

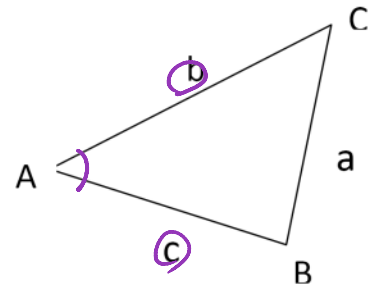
L3- Cosine Law

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Unit 12: Triangle Trigonometry
 Lesson 3 The Law of Cosines

The Cosine Law relates the sides to one of the opposite angles in any triangle.

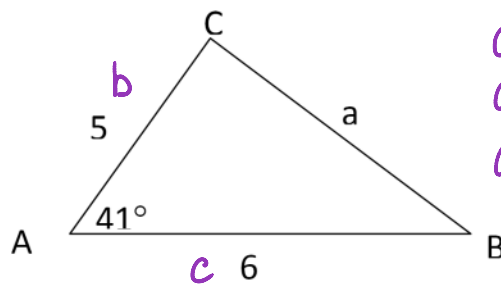
$$a^2 = b^2 + c^2 - 2bc \cos A$$



When do we use the cosine law?

- 1) Non-right triangle.
- 2) Don't know a 'pair',

Ex 1: Find side a



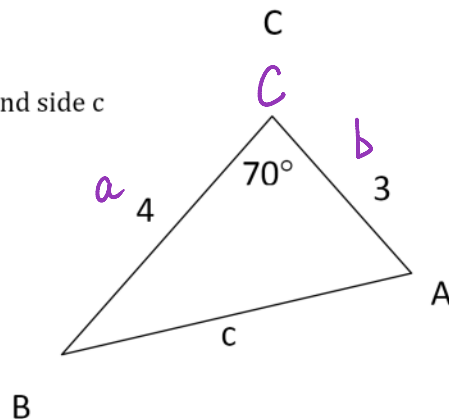
$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$a^2 = (5)^2 + (6)^2 - 2(5)(6) \cos 41^\circ$$

$$a^2 = 15.717$$

$$a = 3.96$$

Ex 2: Find side c



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

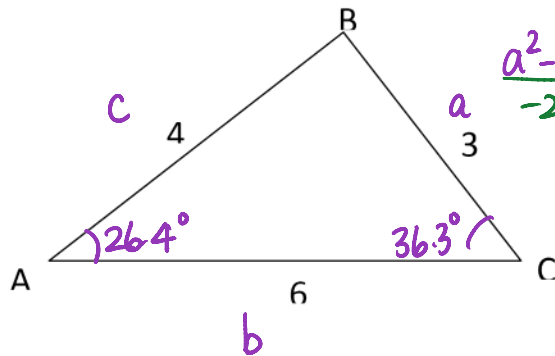
→ swap a with c

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

$$c^2 = (3)^2 + (4)^2 - 2(3)(4) \cos 70^\circ$$

$$c = 4.10$$

Ex 3: Calculate $\angle A$ and $\angle C$.



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

Isolate

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

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

$$\cos A = \frac{(3)^2 - (6)^2 - (4)^2}{-2(6)(4)}$$

$$\cos A = 0.89583$$

$$A = \cos^{-1}(0.89583)$$

$$A = 26.4^\circ$$

$$\frac{\sin C}{c} = \frac{\sin A}{a}$$

$$\frac{\sin C}{4} = \frac{\sin 26.4^\circ}{3}$$

$$\sin C = 0.5925$$

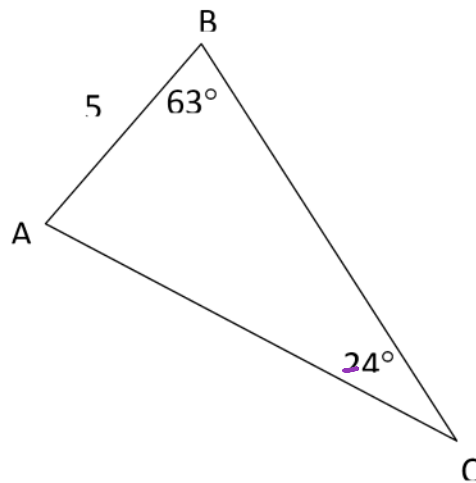
$$C = 36.3^\circ$$

Note: When solving triangles

Sine Law: Know 'pair' * Acute A.S.S.

Cosine Law: Don't know 'pair'

Ex 4: Solve for all sides and angles



$$\angle A = 93^\circ$$

$$a = 12.3$$

$$b = 11.0$$

Practice: p.233 # 1-25