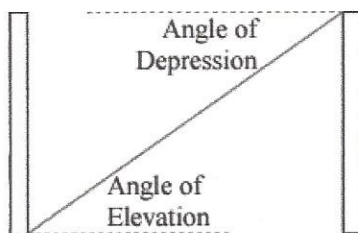
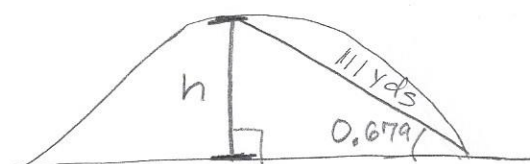


Lesson 27 Examples



1. A Graboid makes a straight 111-yard tunnel down a hillside that makes an angle of 0.679 rad with the horizontal. Find the height of the hill in yards. (HW #2)



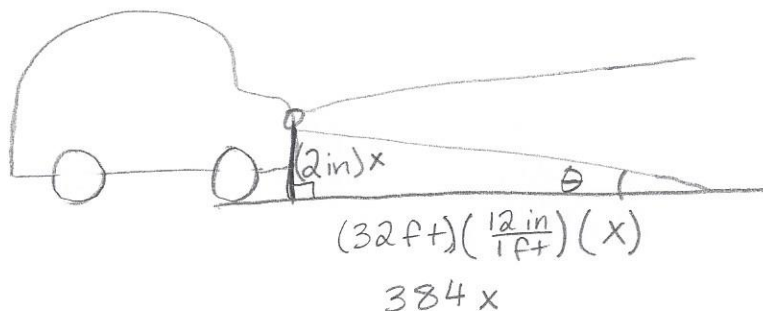
$$\sin(0.679) = \frac{h}{111}$$

$$0.628 = \frac{h}{111}$$

$$h = 111(0.628)$$

$$h = 69.710 \text{ yds}$$

2. The headlights of a Chevy Impala are set such that the beam drops 2 in for each 32 ft in front of the car. What is the angle between the beam and the road in degrees? (HW #3)



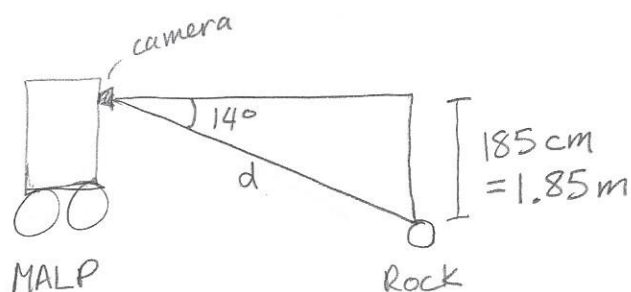
Let $x = \#$ of 32 ft lengths in front of car,

$$\tan \theta = \frac{2x}{384x} = \frac{2}{384} = \frac{1}{192}$$

$$\theta = \tan^{-1}\left(\frac{1}{192}\right)$$

$$\theta = 0.298^\circ$$

3. A MALP robot is on the surface of the planet Abydos. The angle of depression from a camera on the robot to a rock on the surface of Abydos is 14 degrees. The camera is 185 cm above the surface of the planet. How far from the camera is the rock in meters? (HW #7)



