6.4 Applications Day 2

~~Warm-Up Tuesday (notecard)~~

A damsel is in distress and is being held captive in a tower. Her knight in shining armor is on the ground below with a ladder. When the knight stands 15 feet from the base of the tower and looks up to his precious damsel, the angle of elevation to her window is 60 degrees. How long does his ladder have to be?

~~About Me~~

1. Would you rather live like a king but with no friends or family, or be homeless with all your friends and family?

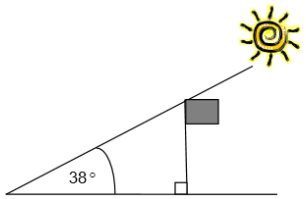
2. Would you rather know WHEN you're going to die or HOW you're going to die?

Questions, Comments, Concerns?

6.4 Real World Triangle Problems Name _____
Trig

#1-3

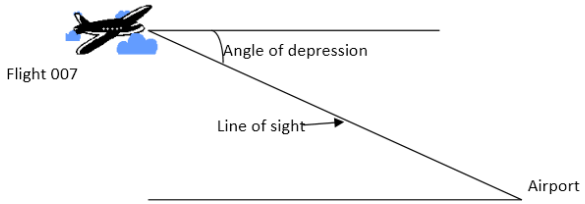
1. *Flagpole Problem:* Calvin Butterball is waiting outside the school building for his trigonometry test to begin. He observes that the flag-pole is casting a shadow on the ground and decides to calculate how high the pole is. He steps off the shadow, finding it to be 22 meters long. From an almanac, he finds that the Sun's angle of elevation is 38°. How tall is the pole?



2. *Airplane Problem:* Aloha Airlines Flight 007 is approaching Kahului Airport at an altitude of 5 kilometers. The angle of depression from the plane to the airport is 9°32'.

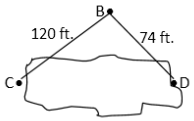
   a) What is the plane's ground distance from the airport?
   b) If the plane descends directly along the line of sight, how far will it travel along this line in reaching the airport?

9.6°

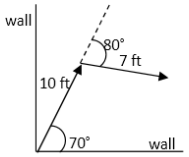


3. *Swimming Problem:* You swim at 3 kph with your body perpendicular to a stream with a current of 5 kph. Find your actual velocity and the angle it makes with the direction you are heading.

4. An engineer wants to measure the width of a sinkhole. He places a stake at B as shown and measures from the stake to C and D as shown. If the angle at B is 103°, how wide is the sinkhole?



5. Suppose you start at the corner of a room and walk 10 feet at an angle of 70° to the right hand wall. Then you turn 80° clockwise and walk another 7 ft. If you had walked straight from the corner of the room to your stopping point, how far and in what direction would you have walked?



6. The pilot of a commercial airplane finds it necessary to detour around a group of thunderstorms, as shown. He turns the plane at an angle of 21° to his original path, flies 100 km, turns, and then rejoins his original path 70 km from where he left it.

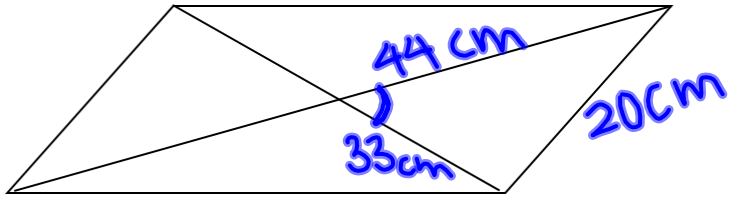
a) How much further did he have to fly because of the detour?
b) At what angle did he rejoin his original course?

6.4 Applications

EQ: How do I solve word problems with the law of sines and cosines?

↗ bisect each other

1. The diagonals of a parallelogram are 88 cm and 66 cm. The shorter side is 20 cm. Find the acute angle formed by the two diagonals. {nearest tenth}



NORMAL FLOAT AUTO a+bi DEGREE MP

Hns▸Frac

$-\frac{181}{651}$

$20^2-44^2-33^2$

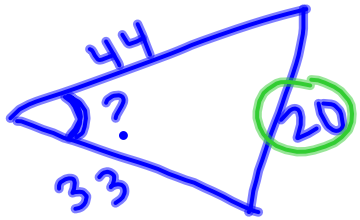
-2625

Ans/(-2*44*33)

0.9039256198

cos⁻¹(0.9039256198

25.32103139



SSS → cosines

$20^2 = 44^2 + 33^2 - 2(44)(33)\cos C$

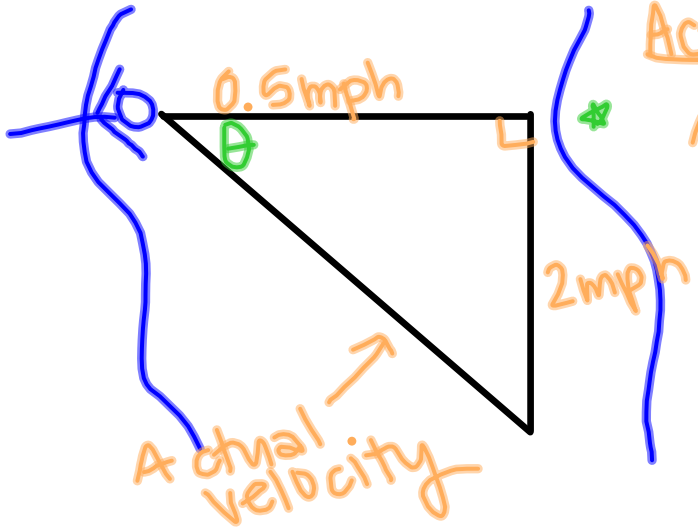
$0.904... = \cos C$

$25.3°$

6.4 Applications

EQ: How do I solve word problems with the law of sines and cosines?

