At the little league baseball game, Little Ryan Collins hit a homerun by striking the ball at a 55° angle. The crowd watched as the ball continued to fly across the field, until it was finally stopped by hitting the top of a pole that was approximately 275 feet away from Ryan.

How far did the ball travel to reach the top of the pole?

What is the height of the pole?

$\cos 55 = 275/x$

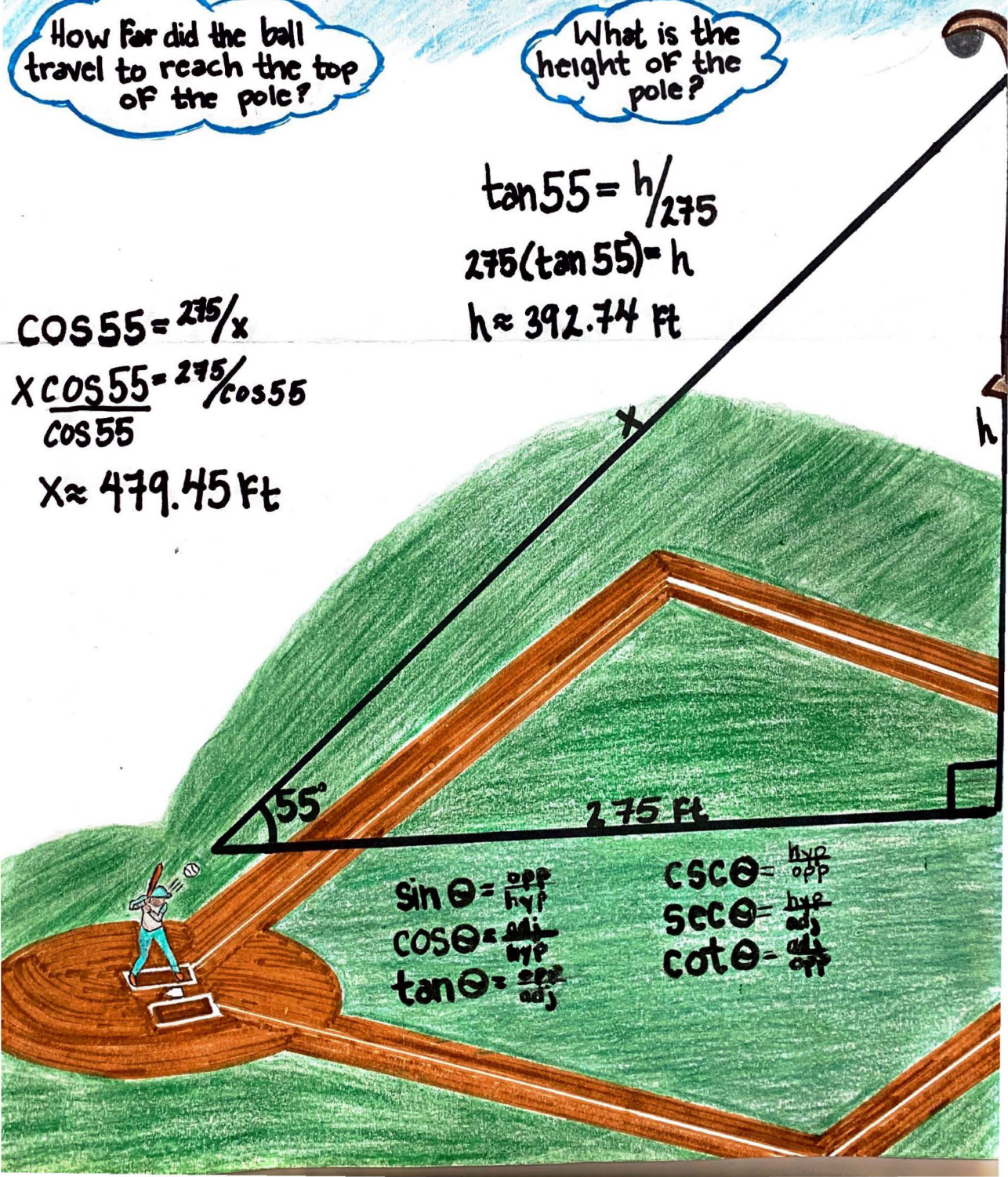
$x \cdot \frac{\cos 55}{\cos 55} = 275/\cos 55$

