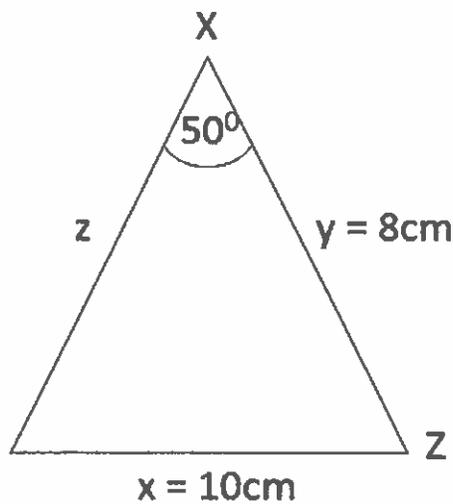


150 - Worksheet - The Cosine Law

Part 1 - Overview of Sine Law and Cosine Law

Sine Law

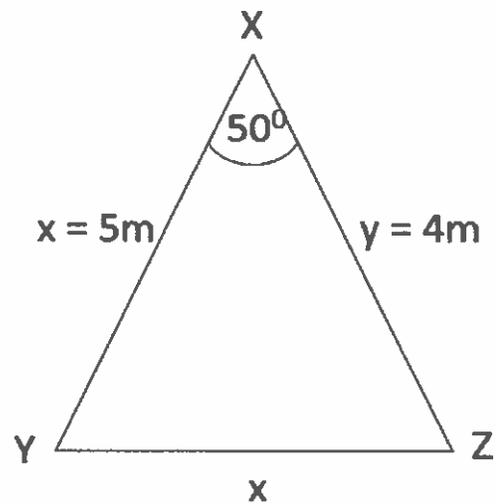
You can use this when you have a known angle opposite a known side.



Don't forget that interior angles in a triangle add to 180° , so once you know two angles, you know all three.

Cosine Law

You can use this when you have a known Side-Angle-Side or Side-Side-Side.

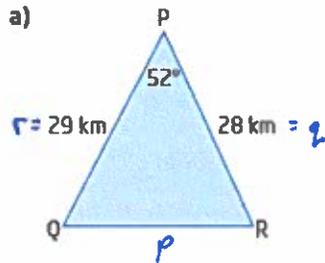


Don't forget that interior angles in a triangle add to 180° , so once you know two angles, you know all three.

Note: Questions have been taken from the Math 20-1 textbook, but are appropriate for Ma20-2.

Part 2 – Textbook Questions

Pg 120 #3: Determine the lengths of the unknown sides and the measure of the unknown angles.



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

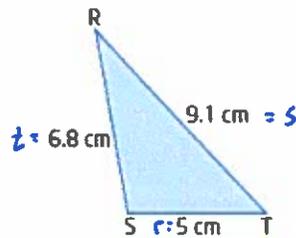
$$p^2 = 29^2 + 28^2 - 2(29)(28) \cos 52$$

$$p = 25.0$$

$$\frac{\sin P}{p} = \frac{\sin R}{r}$$

$$\frac{\sin 52}{25} = \frac{\sin R}{29}$$

$$\angle R = 66.1^\circ \rightarrow \angle Q = 61.9^\circ$$



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

$$r^2 = t^2 + s^2 - 2ts \cos R$$

$$5^2 = 6.8^2 + 9.1^2 - 2(6.8)(9.1) \cos R$$

$$25 = 46.24 + 82.81 - 123.76 \cos R$$

$$-104.05 = -123.76 \cos R$$

$$0.84074 = \cos R$$

$$\angle R = 32.8^\circ$$

$$\frac{\sin B}{b} = \frac{\sin T}{t}$$

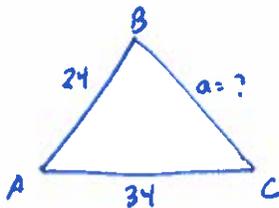
$$\frac{\sin 32.8}{5} = \frac{\sin T}{6.8}$$

$$\angle T = 47.5^\circ$$

$$\angle S = 99.7^\circ$$

Pg 120 #4ace: Make a sketch to show the given information for each $\triangle ABC$. Then, determine the indicated value.

AB = 24 cm, AC = 34 cm,
and $\angle A = 67^\circ$. Determine
the length of BC.



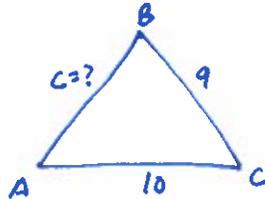
$$c^2 = a^2 + b^2 - 2ab \cos C$$

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

$$a^2 = 24^2 + 34^2 - 2(24)(34) \cos 67$$

$$a = 33.1 \text{ cm}$$

AC = 10 cm, BC = 9 cm,
and $\angle C = 48^\circ$. Determine
the length of AB.

