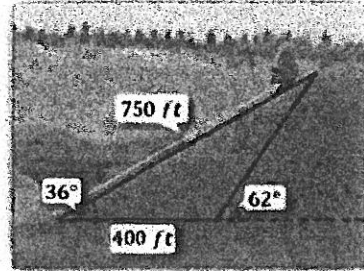


Show all work in a clear and easy to follow manner.

Problem 1

A hill has an angle of inclination of 36° , as shown in the accompanying figure. A study completed by a state's highway commission showed that the placement of a highway requires that 400 ft of the hill, measured horizontally, be removed. The engineers plan to leave a slope alongside the highway with an angle of inclination of 62° , as shown in the figure. Located 750 ft up the hill measured from the base is a tree containing the nest of an endangered hawk. Will this tree be removed in the excavation?



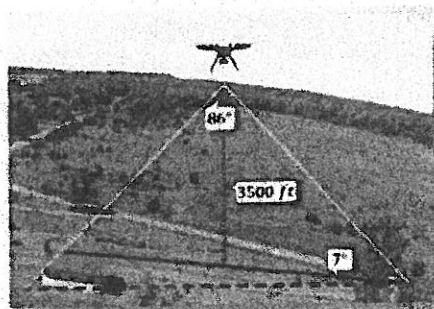
Problem 2

Draw and Label related figure

A painter is going to apply a special coating to a triangular metal plate on a new building. Two sides measure 16.1 m and 15.2 m. She knows that the angle between these sides is 125° . What is the area of the surface she plans to cover with the coating?

Problem 3

A camera lens with a 6-in. focal length has an angular coverage of 86° . Suppose an aerial photograph is taken vertically with no tilt at an altitude of 3500 ft over ground with an increasing slope of 7° , as shown in the accompanying figure. Calculate the ground distance CB that will appear in the resulting photograph.



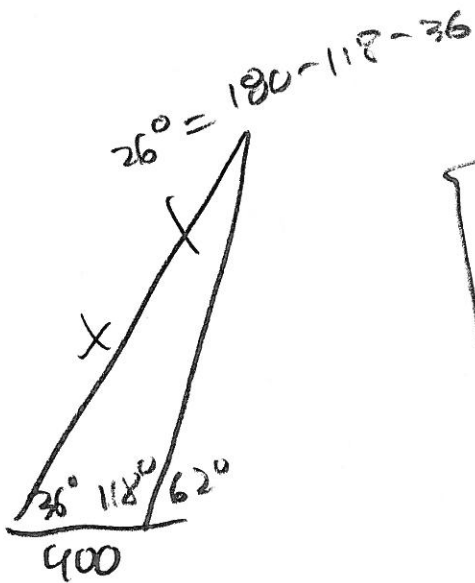
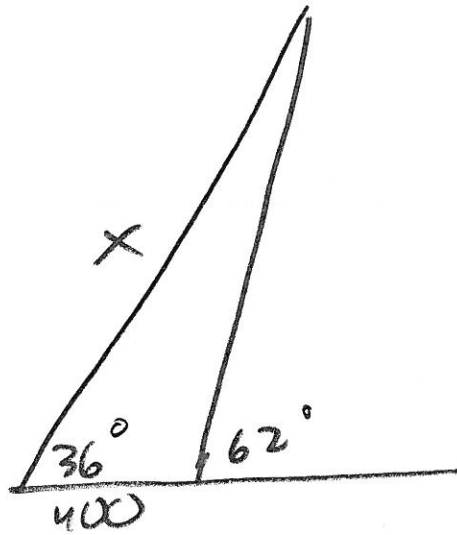
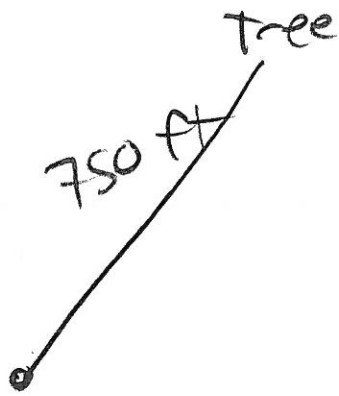
Problem 4

A flagpole 95 feet tall is on top of a building. From a point on level ground, the angle of elevation to the top of the flag pole is 35° and the angle to the bottom of the flag pole is 26° . Find the height of the building.

Problem 5

A painter needs to cover a triangular region with sides of lengths 75 meters, 68 meters, and 85 meters. A can of paint covers 75 square meters of area. How many cans will be needed?

