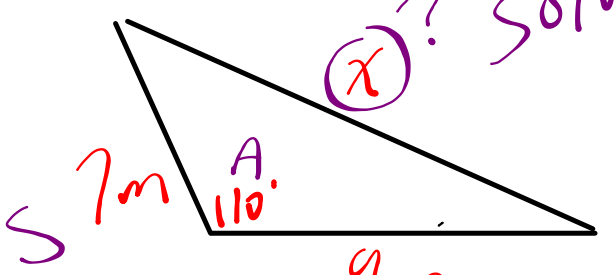
- Warm-up ... ~~Find x~~



Solve $\frac{x}{\sin 110^\circ} = \frac{9}{\sin ?}$

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

$x^2 = 7^2 + 9^2 - 2(7)(9)\cos 110^\circ$

$x^2 = 49 + 81 - (-43.1)$

$x^2 = 173.1$

$\sqrt{x^2} =$

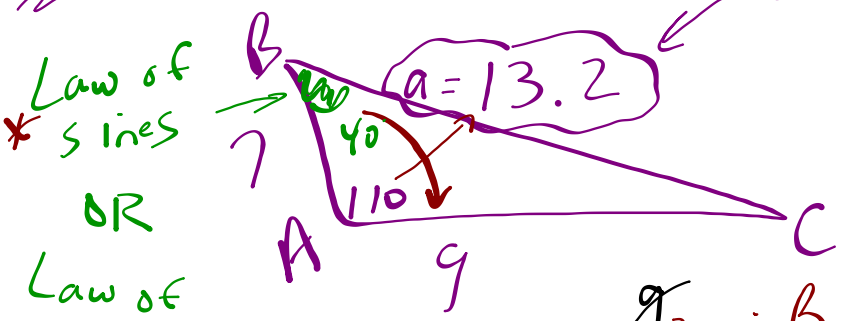
$x =$

```
7²+9²-2*7*9*cos(
110)
        173.0945381
√(Ans
        13.15653974
```

$x = 13.2\text{m}$

ex: SOLVE

Law of Cosines



Law of Sines

OR

Law of Cosines

$\angle C = 180 - 110 - 40$

$\angle C = 30°$

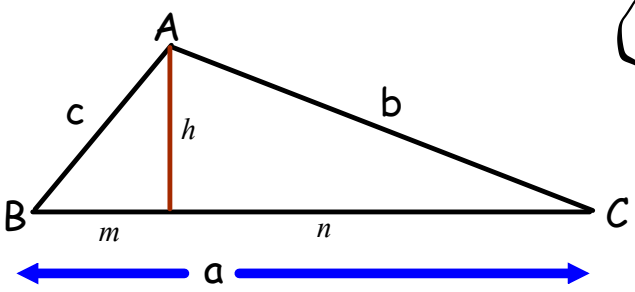
$\frac{\sin B}{9} = \frac{\sin 110}{13.2}$

$\sin^{-1}\sin B = \sin^{-1}(0.6407)$

$\angle B = 40°$

Law of Cosines

Derivation of the law of cosines...



$c^2 = h^2 + m^2$ ← $m = a - n$

$c^2 = h^2 + (a-n)^2$

$c^2 = h^2 + a^2 - 2an + n^2$

$c^2 = h^2 + n^2 + a^2 - 2an$ ← $h^2 + n^2 = b^2$

$c^2 = b^2 + a^2 - 2an$ ← $\cos C = \frac{n}{b}$, $n = b\cos C$

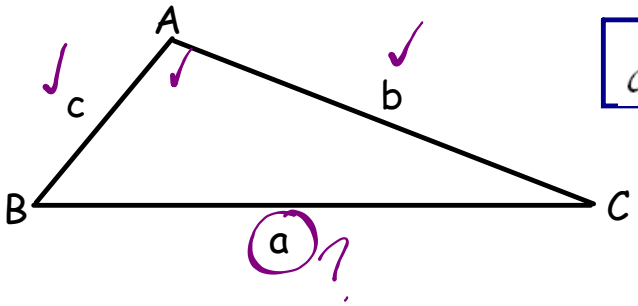
$c^2 = a^2 + b^2 - 2a(b\cos C)$

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

LAW OF COSINES

Finding an unknown side...

- 2 sides and a contained angle (SAS) — between the 2 known sides



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

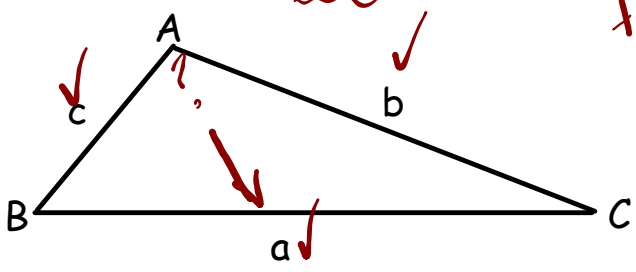
$\frac{2bc\cos A}{2bc} = \frac{b^2 + c^2 - a^2}{2bc}$

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

Finding an unknown angle...

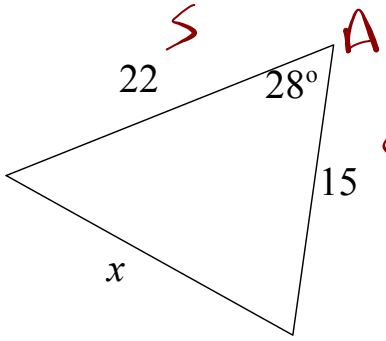
- 3 known sides (SSS)

* subtract side opposite to unknown angle



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

EXAMPLE: Finding an unknown side. $a^2 = b^2 + c^2 - 2bc\cos A$



S A S

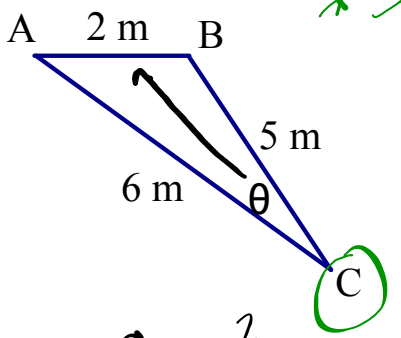
$x^2 = 22^2 + 15^2 - 2(22)(15)\cos 28$

$\sqrt{x^2} = \sqrt{126.3}$

$x = 11.2$

EXAMPLE: Finding an unknown angle.

* SSS



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

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

$\cos\theta = \frac{5^2 + 6^2 - 2^2}{2(5)(6)}$

$\cos^{-1}\cos\theta = \cos^{-1}\left(\frac{57}{60}\right)$

$\theta = 18°$

Homework...

Worksheet - Law of Cosines.doc QUESTIONS???

10.11 (Skills)

1, 2, 5ac, 7ab

10.12 (Word Problems)

#1, 2, 5, 6

Attachments

Worksheet - Law of Cosines.doc