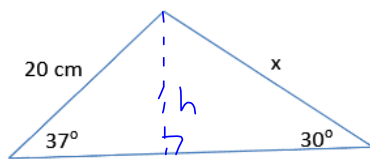


MPM2D

The Sine Law

Warm up - Solve for the missing side in the triangle below.



$$\sin 37^\circ = \frac{h}{20}$$

$$h = 20 \sin 37^\circ$$

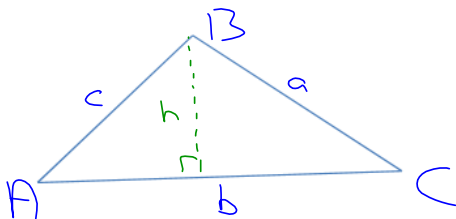
$$h \approx 12 \text{ cm}$$

$$\sin 30^\circ = \frac{12}{x}$$

$$x = 24 \text{ cm}$$

Today we will look at the sine law (or the "law of sines"). The formula we look at today will apply to **any triangle**, not just a right triangle.

Label the triangle below using A, B and C as angles.



Left Δ

$$\sin A = \frac{h}{c}$$

$$h = c \sin A$$

right Δ

$$\sin C = \frac{h}{a}$$

$$h = a \sin C$$

$$c \sin A = a \sin C$$

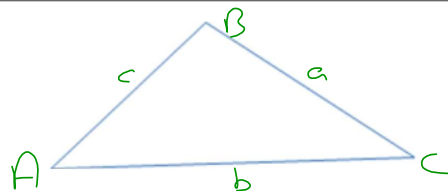
$$\frac{c \sin A}{\sin C} = a$$

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

Summary

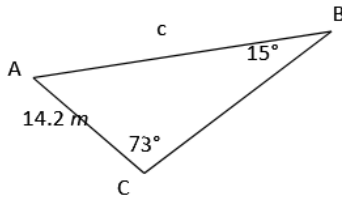
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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



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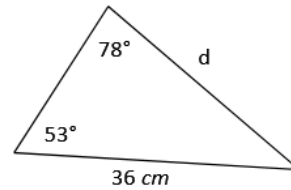
Examples: Use the sine law to solve for the missing side in each triangle below.



$$\frac{c}{\sin 73} = \frac{14.2}{\sin 15}$$

$$c = \frac{14.2 \sin 73}{\sin 15}$$

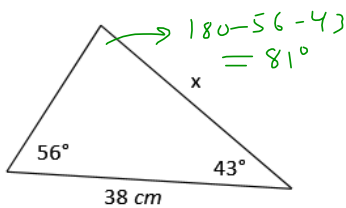
$$c \approx 52 \text{ m}$$



$$\frac{d}{\sin 53} = \frac{36}{\sin 78}$$

$$d = \frac{36 \sin 53}{\sin 78}$$

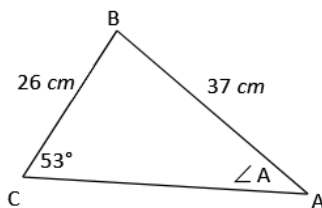
$$d \approx 29 \text{ cm}$$



$$\frac{x}{\sin 56} = \frac{38}{\sin 81} \quad x \approx 32 \text{ cm}$$

$$x = \frac{38 \sin 56}{\sin 81}$$

The sine law can also be used to solve for angles. Try the example below.



$$\frac{26}{\sin A} = \frac{37}{\sin 53}$$

$$37 \sin A = 26 \sin 53$$

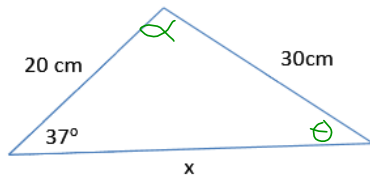
$$\sin A = \frac{26 \sin 53}{37}$$

$$A = \sin^{-1}\left(\frac{26 \sin 53}{37}\right)$$

$$A \approx 34^\circ$$

MPM2D

Sometimes the sine law needs to be used multiple times.



$$\frac{\sin \theta}{20} = \frac{\sin 37}{30}$$

$$\sin \theta = \frac{20 \sin 37^\circ}{30}$$

$$\theta \doteq 24^\circ$$

$$\alpha = 180^\circ - 37 - 24$$

$$\alpha = 119^\circ$$

$$\frac{x}{\sin 119^\circ} = \frac{30}{\sin 37}$$

$$x = \frac{30 \sin 119}{\sin 37}$$

$$x \doteq 44 \text{ cm}$$

Text page 366 #1 – 2, 3af, 4, 5a