Section 7.1: The Law of Sines

Tuesday, March 25, 2014
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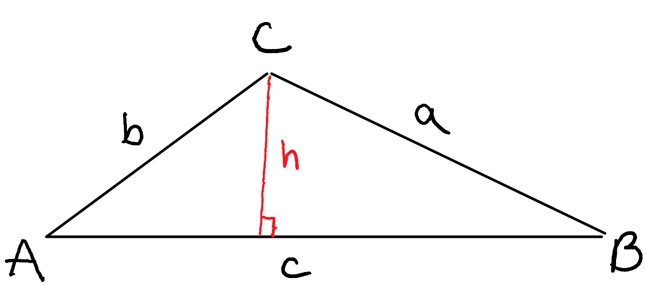
$$\tan\theta = \frac{30}{60} = \frac{1}{2}$$

$$\tan\theta = \frac{1}{2}$$

$$\theta \approx 26.6^\circ$$

Goal: To solve triangles using the Law of Sines

The Law of Sines



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

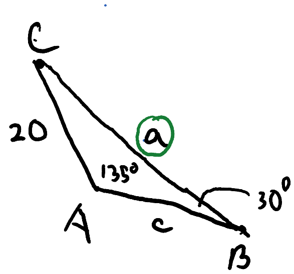
Notes on congruent $\triangle$s

congruent by ASA

Other congruent properties: SSS
SAS
SSA ambiguous
AAS

ex) solve the triangle (AAS)

$A = 135^0$
$B = 30^0$
$b = 20$



$$\frac{a}{\sin 135^0} = \frac{20}{\sin 30^0}$$

$a = 20 \sin 135^0$

$$\overline{\quad\quad\quad}$$
$$\sin 30^\circ$$

$$a = \frac{20 \cdot \frac{\sqrt{2}}{2}}{\frac{1}{2}} = 20\frac{\sqrt{2}}{\cancel{2}} \cdot \cancel{2} = 20\sqrt{2} \text{ units}$$

$$C = 180^\circ - 30^\circ - 135^\circ = 15^\circ$$

$$\frac{c}{\sin 15^\circ} = \frac{20}{\sin 30^\circ}$$

$$c = \frac{20 \sin 15^\circ}{\sin 30^\circ} \approx 10.35 \text{ units}$$

6) $a = 12$, $b = 31$, $A = 20.5^\circ$

$$\frac{31}{\sin B} = \frac{12}{\sin 20.5^\circ}$$

$$12 \sin B = 31 \sin 20.5^\circ$$

$$\sin B = \frac{31 \sin 20.5^\circ}{12} \approx .9$$

$$B = \sin^{-1}\left(\frac{31 \sin 20.5^\circ}{12}\right)$$

$$\frac{}{12}$$

case I

$B \approx 64.8^\circ$

$C = 180^\circ - 64.8^\circ - 20.5^\circ$

$\approx 94.7^\circ$

$$\frac{c}{\sin 94.7^\circ} = \frac{12}{\sin 20.5^\circ}$$

$$c = \frac{12 \sin 94.7^\circ}{\sin 20.5^\circ}$$

$\approx$ 34.2 units

or

case II

$B \approx 115.2^\circ$

$C = 180^\circ - 115.2^\circ - 20.5^\circ$

$\approx 44.3^\circ$

$$\frac{c}{\sin 44.3^\circ} = \frac{12}{\sin 20.5^\circ}$$

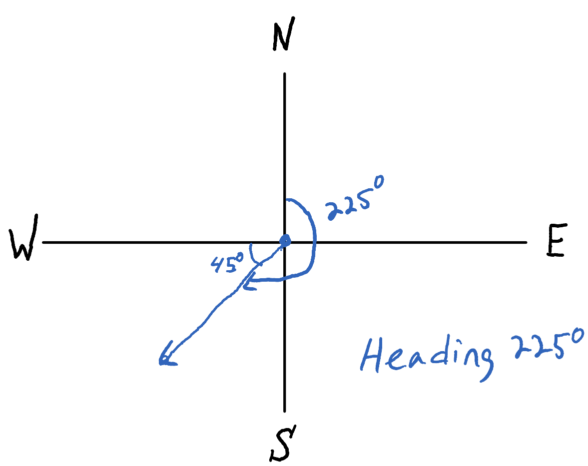
$$c = \frac{12 \sin 44.3^\circ}{\sin 20.5^\circ}$$

