = \frac{H\cancel{\cos 38}}{\cancel{\cos 38}}$

7/cos(38) 8.883127506

$H \approx 8.88$

g.

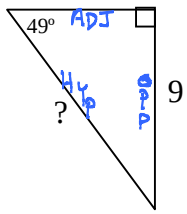


STEP #1: LABEL
STEP #2: HAVE: H, WANT: O } USE SINE
STEP #3: $\frac{\sin 61}{1} \times \frac{x}{5}$
$x = 5\sin 61$

5*sin(61) 4.373098536

$OP \approx 4.37$

h.

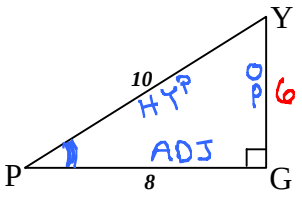


STEP #1: LABEL
STEP #2: HAVE: OP, WANT: HY } USE SINE
STEP #3: $\frac{\sin 49}{1} \times \frac{9}{H}$
$\frac{9}{\sin 49} = \frac{H\cancel{\sin 49}}{\cancel{\sin 49}}$

9/sin(49) 11.92511694

$H \approx 11.93$

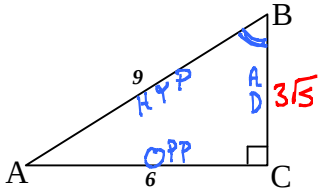
2. **Find the value of sin P.** $\sin P = \frac{OP}{HY} = \frac{6}{10}$



$\frac{6}{10} = \frac{3}{5}$

PYTHAGOREAN THEOREM
$a^2 + b^2 = c^2$
$8^2 + b^2 = 10^2$
$64 + b^2 = 100$
$-64 \quad -64$
$\sqrt{b^2} = \sqrt{36}$
$b = 6$

3. **Find the EXACT value of tan B.** $\tan B = \frac{OP}{AD} = \frac{6}{3\sqrt{5}} = \frac{2}{\sqrt{5}}\frac{\sqrt{5}}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$



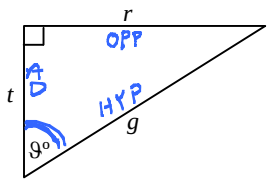
$\frac{2\sqrt{5}}{5}$

PYTHAGOREAN THEOREM
$a^2 + b^2 = c^2$
$6^2 + b^2 = 9^2$
$36 + b^2 = 81$
$-36 \quad -36$
$\sqrt{b^2} = \sqrt{45}$
$b = \sqrt{45} = \sqrt{9\cdot 5} = 3\sqrt{5}$

4. Which expression represents cos (ϑ) for the triangle shown?

A. $\frac{g}{r}$ **B.** $\frac{r}{g}$ **C.** $\frac{g}{t}$ **D.** $\frac{t}{g}$

$\cos\theta = \frac{A}{H} = \frac{t}{g}$



5. As a plane takes off it ascends at a 20° angle of elevation. If the plane has been traveling at an average rate of 290 ft/s and continues to ascend at the same angle, then how high is the plane after 10 seconds (the plane has traveled 2900 ft).

HAVE: H, WANT: O } USE SINE

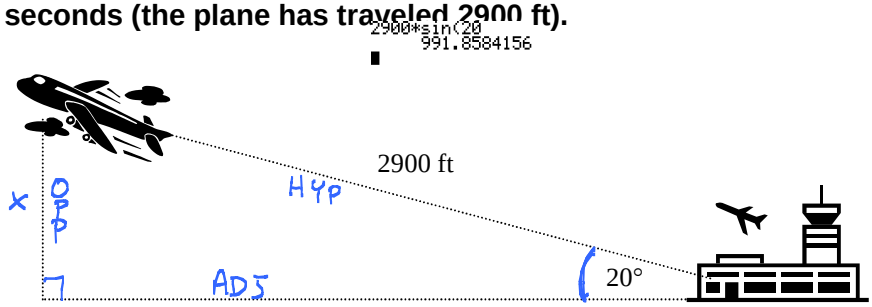
$\frac{\sin 20}{1} = \frac{x}{2900}$

$x = 2900 \sin 20$

$x \approx 992$ ft

≈ 992 ft

2900*sin(20
991.8584156



6. A person noted that the angle of elevation to the top of a silo was 65º at a distance of 9 feet from the silo. Using the diagram approximate the height of the silo.

HAVE: A, WANT: O } USE TANGENT

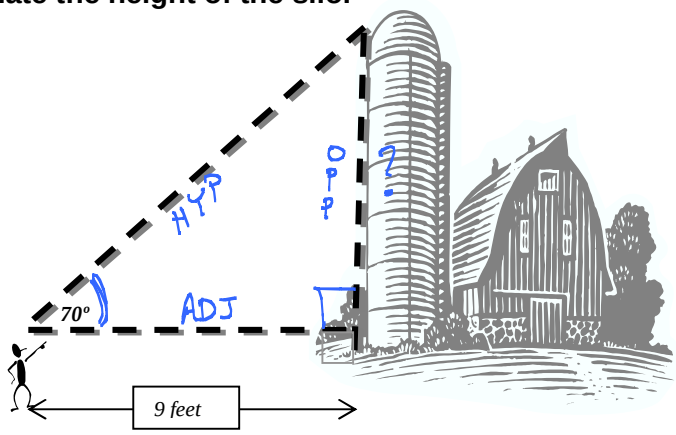
$\frac{\tan 70}{1} = \frac{x}{9}$

$x = 9 \cdot \tan 70$

$x \approx 24.7$

≈ 25 ft

9*tan(70)
24.72729678



7. A kid is flying a kite and has reeled out his entire line of 150 ft of string. If the angle of elevation of the string is 65º then which expression gives the vertical height of the kite?

