

Solving TrianglesDate: May 31/2010

To solve a triangle means to determine the lengths of all unknown sides and the measures of all unknown angles.

Useful tools:

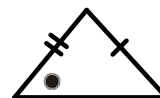
- Primary Trig Ratios (sine, cosine, tangent)
- Pythagorean Theorem $c^2 = a^2 + b^2$
- Angle Sum Theorem ($=180^\circ$)
- Sine Law
- Cosine Law

Soh Cah Toa

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Use the Sine Law given:

- two sides and an angle to find a second angle (SSA)

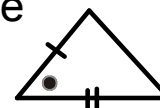


- two angles and a side to find a second side (AAS)

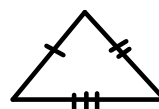


Use the Cosine Law given:

- two sides and the contained angle to find the third side (SAS)

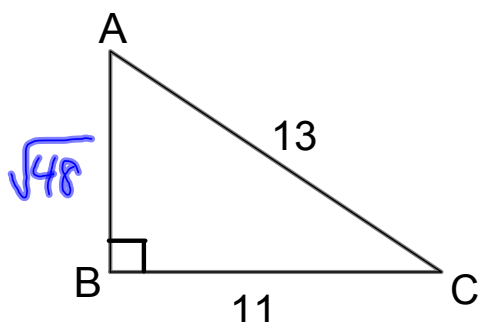


- three sides, and find any angle (SSS)



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Ex.1 Solve



$$13^2 = 11^2 + AB^2$$

$$169 = 121 + AB^2$$

$$48 = AB^2$$

$$AB = \sqrt{48}$$

$$\cos C = \frac{11}{13}$$

$$\cos C = 0.8461$$

$$C = \cos^{-1}(0.8461)$$

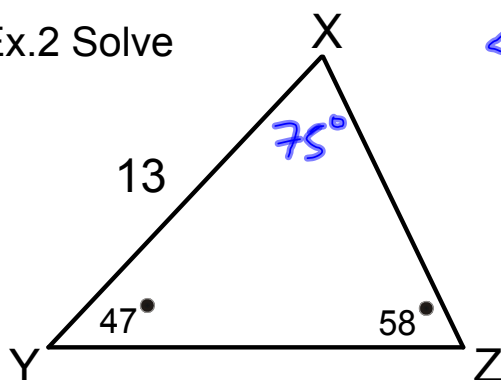
$$C = 32.2^\circ$$

$$\angle A + 32.2^\circ + 90^\circ = 180^\circ$$

$$\angle A = 57.8^\circ$$

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Ex.2 Solve



$$\angle X + 47^\circ + 58^\circ = 180^\circ$$

$$\angle X = 75^\circ$$

$$\frac{XZ}{\sin 47^\circ} = \frac{13}{\sin 58^\circ}$$

$$XZ = \frac{13 \sin 47^\circ}{\sin 58^\circ}$$

$$XZ = 11.2$$

$$\frac{YZ}{\sin 75^\circ} = \frac{13}{\sin 58^\circ}$$

$$YZ = \frac{13 \sin 75^\circ}{\sin 58^\circ}$$

$$YZ = 14.8$$

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A triangle with vertices W, Y, and X. Side WY is 23, side WX is 19, and side XY is 17. The angle at vertex X is labeled 79.2 degrees.

$$x^2 = w^2 + y^2 - 2wy \cos X$$

$$\frac{2wy \cos X}{2wy} = \frac{w^2 + y^2 - x^2}{2wy}$$

$$\frac{\sin Y}{19} = \frac{\sin(79.2047)}{23} \cos X = \frac{17^2 + 19^2 - 23^2}{2(17)(19)}$$

$$S_{mY} = \frac{19(0.9823)}{23}$$

$$\cos X = \frac{121}{646}$$

$$\sin Y \approx 0.8114$$

$$\cos X = 0.1873$$

$$\underline{Y \doteq 5m^{-1}(1.8114)}$$

$$X = \cos^{-1}(0.1873)$$

$$\boxed{Y = 54,2^\circ}$$

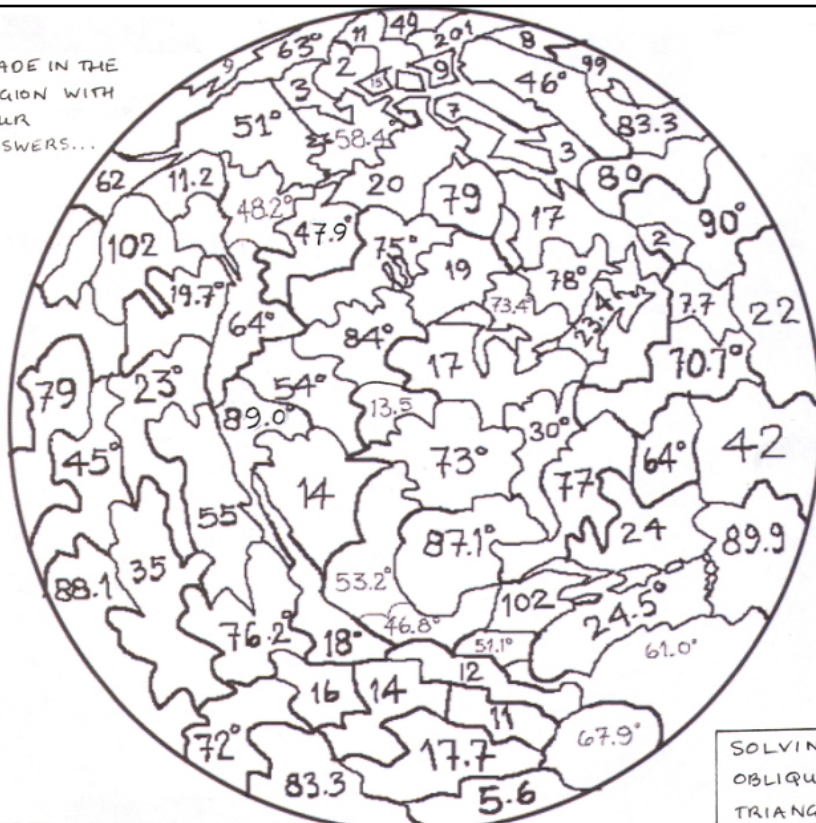
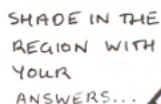
$$X \doteq 79.2047^\circ$$

$$W = 180^\circ - 54.2^\circ - 79.2^\circ$$

$$\omega = 46.6^\circ$$

$$X = 79.2^\circ$$

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SOLVING OBLIQUE TRIANGLES

- c) In $\triangle IJK$, $i = 10.5$ m, $j = 11.8$ m, and $k = 12.5$ m.
d) In $\triangle TUW$, $w = 25.4$ cm, $u = 34.2$ cm, and $\angle T = 43.1^\circ$.

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Assigned Work:

WS - Select Your Trig Method

WS - *Solving Oblique Triangles* (puzzle)

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