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

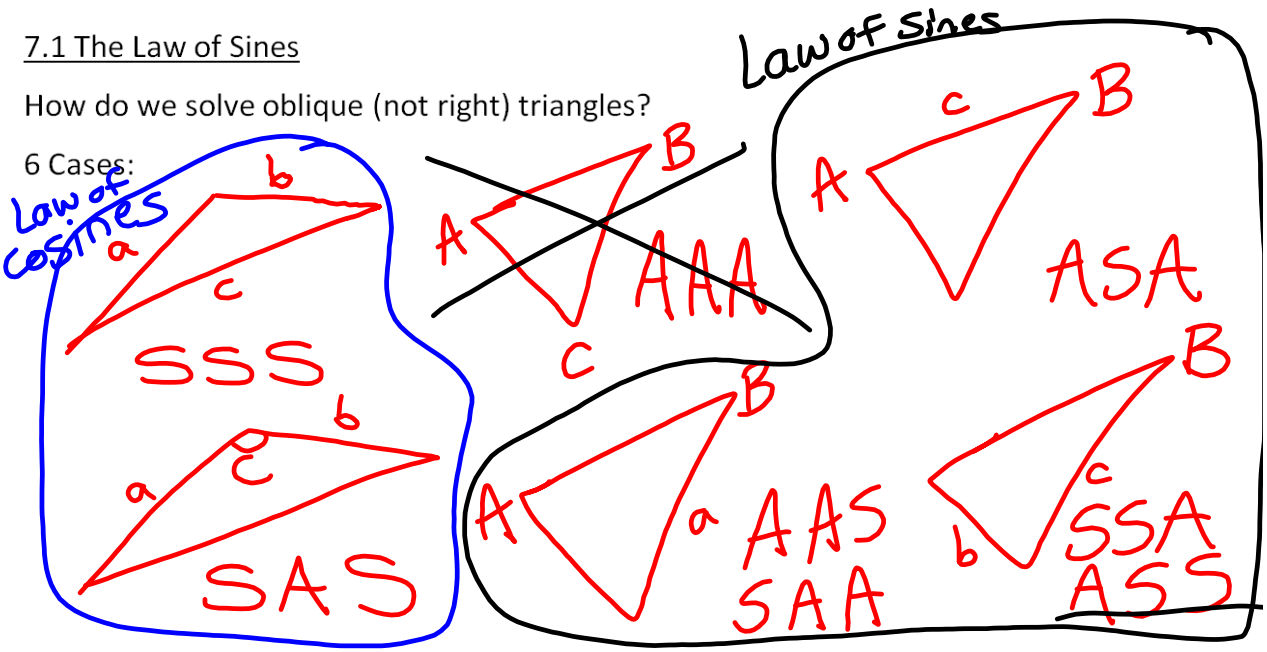
- Upcoming:
- 7.1 Law of Sines
- 7.2 Law of Cosines

Math Team Captain:
Maria Trifas

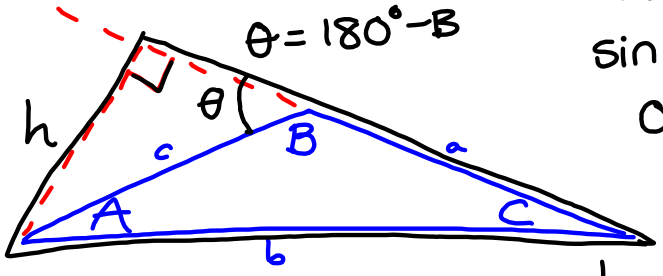
7.1 The Law of Sines

How do we solve oblique (not right) triangles?

