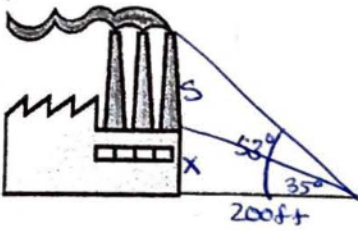


- 1) At a point 200 feet from the base of a building, the angle of elevation to the bottom of a smokestack is 35° , while the angle to the top is 53° . Find the height, s , of the smokestack alone.



$$\tan 35 = \frac{x}{200}$$

$$200 \tan 35 = x$$

$$140.04 = x$$

$$\tan 53 = \frac{x+s}{200} \quad (140.04)$$

$$200 \tan 53 = x+s$$

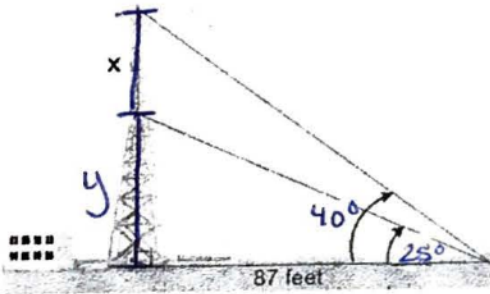
$$(200 \tan 53) - 140.04 = x$$

$$256.4 - 140.04 = x$$

$$\boxed{125.37 \text{ ft} = x}$$

The height of the smokestack is 125.37 ft.

- 2) A radio station tower was built in two sections. From a point 87 feet from the base of the tower, the angle of elevation of the top of the first section is 25° , and the angle of elevation of the top of the second section is 40° . To the nearest foot, what is the height of the top section of the tower?



$$\tan 25 = \frac{y}{87}$$

$$87 \tan 25 = y$$

$$\underline{40.57 \approx y}$$

$$\tan 40 = \frac{x+y}{87}$$

$$87 \tan 40 = x+y$$

$$(87 \tan 40) - y = x$$

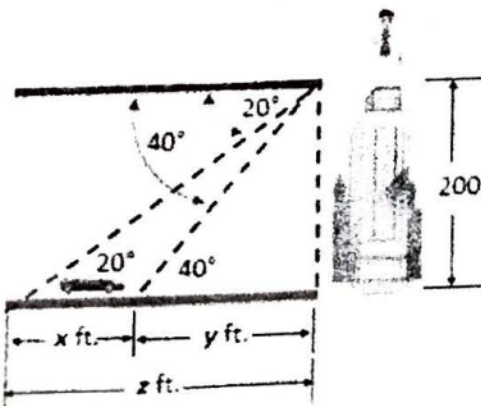
$$(87 \tan 40) - 40.57 = x$$

$$73.00 - 40.57 = x$$

$$32.43 \approx x$$

The height of the top part of the tower is 32 ft.

- 3) From the top of a building that is 200 feet tall, Meryl sees a car coming towards the building. (Somehow she knows that) the angle of depression when she first saw the car was 20° and when she stopped looking at it was 40° degrees. How far did the car travel?



$$\tan 40 = \frac{200}{y}$$

$$y = \frac{200}{\tan 40}$$

$$y \approx 238.4$$

$$\tan 20 = \frac{200}{z}$$

$$z = \frac{200}{\tan 20}$$

$$z \approx 549.11$$

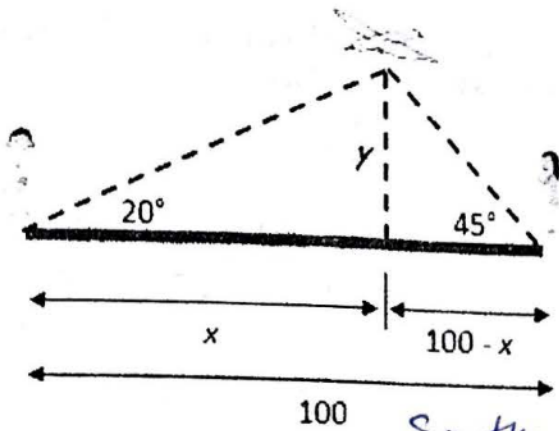
$$x = z - y$$

$$x = 549.11 - 238.4$$

$$x = 310.71 \text{ ft}$$

So the car moved 310.71 ft while Meryl was watching.

- 4) Two girls are standing 100 feet apart. They both see a beautiful seagull in the air between them. The angles of elevation from the girls to the bird are 20° and 45° , respectively. How high up is the seagull?



$$\tan 20 = \frac{y}{x}$$

$$y = x \tan 20$$

$$y = 0.36397x$$

$$y = 0.36397(73.32)$$

$$y \approx 26.69 \text{ ft}$$

$$\tan 45 = \frac{y}{100-x}$$

$$\tan 45 = \frac{0.36397x}{100-x}$$

$$1 = \frac{0.36397x}{100-x}$$

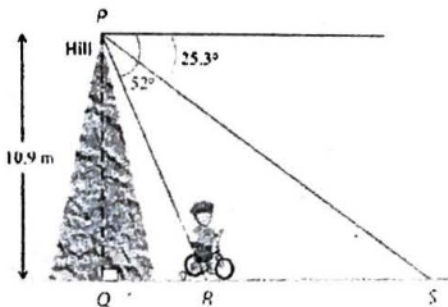
$$\frac{100-x}{1+x} = \frac{0.36397x}{1+x}$$

$$\frac{100}{1.36397} = \frac{1.36397x}{1.36397}$$

$$73.32 \approx x$$

So the seagull is about 26.69 ft high.

- 5) The angle of depression of a cycling kid measured from a hill with 10.9 m high is 52° . When the kid cycles along the hillside and stops, the angle of depression becomes 25.3° . What is the distance cycled by the kid along the hillside?



$$\tan 52 = \frac{10.9}{y}$$

$$y = \frac{10.9}{\tan 52}$$

$$y \approx 8.5 \text{ m}$$

$$\tan 25.3 = \frac{10.9}{x}$$

$$x = \frac{10.9}{\tan 25.3}$$

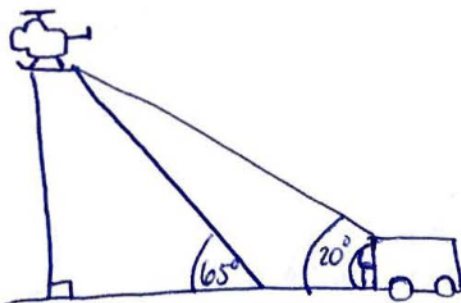
$$x \approx 23.06$$

$$z = 23.06 - 8.5$$

$$z \approx 14.6 \text{ meters}$$

The kid cycled 14.6 meters.

- 6) A helicopter is hovering 800 feet above a road. A truck driver observes the helicopter at a twenty degree angle. Twenty five seconds later the truck driver notices the angle of the helicopter is now at sixty degrees. How fast is the truck moving? Round your answer to the nearest foot.



$$\tan 65 = \frac{800}{x}$$

$$x = \frac{800}{\tan 65}$$

$$x \approx 373.05$$

$$\tan 20 = \frac{800}{z}$$

$$z = \frac{800}{\tan 20}$$

$$z \approx 2197.98$$

$$y = z - x$$

$$y = 2197.98 - 373.05$$

$$y \approx 1824$$

$$d = rt$$

$$r = \frac{d}{t}$$

$$r = \frac{1824}{25}$$

$$r = 73 \text{ ft/sec}$$

The truck was moving 73 ft/sec.