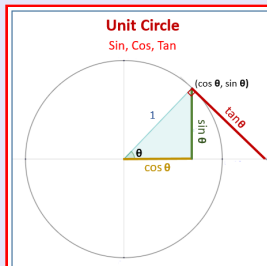


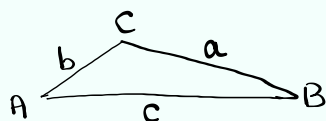
Trigonometry

Lecture 17

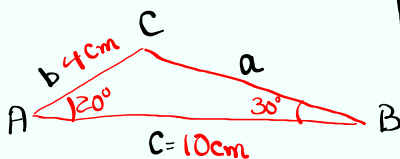


Feb 19-8:47 AM

Law of Sines



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



$$\frac{\sin 20^\circ}{a} = \frac{\sin 30^\circ}{4} = \frac{\sin 130^\circ}{10}$$

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

$$20^\circ + 30^\circ + C = 180^\circ \quad C = 130^\circ$$

Cross-Multiply

$$a \cdot \sin 30^\circ = 4 \sin 20^\circ$$

$$a = \frac{4 \sin 20^\circ}{\sin 30^\circ} \approx 2.7 \approx 3 \text{ cm}$$

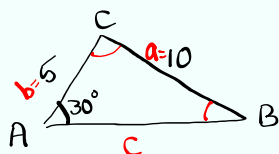
the sum of any two sides > third side

$$4 + 3 > 10$$

NO This triangle has no solution

Sep 25-10:27 AM

Solve the triangle below



using Law of Sines

$$\frac{\sin 30^\circ}{10} = \frac{\sin B}{5} = \frac{\sin C}{c}$$

$$\frac{\sin 30^\circ}{10} = \frac{\sin B}{5}$$

$$10 \sin B = 5 \sin 30^\circ$$

$$\sin B = \frac{5 \sin 30^\circ}{10}$$

$$\sin B = .25$$

$$B = \sin^{-1}(.25)$$

$$B \approx 14^\circ$$

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

$$30^\circ + 14^\circ + C = 180^\circ$$

$$C = 136^\circ$$

$$\frac{\sin 30^\circ}{10} = \frac{\sin 136^\circ}{c}$$

$$c \sin 30^\circ = 10 \cdot \sin 136^\circ$$

$$c = \frac{10 \sin 136^\circ}{\sin 30^\circ}$$

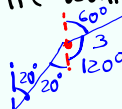
$$c \approx 14$$

Sep 25-10:36 AM

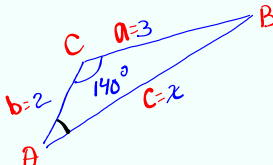
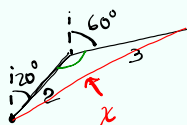
Diego walked 2 miles with the bearing of 20° .



He then changed direction, He walked 3 miles with the bearing of 60° .



How far is he from the original point?

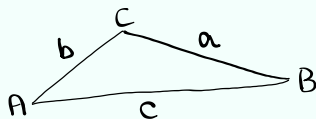


Law of Sines $\frac{\sin A}{3} = \frac{\sin B}{2} = \frac{\sin 140^\circ}{c}$

Not enough information
to use
Law of Sines

Sep 25-10:44 AM

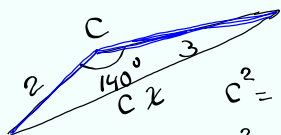
Law of Cosines:



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

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

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



SAS

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

$$c^2 = 2^2 + 3^2 - 2 \cdot 2 \cdot 3 \cos 140^\circ$$

$$c^2 = 22.193$$

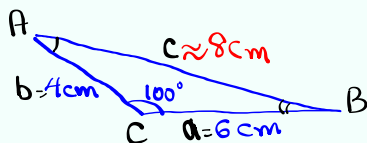
$$c = \sqrt{22.193}$$

$$c \approx 4.711$$

$$\boxed{c \approx 4.7}$$

Sep 25-10:53 AM

Solve the triangle below



SAS

Law of Cosines

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

$$c^2 = 6^2 + 4^2 - 2 \cdot 4 \cdot 6 \cdot \cos 100^\circ$$

$$c^2 = 60.335$$

$$c = \sqrt{60.335} = 7.768$$

$$c \approx 8 \text{ cm}$$

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

$$48^\circ + B + 100^\circ = 180^\circ$$

$$\boxed{B = 32^\circ}$$

$$\frac{\sin A}{6} = \frac{\sin B}{4} = \frac{\sin 100^\circ}{8}$$

$$\frac{\sin A}{6} = \frac{\sin 100^\circ}{8}$$

$$8 \sin A = 6 \sin 100^\circ$$

$$\sin A = \frac{6 \sin 100^\circ}{8}$$

$$\sin A = .739$$

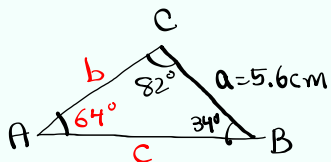
$$A = \sin^{-1}(.739) \approx \boxed{48^\circ}$$

