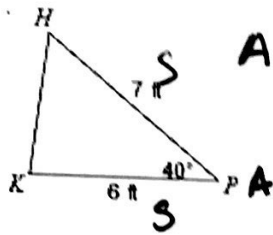


7.5N - Law of Cosines

Starter: (Round answers to the nearest tenth.)

1. Find the area of the triangle



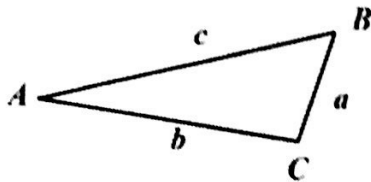
$$A = .5(7)(6) \sin 40$$

$$A = 13.5 \text{ ft}^2$$

3. Solve for x.
 $10 = 8 + 9 - 3x$

$$x = 7/3$$

A. Law of Cosines

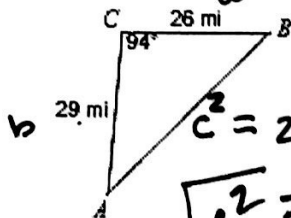


★ When do you use Law of Cosines?

- SSS
- SAS

Examples: Find each measurement indicated. Round your answers to the nearest tenth.

SAS 5. Find \overline{AB} $c^2 =$

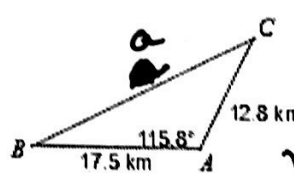


$$c^2 = 26^2 + 29^2 - 2(26)(29) \cos 94$$

$$\sqrt{c^2} = \sqrt{1622.2}$$

$$c = 40.3 \text{ mi}$$

SAS 6. Find \overline{BC} a

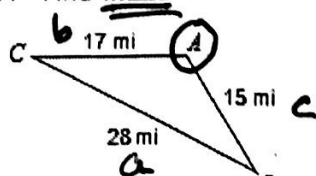


$$a^2 = 12.8^2 + 17.5^2 - 2(12.8)(17.5) \cos 115.8$$

$$\sqrt{a^2} = \sqrt{665.07}$$

$$a = 25.8 \text{ km}$$

SSS 7. Find $m\angle A$



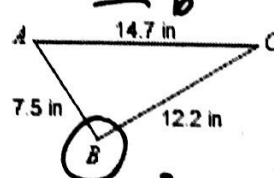
$$28^2 = 17^2 + 15^2 - 2(17)(15) \cos A$$

$$\frac{28^2 - 17^2 - 15^2}{-2(17)(15)} = \frac{-2(17)(15) \cos A}{-2(17)(15)}$$

$$-0.5 = \cos A$$

$$\cos^{-1}(-0.5) = 122^\circ$$

SSS 8. Find $m\angle B$



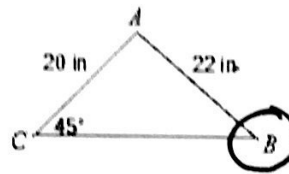
$$14.7^2 = 12.2^2 + 7.5^2 - 2(12.2)(7.5) \cos B$$

$$\frac{14.7^2 - 12.2^2 - 7.5^2}{-2(12.2)(7.5)} = \frac{-2(12.2)(7.5) \cos B}{-2(12.2)(7.5)}$$

$$B = \cos^{-1}(-0.6009) = 93.4^\circ$$

use \sin^{-1} \cos^{-1} \tan^{-1} when finding angle

2. Use law of Sines to find $m\angle B$



$$\frac{\sin B}{20} = \frac{\sin 45}{22}$$

$$22 \sin B = 20 \sin 45$$

4. Solve for x.
 $5 = 4 + 10 - 9x$

$$x = 1$$

$$B = \sin^{-1}\left(\frac{20 \sin 45}{22}\right)$$

Law of Cosines:

Solve for the largest side or angle first.

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

or

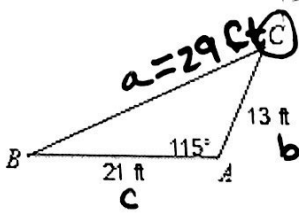
$$b^2 = a^2 + c^2 - 2ac \cos B$$

or

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

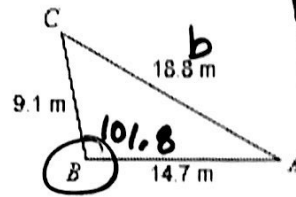
Examples: Solve each triangle. Round your answers to the nearest tenth.

SAS 1.



$$\begin{aligned} m\angle B &= 24^\circ \\ m\angle C &= 41^\circ \\ a &= 29 \text{ ft} \end{aligned}$$

2.



$$\begin{aligned} m\angle B &= 101.8^\circ \\ m\angle A &= 28.8^\circ \\ m\angle C &= 49.4^\circ \end{aligned}$$

SSS

$$18.8^2 = 9.1^2 + 14.7^2 - 2(9.1)(14.7)\cos B$$

$$\frac{18.8^2 - 9.1^2 - 14.7^2}{(-2(9.1)(14.7))} = \frac{-2(9.1)(14.7)\cos B}{-2(9.1)(14.7)}$$

$$-.203857 = \cos B$$

$$B = \cos^{-1}(\text{Ans})$$

$$B = 101.8^\circ$$

$$\frac{\sin C}{14.7} = \frac{\sin 101.8}{18.8}$$

$$\frac{18.8 \sin C}{18.8} = \frac{14.7 \sin 101.8}{18.8}$$

$$C = \sin^{-1}\left(\frac{14.7 \sin 101.8}{18.8}\right)$$

$$\begin{aligned} m\angle A &= 180 - 49.4 - 101.8 \\ m\angle A & \end{aligned}$$

~~SAS~~

$$a^2 = 13^2 + 21^2 - 2(13)(21)\cos 115^\circ$$

$$\sqrt{a^2} = \sqrt{840.7496}$$

$$a = 29 \text{ ft}$$

$$\frac{\sin C}{21} = \frac{\sin 115}{29}$$

$$\frac{29 \sin C}{29} = \frac{21 \sin 115}{29}$$

$$C = \sin^{-1}\left(\frac{21 \sin 115}{29}\right)$$

$$\angle C = 41^\circ$$

$$\begin{aligned} m\angle B &= 180 - 41 - 115 \\ &= 24^\circ \end{aligned}$$