2. Swimming Problem: You swim at 0.5mph with your body perpendicular to a stream with a current of 2mph. Find your actual velocity and the angle it makes with the direction you are heading.



Actual velocity: pythag.

$\sqrt{(0.5)^2 + (2)^2} = \sqrt{c^2}$

2.06 mph

Angle

$\tan\theta = \frac{O}{A}$

$\tan\theta = \frac{2}{0.5}$

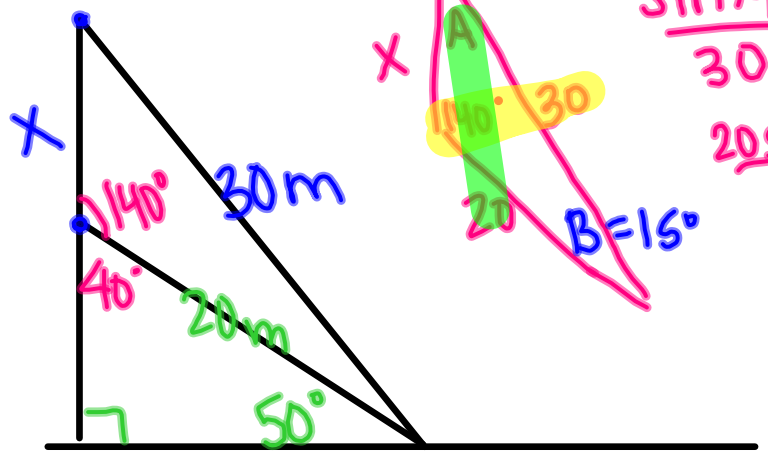
$\theta = \tan^{-1}(2/0.5)$

76°

6.4 Applications

EQ: How do I solve word problems with the law of sines and cosines?

3. A guy wire bracing a transmission tower is 20 meters long and makes an angle of 50° with the ground. It is to be replaced by a 30 meter wire starting from the same point on the ground. How much farther up the tower will the new wire reach? {nearest 10th}



$\frac{\sin 140}{30} = \frac{\sin A}{20}$

$\frac{20\sin 140}{30} = \sin A$

$A = 25°$

$\frac{\sin 140}{30} = \frac{\sin 15}{x}$

$\frac{30\sin 15}{\sin 140} = x$

12.1 m

6.4 Applications Day 2

~~Today...~~

- You have a TEST on FRIDAY & I will NOT be here for tutorials on Thursday or Friday. You need to figure out what you need help on NOW rather than waiting until the last minute!!
- TOMORROW will be the LAST day to earn stamps for both 6.4 (word problem) assignments.
- You will turn in your calendar with (hopefully) 5 total stamps at the end of class ~~TOMORROW~~ THURSDAY.

Pre-Calculus
6.4 Day 2 Worksheet #1-4

6.4 Day 1 #1-3
6.4 Day 2 #1-4

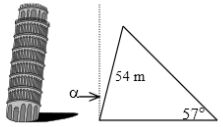
Name _____

Draw a picture. Set up the problem using the Law of Sines, and solve. Show all work. Round all answers to the nearest hundredth.

1. A surveyor marks points A and B 200 meters apart on one bank of a river. She sights a point C on the opposite bank and determines <A = 57° and <B = 42°. What is the distance from A to C?

2. A forest fire is spotted from two fire towers. The triangle determined by the two towers and the fire has angles of 28° and 37° at the tower vertices. If the towers are 3000 meters apart, which one is closer to the fire?

3. A visitor to the Leaning Tower of Pisa observed that the tower's shadow was 40 meters long and the angle of elevation from the tip of the shadow to the top of the tower was 57°. The tower is now 54 meters tall (measured from the ground to the top along the center line of the tower). Approximate the angle α that the center line of the tower makes with the vertical line.



4. An airplane (A) takes off from a carrier (C) and flies in a straight line for 12 kilometers. At that instant, and observer on destroyer D, located 5 kilometers from the carrier, notes that the angle determined by the carrier, destroyer and the plane (<CDA) is 37°. How far is the plane from the destroyer?

Pre-Calculus

5. A plane flying in a straight line passes directly over point A on the ground and later directly over point B, which is 3 miles from A. A few minutes after the plane passes over B, the angle of elevation from A to the plane is 43° and the angle of elevation from B to the plane is 67°. How high is the plane at that moment?

6. Two straight roads meet an angle of 40° in Harville, one leading to Eastview and the other to Wellston. Eastview is 18 miles from Harville and 20 miles from Wellston. What is the distance from Harville to Wellston?