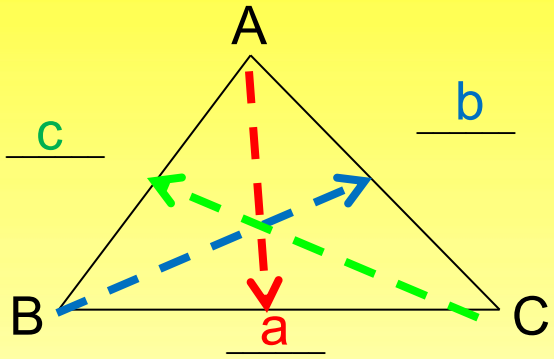
ST. JEAN DE BREBEUF MATHEMATICS

CHAPTER 2.3

THE SINE LAW

CHAPTER 2.3 THE SINE LAW

The **Sine Law** works for both *acute* and *obtuse* triangles

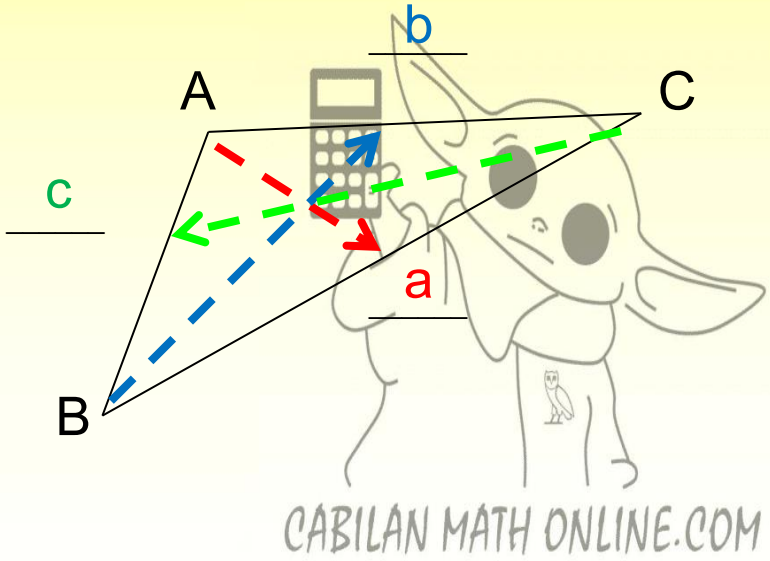


The Sine Law formula for any *acute* or *obtuse* triangle is:

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

A **side length** can be determined if the corresponding opposite angle plus one other side-angle pair is known

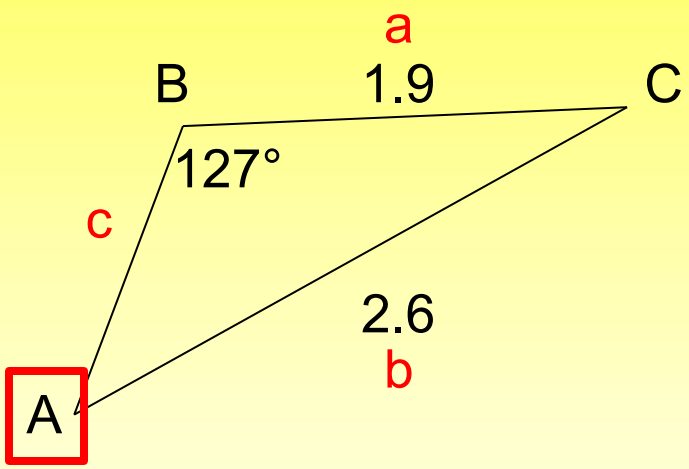
An **angle measure** can be determined if the corresponding opposite side plus one other side-angle pair is known



CHAPTER 2.3 THE SINE LAW

EXAMPLE 1 *Using the Sine Law to Determine the Measure of an Angle*

Solve for ∠**A** to the nearest degree



- Always label the sides first!!!
- Write down formula and fill in known values
- Cross multiply

