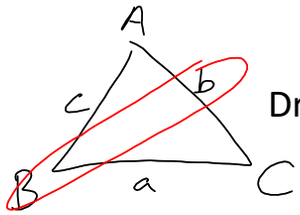
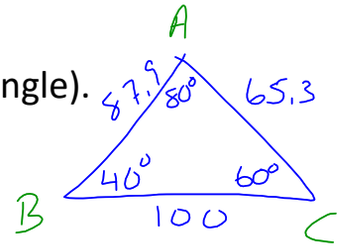
1.6 The Sine Law

What about non right-angle triangles?



Draw an oblique triangle, ΔABC (no 90° angle).
(Choose one from the board)



Then calculate:

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

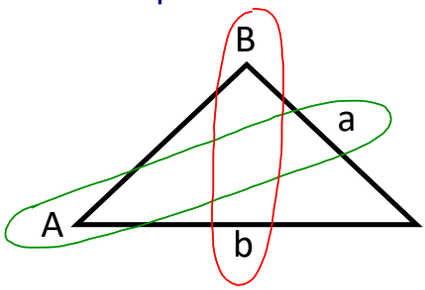
$\frac{\sin B}{b} = \frac{\sin 40}{65.3} = 0.0098$

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

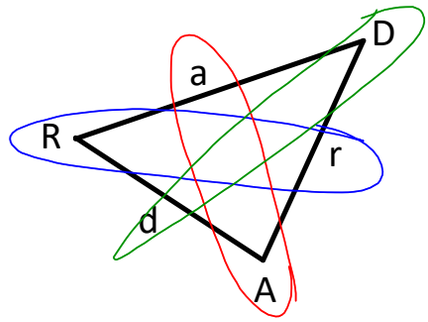
Compare your results with neighbouring group(s). What can you conclude?

They are all the same

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



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



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

The Sine Law

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

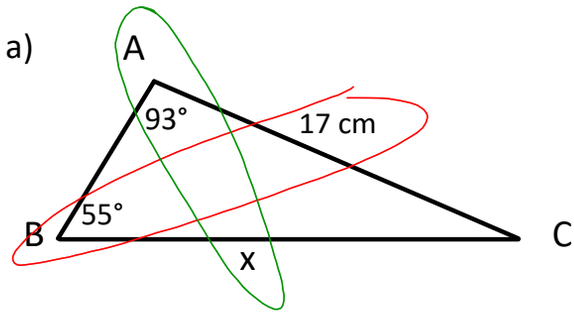
or

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

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

1) Solve for the unknown.

a)

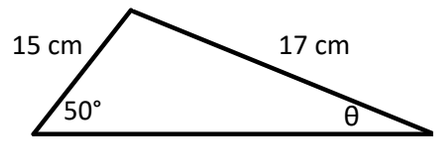


$$\frac{x}{\sin 93} = \frac{17}{\sin 55^\circ}$$

$$x = (\sin 93)\left(\frac{17}{\sin 55}\right)$$

$$\doteq 21$$

b)



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

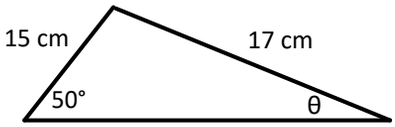
$$\sin\theta = 15\left(\frac{\sin 50}{17}\right)$$

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

$$\doteq 42.5$$

Solve for the unknown.

a)

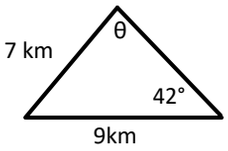


$\frac{\sin\theta}{15} = \frac{\sin 50}{17}$

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

$\theta = 42.5$

b)



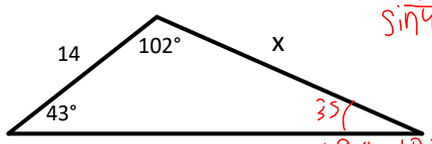
$\frac{\sin\theta}{a} = \frac{\sin B}{b}$

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

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

$\theta = 59^\circ$

c)



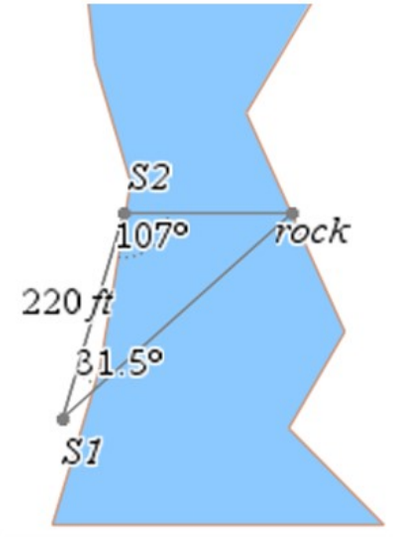
$\frac{x}{\sin 43} = \frac{14}{\sin 35}$

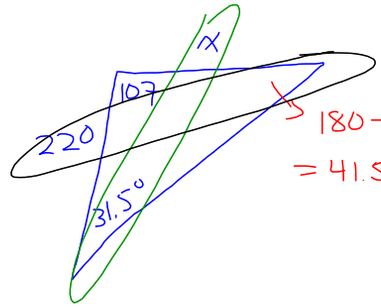
$x = (\sin 43^\circ)\left(\frac{14}{\sin 35^\circ}\right)$

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

$x = 16.6$

How wide is the river?





$180 - 107 - 31.5 = 41.5^\circ$

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

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

$= 173.5$

∴ The river is 173.5 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