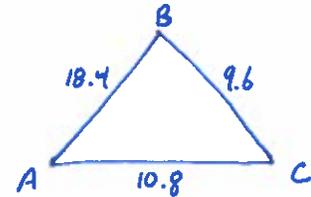


$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$c^2 = 10^2 + 9^2 - 2(10)(9) \cos 48$$

$$c = 7.8 \text{ cm}$$

AB = 18.4 m, BC = 9.6 m,
and AC = 10.8 m. Determine
The measure of $\angle A$.



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

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

$$9.6^2 = 18.4^2 + 10.8^2 - 2(18.4)(10.8) \cos A$$

$$92.16 = 338.56 + 116.64 - 397.44 \cos A$$

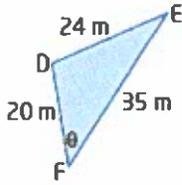
$$-363.04 = -397.44 \cos A$$

$$0.9134 = \cos A$$

$$\angle A = 24.0^\circ$$

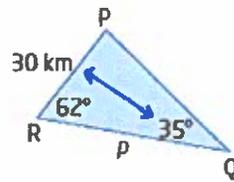
Pg 120 #5: Would you use the sine law or the cosine law to determine each indicated side length or angle measure? Give reasons for your choice.

a) $\angle F$



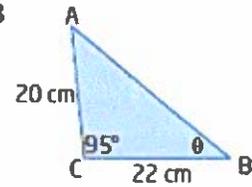
Sine Law requires opposite angle + side. Can't use.
I could use Cosine Law.

b) p



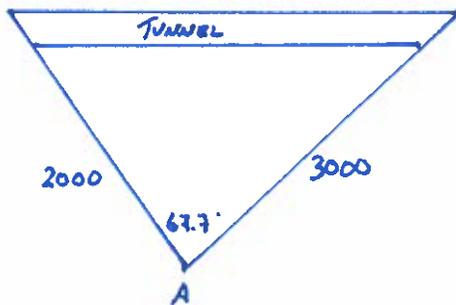
We do have opposite side and angle so Sine Law would work.

c) $\angle B$



Sine Law requires opposite angle + side. Can't use.
I could use Cosine Law.

Pg 120 #8: The longest tunnel in North America could be built through the mountains of the Kicking Horse Canyon, near Golden, British Columbia. The tunnel would be on the Trans-Canada highway connecting the Prairies with the west coast. Suppose the surveying team selected a point A, 3000 m away from the proposed tunnel entrance and 2000 m from the tunnel exit. If $\angle A$ is measured as 67.7° , determine the length of the tunnel, to the nearest meter.

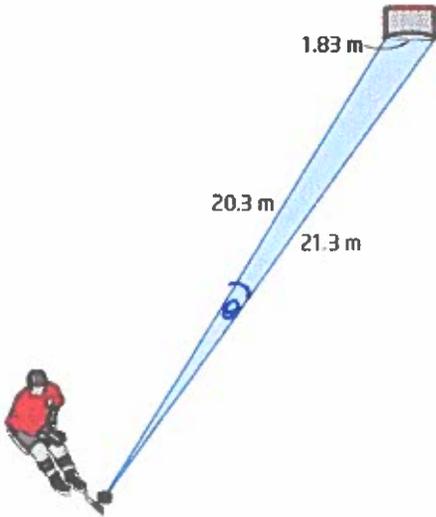


$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$c^2 = 2000^2 + 3000^2 - 2(2000)(3000) \cos 67.7$$

$$c = 2906 \text{ km}$$

Pg 120 #10: The Canadian women's national ice hockey team has won numerous international competitions, including gold medals at the 2002, 2006, and 2010 Winter Olympics. A player on the blue line shoots a puck towards the 1.83-m-wide net from a point 20.3 m from one goal post and 21.3 m from the other. Within what angle must she shoot to hit the net? Answer to the nearest tenth of a degree.



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

$$1.83^2 = 20.3^2 + 21.3^2 - 2(20.3)(21.3) \cos C$$

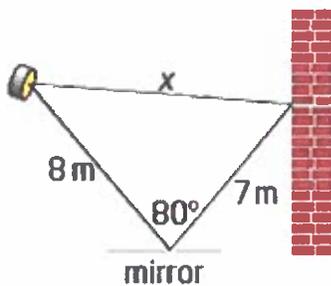
$$3.3489 = 412.09 + 453.69 - 864.78 \cos C$$

$$-862.4311 = -864.78 \cos C$$

$$0.9973 = \cos C$$

$$C = 4.22^\circ$$

Pg 120 #15: A spotlight is 8 m away from a mirror on the floor. A beam of light shines into the mirror, forming an angle of 80° with the reflected light. The light is reflected a distance of 7 m to shine onto a wall. Determine the distance from the spotlight to the point where the light is reflected onto the wall.



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

$$c^2 = 7^2 + 8^2 - 2(7)(8) \cos 80$$

$$c = 9.7 \text{ m}$$