6.6 #1-21 odd — finding solutions between 0 and 2pi
#61-69 odd — finding all possible solutions (+2pi*k)
#71-83 odd

Quiz on solving equations Fri. Feb 3; Test #4 - Wed. Feb 8

Due Tues. 2/7:

- 7.1 #7-21 odd — solving triangles with Law of Sines
- 7.2 #9-19 odd — solving triangles with Law of Cosines
- 7.2 #25-29odd — area

find x. all of 'em.

69. $\sin^2 \frac{x}{2} + \cos x = 1$

$$\left(\sin\frac{x}{2}\right)^2 = \left(\pm\sqrt{\frac{1-\cos x}{2}}\right)^2$$

$$\sin^2\frac{x}{2} = \frac{1-\cos x}{2}$$

$$\left(\frac{1-\cos x}{2} + \cos x\right) \cdot 2 = (1) \cdot 2$$

$$1 - \cos x + 2\cos x = 2$$

$$\cos x = 1$$

$$x = 0 + 2\pi k = \boxed{2\pi k}$$

A. $x \in [0, 2\pi)$

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

$$\sin a \cos b + \cos a \sin b$$

$$\sin(a+b)$$

$$\sin(2x + x) = 0$$

$$\sin 3x = 0$$

$$\cancel{3}x = \frac{0, \pi, 2\pi, 3\pi, 4\pi, 5\pi}{3}$$

83. $x \in [0, 2\pi)$

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

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

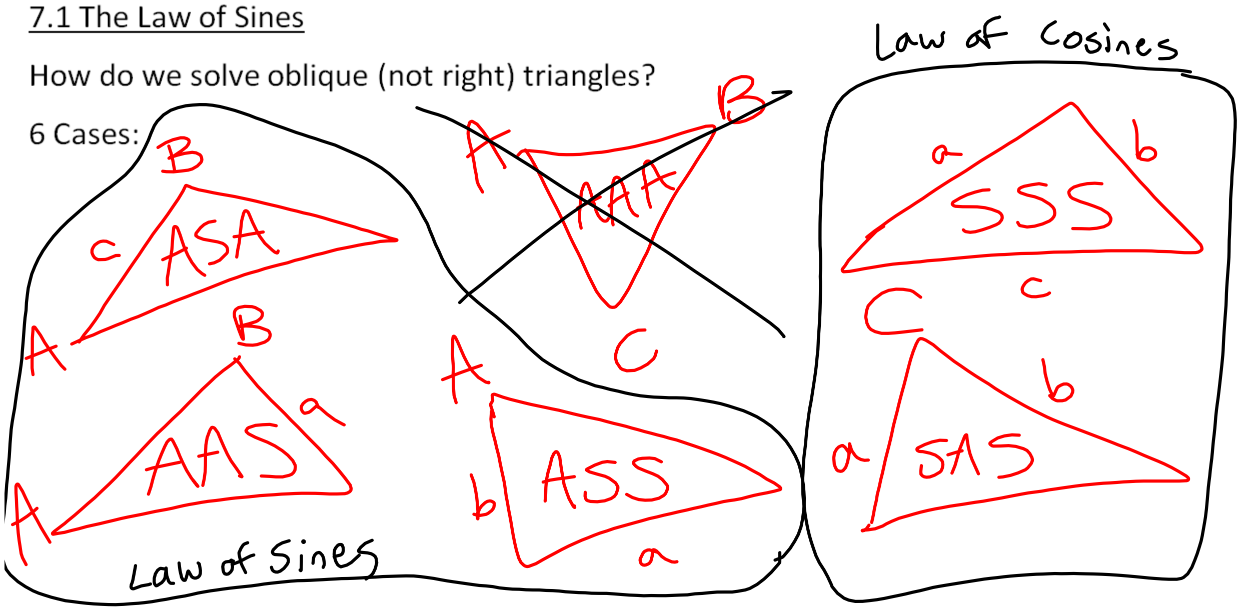
$$(\cos x + 1)(2\sin x - 1) = 0$$

19. $4\sin^2 x + 2\sqrt{3}\sin x - \sqrt{3} = 2\sin x$

7.1 The Law of Sines

How do we solve oblique (not right) triangles?

