MWF12, F19

EX: Solve a triangle with $a = 25.2$, $b = 37.8$ and $c = 43.4$. Round answers to one decimal.

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

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

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

$$\boxed{\cos A = \frac{b^2 + c^2 - a^2}{2bc}}$$ Alternate form for Law of Cosines

TO BE CONT'D

4.3 Continued

$$\cos A = \frac{37.8^2 + 43.4^2 - 25.2^2}{2(37.8)(43.4)} = 0.816$$

$$\Rightarrow A = \cos^{-1}(0.816) = \underline{35.3^\circ}$$

Choose to use the Law of Cosines to find B:

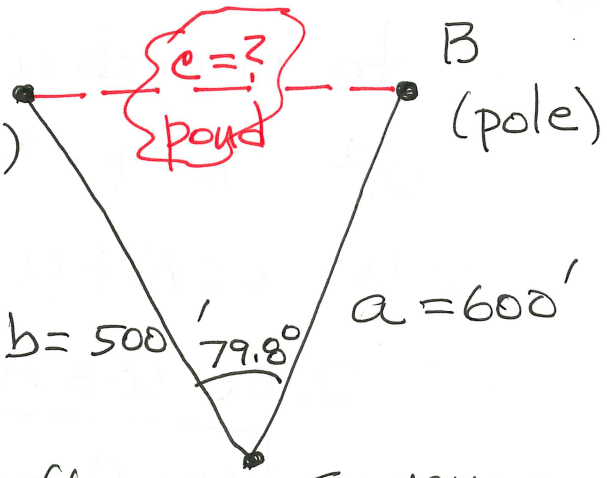
$$\cos B = \frac{a^2 + c^2 - b^2}{2ac} = \frac{25.2^2 + 43.4^2 - 37.8^2}{2(25.2)(43.4)}$$

$$\cos B = 0.498 \Rightarrow \cos^{-1}(0.498) = \underline{60.1^\circ}$$

$$C = 180^\circ - 35.3^\circ - 60.1^\circ = \underline{84.6^\circ}$$

- Applications

EX: Two telephone poles are located on opposit sides of a small pond. To determine the distance between the two poles a surveyor measures a distance "b" to be 500 ft and a distance "a" to be 600 ft. With a transit the surveyor measures angle C to be 79.8°. How far apart are the poles to nearest tenth.



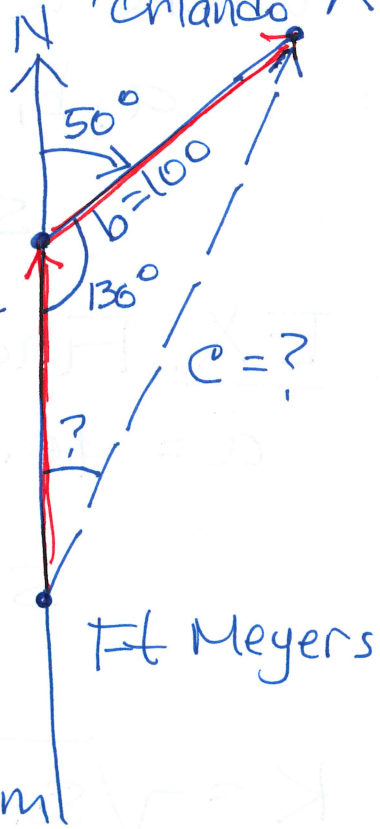
$$c^2 = a^2 + b^2 - 2ab\cos C$$

$$= 600^2 + 500^2 - 2(600)(500)\cos 79.8^\circ$$

$$c = 709.8 \text{ ft}$$

EX: An airplane flies due north from Ft. Meyers to Sarasota, a distance of 150 miles. Then, the plane turns right through an angle of 50° and continues to Orlando, a distance of 100 miles.

FIND: (a) What is the direct distance from Ft. Meyers to Orlando?



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

$$c^2 = 150^2 + 100^2 - 2(150)(100)\cos 130^\circ$$

$$c = 227.56 \text{ miles}$$

(b) What bearing must the pilot use to fly directly from Ft. Meyers to Orlando?

$$\frac{\sin B}{b} = \frac{\sin C}{c} \Rightarrow \sin B = \frac{100 \sin 130^\circ}{227.5602}$$

$$\Rightarrow B = \sin^{-1}\left(\frac{100 \sin 130^\circ}{227.5602}\right) = 19.67^\circ$$

$$\Rightarrow \text{Bearing} = N\ 19.67^\circ\ E$$