HW 5-6

1. A=52.4°, B=29.7°, C=97.9°

2. 33.2

3. 46.0
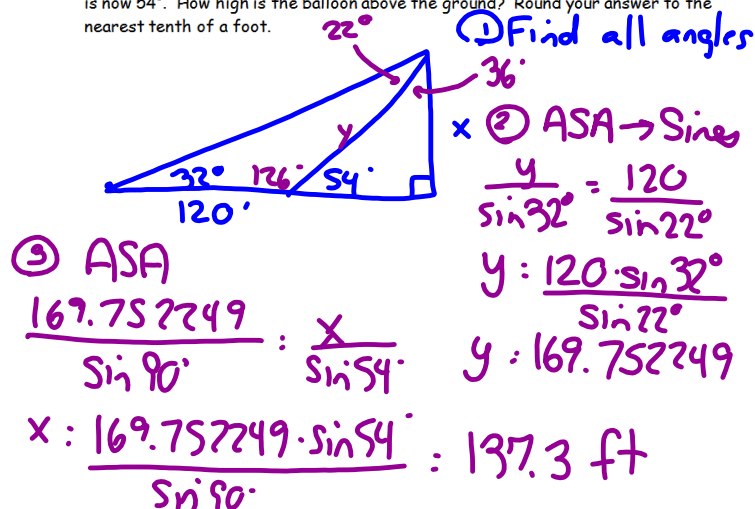
4. 30.1

5. 29°56'

More Applications of Trig Laws   Unit 5 Day 7

Law of Sines: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Law of Cosines: $c^2 = a^2 + b^2 - 2ab\cos C$

Area of a Triangle: $k = \frac{1}{2}ab\sin C$

For each problem, draw a diagram to represent the given information.

1. Katie is out with her parents at the Long Island State Fair when she sees a large balloon with her name on it. Her dad tells her the angle of elevation is 32° but Katie is in too much of a hurry to get closer to the balloon to listen. She runs 120 feet toward the balloon before he mom catches up to her and says the angle of elevation is now 54°. How high is the balloon above the ground? Round your answer to the nearest tenth of a foot.

(handwritten work):

22°

36°

① Find all angles

② ASA → Sines

$\dfrac{y}{\sin 32°} = \dfrac{120}{\sin 22°}$

$y = \dfrac{120 \cdot \sin 32°}{\sin 22°}$

$y = 169.752249$

32° 126° 54°
120'

③ ASA

$\dfrac{169.752249}{\sin 90°} = \dfrac{x}{\sin 54°}$

$x = \dfrac{169.752249 \cdot \sin 54°}{\sin 90°} = 137.3 \text{ ft}$

2. A surveyor on the ground takes 2 readings of the angle of elevation of the top of a tower. The readings are taken 150' apart and are 50° and 70°. Find the height of the tower to the nearest foot.
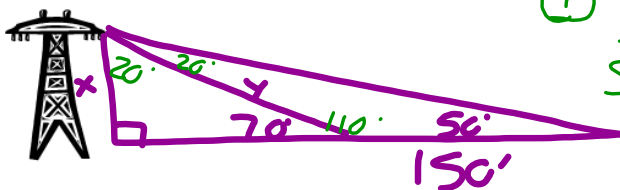
①

$$\frac{y}{\sin 50°} = \frac{150}{\sin 20°}$$

$$y = \frac{150 \cdot \sin 50°}{\sin 20°}$$

$$y = 335.964617$$

②

$$\frac{y}{\sin 90°} = \frac{x}{\sin 70°}$$

$$x = \frac{y \cdot \sin 70°}{\sin 90°} = 315.7 ft = 316 ft$$

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3. A ship captain at sea uses a sextant to sight an angle of elevation of 37° to the top of a lighthouse. After the ship travels 250 feet directly toward the lighthouse, another sighting is made, and the new angle of elevation is 50°. The ship's charts show that there are dangerous rocks 100 feet from the base of the lighthouse. Find, to the nearest foot, how close to the rocks the ship is at the time of the second sighting.
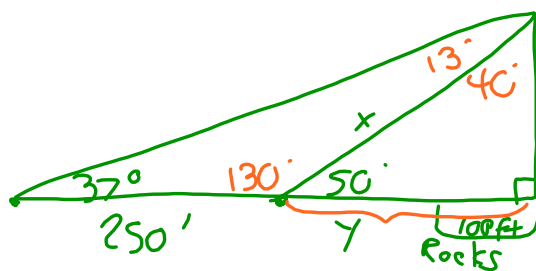
①

$$\frac{x}{\sin 37°} = \frac{250}{\sin 13°}$$

$$x = \frac{250 \sin 37°}{\sin 13°}$$

$$x = 668.8288536$$

②

$$\frac{x}{\sin 90°} = \frac{y}{\sin 40°}$$

$$y = \frac{x \sin 40°}{\sin 90°}$$

$$y = 429.9 \approx 430'$$

$$430' - 100 = 330' \text{ feet away}$$

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2

4. Carmen and Jamal are standing 1 mile apart on a straight, horizontal road. They observe a hot-air balloon between them directly above the road. The angle of elevation from Carmen is 60° and from Jamal is 75°. Draw a diagram to illustrate this situation and find the height of the balloon to the nearest foot.

45°

y   x

C 60°   75° J
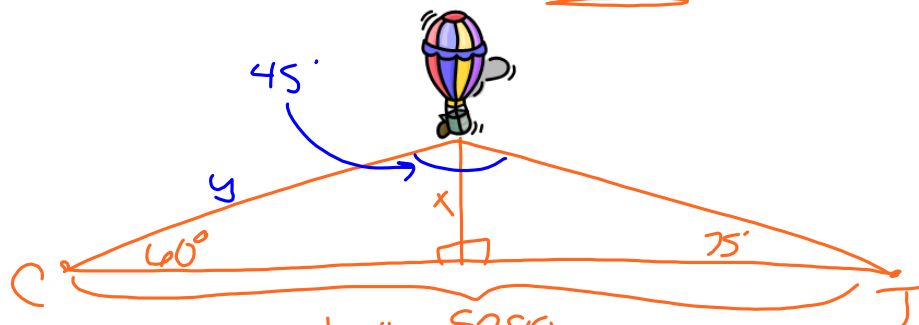
1 mile = 5280

"5 tomatoes"

① $\dfrac{y}{\sin 75°} = \dfrac{5280}{\sin 45°}$

$y = \dfrac{5280 \cdot \sin 75°}{\sin 45°}$

$y = 7212.614132$

② $\dfrac{y}{\sin 90°} = \dfrac{x}{\sin 60°}$

$x = \dfrac{y \sin 60°}{\sin 90°}$

$x = 6246'$

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