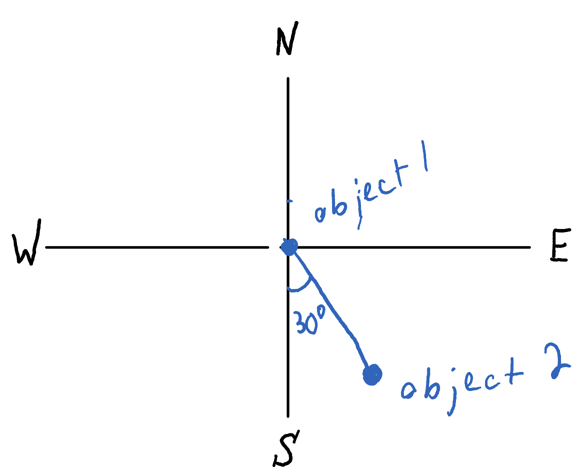
$c \approx$ 23.9 units

Direction Specification

Heading: The angular direction in which a craft is pointed. Heading is expressed in terms of an angle measured clockwise from the north.

Bearing: Used to locate one object in relation to another object. It is expressed in terms of the acute angle formed by a north-south line of direction.





object 2 is S 30° E

of object 1.

Distance to a Lighthouse A navigator on a ship sights a lighthouse at a bearing of N36°E. After traveling 8.0 miles at a heading of 332°, the ship sights the lighthouse at a bearing of S82°E. How far is the ship from the lighthouse at the second sighting?

Aufmann, Algebra & Trigonometry, 8e
http://www.webassign.net/ebooks/aufcat8/shell.html?s=3e2d6138bc03983cc1823fad195814e4&c=250230&f=4721409
&type=youbook&id=463
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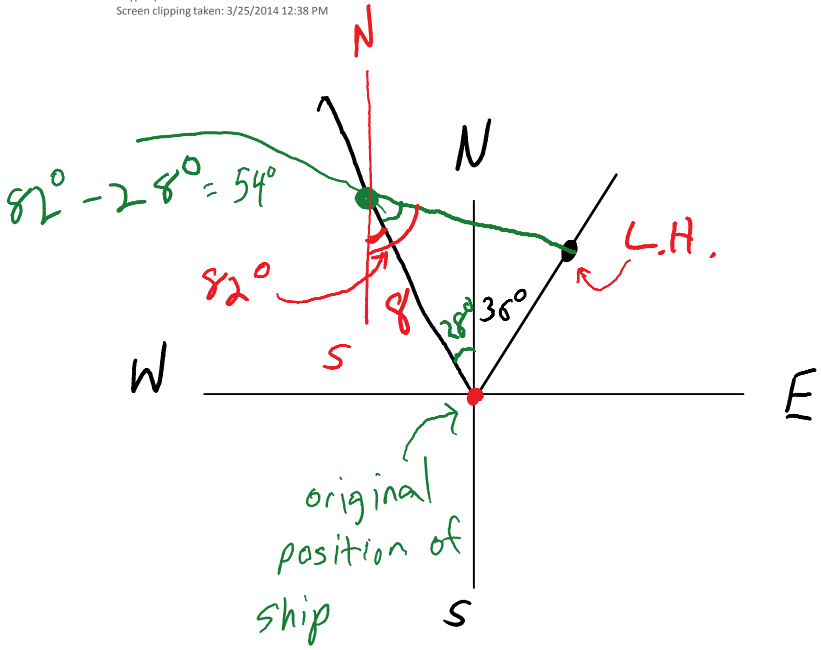
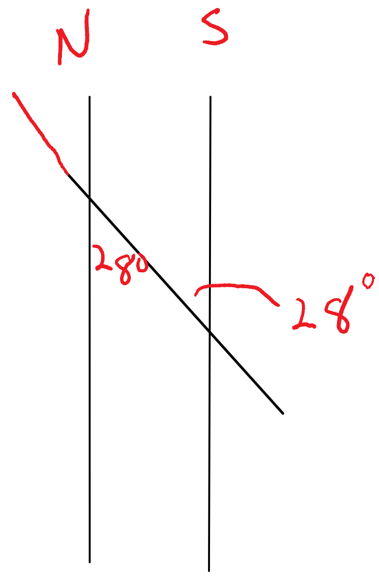
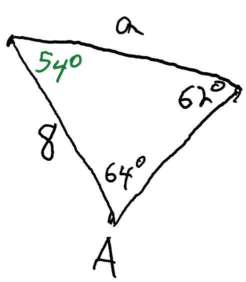




use Law of Sines to find a



$$\frac{a}{\sin 64^\circ} = \frac{8}{\sin 62^\circ}$$

$$a = \frac{8 \sin 64^\circ}{} \approx \boxed{8.1 \text{ miles}}$$

$$a = \frac{8 \sin 64^\circ}{\sin 62^\circ} \approx 8.1 \text{ miles}$$