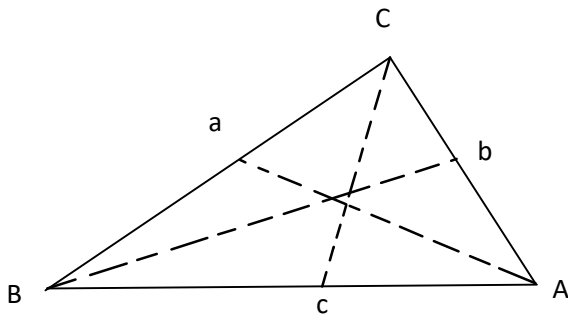


Remember: Find the smallest angle first, and/or 180 minus

C11 - 2.10 - Cosine Law Notes

Cosine Law



Cosine Law:

$$c^2 = b^2 + a^2 - 2ab\cos C$$

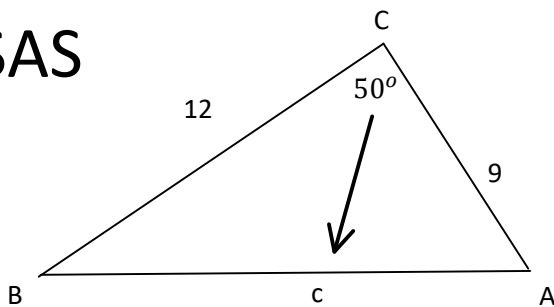
Notice: This pattern should occur.

Cosine Law: SSS (hard) and SAS (easy)

Remember: Only one angle in the formula

Remember: We only *cos* angles.

SAS



$$c^2 = b^2 + a^2 - 2ab\cos C$$

$$c^2 = 9^2 + 12^2 - 2(12)(9)\cos 50$$

$$c^2 = 86.2$$

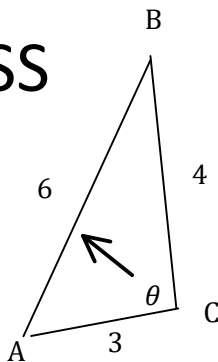
$$\sqrt{c^2} = \sqrt{86.2}$$

$$c = 9.3$$

Plug into calculator

Square root both sides

SSS



$$c^2 = b^2 + a^2 - 2ab\cos C$$

$$6^2 = 3^2 + 4^2 - 2(4)(3)\cos C$$

$$36 = 9 + 16 - 24\cos C$$

$$36 = 25 - 24\cos C$$

$$36 = 25 - 24\cos C$$

$$\begin{matrix} -25 & -25 \end{matrix}$$

$$\frac{11}{-24} = \frac{-24\cos C}{-24}$$

$$-\frac{11}{24} = \cos C$$

$$\cos C = -\frac{11}{24}$$

$$C = \cos^{-1}\left(-\frac{11}{24}\right)$$

$$C = 117.3^\circ$$

Substitute values in

Calculate the squares, multiply

Add

Subtract from both sides

Divide both sides

Inverse cos

$$C = \cos^{-1}\left(\frac{a^2 + b^2 - c^2}{2ab}\right)$$

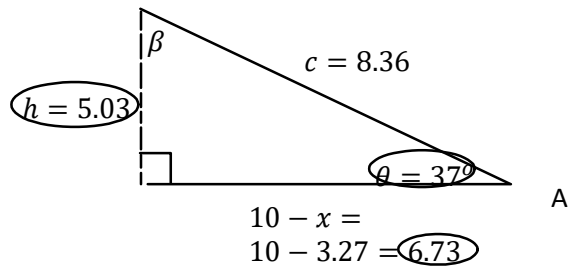
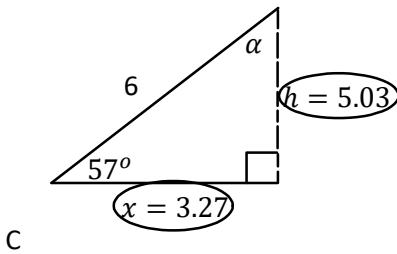
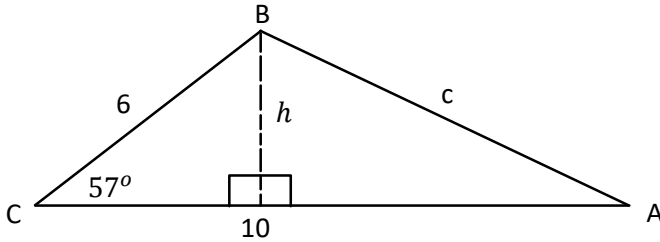
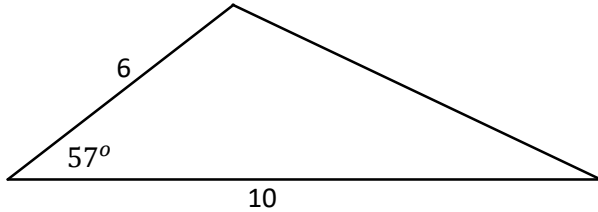
~~$$c^2 = b^2 + a^2 - 2ab\cos C$$

$$b^2 = c^2 + a^2 - 2ac\cos B$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$~~

C11 - 2.10 - Solve SAS Triangle Without Cosine Law Notes

Solve the triangle with side lengths of 6 m and 10 m, and an angle between the two given sides of 57° .



$$\begin{aligned} \sin\theta &= \frac{O}{H} \\ \sin 57^\circ &= \frac{h}{6} \\ 6 \times \sin 57^\circ &= \frac{h}{6} \times 6 \\ 6 \sin 57^\circ &= h \\ 5.03 &= h \\ h &= 5.03 \end{aligned}$$

$$\begin{aligned} \cos\theta &= \frac{A}{H} \\ \cos 57^\circ &= \frac{x}{6} \\ 6 \times \cos 57^\circ &= \frac{x}{6} \times 6 \\ 6 \cos 57^\circ &= x \\ 3.27 &= x \\ x &= 3.27 \end{aligned}$$

$$\begin{aligned} \tan\theta &= \frac{O}{A} \\ \tan\theta &= \frac{5.03}{6.73} \\ \tan\theta &= 0.7474 \\ \theta &= \tan^{-1}(0.7474) \\ \theta &= 36.77^\circ \\ \theta &= 37^\circ \end{aligned}$$

$$\begin{aligned} \sin\theta &= \frac{O}{H} \\ \sin 37^\circ &= \frac{5.03}{c} \\ c \times \sin 37^\circ &= \frac{5.03}{c} \times c \\ c \sin 37^\circ &= 5.03 \\ \frac{c \sin 37^\circ}{\sin 37^\circ} &= \frac{5.03}{\sin 37^\circ} \\ c &= \frac{5.03}{\sin 37^\circ} \\ c &= 8.36 \end{aligned}$$

$$\begin{aligned} 57^\circ + 90^\circ + \alpha &= 180^\circ \\ 147^\circ + \alpha &= 180^\circ \\ -147^\circ & \quad -147^\circ \\ \alpha &= 33^\circ \end{aligned}$$

$$\begin{aligned} 37^\circ + 90^\circ + \beta &= 180^\circ \\ 127^\circ + \beta &= 180^\circ \\ -127^\circ & \quad -127^\circ \\ \beta &= 53^\circ \end{aligned}$$

$$\begin{aligned} B &= \alpha + \beta \\ &= 33^\circ + 53^\circ \\ &= 86^\circ \end{aligned}$$

