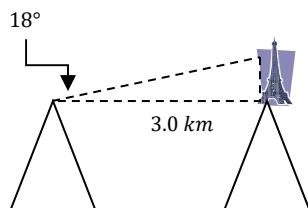


**Draw Diagrams. Show work. Round off all answers to one decimal place. (3 marks each)**

- 1.) The angle of elevation of the Rock Mountain fire-control tower from the top of Blue Mountain 3.0 km away (horizontal distance) is  $18^\circ$ . How much higher than Blue Mountain is the fire-control tower?

**0.97 km**

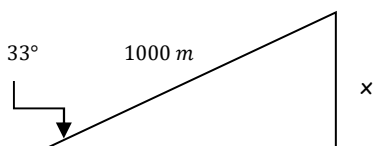


$$\tan 18 = \frac{x}{3.0}$$

$$x = 0.9747$$

$$x = 0.97 \text{ km}$$

- 2.) The angle of elevation of the summit from the bottom of the second lift at Snow Bowl is  $33.0^\circ$ . If a skier rides 1000. m on this lift to the summit, what is the vertical distance between the bottom of the lift and the summit? **545 m**

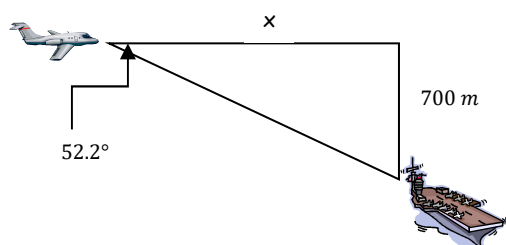


$$\sin 33 = \frac{x}{1000.}$$

$$x = 544.639$$

$$x = 545 \text{ m}$$

- 3.) The angle of depression of an aircraft carrier from an approaching airplane is  $52.2^\circ$ . If the plane is 700. m above level of the deck of the carrier, how far away (horizontally) is the carrier? **543 m**

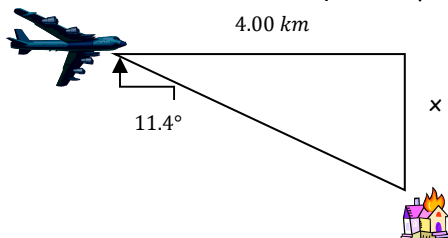


$$\tan 52.2 = \frac{700}{x.}$$

$$x = 542.9756$$

$$x = 543 \text{ m}$$

- 4.) The navigator on a bomber finds that the angle of depression of a target 4.00 km away is  $11.4^\circ$ . At what altitude is the plane flying? **0.807 km**

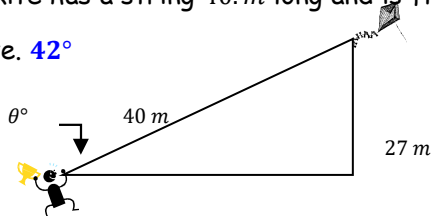


$$\tan 11.4 = \frac{x}{4.00}$$

$$x = 0.8065$$

$$x = 0.807 \text{ m}$$

- 5.) Billy's kite has a string 40. m long and is flying 27 m above his eye level. Find the angle of elevation of the kite.  **$42^\circ$**

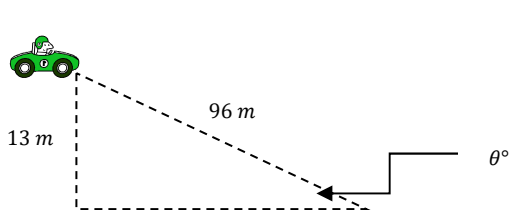


$$\sin \theta = \frac{27}{40.}$$

$$\theta = 42.454$$

$$x = 42 \text{ m}$$

- 6.) At an airport, cars drive down a ramp 96 m long to reach the lower level baggage-claim area 13 m below the main level. What angle does the ramp make with the ground at the lower level? **7.8°**

