Assignments for the Week of Oct. 3

- Read 6.6, 7.1
- 45 minutes of Khan Academy
- Textbook assignment due Friday 10/14:

6.5 #25-55 odd	Inverse Trig Functions
6.6 #1-21 odd	Solving Trig Equations
#61-83 odd	

- Upcoming:

• 7.1 #1-21 odd; 29,30,33,34,35	Law of Sines
• 7.2 #9-19 odd	Law of Cosines
#25-29odd;	area
#38,43,46,47,48	Law of Cosines
• 7.3 #37,41,43	word problems with Law of Sines/Cosines

$\sin 2x - \sin x = 0$

$2\sin x\cos x - \sin x = 0$

$\sin x(2\cos x - 1) = 0$

$\sin x = 0$ $\qquad$ $2\cos x - 1 = 0$

$x = 0 + 2\pi k,\ \pi + 2\pi k$ $\qquad$ $\cos x = \frac{1}{2} + 2\pi k$

πk $\qquad$ $x = \frac{\pi}{3}, \frac{5\pi}{3} + 2\pi k$

$\tan\frac{x}{2} = \sin x$

$\frac{1-\cos x}{\sin x} = \sin x$

$1-\cos x = \sin^2 x$

$\cancel{1}\cancel{-}\cos x = \cancel{1}\cancel{-}\cos^2$

$\cos^2 x - \cos x = 0$

$\cos x(\cos x - 1) = 0$

$\cos x = 0$ $\quad$ $\cos x = 1$

$x = \frac{\pi}{2}, \frac{3\pi}{2}$ $\quad$ $x = 0$

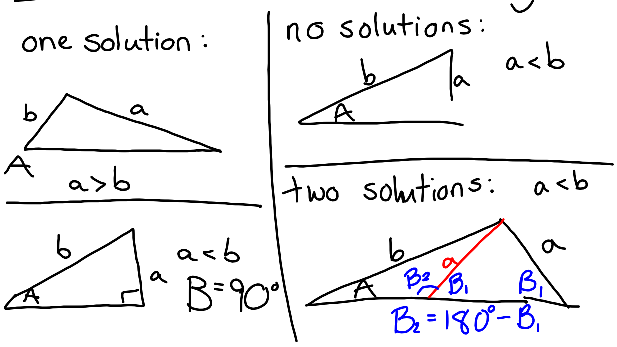
The Law of Sines

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

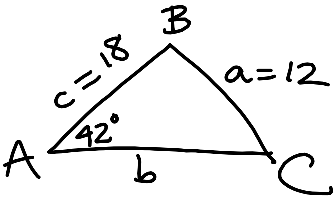
or

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

ASS, The Problematic Triangle



16. $A = 42°, a = 12, c = 18$



ASS → Law of Sines

$$\frac{\sin C}{18} = \frac{\sin 42°}{12}$$

$$\sin C = \frac{18 \sin 42°}{12}$$

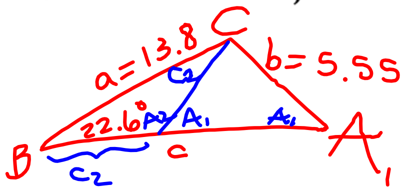
$$C = \sin^{-1}\left(\underbrace{\frac{18\sin 42°}{12}}_{>1}\right)$$

undefined

no such triangle exists

:(

18. $B = 22.6°$, $b = 5.55$, $a = 13.8$



ASS → Law of Sines

$$\frac{\sin A}{13.8} = \frac{\sin 22.6°}{5.55}$$

$$\sin A = \frac{13.8 \sin 22.6°}{5.55}$$

$$A = \sin^{-1}\left(\frac{13.8 \sin 22.6°}{5.55}\right)$$

$$\boxed{A_1 = 72.9°}$$

$$C_1 = 180° - 22.6° - 72.9°$$

$$\boxed{C_1 = 84.5°}$$

$$\frac{c}{\sin 84.5°} = \frac{5.55}{\sin 22.6°}$$

$$c = \frac{5.55 \sin 84.5°}{\sin 22.6°}$$

$$\boxed{c_1 = 14.4}$$

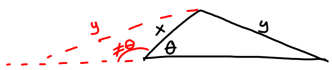
$$\boxed{A_2} = 180° - 72.9° = \boxed{107.1°}$$

$$\boxed{C_2} = 180° - 107.1° - 22.6° = \boxed{50.3°}$$

$$\frac{c}{\sin 50.3°} = \frac{5.55}{\sin 22.6°}$$

$$\boxed{c_2} = \frac{5.55 \sin 50.3°}{\sin 22.6°} = \boxed{11.1}$$

Why does this ASS triangle have only one solution?



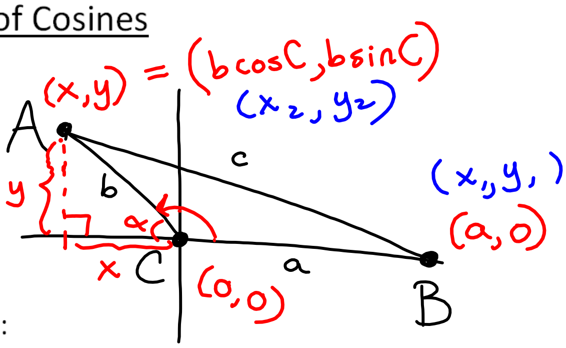
The measure of θ and the lengths of x & y are fixed. If we try to reposition y, the measure of θ changes, unlike in the 2-solution case:

7.2 - The Law of Cosines

Derivation:

$\sin C = \frac{y}{b}$

$\cos C = \frac{x}{b}$



Distance Formula:

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$$d^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

$$c^2 = (b\cos C - a)^2 + (b\sin C - 0)^2$$

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

$$c^2 = a^2 + b^2\underbrace{(\sin^2 C + \cos^2 C)}_{=1} - 2ab\cos C$$

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

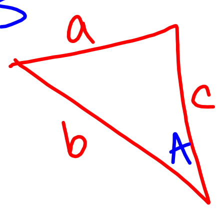
The Law of Cosines

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

$$b^2 = a^2 + c^2 - 2ac\cos B$$

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

SSS



SAS