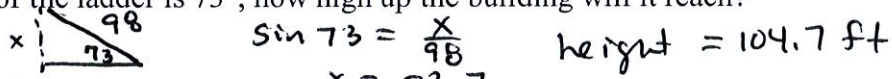


Law of Sines and Cosines Applications Worksheet

Round all lengths to the nearest tenths and angles to the nearest minute.

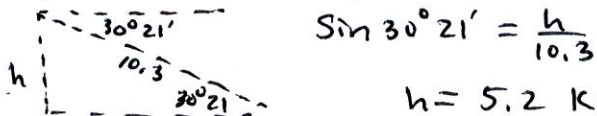
1. A 98 ft. extension ladder rests on top of a hook ladder truck with its base 11 ft. from the ground. When the angle of elevation of the ladder is  $73^\circ$ , how high up the building will it reach?



$$\sin 73 = \frac{x}{98} \quad \text{height} = 104.7 \text{ ft}$$

$$x = 93.7$$

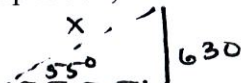
2. The angle of depression of an airplane to the airport is  $30^\circ 21'$  when the plane is 10.3 km from the airport. Determine the altitude of the plane.



$$\sin 30^\circ 21' = \frac{h}{10.3}$$

$$h = 5.2 \text{ km}$$

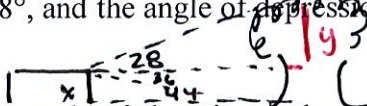
3. The Gateway Arch in St. Louis is 630 ft. high. If a person is walking away from the Arch until the angle of elevation to the top is  $55^\circ$ , how far from the Arch is the person?



$$\sin 55^\circ = \frac{630}{x}$$

$$x = 768.1 \text{ ft.}$$

4. A ranger's tower is located 44m from a tall tree. From the top of the tower, the angle of elevation to the top of the tree is  $28^\circ$ , and the angle of depression to the base of the tree is  $36^\circ$ . How tall is the tree?



$$\tan 36 = \frac{x}{44}$$

$$\tan 28 = \frac{y}{44}$$

$$\text{height} = x + y = 55.4 \text{ ft.}$$

$$x = 31.97$$

$$y = 23.4$$

5. From a point A, the angle of elevation to the top of a building is  $50^\circ$ . From point B which is 11 m closer to the building the angle of elevation to the top is  $63^\circ$ . How far is point B from the top of the building? How tall is the building?



$$\frac{\sin 13}{11} = \frac{\sin 117}{x} \quad \frac{\sin 13}{11} = \frac{\sin 50}{h} \quad \sin 63 = \frac{h}{37.5}$$

$$a = 43.6$$

$$x = 37.5$$

$$h = 33.4$$

6. If a pole has one 62 ft. guy wire that makes an angle of  $39^\circ$  with the ground, and a second 50 ft guy wire is available for the opposite side of the pole, what angle measure will the second wire make with the ground?



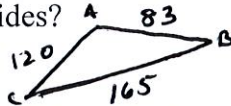
$$\sin 39^\circ = \frac{h}{62}$$

$$\sin x = \frac{39.02}{50}$$

$$h = 39 \text{ ft.}$$

$$x = 51^\circ 18'$$

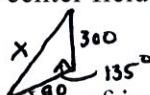
7. A field is triangular shaped with sides of lengths 83 m, 120 m, and 165 m. What is the measure of the angle formed by the two longest sides?



$$83^2 = 165^2 + 120^2 - [2(165)(120) \cos C]$$

$$C = 28^\circ 42'$$

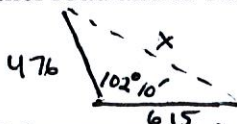
8. The base paths in baseball are 90 ft. The angles formed by the base paths are  $90^\circ$ . If a center fielder stands 300 ft. from second base in straight center field, how far is he from third base?



$$x^2 = 90^2 + 300^2 - [2(90)(300) \cos 135^\circ]$$

$$x = 369.2 \text{ ft.}$$

9. Two roads intersect at an angle of  $102^\circ 10'$ . Your friend's mailbox is 476 ft. from the intersection. Your mailbox is on the other road and is 615 ft. from the intersection. How far is it from your mailbox to your friend's?

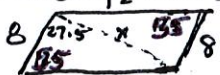


$$x^2 = 476^2 + 615^2 - [2(476)(615) \cos 102^\circ 10']$$

$$x = 853.3 \text{ ft.}$$

10. The sides of a parallelogram are 12 ft. and 8 ft., and each of the larger angles measures  $125^\circ$ . Find the length of the shorter diagonal of the parallelogram.

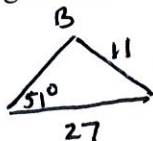
other angle 55 gets bisected.



$$x^2 = 8^2 + 12^2 - [2(8)(12) \cos 55]$$

$$x = 9.89$$

11. How many triangles exist with an angle of  $51^\circ$ , adjacent side of length 27 cm, and opposite side of length 11 cm?



$$\frac{\sin 51}{11} = \frac{\sin B}{27}$$

none