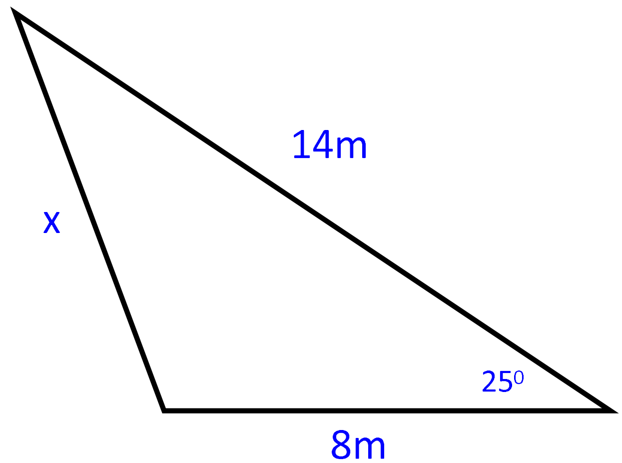
How can we solve this?



We need something new!

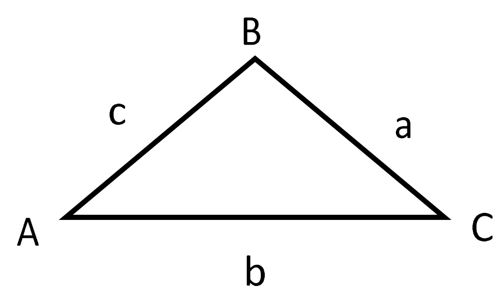
1.7 The Cosine Law

We need a new formula!

Cosine Law: In Δ ABC

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

use to find a side length
when given 2 sides and a
contained angle



Write the Cosine Law in terms of side b.

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

Write the Cosine Law in terms of side c.

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

Can you see
the pattern?

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

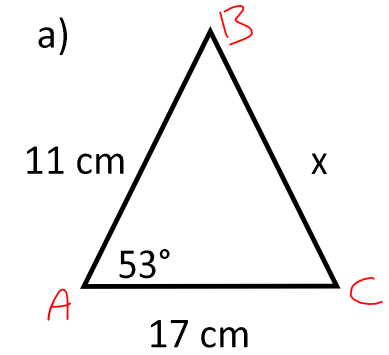
It looks like Pythagorean Formula

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

^ with a bit extra

1) Determine the unknown variable using the cosine law.

a)



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

$x^2 = 11^2 + 17^2 - 2(11)(17)\cos 53°$

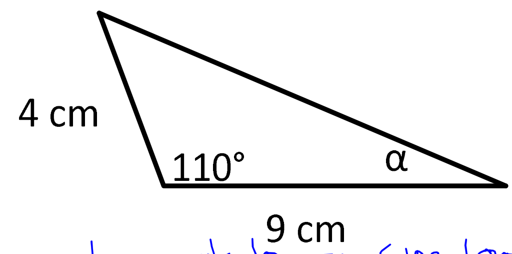
$x^2 = 410 - 374\cos 53°$

$x^2 \doteq 184.9$

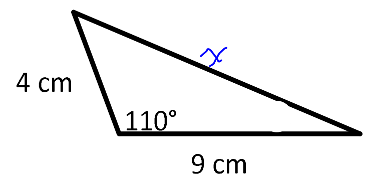
$x \doteq 13.6$

Do in one step!

b)



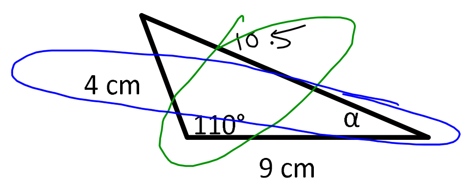
I want to use sine law but I can't! If I solve for the opposite of 100° first....



$x^2 = 4^2 + 9^2 - 4(9)\cos 110°$

$x^2 \doteq 109.3$

$x \doteq 10.5$



$\frac{\sin\alpha}{4} = \frac{\sin 110°}{10.5}$

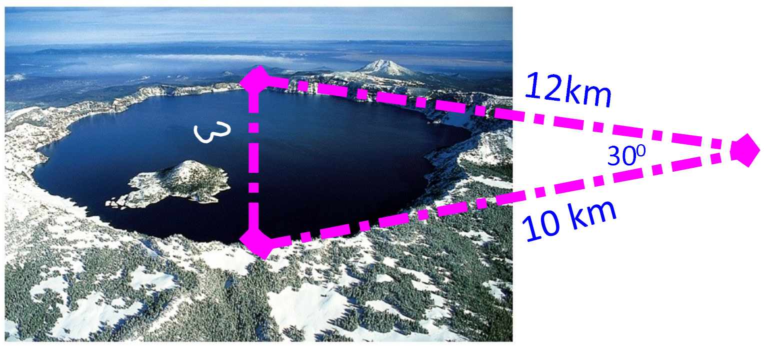
$\sin\alpha = 4 \cdot \frac{\sin 110°}{10.5}$

$\sin\alpha \doteq 0.3579$

$\alpha \doteq 21°$

3) Given ΔABC, where A= 48°, b= 17 cm and c= 25 cm, solve the triangle.

2) Find the width of the lake, to the nearest metre, given the following:



$w^2 = 12^2 + 10^2 - 2(12)(10)\cos 30°$

$w^2 \doteq 36.15$

$w \doteq 6$

$\therefore$ The lake is approx. 6 km wide

Practice

Set 1: p. 409 #C1,C2,1a,3a,4b,7,9

Set 2: p. 409 #C1,C2,3,4b,8,11,15