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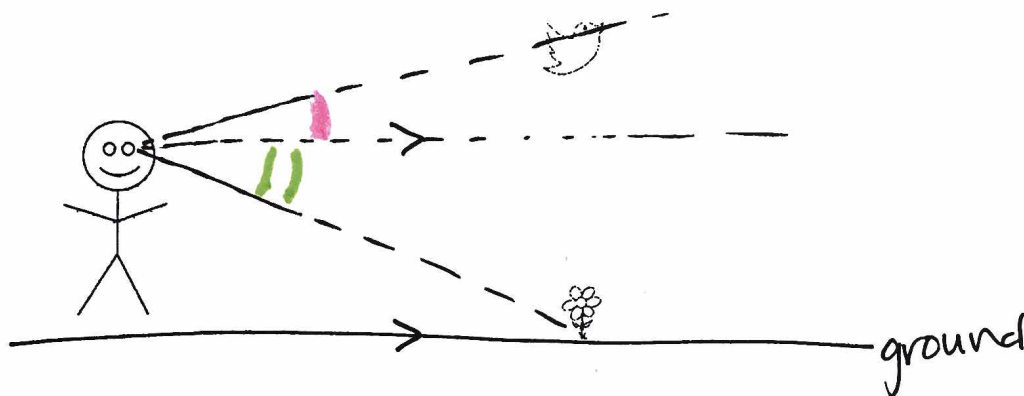
Angles of Elevation and Depression

Lesson Objective: IWBAT apply ~~the~~ trig ratios to real-life ~~scenarios~~ scenarios using angles of elevation + depression.

Angle of Elevation: The angle that an upward line of sight makes with a horizontal line

Angle of Depression: The angle that a downward line of sight makes with a horizontal line

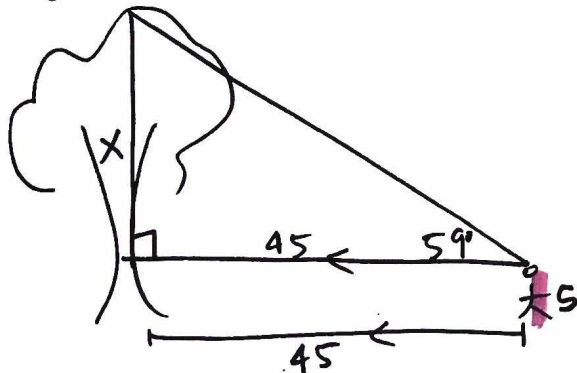
parallel to ground.



SOH-CAH-TOA

Examples:

1. You are measuring the height of a spruce tree. You stand 45 feet from the base of the tree. Your view to the top of the tree has an angle of elevation of 59° and your pupils are located 5 feet above the ground. Find the height of the tree to the nearest foot. Draw a sketch of the scenario.



$$\tan(59) = \frac{x}{45}$$

$$\frac{1.6643}{1} = \frac{x}{45}$$

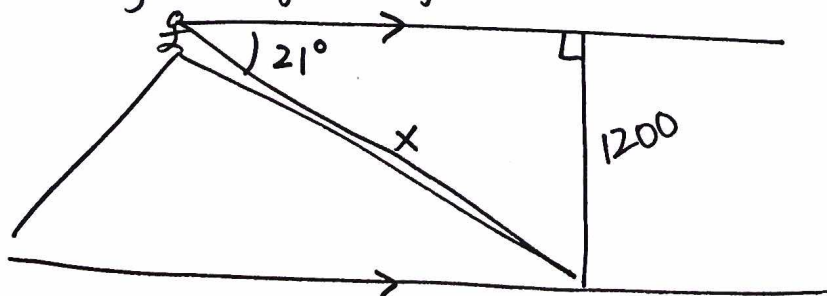
$$x \approx 74.89 \rightarrow 75 \text{ ft}$$

$$\boxed{80 \text{ ft}}$$

↑ +5 ft

2. You are skiing on a mountain. The run you are about to take starts 1200 feet above the base of the run. You look down to the bottom of the ski run at an angle of depression of 21° . Find the distance that you would ski down the mountain to the nearest foot. Draw a sketch of the scenario.

