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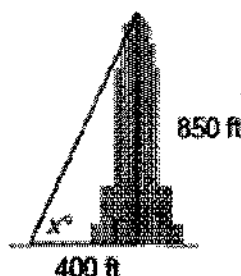
Unit 4 Review

- 1) Find the angle of elevation if you are standing 400 ft. from the base of a building that is 850 ft. tall.

$$\tan x^\circ = \frac{850}{400}$$

$$x = \tan^{-1}\left(\frac{850}{400}\right)$$

$$x = 64.8^\circ$$



- 2) You are a block away from a skyscraper that is 780 feet tall. Your friend is between the skyscraper and yourself. The angle of elevation from your position to the top of the skyscraper is 42° . The angle of elevation from your friend's position to the top of the skyscraper is 71° . To the nearest foot, how far are you from your friend?

$$\tan(42^\circ) = \frac{780}{y}$$

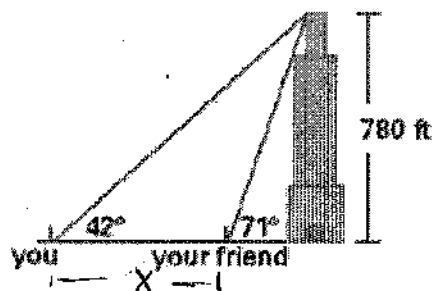
$$y = 866$$

$$\tan(71^\circ) = \frac{780}{y'}$$

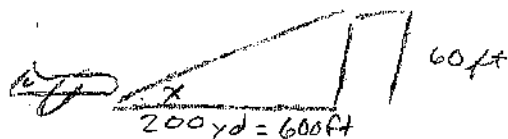
$$y' = 269$$

$$x = 866 - 269$$

$$x = 597 \text{ ft}$$



- 3) An airplane takes off 200 yards in front of a 60 foot building. At what angle of elevation must the plane take off in order to avoid crashing into the building? Assume that the airplane flies in a straight line and the angle of elevation remains constant until the airplane flies over the building.

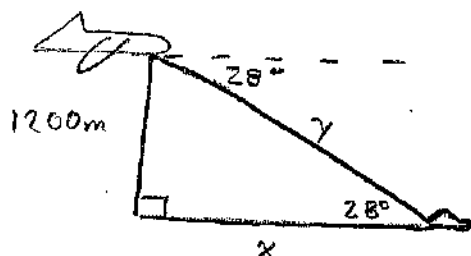


$$\tan x^\circ = \frac{60}{600}$$

$$x = \tan^{-1}\left(\frac{60}{600}\right)$$

$$x = 5.7^\circ$$

- 4) From an airplane at an altitude of 1200 m, the angle of depression to a rock on the ground measures 28° . Find the distance from the plane to the rock.



$$\tan 28^\circ = \frac{1200}{x}$$

$$x = 2256.19 \text{ m}$$

$$\sin 28^\circ = \frac{1200}{y}$$

$$y = 2556.1 \text{ m}$$

5) The accompanying diagram shows a flagpole that stands on level ground. Two cables, r and s , are attached to the pole at a point 16 feet above the ground. The combined length of the two cables is 50 feet. If cable r is attached to the ground 12 feet from the base of the pole, what is the measure of the angle, x , to the nearest degree, that cable s makes with the ground?

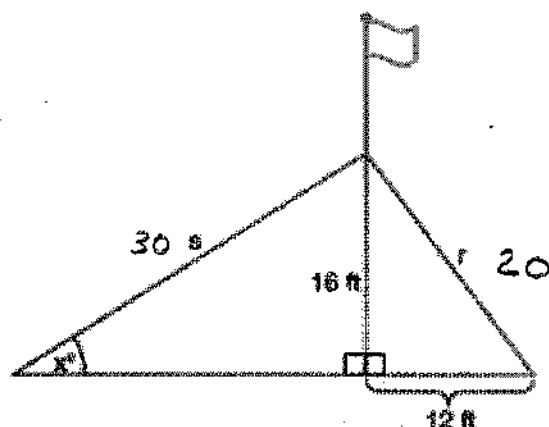
$$r = \sqrt{12^2 + 16^2}$$

$$r = 20$$

$$s = 30$$

$$\sin x^\circ = \frac{16}{30}$$

$$x^\circ = 32^\circ$$

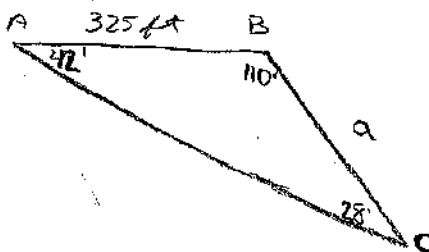


6) A surveyor needs to find the distance BC across a lake as part of a project to build a bridge. The distance from point A to point B is 325 feet. The measurement of angle A is 42° and the measurement of angle B is 110° . What is the distance BC across the lake to the nearest foot?