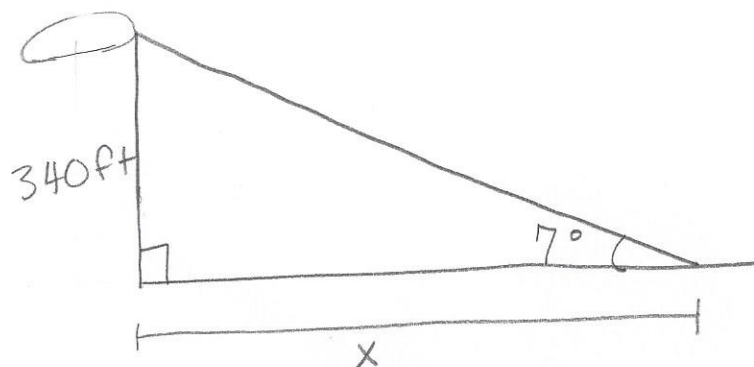
$$\sin(14^\circ) = \frac{1.85}{d}$$

$$0.242 = \frac{1.85}{d}$$

$$d = \frac{1.85}{0.242}$$

$$d = 7.647 \text{ m}$$

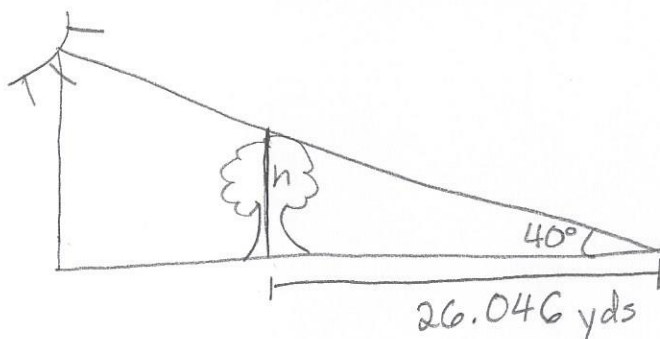
4. Anakin is crash landing a battle cruiser on a landing pad on Coruscant. During the landing, the ship was 340 ft above the beginning of the landing strip. It then came in on a constant angle of 7 degrees with the landing strip. How far from the beginning of the landing strip did it first touch the ground in feet? (HW #9)



$$\begin{aligned}\tan(7^\circ) &= \frac{340}{x} \\ 0.123 &= \frac{340}{x} \\ x &= \frac{340}{0.123}\end{aligned}$$

$$x = 2769 \text{ ft}$$

5. (a) When the elevation of the sun is 40° , the Whomping Willow has a shadow 26.046 yards long. How tall is the Whomping Willow in yards? (HW #10)

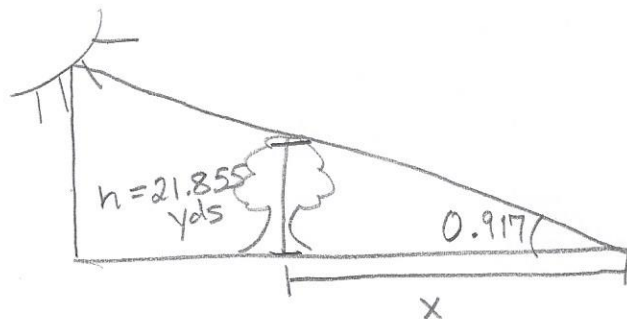


$$\begin{aligned}\tan(40^\circ) &= \frac{h}{26.046} \\ 0.839 &= \frac{h}{26.046}\end{aligned}$$

$$h = (26.046)(0.839)$$

$$h = 21.855 \text{ yds}$$

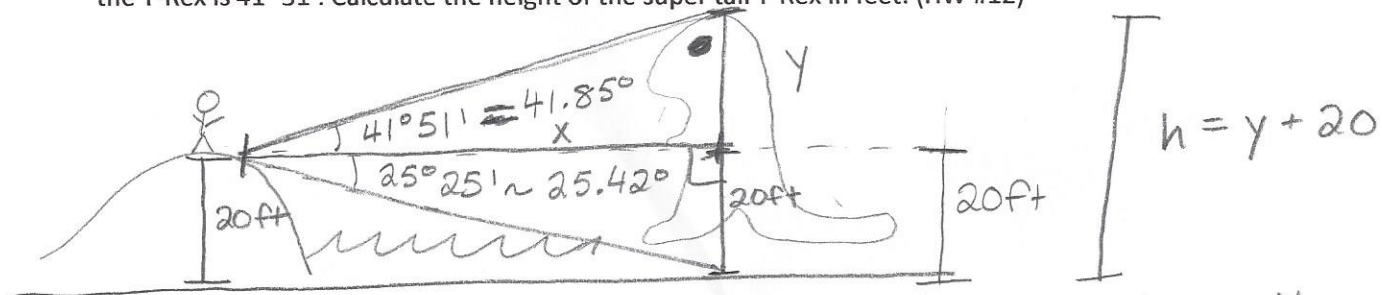
- (b) When the elevation of the sun is 0.917 rad, how long is the Whomping Willow's shadow in yards? (HW #11)