6 Cases:



Derivation of the Law of Sines



$\sin(180° - B) =$
$\sin 180° \cos B - \cos 180° \sin B =$
$0 \cdot \cos B - (-1)\sin B =$
$= \sin B$

$\sin C = \frac{h}{b}$ $\sin\theta = \frac{h}{c}$

$\sin B = \frac{h}{c}$

$b \sin C = h$ $c \sin B = h$

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

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

The Law of Sines

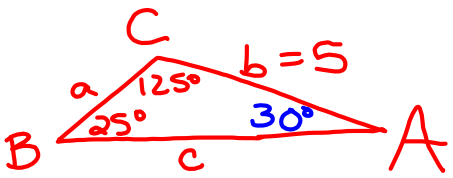
$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

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

$\angle A = 180° - 125° - 25°$

$\boxed{\angle A = 30°}$

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

$\frac{a}{\sin 30°} = \frac{5}{\sin 25°}$

$a = \frac{5\sin 30°}{\sin 25°}$

$\boxed{a \approx 5.9}$

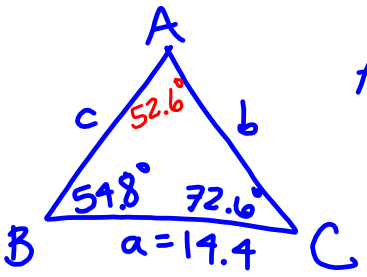
$\frac{c}{\sin C} = \frac{b}{\sin B}$

$\frac{c}{\sin 125°} = \frac{5}{\sin 25°}$

$c = \frac{5\sin 125°}{\sin 25°}$

$\boxed{c \approx 9.7}$

8. $B=54.8°, C=72.6°, a=14.4$



ASA → Law of Sines

$\angle A = 180° - 54.8° - 72.6°$

$\boxed{\angle A = 52.6°}$

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

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

$\boxed{b \approx 14.8}$

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

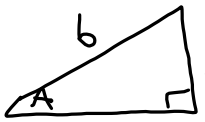
$c = \frac{14.4\sin 72.6°}{\sin 52.6°}$

$\boxed{c \approx 17.3}$

ASS, The Problematic Triangle

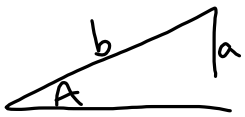
one solution:

$a > b$



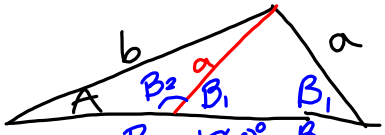
$a < b$, $B = 90°$

no solutions:



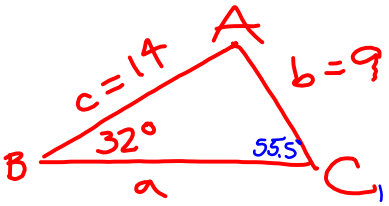
$a < b$

two solutions: $a < b$



$B_2 = 180° - B_1$

14. $B = 32°$, $c = 14$, $b = 9$



ASS → Law of Sines

problematic - 0, 1, or 2 solutions

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

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

$\sin C = \frac{14 \sin 32°}{9}$

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

$C_1 \approx 55.5°$

$\angle A = 180° - 32° - 55.5°$

$\angle A_1 \approx 92.5°$

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

$\frac{a}{\sin 92.5°} = \frac{9}{\sin 32°}$

$a = \frac{9 \sin 92.5°}{\sin 32°}$

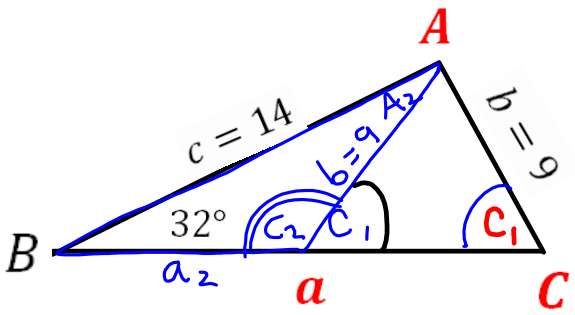
$a_1 \approx 17.0$

7.1 The Law of Sines, continued

ASS – Problematic Triangle

14. $B = 32°, c = 14, b = 9$

Case 1: $C \approx 55.5°, A \approx 92.5°, a \approx 17$



$C_2 = 180° - C_1$

$= 180° - 55.5°$

$C_2 \approx 124.5°$

$A_2 = 180° - 32° - 124.5°$

$A_2 \approx 23.5°$

$\frac{a_2}{\sin A_2} = \frac{9}{\sin 32°}$

$a_2 = \frac{9 \sin(23.5°)}{\sin 32°}$

$a_2 \approx 6.8$