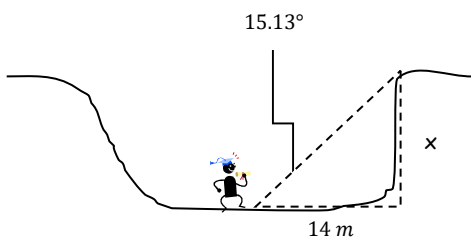


$$\sin \theta = \frac{13}{96}$$

$$\theta = 7.783$$

$$\theta = 7.8^\circ$$

- 7.) A surveyor standing in a ravine finds the angle of elevation of the top of one side is 15.13°. If he is standing 14 m from the base of this side, how deep is the ravine? **3.8 m**

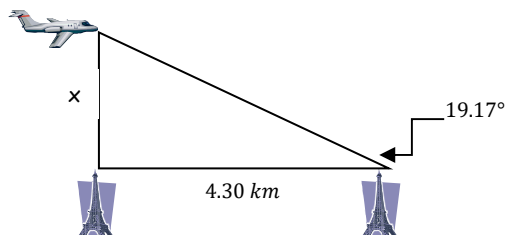


$$\tan 15.13 = \frac{x}{14}$$

$$x = 3.785$$

$$x = 3.8 \text{ m}$$

- 8.) As an airplane flying north passes directly over a civil defense air watch unit, another unit 4.30 km due north finds the angle of elevation of the plane to be 19.17°. Find the altitude of the plane. **1.50 km**

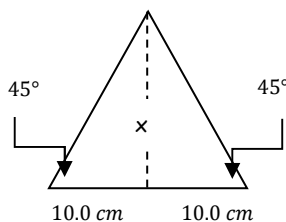


$$\tan 19.17 = \frac{x}{4.30}$$

$$x = 1.495$$

$$x = 1.50 \text{ km}$$

- 9.) Find the length of the altitude of an isosceles triangle whose base has length 20.0 cm and whose base angles each has a measure of 45°. **10. cm**

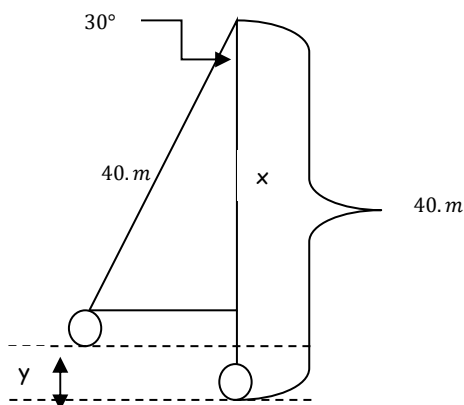


$$\tan 45 = \frac{10.0}{x}$$

$$x = 10$$

$$x = 10. \text{ cm}$$

- 10.) A pendulum 40. cm long is moved 30.° from the vertical. How much is the lower end of the pendulum lifted? **5.4 cm**



$$\cos 30 = \frac{x}{40.}$$

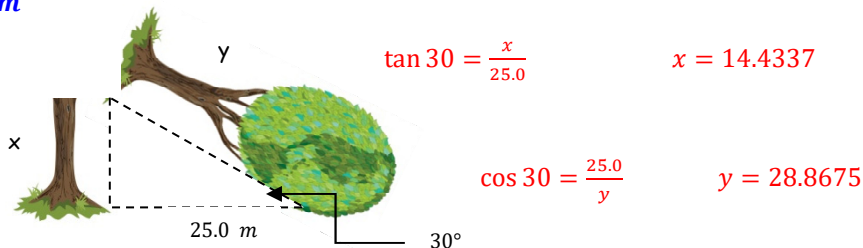
$$x = 34.64$$

$$y = 40.0 - 34.64$$

$$y = 5.35$$

$$y = 5.4 \text{ m}$$

11.) The top of a vertical tree broken by the wind hits the ground 25.0 m from the foot of the tree. If the upper portion makes an angle of 30.0° with the horizontal ground, what was the original height of the tree? **43.3 m**

