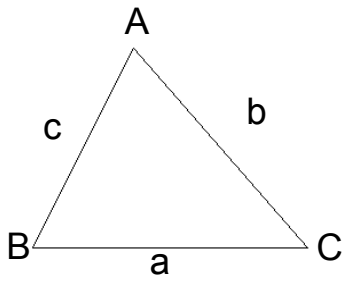
Warm-up

Let's look at the cosine law:



First, can you write it from memory?

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

What if we wanted to find $\angle A$?

We would have to rearrange the formula to isolate A.

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

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

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

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

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

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

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

Before we begin, are there any questions from last day's work?

pp. 409-410 #1a, 2c, 4b, 5b, 8, 11

Return and Correct SWYK 7.1

(If not done yesterday)

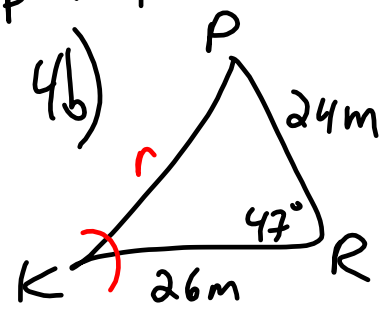
Today's Learning Goal(s):

By the end of the class, I will be able to:

a) Correctly write the cosine LAW to find an unknow**angle**.
b) Use the cosine law to solve a non-right triangle.

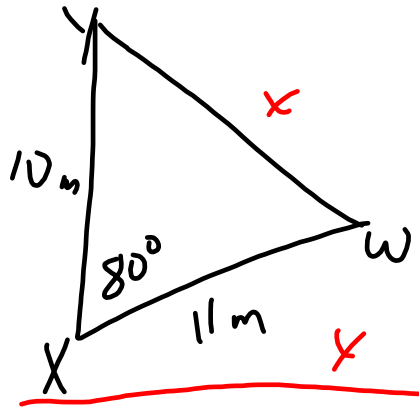
p.409

4b)



r	K	P
$r^2 = 26^2 + 24^2 - 2(26)(24)\cos 47°$	$\frac{\sin K}{24} = \frac{\sin 47°}{20}$	$P \doteq 180° - 47° - 61°$
$r \doteq 20.02$	$K = \sin^{-1}\left(24 \times \frac{\sin 47°}{20}\right)$	$\doteq 72°$
$\doteq 20\,m$	$\doteq 61.3$	
	$\doteq 61°$	

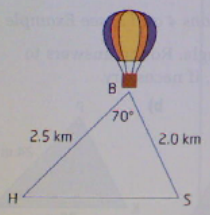
p.410 5b



x	W	Y
$x^2 = 10^2 + 11^2 - 2(10)(11)\cos 80°$	$\frac{\sin W}{10} = \frac{\sin 80°}{14}$	$Y \doteq 180°$
$x \doteq 13.52$	$W \doteq \sin^{-1}\left(10 \times \frac{\sin 80°}{14}\right)$	$-45°$
$x \doteq 14$	$\doteq 44.7$	$-80°$
	$\doteq 45°$	$\doteq 65°$

p. 410 #8

8. Chandra is riding in a hot-air balloon and spots her house and her school. She estimates how far away they are from her, and the angle separating their lines of sight, as shown.



Use Chandra's estimated measures.

a) How far apart are Chandra's home and school, to the nearest tenth of a kilometre?

b) Chandra's mom is watching her from home, and her friends are watching from school. At what angle of elevation does Chandra appear to each of them, to the nearest degree?

a) Let HS represent the distance between her home & school, in km.

$HS^2 = 2.5^2 + 2^2 - 2(2.5)(2)\cos 70°$

$HS = \sqrt{2.5^2 + 2^2 - 2(2.5)(2)\cos 70°}$

$\doteq 2.61$

$\doteq 2.6$ km

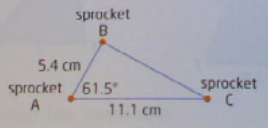
Chandra's home and school are 2.6 km apart.

b)

$\angle S$	$\angle H$
$\frac{\sin S}{2.5} = \frac{\sin 70°}{2.6}$	$H \doteq 180° - 70° - 65°$
$S = \sin^{-1}\left(2.5 \times \frac{\sin 70°}{2.6}\right)$	$\doteq 45°$
$\doteq 64.6$	
$\doteq 65°$	

p. 410 #11

11. Connor is building a toy model of a track-type bulldozer. Three sprockets for one of the tracks are to be assembled as shown.