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

$$\frac{1.9}{\sin A}=\frac{2.6}{\sin 127^\circ}=\frac{c}{\sin C}$$

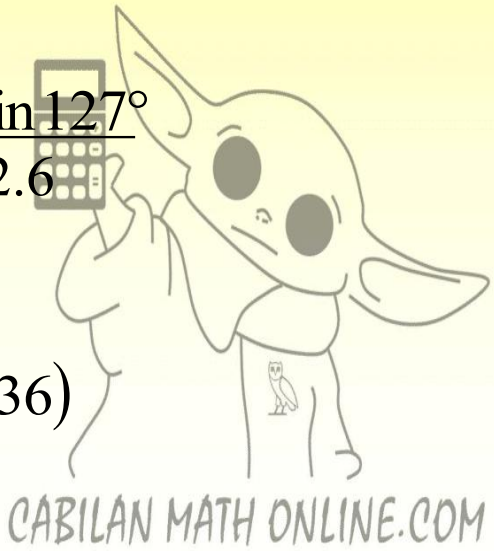
$$\frac{1.9}{\sin A}=\frac{2.6}{\sin 127^\circ}$$

$$\frac{2.6\sin A}{2.6}=\frac{1.9\sin 127^\circ}{2.6}$$

$$\sin A=0.5836$$

$$\angle A=\sin^{-1}(0.5836)$$

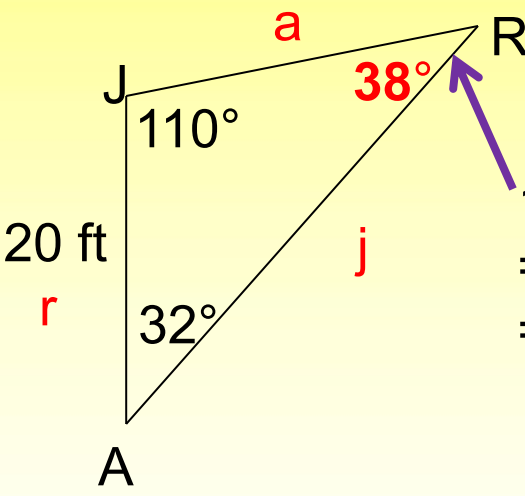
$$\angle A=36^\circ$$



CHAPTER 2.3 THE SINE LAW

EXAMPLE 2 *Using the Sine Law to Determine a Side Length*

Andre (A), the quarterback of his football team, is attempting to throw a pass to his receiver, Roberto (R). Juan (J) is trying to block. How far must Andre throw his pass to Roberto? Round your answer to the nearest foot.



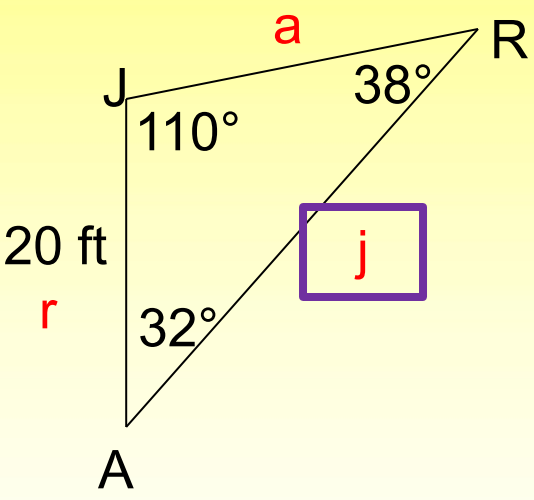
$180° - (110 + 32)°$
$= 180° - 142°$
$= \mathbf{38}°$

•Always label the sides first!!!

CHAPTER 2.3 THE SINE LAW

EXAMPLE 2 *Using the Sine Law to Determine a Side Length*

Andre (A), the quarterback of his football team, is attempting to throw a pass to his receiver, Roberto (R). Juan (J) is trying to block. How far must Andre throw his pass to Roberto? Round your answer to the nearest foot.



$$\frac{a}{\sin A} = \frac{j}{\sin J} = \frac{r}{\sin R}$$

$$\frac{a}{\sin 32°} = \frac{j}{\sin 110°} = \frac{20}{\sin 38°}$$

$$\frac{j}{\sin 110°} = \frac{20}{\sin 38°}$$

$$j \sin 38° = 20 \sin 110°$$

$$\frac{j \sin 38°}{\sin 38°} = \frac{20 \sin 110°}{\sin 38°}$$

$$j = 30.5263$$

$$\boxed{j = 31}$$

- Always label the sides first!!!
- Write down formula and fill in known values
- Cross multiply

