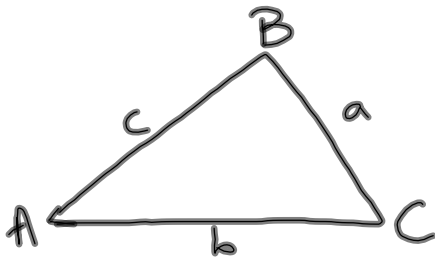


5.5 The Law of Sines

Obj: 1. Understand & use the Law of Sines



3 angles
3 sides

Law of Sines

The ratio of the sine of an angle to the length of the opposite side is the same for all 3 $\angle s$ in a Δ .

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

Feb 19-9:00 AM

Solve ΔABC if $\angle A = 36^\circ$ $\angle B = 48^\circ$ and $a = 8$.

$$C = 180^\circ - 36^\circ - 48^\circ = 96^\circ$$

| | |
|----------------|-------------|
| $A = 36^\circ$ | $a = 8$ |
| $B = 48^\circ$ | $b = 10.11$ |
| $C = 96^\circ$ | $c = 13.5$ |

$$\frac{\sin 36^\circ}{8} = \frac{\sin 48^\circ}{b}$$

$$\frac{b \sin 36^\circ}{\sin 36^\circ} = \frac{8 \sin 48^\circ}{\sin 36^\circ}$$

$$b = \left(\frac{8 \sin 48^\circ}{\sin 36^\circ} \right) \approx 10.11$$

$$\frac{\sin 36^\circ}{8} = \frac{\sin 96^\circ}{c}$$

$$c = \frac{8 \sin 96^\circ}{\sin 36^\circ} \approx 13.5$$

Feb 19-9:21 AM

Solve $\triangle ABC$ if $\angle A = 50^\circ$ $\angle B = 62^\circ$ and $a = 4$.

$C = 180 - 50 - 62 = 68$

| | |
|----------|------------|
| $A = 50$ | $a = 4$ |
| $B = 62$ | $b = 4.61$ |
| $C = 68$ | $c = 4.84$ |

$$\frac{\sin 50^\circ}{4} = \frac{\sin 62^\circ}{b}$$

$$b = \frac{4 \sin 62^\circ}{\sin 50^\circ} = 4.61$$

$$\frac{\sin 50^\circ}{4} = \frac{\sin 68^\circ}{c}$$

$$c \approx 4.84$$

Feb 19-9:27 AM

Solve $\triangle ABC$ if $a = 7$ $b = 6$ and $\angle A = 26.3^\circ$

| | |
|-------------------|------------|
| $A = 26.3$ | $a = 7$ |
| $B = 22.3^\circ$ | $b = 6$ |
| $C = 131.4^\circ$ | $c = 11.9$ |

$$\frac{\sin 26.3}{7} = \frac{\sin B}{6}$$

$$\sin B = \frac{6 \sin 26.3}{7}$$

$$B = \sin^{-1} \left(\frac{6 \sin 26.3}{7} \right) \approx 22.3^\circ$$

$$C = 180^\circ - 26.3^\circ - 22.3^\circ = 131.4^\circ$$

$$\frac{\sin 26.3}{7} = \frac{\sin 131.4}{c}$$

$$c = \frac{7 \sin 131.4}{\sin 26.3} \approx 11.9$$

Feb 19-9:36 AM

Solve $\triangle ABC$ if $\angle A = 49^\circ$ $a = 32$ $b = 28$.

$$\frac{\sin 49^\circ}{32} = \frac{\sin B}{28}$$

$$\sin B = \frac{28 \sin 49^\circ}{32}$$

$$B = \sin^{-1}\left(\frac{28 \sin 49^\circ}{32}\right)$$

$$\approx 41.3^\circ$$

$$C = 180^\circ - 49^\circ - 41.3^\circ = 89.7^\circ$$

| | |
|------------------|------------|
| $A = 49^\circ$ | $a = 32$ |
| $B = 41.3^\circ$ | $b = 28$ |
| $C = 89.7^\circ$ | $c = 42.4$ |

$$\frac{\sin 49^\circ}{32} = \frac{\sin 89.7^\circ}{c}$$

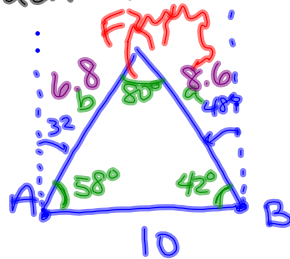
$$c = \frac{32 \sin 89.7^\circ}{\sin 49^\circ}$$

$$\approx 42.4$$

Feb 19-9:43 AM

Forest Ranger Chris at Ranger Station A sights a fire in the direction 32° east of north.

Ranger Rick at Station B, 10 miles due east of A sights the same fire on a line 48° west of north. Find the distance from each station to the fire.



$$\frac{\sin 58^\circ}{a} = \frac{\sin 80^\circ}{10}$$

$$a = 8.6$$

$$\frac{\sin 80^\circ}{10} = \frac{\sin 42^\circ}{b}$$

$$b = 6.8$$

Feb 19-9:52 AM