$$\begin{aligned}\tan(0.917) &= \frac{21.855}{x} \\ 1.305 &= \frac{21.855}{x} \\ x &= \frac{21.855}{1.305}\end{aligned}$$

$$x = 16.746 \text{ yds}$$

6. You are standing on a hill 20 feet high looking at a huge Tyrannosaurus Rex across a river. You determine that the angle of depression to the feet of the T-Rex is $25^\circ 25'$ and the angle of elevation to the top of the T-Rex is $41^\circ 51'$. Calculate the height of the super tall T-Rex in feet. (HW #12)



$$\tan(25.42^\circ) = \frac{20}{x}$$

$$0.475 = \frac{20}{x}$$

$$x = \frac{20}{0.475}$$

$$x = 42.088 \text{ ft}$$

$$\tan(41.85^\circ) = \frac{y}{x}$$

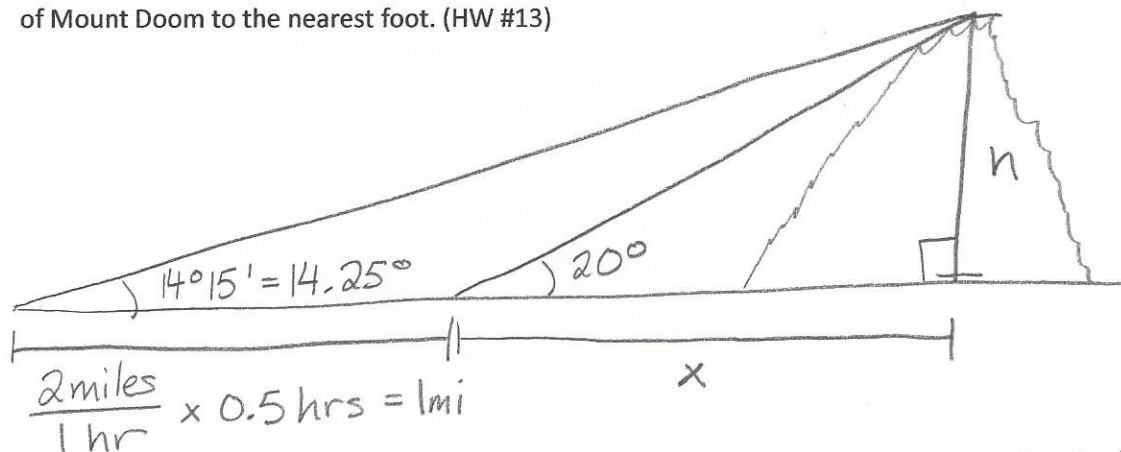
$$0.896 = \frac{y}{42.088}$$

$$y = 42.088(0.896)$$

$$y = 37.697 \text{ ft}$$

$$h = 20 + y = 20 + 37.697 = 57.697 \text{ ft}$$

7. Sam and Frodo are walking along a straight path at 2 miles per hour and see Mount Doom in the distance. Sam determines that the angle of elevation to the top of Mount Doom is $14^\circ 15'$. After 30 minutes, Sam determines the angle of elevation to the top of Mount Doom is 20° . Calculate the height of Mount Doom to the nearest foot. (HW #13)



$$\tan(20^\circ) = \frac{h}{x}$$

$$0.364 = \frac{h}{x}$$

$$0.364x = h$$

$$\tan(14.25^\circ) = \frac{h}{1+x}$$

$$0.254 = \frac{h}{1+x}$$

$$(0.254)(1+x) = h$$

$$0.364x = 0.254(1+x)$$

$$0.364x = 0.254 + 0.254x$$

$$0.11x = 0.254$$

$$x = \frac{0.254}{0.11}$$

$$x = 2.309 \text{ mi}$$

$$h = 0.364(2.309 \text{ mi})$$

$$h = 0.840 \text{ miles}$$

$$h = (0.840 \text{ mi}) \left(\frac{5280 \text{ ft}}{1 \text{ mi}} \right) = 4437 \text{ ft}$$