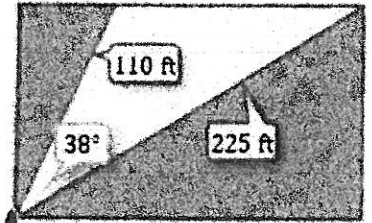


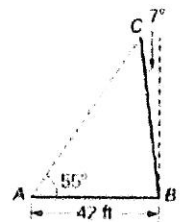
Problem 1

A stationary surveillance camera is set up to monitor activity in the parking lot of a shopping mall. If the camera has a 38° field of vision, how many square feet of the parking lot can it tape using the given dimensions?



Problem 2: Two radar stations are 20 miles apart. The angle of elevation to an airplane that is BETWEEN the two radar stations from Radar Station Alpha is 15 degrees. The angle of elevation to the same airplane from Radar Station Bravo is 35 degrees. Determine the height of the airplane and the distance from the airplane to each radar station.

Problem 3: A pole leans away from the sun at an angle of 7 degrees to the vertical, as shown in the figure to the right. When the angle of elevation to the sun is 55 degrees, the shadow is 42 feet along the ground. How long is the pole?

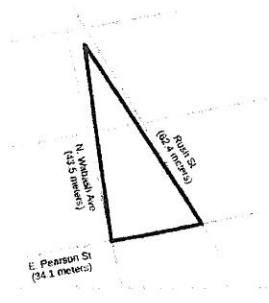


Problem 4:

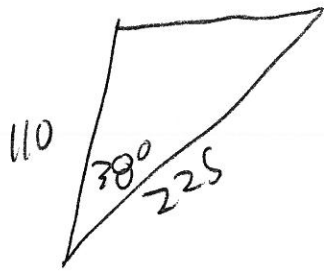
In order to estimate the height of a building, two students stand at a certain distance from the building at street level. From this point, they find the angle of elevation from the street to the top of the building to be 39° . They then move 300 feet closer to the building and find the angle of elevation to be 50° . Assuming that the street is level, estimate the height of the building to the nearest foot.

Problem 5: On many cell phones with GPS, an approximate location can be given before the GPS signal is received. This is accomplished through a process called triangulation, which works by using the distances from two known points. Suppose there are two cell phone towers within range of a cell phone. The two towers are located 6000 feet apart along a straight highway, running east to west, and the cell phone is north of the highway. Based on the signal delay, it can be determined that the signal is 5,050 feet from the first tower and 2,420 feet from the second tower. Determine the position of the cell phone north and east of the first tower, and determine how far it is from the highway.

Problem 6: A Chicago city developer wants to construct a building consisting of artist's lofts on a triangular lot bordered by Rush Street, Wabash Avenue, and Pearson Street. The frontage along Rush Street is approximately 62.4 meters, along Wabash Avenue it is approximately 43.5 meters, and along Pearson Street it is approximately 34.1 meters. If the taxes are based on the area of the plot and the tax rate is \$15,000 per square meter, then determine the tax bill to the nearest dollar.



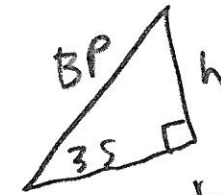
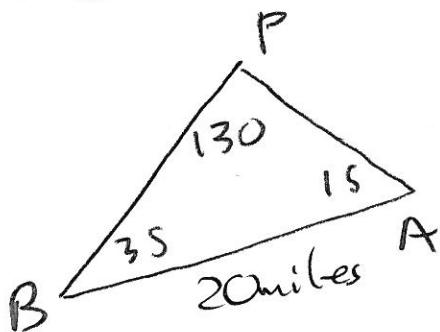
Problem (1)



$$A = \frac{1}{2} (110)(225) \sin 38$$

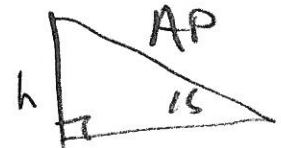
$$= 7618.811 \text{ ft}^2$$

Problem (2)



