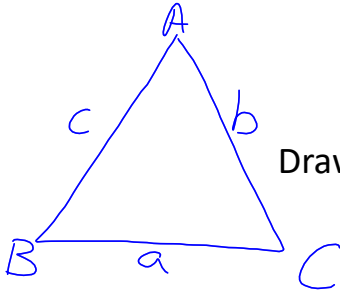
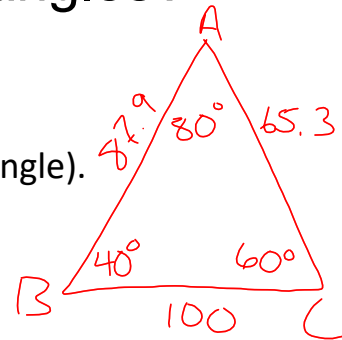


1.6 The Sine Law

What about non right-angle triangles?



Draw an oblique triangle, $\triangle ABC$ (no 90° angle).



Then calculate:

$$\frac{\sin A}{a} = \frac{\sin 80}{100} = 0.0098$$

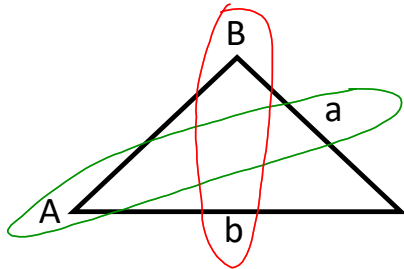
$$\frac{\sin B}{b} = \frac{\sin 40}{65.3} = 0.0098$$

$$\frac{\sin C}{c} = \frac{\sin 60}{87.9} = 0.0098$$

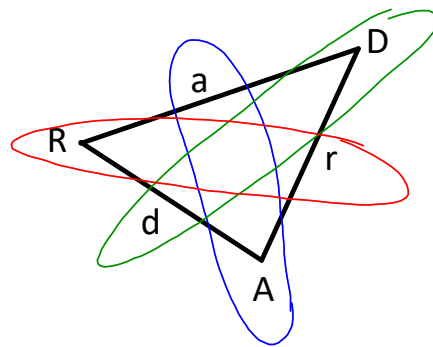
Compare your results with neighbouring group(s). What can you conclude?

All the same!

Write an equation to model the relationship between the variables shown.



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



$$\frac{\sin A}{a} = \frac{\sin D}{d} = \frac{\sin R}{r}$$

ALSO!

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



The Sine Law

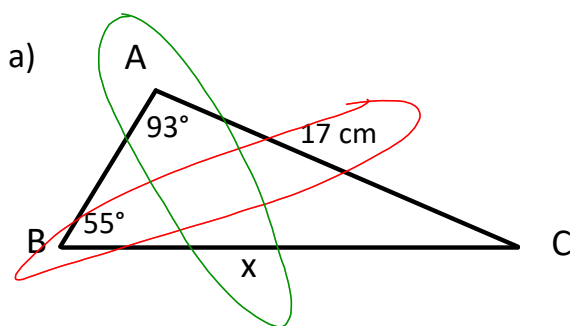
$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

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

These ratios can be used to find unknown sides or angles in oblique triangles.

★ Set up with unknown in numerator!

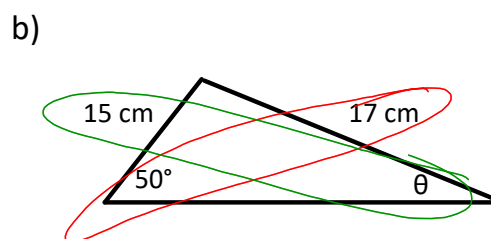
1) Solve for the unknown.



$$\frac{x}{\sin 93^\circ} = \frac{17}{\sin 55^\circ}$$

$$x = \frac{17}{\sin 55^\circ} \cdot \sin 93^\circ$$

$$= 21$$



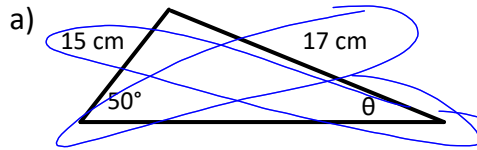
$$\frac{\sin \theta}{15} = \frac{\sin 50^\circ}{17}$$

$$\sin \theta = \frac{\sin 50^\circ \cdot 15}{17}$$

$$\theta = \sin^{-1}\left(\frac{\sin 50^\circ}{17} \cdot 15\right)$$

$$= 43^\circ$$

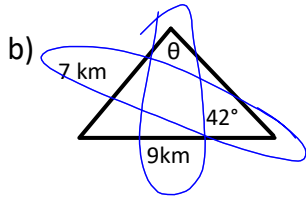
Solve for the unknown.



$$\frac{\sin \theta}{15} = \frac{\sin 50}{17}$$



$$\sin \theta = \frac{15 \cdot \sin 50}{17}$$



$$\frac{\sin \theta}{9} = \frac{\sin 42}{7}$$

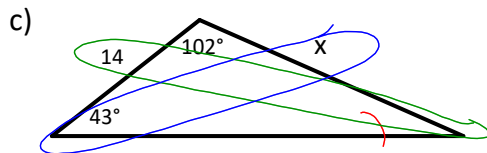
$$\sin \theta = \frac{9 \cdot \sin 42}{7}$$

$$\theta = \sin^{-1} \left(\frac{9 \cdot \sin 42}{7} \right)$$

$$\approx 59^\circ$$

$$\theta = \sin^{-1} \left(\frac{15 \cdot \sin 50}{17} \right)$$

$$\approx 43^\circ$$

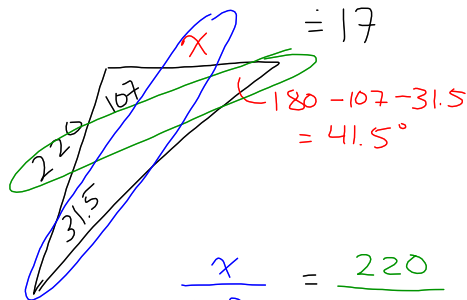
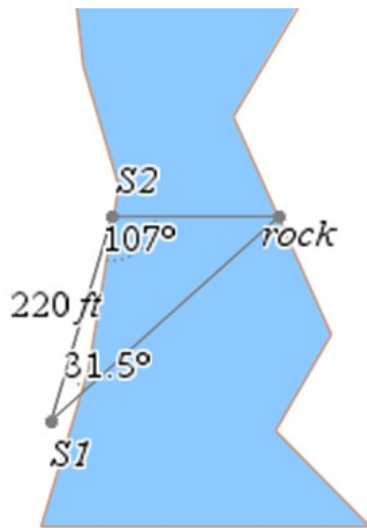


$$\frac{x}{\sin 43^\circ} = \frac{14}{\sin 35^\circ}$$

$$180 - 43 - 102 = 35^\circ$$

$$x = \frac{\sin 43 \cdot 14}{\sin 35^\circ}$$

How wide is the river?



$$\frac{x}{\sin 31.5} = \frac{220}{\sin 41.5^\circ}$$

$$x = \frac{\sin 31.5}{\sin 41.5} \left(\frac{220}{\sin 41.5} \right)$$

$$\approx 173$$

∴ The river is 173 ft wide

Practice work

Set 1: p.401 #C2,C3,2ab,3ab,4a,6b,10

Set 2: p.401 #C2,C3,2b,4a,6b,9,12,15,20