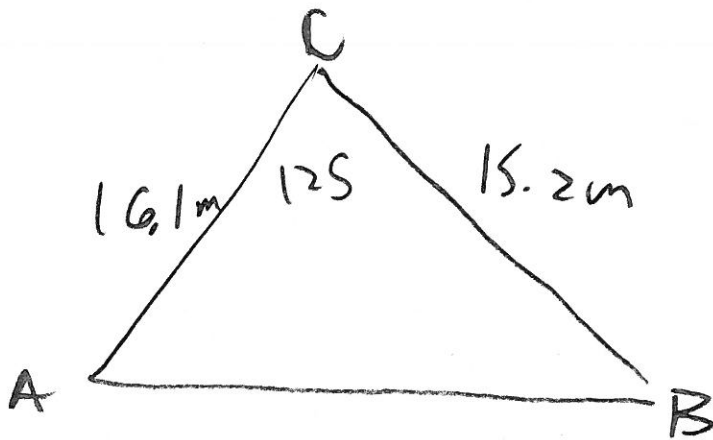
①



$$\frac{x}{\sin 118} = \frac{400}{\sin 26}$$
$$x = \frac{400 \sin 118}{\sin 26} \approx 805.662$$

Since $x > 750$ tree will be lost

Problem 2



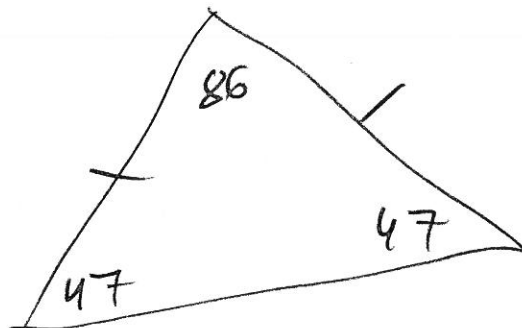
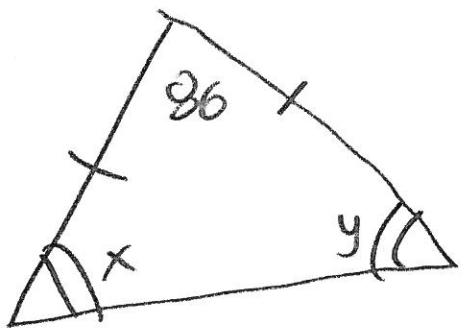
$$A = \frac{1}{2} ab \sin C$$

$$= \frac{1}{2} (16.1)(15.2) \sin 125^\circ$$

$$= 122.36 \sin 125$$

$$A = 100.231 \text{ m}^2$$

Problem 3

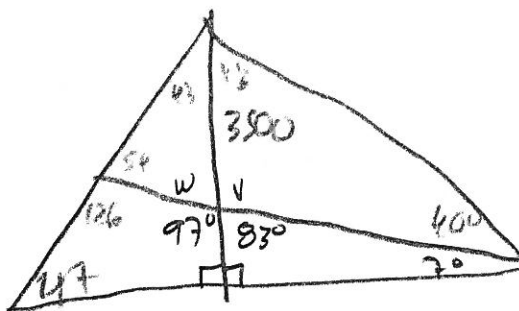
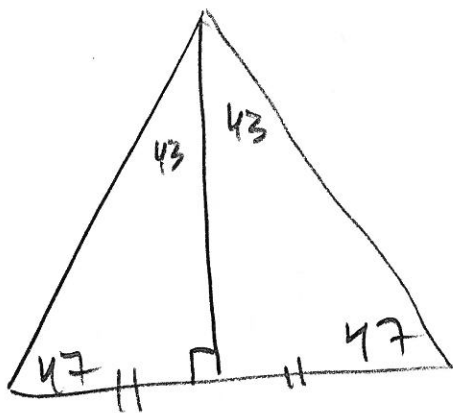
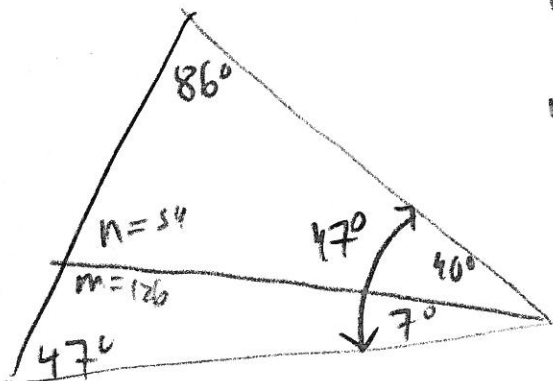


