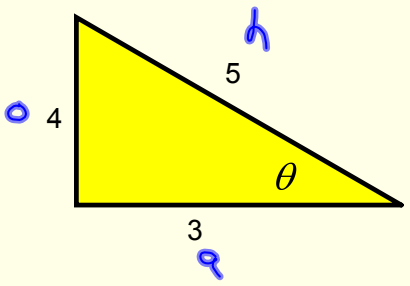
C3 - Solving Triangles

- ✓ Use all of your knowledge about triangles to solve for the missing angles and sides of a right triangle
- ✓ Solve for missing sides and angles in a situation involving multiple right triangles

Review

Solve for the indicated angle using the trig ratio for your group #.



Group 1: Sine Ratio

$\sin\theta = \frac{4}{5}$

$\theta = \sin^{-1}\left(\frac{4}{5}\right)$

$\theta = 53^\circ$

Group 2: Cosine Ratio

$\cos\theta = \frac{3}{5}$

$\theta = \cos^{-1}\left(\frac{3}{5}\right)$

$\theta = 53^\circ$

Group 3: Tangent Ratio

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

$\theta = \tan^{-1}\left(\frac{4}{3}\right)$

$\theta = 53^\circ$

Solving Triangles Concept Map

Solve a Triangle

(This means to find all angles and sides of a triangle)

Find Angles

Sum of Angles is $180°$

SohCahToa

$$\theta = \sin^{-1}\left(\frac{opp}{hyp}\right)$$

$$\theta = \cos^{-1}\left(\frac{adj}{hyp}\right)$$

$$\theta = \tan^{-1}\left(\frac{opp}{adj}\right)$$

Find Sides

Pythagorean Thm

$$a^2 + b^2 = c^2$$

SohCahToa

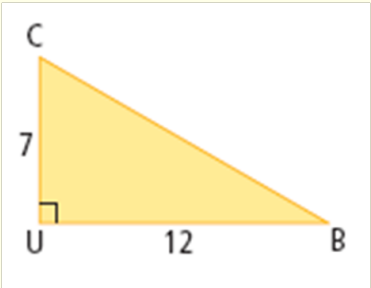
$$\sin\theta = \frac{opp}{hyp}$$

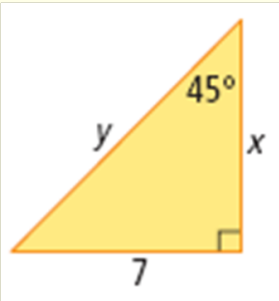
$$\cos\theta = \frac{adj}{hyp}$$

$$\tan\theta = \frac{opp}{adj}$$

Solving Triangles (Board Work)

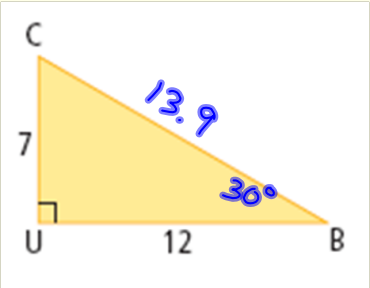
Tell me everything you can about the triangles below.





Solving Triangles - Solution #1

Tell me everything you can about the triangles below.



$\boxed{BC}$

$7^2 + 12^2 = BC^2$

$\sqrt{193} = \sqrt{BC^2}$

$\pm 13.9 = BC$

$\boxed{BC = 13.9}$

$\boxed{\angle B}$

$\tan B = \frac{7}{12}$

$B = \tan^{-1}\left(\frac{7}{12}\right)$

$\boxed{B = 30°}$

$\boxed{\angle C}$

$\angle C = 90° - 30°$

$= \boxed{60°}$

Solving Triangles - Solution #2

Tell me everything you can about the triangles below.

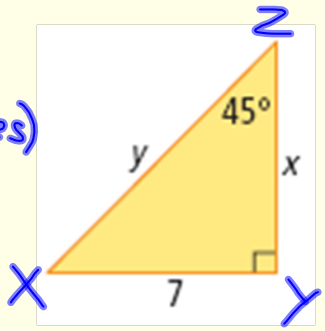
$\boxed{\angle X}$

$\angle X = 90° - 45°$

$\boxed{\angle X = 45°}$

$\boxed{x}$

$\boxed{x = 7}$ (isosceles)



$\boxed{y}$

$7^2 + 7^2 = y^2$

$\sqrt{98} = \sqrt{y^2}$

$\pm 9.9 = y$

$\boxed{y = 9.9}$

Practice

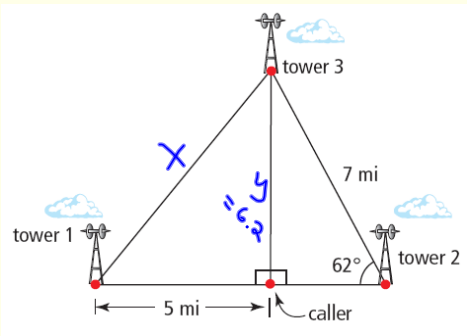
Text pg. 48: 1bc

Solving Multiple Triangles

Some problems involve multiple triangles and solutions will involve multiple steps.

Note: When using a calculated value for further calculations,
use the stored value on your calculator and not a rounded value.

Example: A cell phone can be used to send music, but as your location changes, you move in and out of range from one *cell* to the next. Three or more cellular towers may pick up a cell phone's signal. A cell phone signal has been located 5 mi from tower 1. How far is tower 1 from tower 3?



MHR pg. 134

① Solve for y

$\sin 62° = \frac{y}{7}$

$y = 6.2$ mi

② Solve for x

$(5)^2 + (6.2)^2 = x^2$

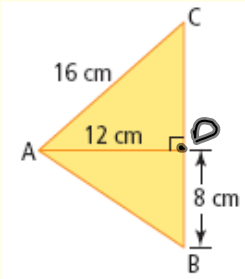
$\sqrt{63.2} = \sqrt{x^2}$

$\pm 7.9 = x$

$\boxed{x = 7.9 \text{ mi}}$

Solving Multiple Triangles (Board Work)

Determine the measure of $\angle CAB$



MHR pg. 132

$\boxed{\angle CAD}$

$\cos(\angle CAD) = \frac{12}{16}$

$\angle CAD = \cos^{-1}\left(\frac{12}{16}\right)$

$\boxed{\angle CAD = 41^\circ}$

$\boxed{\angle BAD}$

$\tan(\angle BAD) = \frac{8}{12}$

$\angle BAD = \tan^{-1}\left(\frac{8}{12}\right)$

$\boxed{\angle BAD = 34^\circ}$

$\boxed{\angle CAB}$

$\angle CAB = \angle CAD + \angle BAD$

$= 41^\circ + 34^\circ$

$= \boxed{75^\circ}$

Practice: Text pg. 49: 4, 7