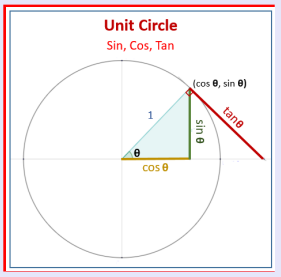
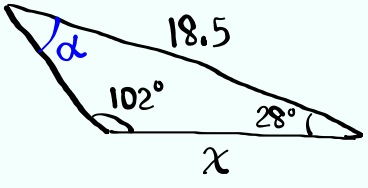
Trigonometry

Lecture 18



Feb 19-8:47 AM

Find x:



$102^\circ + 28^\circ + \alpha = 180^\circ$

$130^\circ + \alpha = 180^\circ$

$\alpha = 50^\circ$

Law of Sines

$$\frac{\sin 102^\circ}{18.5} = \frac{\sin 50^\circ}{x}$$

Cross-Multiply

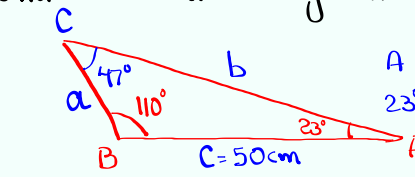
$x \sin 102^\circ = 18.5 \sin 50^\circ$

$$x = \frac{18.5 \sin 50^\circ}{\sin 102^\circ}$$

$= 14.488 \approx \boxed{14.5}$

Sep 30-10:31 AM

Solve triangle ABC such that $A=23^\circ$, $B=110^\circ$, and $C=50$cm. Drawing will Help.



$A+B+C=180^\circ$

$23^\circ+110^\circ+C=180^\circ$

$133^\circ+C=180^\circ$

$C=180^\circ-133^\circ$

$\boxed{C=47^\circ}$

Using Law of Sines

$$\frac{\sin 23^\circ}{a}=\frac{\sin 110^\circ}{b}=\frac{\sin 47^\circ}{50}$$

$$\frac{\sin 23^\circ}{a}=\frac{\sin 47^\circ}{50} \qquad a\cdot\sin 47^\circ=50\cdot\sin 23^\circ$$

$$a=\frac{50\cdot\sin 23^\circ}{\sin 47^\circ}\approx\boxed{27\text{cm}}$$

$$\frac{\sin 110^\circ}{b}=\frac{\sin 47^\circ}{50} \qquad b=\frac{50\sin 110^\circ}{\sin 47^\circ}$$

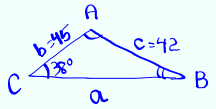
$$\approx\boxed{64\text{cm}}$$

Sep 30-10:36 AM

Given $b=45$, $C=42$, $C=38^\circ$

Solve triangle ABC. Drawing will help.

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



$$\frac{\sin A}{a}=\frac{\sin B}{45}=\frac{\sin 38^\circ}{42}$$

If $B=41^\circ$

$38^\circ+41^\circ+A=180^\circ$

$A=180^\circ-79^\circ$

$\boxed{A=101^\circ}$

$42\sin B=45\sin 38^\circ$

$\sin B=\frac{45\sin 38^\circ}{42}$

$\sin B\approx .66$

$B\approx\sin^{-1}(.66)$

$\boxed{B\approx 41^\circ}$ RA

If $B=139^\circ$

$38^\circ+139^\circ+A=180^\circ$

$\boxed{A=3^\circ}$

$\sin 41^\circ\approx .66$

$\sin 139^\circ\approx .66$

$$\frac{\sin 101^\circ}{a}=\frac{\sin 38^\circ}{42}$$

$a\sin 38^\circ=42\sin 101^\circ$

$$a=\frac{42\sin 101^\circ}{\sin 38^\circ}\approx\boxed{67}$$

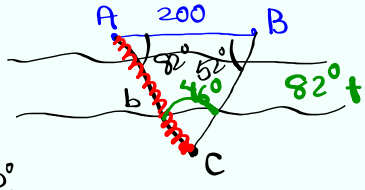
$$\frac{\sin 3^\circ}{a}=\frac{\sin 38^\circ}{42} \qquad a=\frac{42\sin 3^\circ}{\sin 38^\circ}\approx\boxed{4}$$

Sep 30-10:45 AM

Two points A & B are on one side of a river and are 200 ft apart.

From another point C on the other side of the river, $\angle ABC = 52°$ and $\angle CAB = 82°$

How far is point C from Point A? Drawing will help.



$82° + 52° + C = 180°$

$C = 46°$

$\frac{\sin 46°}{200} = \frac{\sin 52°}{b}$

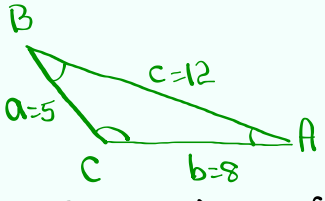
$b \sin 46° = 200 \sin 52°$

$b = \frac{200 \sin 52°}{\sin 46°}$

$b \approx \boxed{219 \text{ ft}}$

Sep 30-11:00 AM

Find angle A if $a=5$, $b=8$, and $c=12$.



$\frac{\sin A}{5} = \frac{\sin B}{8} = \frac{\sin C}{12}$

Use Law of Cosines

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

$5^2 = 8^2 + 12^2 - 2 \cdot 8 \cdot 12 \cos A$

$25 = 64 + 144 - 192 \cos A$

$192 \cos A = 64 + 144 - 25$

$192 \cos A = 183$

$\cos A = \frac{183}{192}$

$A = \cos^{-1}\left(\frac{183}{192}\right)$

$A \approx \boxed{18°}$

Is this a right triangle?

$5^2 + 8^2 \stackrel{?}{=} 12^2$

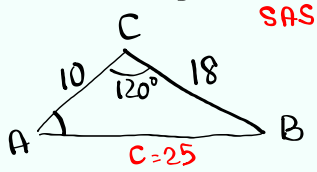
$25 + 64 \stackrel{?}{=} 144$

$89 \neq 144$

Not a right triangle.

Sep 30-11:12 AM

Solve triangle ABC



SAS → Law of Cosines

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

$= 18^2 + 10^2 - 2 \cdot 18 \cdot 10 \cdot \cos 120°$

$c^2 = 604 \quad c = \sqrt{604} \approx 25$

$\frac{\sin 120°}{25} = \frac{\sin A}{18}$

$25 \sin A = 18 \cdot \sin 120°$

$\sin A = \frac{18 \sin 120°}{25}$

$\sin A \approx .624$

$A \approx \sin^{-1}(.625)$

$A \approx 39°$

$A \approx 39°, \quad C = 120°$

$B \approx 21°$

Sep 30-11:21 AM

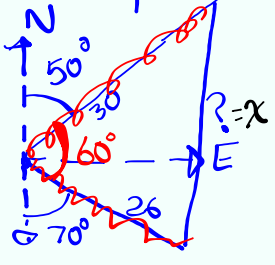
Two boat leave the Same port at Same time.

Boat A has a bearing of N 50° E with 30mph.

Boat B has a bearing of S 70° E with 26mph.

How far apart are they after one hour?

SAS



$x^2 = 30^2 + 26^2 - 2 \cdot 30 \cdot 26 \cdot \cos 60°$

$= 796$

$x = \sqrt{796} \approx 28 \text{ miles}$

Sep 30-11:32 AM