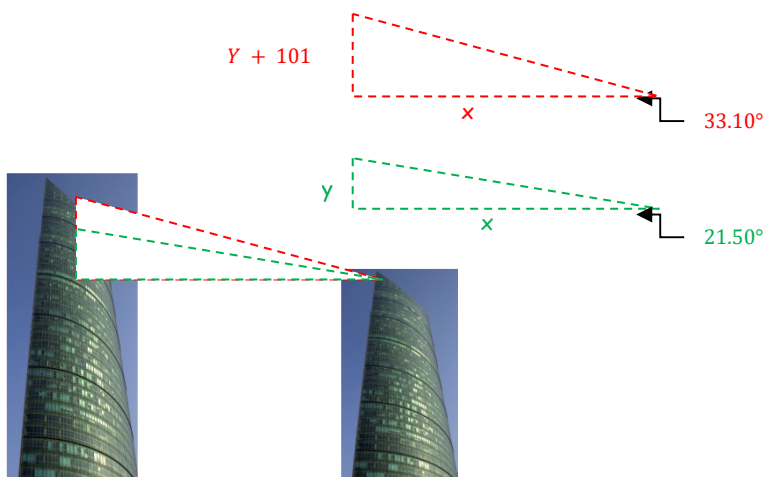


$$\tan 30 = \frac{x}{25.0} \quad x = 14.4337$$

$$\cos 30 = \frac{25.0}{y} \quad y = 28.8675$$

$$\text{height} = x + y \quad \text{height} = 43.3 \text{ m}$$

12.) The angle of elevation of the top of Billings building from the roof of the Wolcott Building (in the same vertical plane) is 33.10°. As well, from the roof of the Wolcott to the 15<sup>th</sup> floor of the Billings building is 21.50°. If the distance between the roof and the 15<sup>th</sup> floor is 101 m, how far apart are the buildings? **392 m**



$$1.) \tan 33.10 = \frac{y+101}{x} \quad x = \frac{y+101}{\tan 33.10}$$

$$2.) \tan 21.50 = \frac{y}{x} \quad x = \frac{y}{\tan 21.50}$$

**Combine 1 and 2**

$$\frac{y+101}{\tan 33.10} = \frac{y}{\tan 21.50} \quad \frac{\tan 21.50(y+101)}{\tan 33.10} = y$$

$$\tan 21.50 (y + 101) = (\tan 33.10)y$$

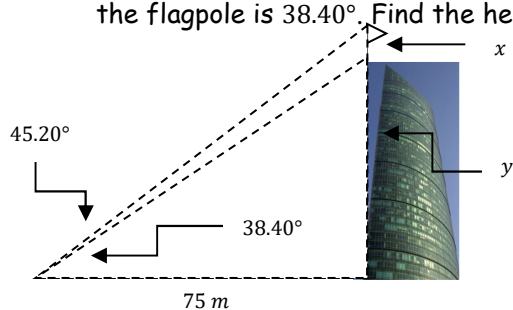
$$\tan 21.50 y + \tan 21.50 \times 101 = (\tan 33.10)y$$

$$\tan 21.50 \times 101 = (\tan 33.10)y - \tan 21.50 y$$

$$101.3939 = 0.25798y \quad y = 154.216$$

$$x = 391.501 \quad x = 392 \text{ m}$$

13.) From a point on the ground 75 m from the base of a building, the angle of elevation of the top of a flagpole on the edge of the roof of the building is 45.20° and the angle of elevation of the bottom of the flagpole is 38.40°. Find the height of the pole. **16 m**



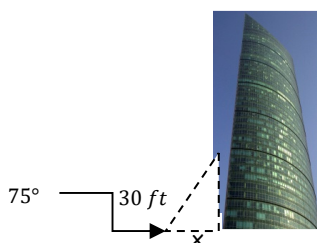
$$1.) \tan 45.20 = \frac{x}{75} \quad x = 75.525$$

$$2.) \tan 38.40 = \frac{y}{75} \quad y = 59.44$$

$$\text{height} = x - y \quad \text{height} = 75.525 - 59.44$$

$$\text{height} = 16.085 \quad \text{height} = 16.1 \text{ m}$$

14.) How far from the vertical wall of a building is the base of a thirty-foot ladder, which makes a 75° angle with the ground? **7.8 ft**



$$\cos 75 = \frac{x}{30}$$

$$x = 7.7645$$

$$x = 7.8 \text{ ft}$$