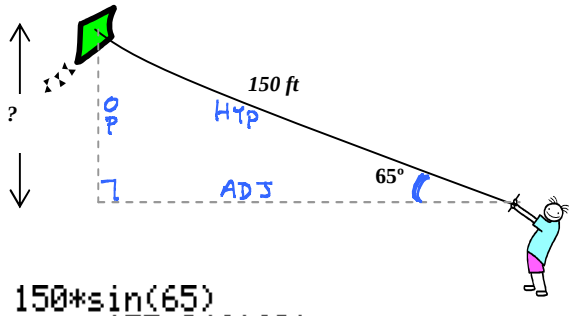
HAVE: H, WANT: O } USE SINE

$\frac{\sin 65}{1} = \frac{x}{150}$

$x = 150 \sin 65$

$x \approx 135.9$ ft

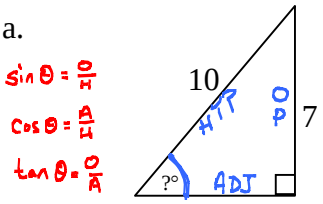
≈ 136 ft



150*sin(65)
135.9461681

2. Find the requested unknown angles of the following triangles using a calculator.

a.



STEP #1: LABEL

STEP #2: HAVE: OP, HAVE: HYP } USE SINE

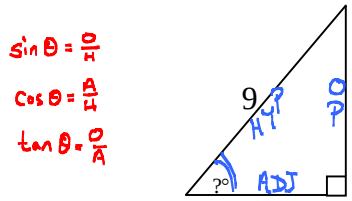
STEP #3: $\sin\theta = \frac{7}{10}$

$\sin^{-1}(\sin\theta) = \sin^{-1}\left(\frac{7}{10}\right)$

$\theta = \sin^{-1}\left(\frac{7}{10}\right) \approx 44.4°$

sin⁻¹(7/10)
44.427004

b.



STEP #1: LABEL

STEP #2: HAVE: A, HAVE: H } USE COSINE

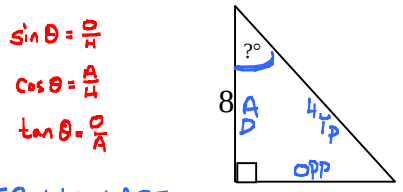
STEP #3: $\cos\theta = \frac{3}{9}$

$\cos^{-1}(\cos\theta) = \cos^{-1}\left(\frac{3}{9}\right)$

$\theta = \cos^{-1}\left(\frac{3}{9}\right) \approx 70.5°$

cos⁻¹(3/9)
70.52877937

c.



STEP #1: LABEL

STEP #2: HAVE: OP, HAVE: AD } USE TANGENT

STEP #3: $\tan\theta = \frac{5}{8}$

$\tan^{-1}(\tan\theta) = \tan^{-1}\left(\frac{5}{8}\right)$

$\theta = \tan^{-1}\left(\frac{5}{8}\right) \approx 32°$

tan⁻¹(5/8)
32.00538321

2. Find the approximate unknown angle, θ, using INVERSE trigonometric ratios ($\sin^{-1}$, $\cos^{-1}$, or $\tan^{-1}$).

a. $\cos\theta = 0.823$

$\cos^{-1}(\cos\theta) = \cos^{-1}(0.823)$

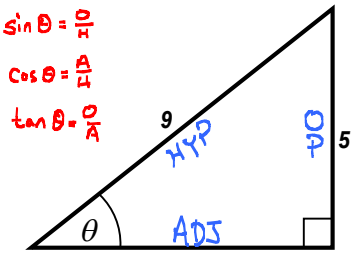
$\theta = \cos^{-1}(0.823)$

$\approx 34.6°$

cos⁻¹(.823
34.61375727

$\theta = 34.6°$

b.



STEP #1: LABEL

STEP #2: HAVE: OPP, HAVE: HYP } USE SINE

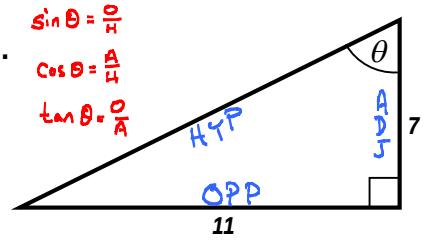
STEP #3: $\sin\theta = \frac{5}{9}$

$\sin^{-1}(\sin\theta) = \sin^{-1}\left(\frac{5}{9}\right)$

sin⁻¹(5/9)
33.7489886

$\theta = 33.7°$

c.



STEP #1: LABEL

STEP #2: HAVE: OP, HAVE: AD } USE TANGENT

STEP #3: $\tan\theta = \frac{11}{7}$

$\tan^{-1}(\tan\theta) = \tan^{-1}\left(\frac{11}{7}\right)$

tan⁻¹(11/7)
57.52880771

$\theta = 57.5°$

3. Indentify each of the following requested Trig Ratios.

A. sin A = $\frac{OPP}{HYP} = \frac{15}{17}$

B. cos B = $\frac{AD}{HYP} = \frac{15}{17}$

$\cos B = \frac{15}{17}$

$\cos^{-1}(\cos B) = \cos^{-1}\left(\frac{15}{17}\right)$

$B \approx 28.1°$

cos⁻¹(15/17
28.07248694

C. Measure of angle B = 28.1°