Sep 25-11:00 AM

Solve the triangle below:

Triangle ABC, $B=34^\circ$, $C=82^\circ$, $a=5.6$ cm.

Draw & label clearly



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

$$A + 34^\circ + 82^\circ = 180^\circ$$

$$A = 64^\circ$$

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

$$\frac{\sin 64^\circ}{5.6} = \frac{\sin 34^\circ}{b} = \frac{\sin 82^\circ}{c}$$

$$\frac{\sin 64^\circ}{5.6} = \frac{\sin 82^\circ}{c}$$

Cross-multiply

$$b \sin 64^\circ = 5.6 \sin 34^\circ$$

$$b = \frac{5.6 \sin 34^\circ}{\sin 64^\circ} \approx \boxed{3.5 \text{ cm}}$$

$$c \cdot \sin 64^\circ = 5.6 \sin 82^\circ$$

$$c = \frac{5.6 \sin 82^\circ}{\sin 64^\circ}$$

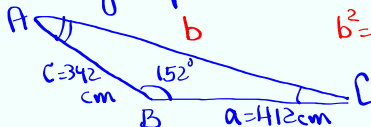
$$\boxed{c \approx 6.2 \text{ cm}}$$

Sep 25-11:10 AM

Solve triangle below:

$a=412$ cm, $C=342$ cm, $B=152^\circ$

Drawing Required.



SAS

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

$$\frac{\sin A}{412} = \frac{\sin 152^\circ}{732} = \frac{\sin C}{342}$$

$$732 \sin A = 412 \sin 152^\circ$$

$$\sin A = \frac{412 \sin 152^\circ}{732}$$

$$\sin A = .264$$

$$A = \sin^{-1}(.264) \approx \boxed{15^\circ}$$

Law of Cosines

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

$$b^2 = 412^2 + 342^2 - 2 \cdot 412 \cdot 342 \cdot \cos 152^\circ$$

$$b^2 = 535529.6952$$

$$b = \sqrt{535529.6952}$$

$$\boxed{b \approx 732 \text{ cm}}$$

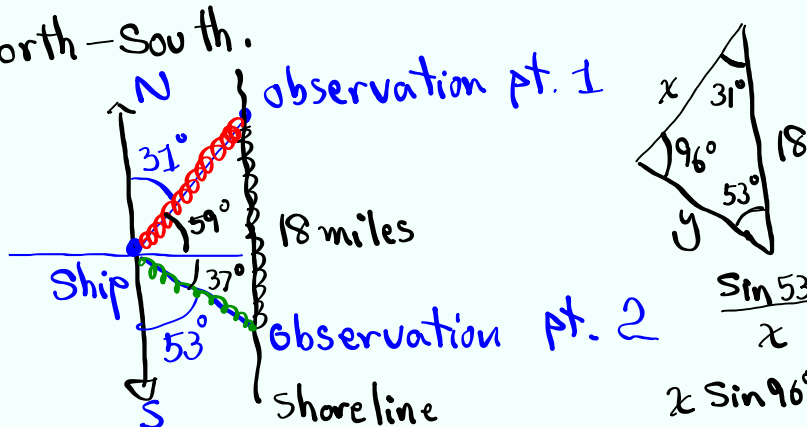
$$A + B + C = 180^\circ$$

$$15^\circ + 152^\circ + C = 180^\circ$$

$$\boxed{C = 13^\circ}$$

Sep 25-11:21 AM

A ship is anchored off a shoreline that is North-South.



$$\frac{\sin 31^\circ}{y} = \frac{\sin 96^\circ}{18} \rightarrow y \approx 15 \text{ miles}$$

Be aware of notations

$$\frac{\sin 53^\circ}{x} = \frac{\sin 96^\circ}{18}$$

$$x \sin 96^\circ = 18 \sin 53^\circ$$

$$x = \frac{18 \sin 53^\circ}{\sin 96^\circ}$$

$$x \approx 9 \text{ miles}$$

Sep 25-11:31 AM