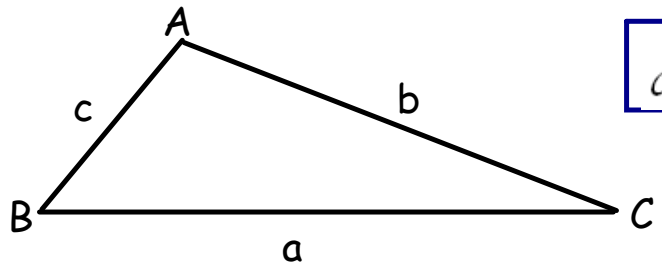
Law of Cosines

Finding an unknown side...

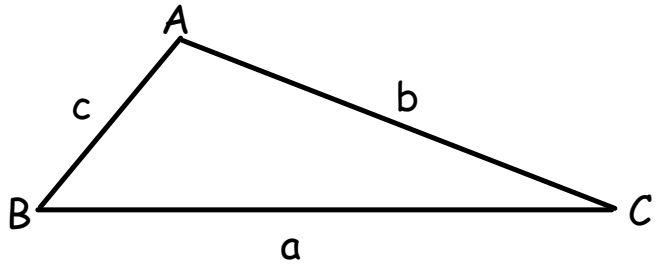
- 2 sides and a contained angle (SAS)



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

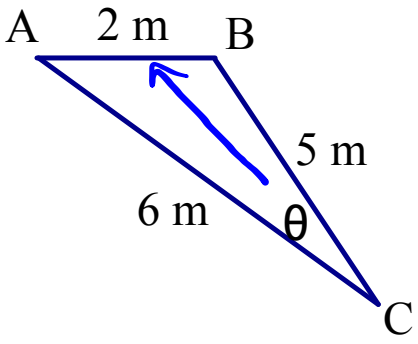
Finding an unknown angle...

- 3 known sides (SSS)



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

EXAMPLE: Finding an unknown angle



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

angle ?

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

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

$$\angle C = 18^\circ$$

Application Questions - Law of Cosines

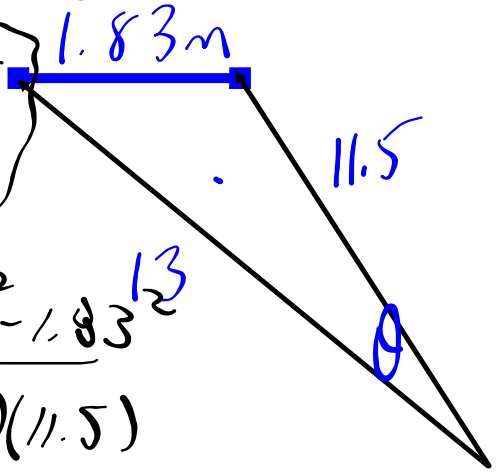
Ask yourself...

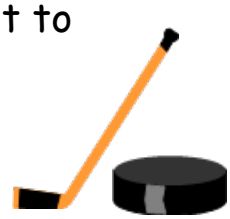
1. What am I given?
2. What am I trying to find?

EXAMPLE...

A hockey net is 1.83m wide. A player shoots from a point where the puck is 13m from one goal post and 11.5m from the other. Within what angle must he make his shot to score?

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





$\cos\theta = \frac{13^2 + 11.5^2 - 1.83^2}{2(13)(11.5)}$

$\cos\theta = 297.9011$

$\cos^{-1}(297.9011 \div 299)$

$\theta = 5°$

Example #2:

From T, a golfer aims a ball towards the hole at H which is 100m away. But the ball actually sliced in a direction 30° off course and lands at M, 60m away. If the next shot is hit 50 m towards the hole, will the ball go in the hole?

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

$t^2 = 60^2 + 100^2 - 2(60)(100)\cos 30°$

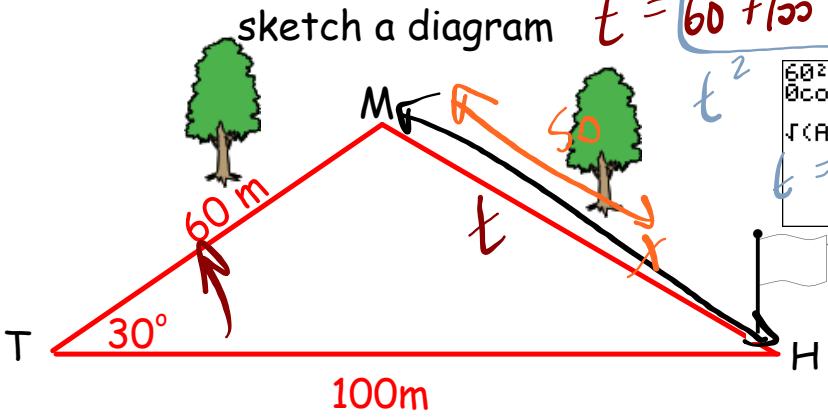
t^2

60²+100²-2*60*10
0cos(30)
3207.695155
√(Ans
56.63651785

$t = 56.6$

-50

6.6 m
short



HW

10.11 → #1, 2, 7

10.12 → #1, 2, 3, 5, 6

Perimeter

Unknown Side (SAS)

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

Unknown Angle (SSS)

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

Law of Sines... $\frac{a}{\sin A} = \frac{b}{\sin B}$