a) How far should sprocket C be placed from sprocket B, to the nearest tenth of a centimetre?

b) Find the interior angles of the triangle formed by these sprockets, to the nearest tenth of a degree.

a)

$BC^2 = 11.1^2 + 5.4^2 - 2(11.1)(5.4)\cos 61.5°$

$BC \doteq \sqrt{95.16}$

$\doteq 9.75$

$\doteq 9.8$ cm

b)

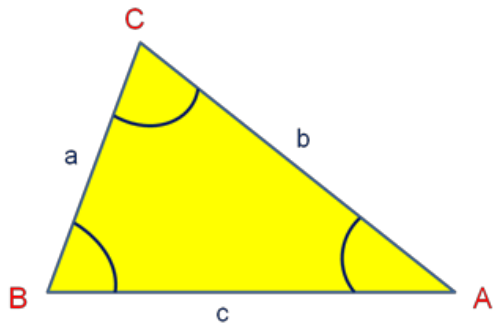
$\angle B$	$\angle C$
$\frac{\sin B}{11.1} \doteq \frac{\sin 61.5°}{9.8}$	$C \doteq 180° - 61.5° - 84.5°$
$B \doteq \sin^{-1}\left(11.1 \times \frac{\sin 61.5°}{9.8}\right)$	$\doteq 34.0°$
$\doteq 84.49$	
$\doteq 84.5°$	

MPM 2DI

8.3 Finding Angles Using the Cosine Law

Date: Dec. 22/16

The Cosine Law can be used with any triangle, even if it is not a right triangle.
Given any triangle,



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

or

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

or

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

When the triangle we are solving involves 3 known sides, but no known angles (a.k.a. SSS), then we use this formula. Remember to take the inverse cos, (or $\cos^{-1}$) to find the measure of angle A.

Note: In this case, always find the largest angle first, in case it is an obtuse angle.
The largest angle will be located opposite the longest side. [Think about it!]

Ex. 1 Solve the triangle. (Round side lengths and angles to the nearest tenth.)

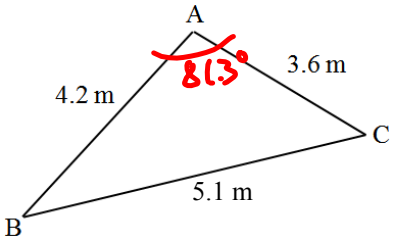


Diagram is not drawn to scale.

(Tenth means 1 decimal place).

$\angle A$	$\angle C$	$\angle B$
Write the cosine law for finding $\angle A$ $\cos A = \dfrac{3.6^2 + 4.2^2 - 5.1^2}{2(3.6)(4.2)}$ $A = \cos^{-1}\left(\dfrac{3.6^2 + 4.2^2 - 5.1^2}{2\times 3.6\times 4.2}\right)$ $\doteq \cos^{-1}(0.151)$ $\doteq 81.26$ $\doteq 81.3^o$	Now use the sine law $\dfrac{\sin C}{4.2} \doteq \dfrac{\sin 81.3°}{5.1}$ $\sin C \doteq \dfrac{4.2\sin 81.3°}{5.1}$ $C \doteq \sin^{-1}\left(\dfrac{4.2\sin 81.3°}{5.1}\right)$ $\doteq 54.49$ $\doteq 54.5^o$	Now use the triangle sum $\angle B \doteq 180^o - 81.3^o - 54.5^o$ $\doteq 44.2^o$

Review the learning goals on the next page.

Review the learning goals. Were we successful today?

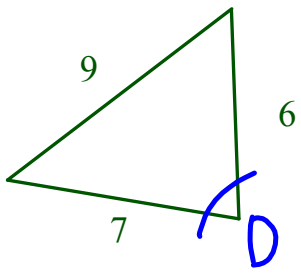
By the end of the class, I will be able to:

a) Correctly write the cosine LAW to find an unknown**angle**.
b) Use the cosine law to solve a non-right triangle.

Today's practice: pp. 418-419 #1ac, 2ac, 3a, 5a, 6a, 9, 11

***Enrichment*:** p. 419 #15, 16

Quick Practice Question:



Label the angle you should find first as "D".
Write the formula for cosD.

$$\cos D = \frac{7^2+6^2-9^2}{2(7)(6)}$$