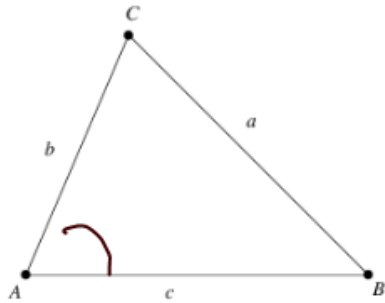## 9.3 Law Of Sines

Write 3 different equations for K, the area of the triangle.

$$K = \frac{1}{2} ac \sin B$$

$$K = \frac{1}{2} bc \sin A$$

$$K = \frac{1}{2} ab \sin C$$

$$\frac{1}{2} a\cancel{c} \sin B = \frac{1}{2} b\cancel{c} \sin A$$

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

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

Law of Sines:

In $\triangle ABC$, $\dfrac{\sin A}{a} = \dfrac{\sin B}{b} = \dfrac{\sin C}{c}$

Example:

Solve $\triangle ABC$, if $<A = 63°$, $<B = 49°$, and
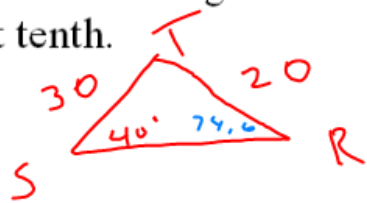c = 78.

B

78   49

63   68

A   63.5   C

$\dfrac{\sin 68}{78} = \dfrac{\sin 49}{b}$

$b = 63.5$

$\dfrac{\sin 68}{78} = \dfrac{\sin 63}{a}$

$a = 75$

Solve $\triangle RST$ if $<S = 40°$, r = 30, and s = 20.
Give the angle measures to the nearest tenth
degree and the lengths rounded to the
nearest tenth.

30   20

40° 74.6   R

S

$$\frac{\sin 40}{20} = \frac{\sin R}{30}$$

$\sin R = .9642$

$\angle R = 74.6°$ $\angle R = 105.4°$
$\angle T = 65.4$ $\angle T = 34.6$

$$\frac{\sin 40}{20} = \frac{\sin 65.4}{t}$$ $$\frac{\sin 40}{20} = \frac{\sin 34.6}{t}$$

$t = 28.3$ $t = 17.7$

Solve $\triangle ABC$ if $<A = 30°$, b $= 10$ and a $= 4$.
Give the angle measures to the nearest tenth
degree and the lengths rounded to the
nearest tenth.

B

4

A

30
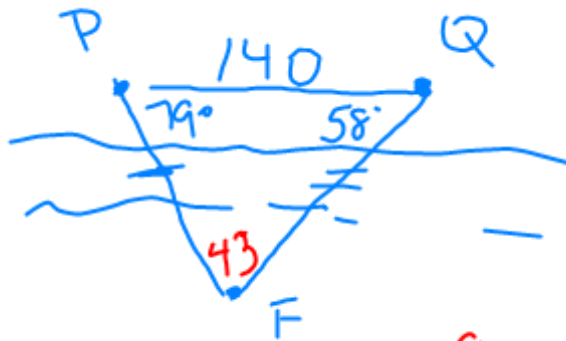
10

C

$$\frac{Sin30}{4} = \frac{Sin\beta}{10}$$

$$\frac{10sin30}{4} = Sin\beta$$

$$1.25 = Sin\beta$$
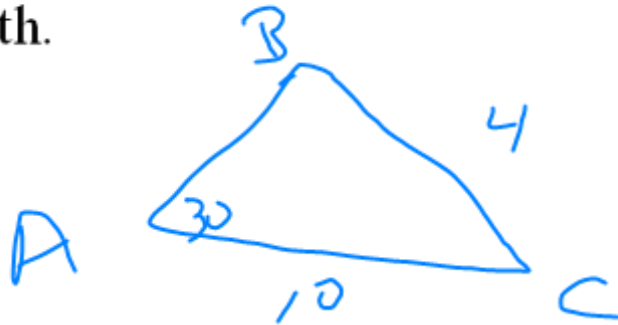
Example: From two points P and Q that are
140 ft apart, the lines of sight to a flagpole
across a river make angles of 79° and 58°
respectively, with the line joining P and Q.
What are the distances from P and Q to the
flagpole?

$$\frac{\sin 43}{140} = \frac{\sin 58}{Q} = \frac{\sin 79}{P}$$

$$Q = 174$$

A#16
Pg 347 # 3, 6, 7, 9, 13, 16, 17
Pg 343 #19, 20
Pg 336 #23

and group problem