8.6 LAW OF SINES

- works for non-right Δ's

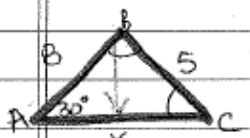
need to know sides AND angles

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

Capital letters = Angles!

ex. Δ ABC, $\angle A = 30°$, $\overline{AB} = 8cm$, $\overline{BC} = 5cm$

find measures of $\angle B$, $\angle C$, $\overline{AC}$



$$\frac{\sin 30°}{5} = \frac{\sin C}{8}$$

$$\frac{8 \sin 30°}{5} = \sin C$$ cross multiply

divide by 5

$$\frac{8 \sin 30°}{5} = \sin C$$

$$.8 = \sin C$$

use $\sin^{-1}$ to get

$C \approx 53.1°$

find $B = 180° - 30° - 53.1° = 96.9°$

$$\frac{\sin 96.9}{b} = \frac{\sin 30°}{5}$$

solve like above

× multiply, then ÷

$\overline{AC} = 9.9cm$

Work: handout p472 1, 5, 6

8.7 Law of Cosines - works for all triangles

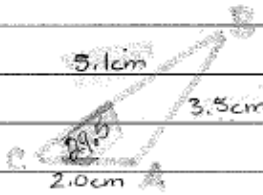
$c^2 = a^2 + b^2 - 2ab\cos C$

Can switch a, b + c so:

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

$b^2 = a^2 + c^2 - 2ac\cos B$ (cos letter matches side squared letter)

* Don't need to know any angles to solve *

ex. 

Find $\angle C$

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

$3.5^2 = 5.1^2 + 2.0^2 - 2(5.1)(2.0)\cdot\cos C$ Do step by step

$12.25 = 30.01 - 20.4\cos C$ Can't put 30.01 + 20.4 together since cos C is attached!!

$-30.01 \quad -30.01$ (subtract)

$\frac{-17.76}{-20.4} = \frac{-20.4\cdot\cos C}{-20.4}$ (divide)

$\cos C = \frac{17.76}{20.4}$

use $\cos^{-1}$ to get $\angle$ measure

$\cos^{-1}\left(\frac{17.76}{20.4}\right) \approx 29.5°$

now could use either Law of Sines or Cosines to get $\angle B$

Chuck: handout

3 W Y: u