Assignments for the Week of Oct. 17

- Read 7.1-7.3
- 45 minutes of Khan Academy
- Textbook assignment due Friday 10/21:
  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

Test #4 - Friday, 10/21

1. $\cos^{-1}\left(-\frac{1}{2}\right) = \boxed{\frac{2\pi}{3}}$

2. $\sin\frac{7\pi}{4} = \boxed{\frac{-1}{\sqrt{2}}} = -\frac{\sqrt{2}}{2}$

3. $\cot^{-1}\left(\cot\frac{2\pi}{3}\right) = \boxed{\frac{2\pi}{3}}$

4. $\csc\frac{4\pi}{3} = \boxed{\frac{-2}{\sqrt{3}}} = \frac{-2\sqrt{3}}{3}$

5. $\sec^{-1}(-\sqrt{2}) = \boxed{\frac{3\pi}{4}}$

$\cot^{-1}\left(\cot\frac{-\pi}{3}\right) = \frac{2\pi}{3}$

$\cot^{-1}\left(\cot\frac{4\pi}{3}\right) = \frac{\pi}{3}$

$2\sin^2 x = \sin x$

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

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

$\sin x = 0$, $2\sin x - 1 = 0$

$\boxed{x = 0, \pi}$

$\sin x = 1/2$

$\boxed{x = \frac{\pi}{6}, \frac{5\pi}{6}}$

$1 - 4\cos^2 x = 0$

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

$\cos x = 1/2$, $\cos x = -1/2$

$1 = 4\cos^2 x$

$\frac{1}{4} = \cos^2 x$

$\pm\frac{1}{2} = \cos x$

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

The Law of Sines

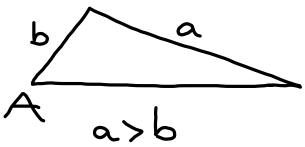
$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

or

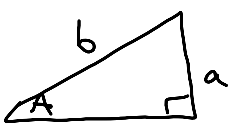
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

ASS, The Problematic Triangle

one solution:



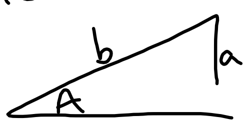
$a > b$



$a < b$

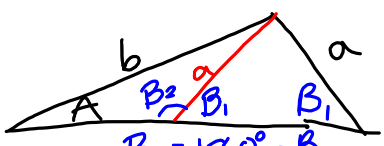
$B = 90°$

no solutions:



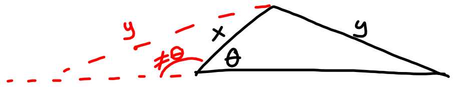
$a < b$

two solutions: $a < b$

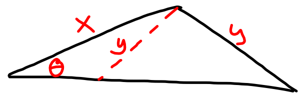


$B_2 = 180° - B_1$

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:



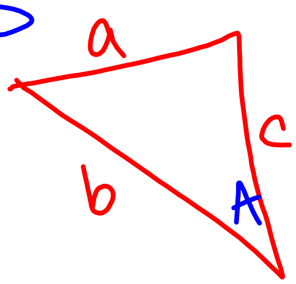
The Law of Cosines

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

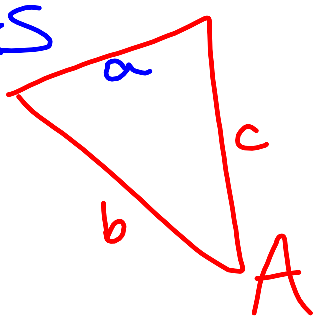
$$b^2 = a^2 + c^2 - 2ac\cos B$$

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

SSS

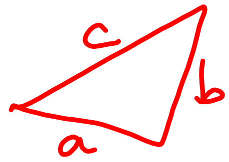


SAS



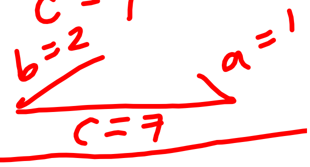
7.2 SSS ⇒ Law of Cosines

16. $a = 60, b = 88, c = 120.\ B = ?$



$a + b > c$

$a = 1$
$b = 2$
$c = 7$



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

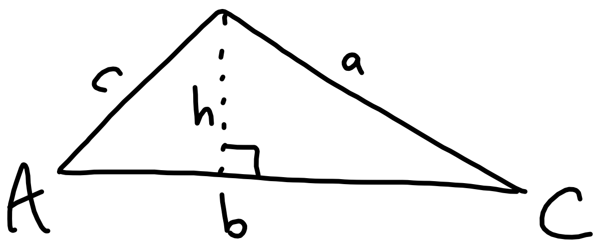
$$2ac\cos B = a^2 + c^2 - b^2$$

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

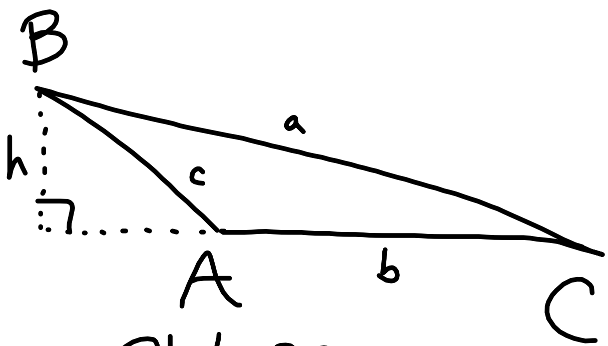
$$B = \cos^{-1}\left(\frac{a^2 + c^2 - b^2}{2ac}\right)$$