$$x = y$$

$$\frac{180 - 86}{2} = \frac{94}{2} = 47$$

$$n = 180 - 86 - 40 = 54$$

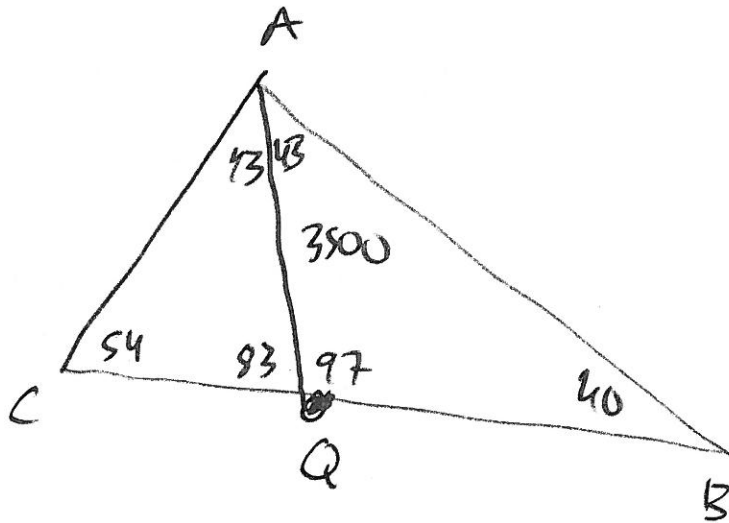
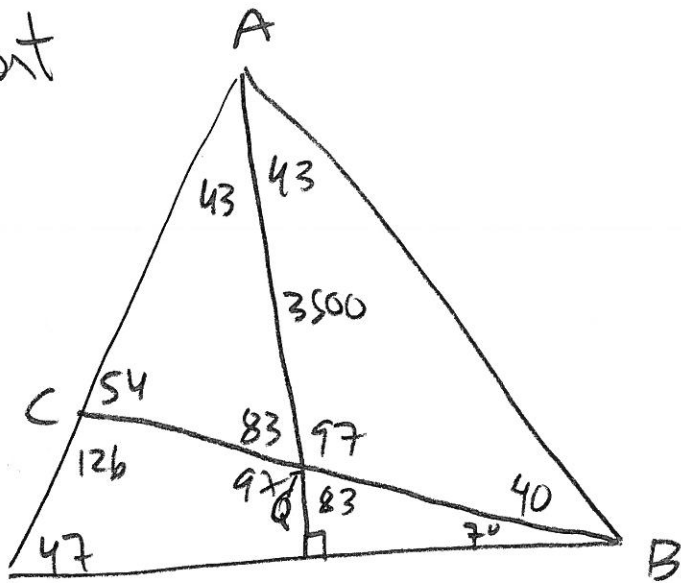
$$m = 180 - 47 - 7 = 126^\circ$$



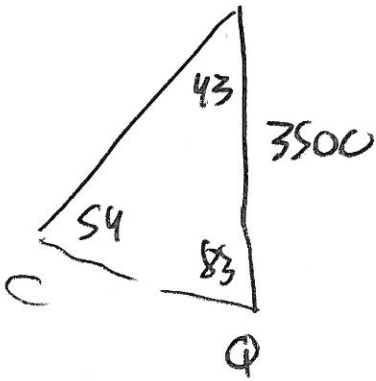
$$v = 180 - 43 - 40 = 97$$

$$w = 180 - 54 - 43 = 83$$

(3) cont

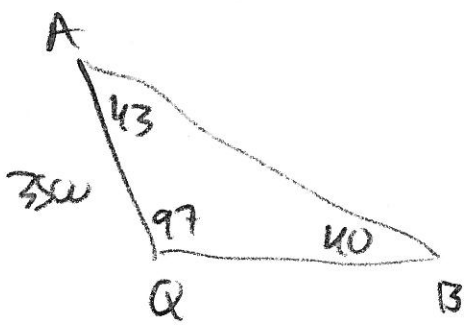


$$\begin{aligned}
 CQ + QB &= CB \\
 &= \frac{3500 \sin 43}{\sin 54} + \frac{3500 \sin 40}{\sin 40} \\
 &= 2950.487 + 3713.50 \\
 &= 6663.991
 \end{aligned}$$