Andre must pass **31 feet** to Roberto

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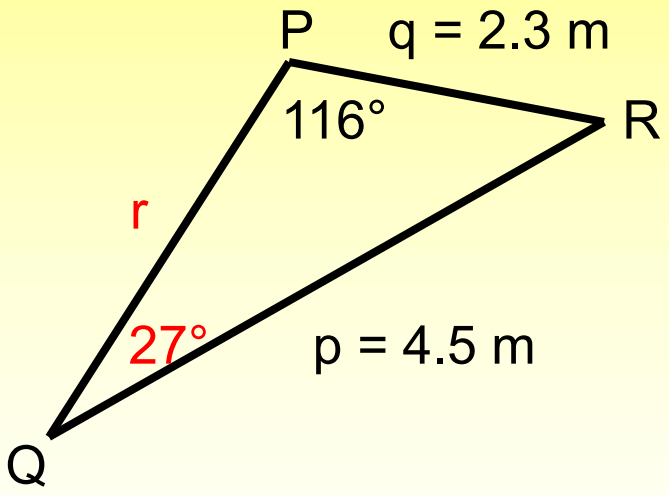
EXAMPLE 3 *Solving an Obtuse Triangle*

ΔPQR has **p = 4.5 m**, **q = 2.3 m** and **$\angle P = 116°$**.

$\angle P$ and p will be located across from each other

Solve ΔPQR. Round all *angles* to the nearest degree and all *side lengths* to one decimal place.



- Draw an accurate diagram
- Write down formula and fill in known values

$$\frac{p}{\sin P} = \frac{q}{\sin Q} = \frac{r}{\sin R}$$

$$\frac{4.5}{\sin 116°} = \frac{2.3}{\sin Q} = \frac{r}{\sin R}$$

Need to solve for $\angle Q$ first

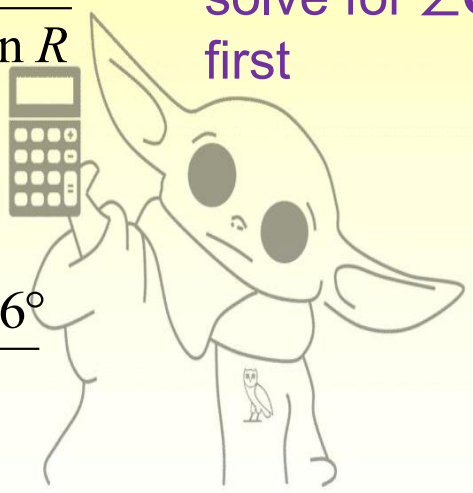
$$\frac{4.5}{\sin 116°} = \frac{2.3}{\sin Q}$$

$$\frac{4.5 \sin Q}{4.5} = \frac{2.3 \sin 116°}{4.5}$$

$$\sin Q = 0.4594$$

$$\angle Q = \sin^{-1}(0.4594)$$

$$\angle Q = 27°$$

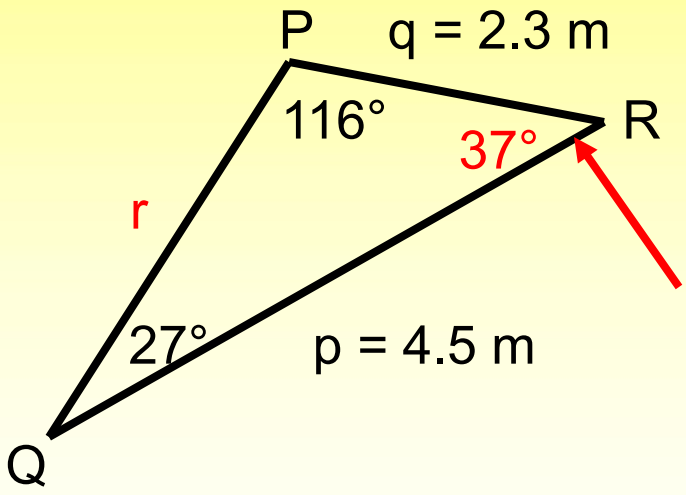


CHAPTER 2.3 THE SINE LAW

EXAMPLE 3 *Solving an Obtuse Triangle*

ΔPQR has **p = 4.5 m**, **q = 2.3 m** and $\angle P = 116°$.