* neglect eye height *



$$\sin(21) = \frac{1200}{x}$$

$$\frac{0.3584}{1} = \frac{1200}{x}$$

$$0.3584x = 1200$$

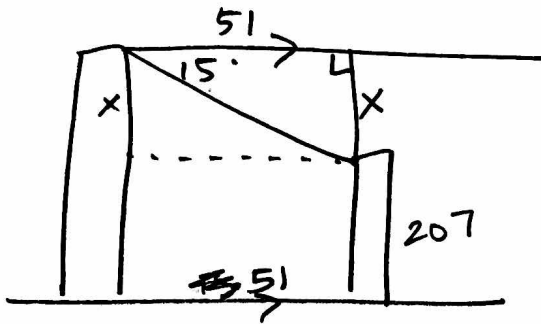
$$x = \frac{1200}{0.3584} \approx 3348.2 \text{ ft}$$

$$\boxed{3348 \text{ ft}}$$

↑

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3. Two office buildings are 51m apart. The height of the shorter building is 207m. The angle of depression from the top of the taller building to the top of the shorter building is 15° . Find the height of the taller building. Draw a sketch of the scenario.



$$\tan(15) = \frac{x}{51}$$

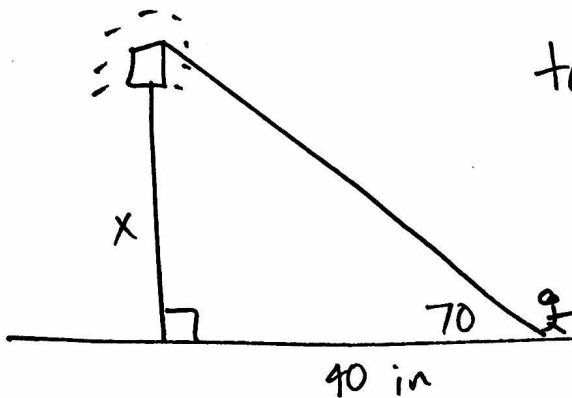
$$0.2679 = \frac{x}{51}$$

$$x \approx 13.66 \text{ m}$$

$$+ 207 \text{ m}$$

$$\approx 220.66 \text{ m}$$

4. You are measuring the height of a lamppost. You stand 40 inches from the base of the lamppost. You measure the angle of elevation from the ground to the top of the lamppost to be 70° . Find the height of the lamppost to the nearest inch. Draw a sketch of the scenario.

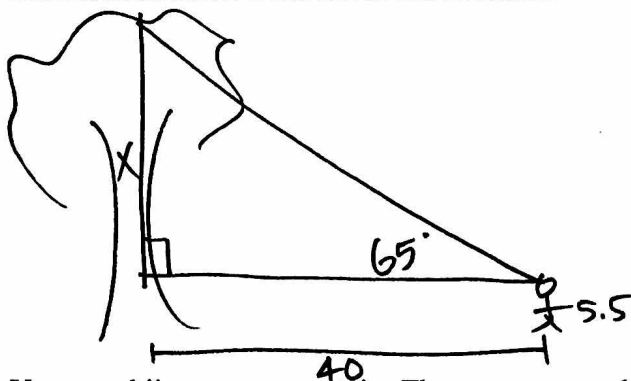


$$\tan(70) = \frac{x}{40}$$

$$2.7475 = \frac{x}{40}$$

$$x = 109.9 \rightarrow \boxed{110 \text{ in}}$$

5. You are measuring the height of a tree. You stand 40 feet from the base of the tree. The angle of elevation to the top of the tree is 65° . Your pupils are 5 feet 6 inches from the ground. Find the height of the tree to the nearest foot. Draw a sketch of the scenario.



$$\tan 65 = \frac{x}{40}$$

$$2.1445 = \frac{x}{40}$$

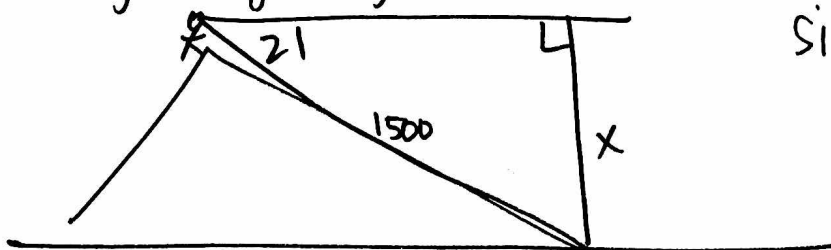
$$85.78 = x$$

$$+ 5.5$$

$$\approx 91.28$$

$$\boxed{\approx 91 \text{ ft}}$$

6. You are skiing on a mountain. The run you are about to take is 1500 feet long. You look down to the bottom of the ski run at an angle of depression of 21° . Find the altitude of the ski run. Draw a sketch of the scenario.
neglect eye height



$$\sin 21 = \frac{x}{1500}$$

$$0.3584 = \frac{x}{1500}$$

$$x \approx 537.6 \text{ ft}$$