$$\frac{CQ}{\sin 43} = \frac{3500}{\sin 54}$$

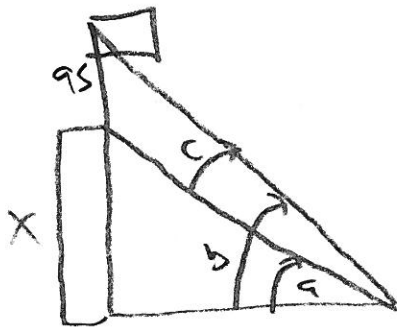
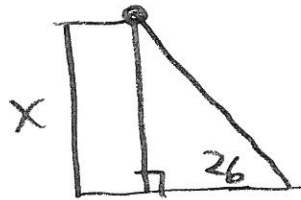
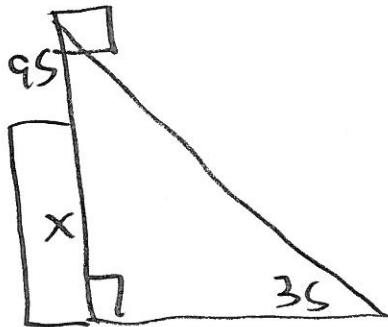
$$CQ = \frac{3500 \sin 43}{\sin 54} \approx 2950.487$$



$$\frac{QB}{\sin 43} = \frac{3500}{\sin 40}$$

$$QB = \frac{3500 \sin 43}{\sin 40} \approx 3713.504$$

Problem 4

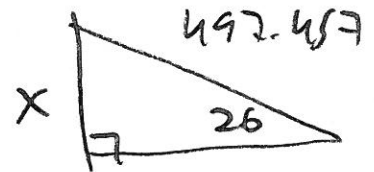


$$a + c = b$$

$$26 + c = 35$$

$$c = 35 - 26$$

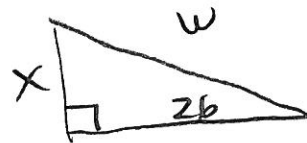
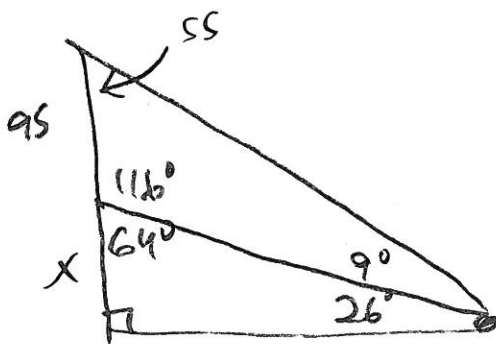
$$c = 9$$



$$\sin 26 = \frac{x}{497.457}$$

$$x = 497.457 \sin 26$$

$$\approx 218.071$$

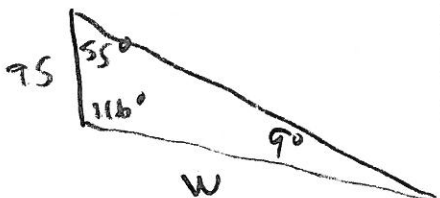


$$\sin 26 = \frac{x}{w}$$

$$x = w \sin 26$$

$$x = \frac{95 \sin 55 \sin 26}{\sin 9}$$

$$x \approx 218.070 \text{ ft}$$



$$\frac{w}{\sin 55} = \frac{95}{\sin 9}$$

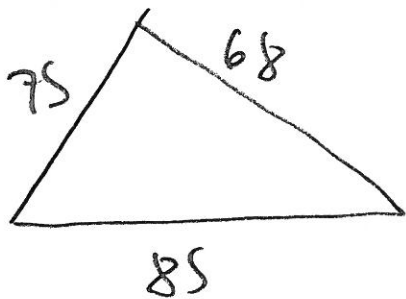
$$w = \frac{95 \sin 55}{\sin 9}$$

$$\approx 497.457$$

Building height ↗

← straight line distance to object

Problem (5)



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

$$s = \frac{75 + 68 + 85}{2}$$

$$s = \frac{228}{2}$$

$$s = 114$$

$$A = \sqrt{114(114-75)(114-68)(114-85)}$$

$$= \sqrt{114(39)(46)(29)}$$

$$= \sqrt{5930964}$$

$$= 2435.357 \text{ m}^2$$

$$N = \frac{2435.357 \text{ m}^2}{75 \text{ m}^2} = 32.471$$

$$N = 33 \text{ cars}$$