Solve ΔPQR. Round all *angles* to the nearest degree and all *side lengths* to one decimal place.



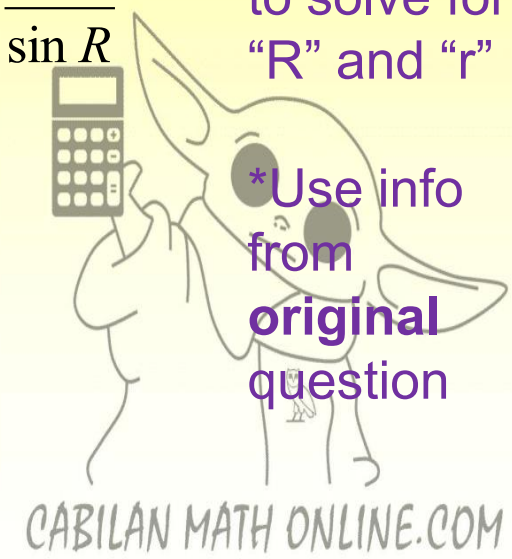
$$\frac{p}{\sin P} = \frac{q}{\sin Q} = \frac{r}{\sin R}$$

$$\frac{4.5}{\sin 116°} = \frac{2.3}{\sin Q} = \frac{r}{\sin R}$$

$180° - (116 + 27)°$
$= 180° - 143°$
$= \mathbf{37°}$

Now, need to solve for "R" and "r"

*Use info from **original** question

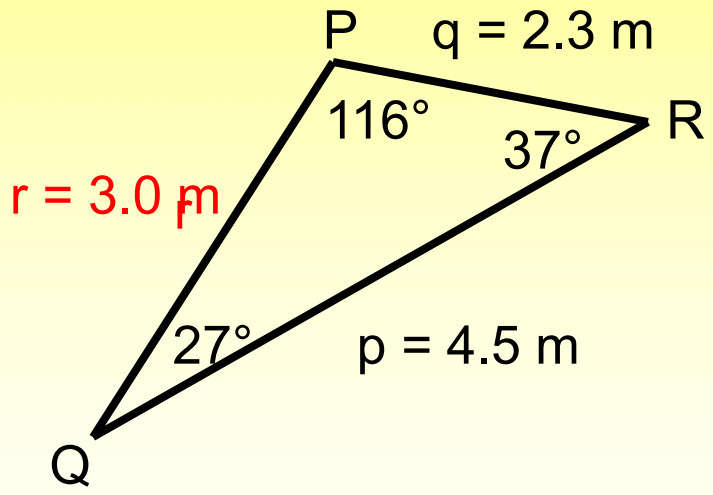


CHAPTER 2.3 THE SINE LAW

EXAMPLE 3 *Solving an Obtuse Triangle*

ΔPQR has **p = 4.5 m**, **q = 2.3 m** and $\angle P = 116°$.

Solve ΔPQR. Round all *angles* to the nearest degree and all *side lengths* to one decimal place.



$$\frac{p}{\sin P} = \frac{q}{\sin Q} = \frac{r}{\sin R}$$

$$\frac{4.5}{\sin 116°} = \frac{2.3}{\sin 27°} = \frac{r}{\sin 37°}$$

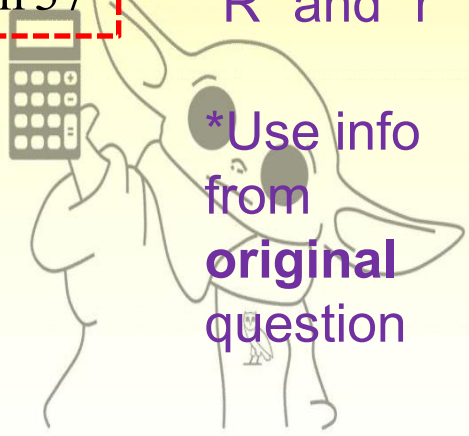
Now, need to solve for "R" and "r"

$$\frac{4.5}{\sin 116°} = \frac{r}{\sin 37°}$$

*Use info from **original** question

$$\frac{r \sin 116°}{\sin 116°} = \frac{4.5 \sin 37°}{\sin 116°}$$

$$r = 3.0\,m$$



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SEATWORK / HOMEWORK

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