6 Cases:



The Law of Sines

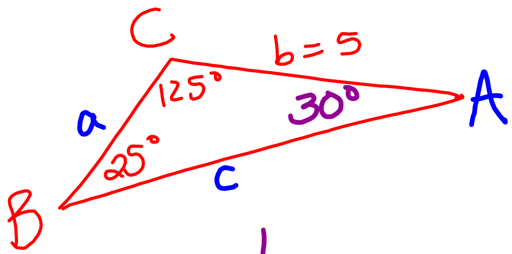
$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

or

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

7.1

2. $B = 25°,\ C = 125°,\ b = 5$



AAS ⇒ Law of Sines

$\angle A = 180° - 125° - 25°$

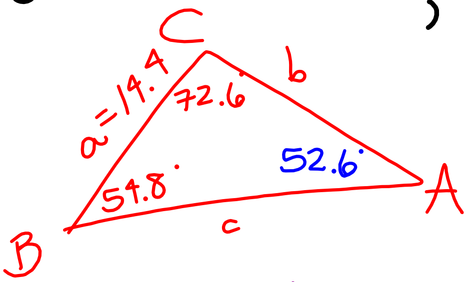
$\boxed{\angle A = 30°}$

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

$$c = \frac{b \sin C}{\sin B} = \frac{5 \sin 125°}{\sin 25°} \approx \boxed{9.7 = c}$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} \Rightarrow a = \frac{b \sin A}{\sin B} = \frac{5 \sin 30°}{\sin 25°} \approx \boxed{5.9 = a}$$

8. $B = 54.8°$, $C = 72.6°$, $a = 14.4$



ASA ⇒ Law of Sines

$\angle A = 180° - 72.6° - 54.8°$

$\boxed{A = 52.6°}$

$$\frac{b}{\sin 54.8°} = \frac{14.4}{\sin 52.6°}$$

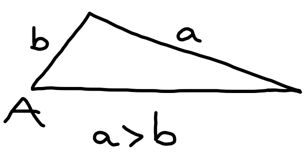
$$b = \frac{14.4 \sin 54.8°}{\sin 52.6°} \approx \boxed{14.8 = b}$$

$$\frac{c}{\sin 72.6°} = \frac{14.4}{\sin 52.6°}$$

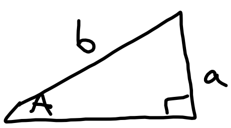
$$c = \frac{14.4 \sin 72.6°}{\sin 52.6°} \approx \boxed{17.3 = c}$$

ASS, The Problematic Triangle

one solution:



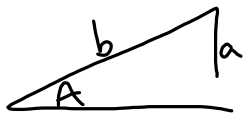
$a > b$



$a < b$

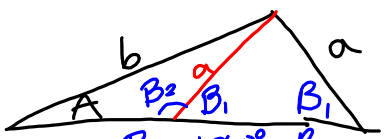
$B = 90°$

no solutions:



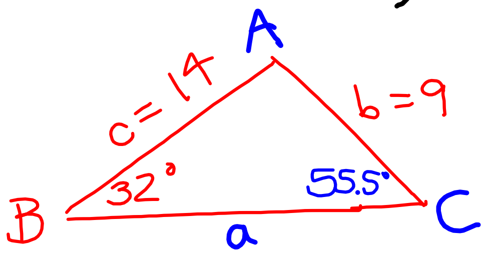
$a < b$

two solutions: $a < b$



$B_2 = 180° - B_1$

14. $B = 32°$, $c = 14$, $b = 9$



$b < c$ ASS → 0, 1, or 2 solutions

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

$$\frac{\sin C}{14} = \frac{\sin 32°}{9}$$

$$\sin C = \frac{14 \sin 32°}{9}$$

$$C = \sin^{-1}\left(\frac{14 \sin 32°}{9}\right) \approx \boxed{55.5° = C}$$

$$\angle A = 180° - 55.5° - 32°$$

$$\boxed{A = 92.5°}$$

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

$$a = \frac{b \sin A}{\sin B} = \frac{9 \sin 92.5°}{\sin 32°} \approx \boxed{17.0 = a}$$