$$\sin 35 = \frac{h}{BP}$$

$$h = BP \sin 35$$



$$\sin 15 = \frac{h}{AP}$$

$$h = AP \sin 15$$

$$\frac{BP}{\sin 15} = \frac{20}{\sin 130}$$

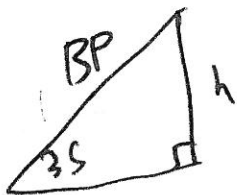
$$BP = \frac{20 \sin 15}{\sin 30}$$

$$\approx 6.757$$

$$\frac{AP}{\sin 35} = \frac{20}{\sin 130}$$

$$AP = \frac{20 \sin 35}{\sin 130}$$

$$\approx 14.975$$



$$\sin 35 = \frac{h}{BP}$$

$$h = BP \sin 35$$

$$= \frac{20 \sin 15}{\sin 130} \cdot \sin 35$$

$$\approx 3.876$$



$$\sin 15 = \frac{h}{AP}$$

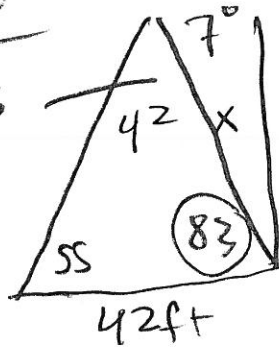
$$h = AP \sin 15$$

$$= \frac{20 \sin 35}{\sin 130} \cdot \sin 15$$

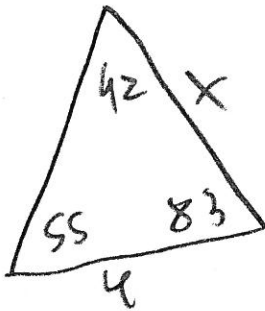
$$= 3.876$$

Problem 3

$$180 - 55 - 83$$



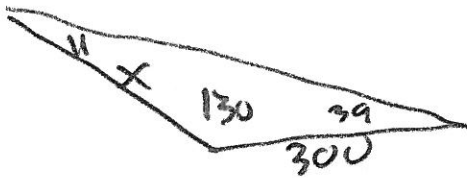
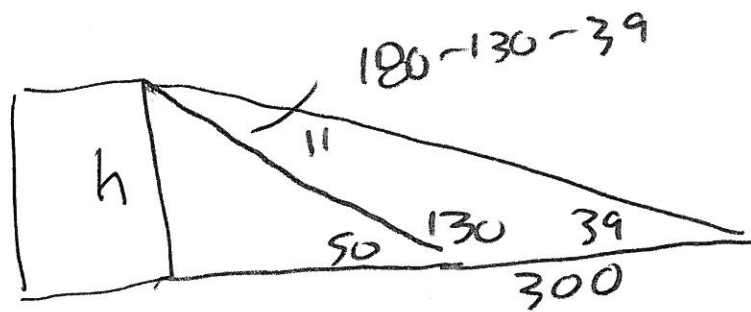
$$\frac{42}{\sin 42} = \frac{x}{\sin 55}$$



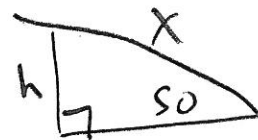
$$x = \frac{42 \sin 55}{\sin 42}$$

$$x \approx 51.417$$

Problem 4



$$\frac{x}{\sin 39} = \frac{300}{\sin 11}$$



$$\sin 50 = \frac{h}{x}$$

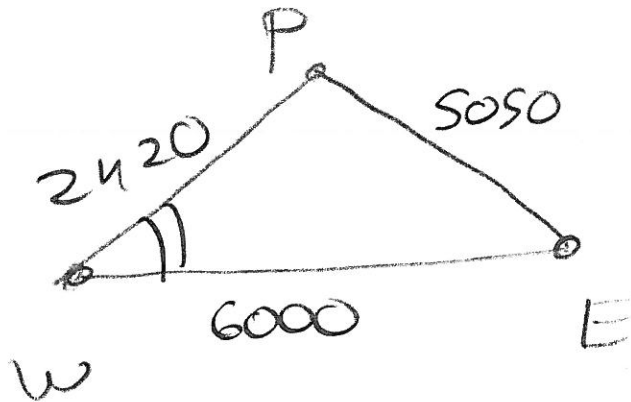
$$x \sin 50 = h$$

$$x = \frac{300 \sin 39}{\sin 11} \approx 989.451$$

$$h = \frac{300 \sin 39}{\sin 11} \cdot \sin 50$$

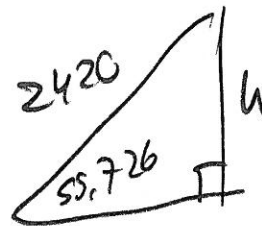
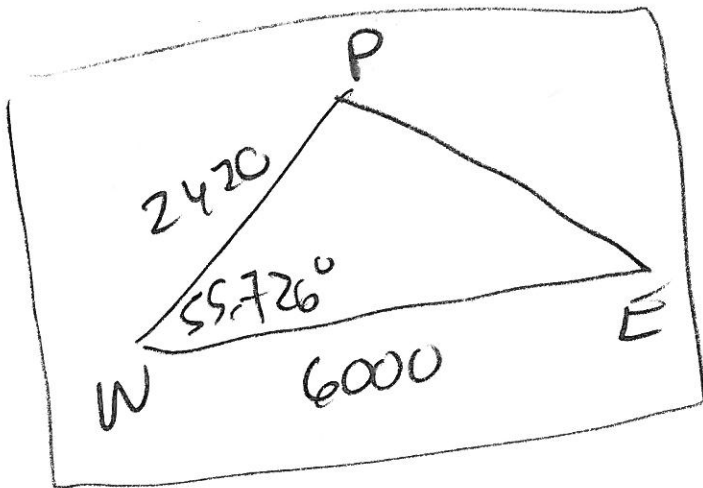
$$\approx 757.963$$

Problem 5



$$\cos W = \frac{2420^2 + 6000^2 - 5050^2}{2(2420)(6000)}$$

$$W = \cos^{-1}\left(\frac{2420^2 + 6000^2 - 5050^2}{2(2420)(6000)}\right) \approx 55.726$$

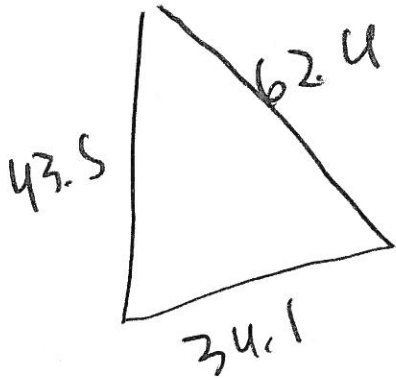


$$\sin 55.726 = \frac{h}{2420}$$

$$h = 2420 \sin 55.726$$

$$h \approx 1999.777$$

Problem 6



$$S = \frac{1}{2} (43.5 + 62.4 + 34.1)$$
$$= \frac{1}{2} (140)$$
$$S = 70$$

$$A = \sqrt{S(S-a)(S-b)(S-c)}$$

$$A = \sqrt{70(70-43.5)(70-62.4)(70-34.1)}$$

$$A = 711.4198$$

Tax Rate 15000 per m^2

$$\text{Tax} = 15000 \cdot A$$
$$= 15000 (711.4198)$$
$$\approx 10671,297$$