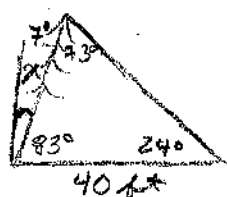
$$\frac{\sin(28)}{325} = \frac{\sin(42)}{a}$$

$$a = \frac{325 \sin(42)}{\sin(28)}$$

$$a = 463 \text{ ft}$$



7) A tree leans 7° to the vertical. At a point 40 feet from the tree (on the side closest to the lean), the angle of elevation to the top of the tree is 24° . Find the height of the tree.



$$\frac{\sin(24)}{x} = \frac{\sin(73)}{40}$$

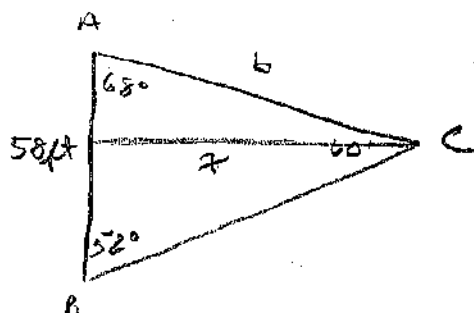
$$x = \frac{40 \sin(24)}{\sin(73)} = 17 \text{ ft}$$

8) Two markers A and B are on the same side of a river and are 58 feet apart. A third marker is located across the river at point C. A surveyor determines that $\angle CAB = 68^\circ$ and $\angle ABC = 52^\circ$. What is the distance between points A and C and what is the distance across the river?

$$\frac{\sin(52)}{b} = \frac{\sin(60)}{58}$$

$$b = \frac{58 \sin(52)}{\sin(60)}$$

$$b = 52.8 \text{ ft}$$



$$\sin(68) = \frac{x}{52.8}$$

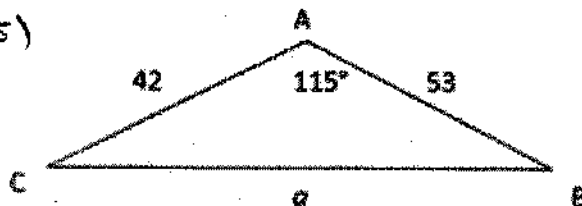
$$x = 48.9 \text{ ft}$$

9) For $\triangle ABC$ find the measure of side a to the nearest tenth.

$$a^2 = 42^2 + 53^2 - 2(42)(53)\cos(115^\circ)$$

$$a^2 = 6715.5$$

$$a = 81.9$$

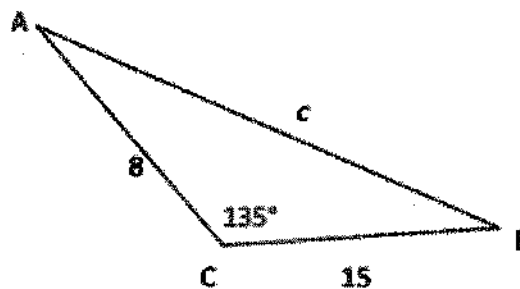


10) For $\triangle ABC$ find the measure of side c to the nearest tenth.

$$c^2 = 8^2 + 15^2 - 2(8)(15)\cos(135^\circ)$$

$$c^2 = 458.7$$

$$c = 21.4$$



11) On a regulation baseball field, the four bases form a square whose sides are all 90 feet apart. The center of the pitching mound is 60 feet from home plate. How far is the mound from first base?

$$x^2 = 60^2 + 90^2 - 2(60)(90)\cos(45^\circ)$$

$$x^2 = 4063.25$$

$$x = 63.7 \text{ ft}$$

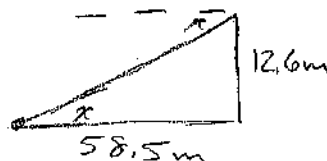


12) A person stands at the window of a building so that his eyes are 12.6 m above the level ground. An object is on the ground 58.5 m away from the building on a line directly beneath the person. Compute the angle of depression of the person's line of sight to the object on the ground.

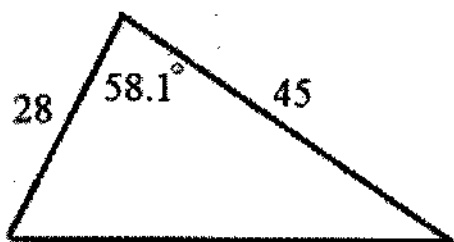
$$\tan x^\circ = \frac{12.6}{58.5}$$

$$x = \tan^{-1}\left(\frac{12.6}{58.5}\right)$$

$$x = 12.2^\circ$$



13) Find the area



$$A = \frac{1}{2}(45)(28)\sin(58.1^\circ)$$

$$A = 534.9 \text{ m}^2$$