$$= \cos^{-1}\left(\frac{60^2 + 120^2 - 88^2}{2(60)(120)}\right) \approx \boxed{44.6^\circ}$$

7.1/7.2 Area of a Triangle



Acute



Obtuse

$\sin A = \frac{h}{c}$
$c \sin A = h$
area $= \frac{1}{2} b \cdot c \sin A$

$\sin A = \frac{h}{c}$
$c \sin A = h$
area $= \frac{1}{2} b \cdot c \sin A$

Area of a △

$K = \frac{1}{2} bc \sin A$

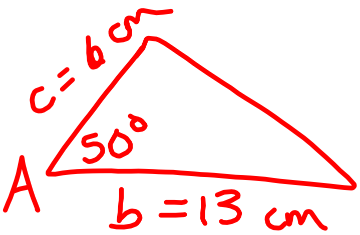
$K = \frac{1}{2} ac \sin B$

$K = \frac{1}{2} ab \sin C$

$\frac{1}{2}$ the product of 2 sides & the sine of the included angle

Find the area of the triangle.

$A = 50°, b = 13\ cm, c = 6\ cm$



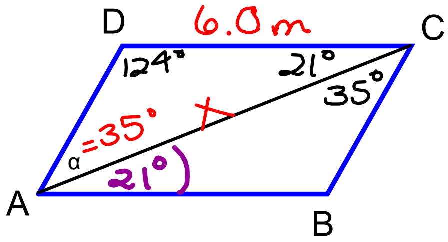
$\text{area} = \frac{1}{2}(6\text{cm})(13\text{cm}) \sin 50°$

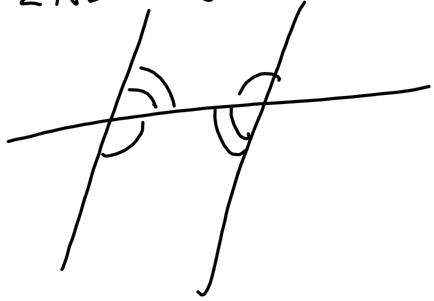
$= \boxed{29.9\ cm^2}$

7.1 #28

The longer side of a parallelogram is 6.0 meters. The measure of angle BAD is 56° and α is 35°. Find the length of the longer diagonal.

$\angle ADC = 180° - 56°$



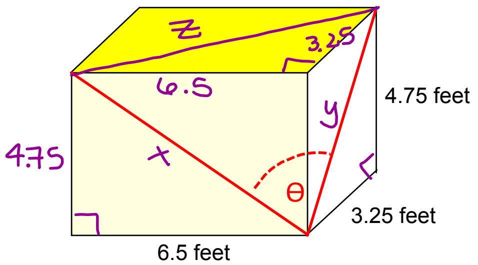


$$\frac{x}{\sin 124°} = \frac{6}{\sin 35°}$$

$$x = \frac{6 \sin 124°}{\sin 35°} = \boxed{8.7\text{ m}}$$

7.2 #41

The rectangular box in the figure measures 6.50 feet by 3.25 feet by 4.75 feet. Find the measure of the angle ϴ that is formed by the union of the diagonal shown on the front of the box and the diagonal shown on the right side of the box.



$$x^2 = 4.75^2 + 6.5^2$$
$$x = \sqrt{4.75^2 + 6.5^2} = 8.05$$
$$y^2 = 3.25^2 + 4.75^2$$
$$y = \sqrt{3.25^2 + 4.75^2} = 5.76$$
$$z^2 = 6.5^2 + 3.25^2$$
$$z = \sqrt{6.5^2 + 3.25^2} = 7.27$$

$$z^2 = x^2 + y^2 - 2xy\cos\theta$$
$$2xy\cos\theta = x^2 + y^2 - z^2$$
$$\cos\theta = \frac{x^2 + y^2 - z^2}{2xy}$$
$$\theta = \cos^{-1}\left(\frac{x^2 + y^2 - z^2}{2xy}\right) = \cos^{-1}\left(\frac{8.05^2 + 5.76^2 - 7.27^2}{2(8.05)(5.76)}\right)$$
$$\boxed{\theta = 60.88°}$$