$x \approx 479.45$ ft

$\tan 55 = h/275$

$275(\tan 55) = h$

$h \approx 392.74$ ft



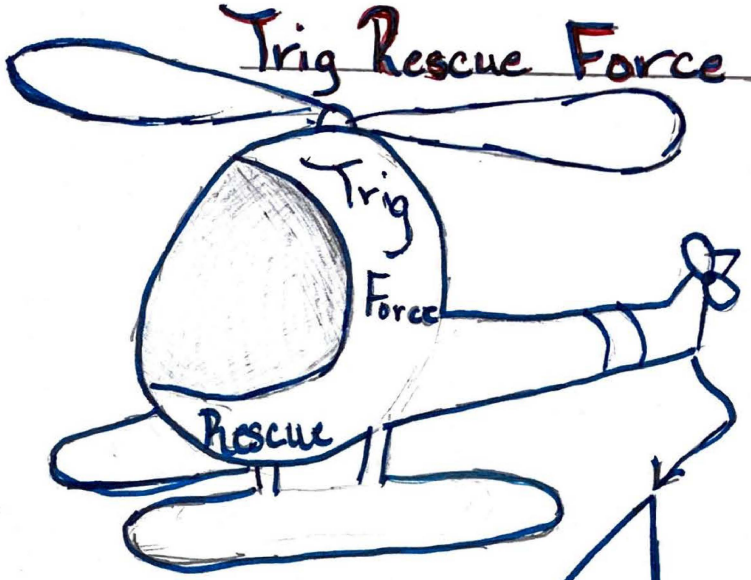
$\sin\theta = \frac{opp}{hyp}$ $\quad \csc\theta = \frac{hyp}{opp}$

$\cos\theta = \frac{adj}{hyp}$ $\quad \sec\theta = \frac{hyp}{adj}$

$\tan\theta = \frac{opp}{adj}$ $\quad \cot\theta = \frac{adj}{opp}$

Trig Rescue Force!

A rescue helicopter is flying at an angle of elevation of about 55°. The rescue helicopter has a long dragging ladder in order to pull people up, find the height of the kite if 75 m of the ladder has been let out.



Work:

Use $\frac{opp}{hyp}$ ➡ sin

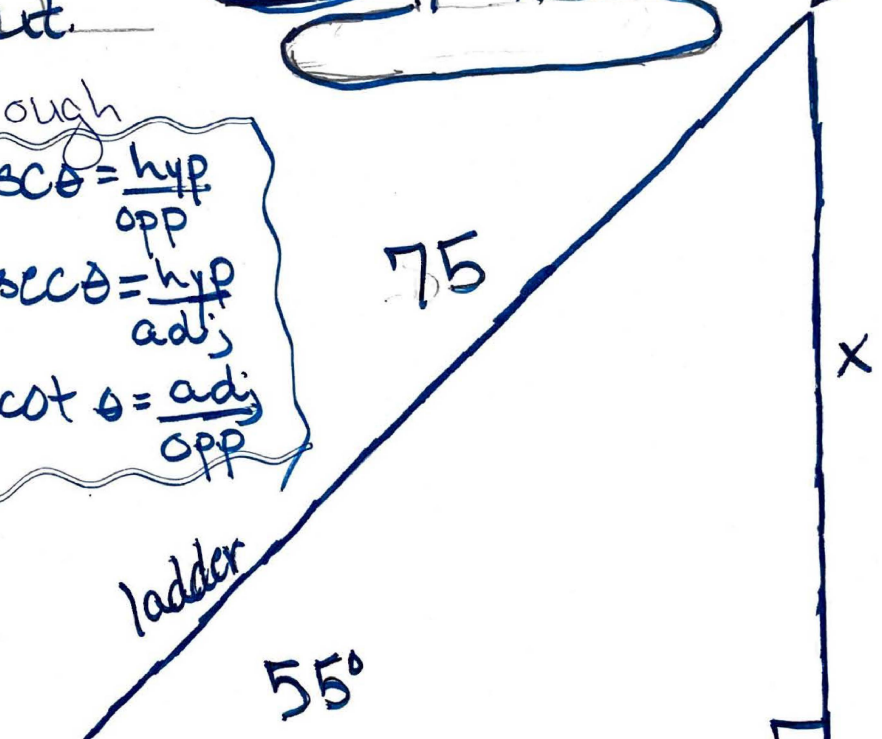
$\sin 55° = x/75$

$75(\sin 55°) = x$

$75(.819) = x \approx 61.43$

Davidson Scarborough

$\sin\theta = \frac{opp}{hyp}$	$\csc\theta = \frac{hyp}{opp}$
$\cos\theta = \frac{adj}{hyp}$	$\sec\theta = \frac{hyp}{adj}$
$\tan\theta = \frac{opp}{adj}$	$\cot\theta = \frac{adj}{opp}$



Lily Greer

The Helicopter Problem

A helicopter is flying over the California coast to take arial pictures of the coast. Two bouys are stationed near where the helicopter is. One has an angle of elivation of 40° to the helicopter. It is 3500 ft from the 2nd bouy. The 2 bouy is X ft from where helicopter is and has an angle of elivation of 45° to the helicopter. How high is the helicopter?

$\tan(45)=h/x$ $\tan(40)=h/3500+x$

$(3500+x)\tan(40)=h$

$x\tan(45)=h$

$(3500+x)\tan(40)=x\tan(45)$

$x\tan(40)+3500\tan(40)=x\tan(45)$

$3500\tan(40)=x\tan(45)-\tan(40)$

$3910.25=x\tan(45)-1.11$

$+1.11$ $+1.11$

$3911.36=x\tan(45)$

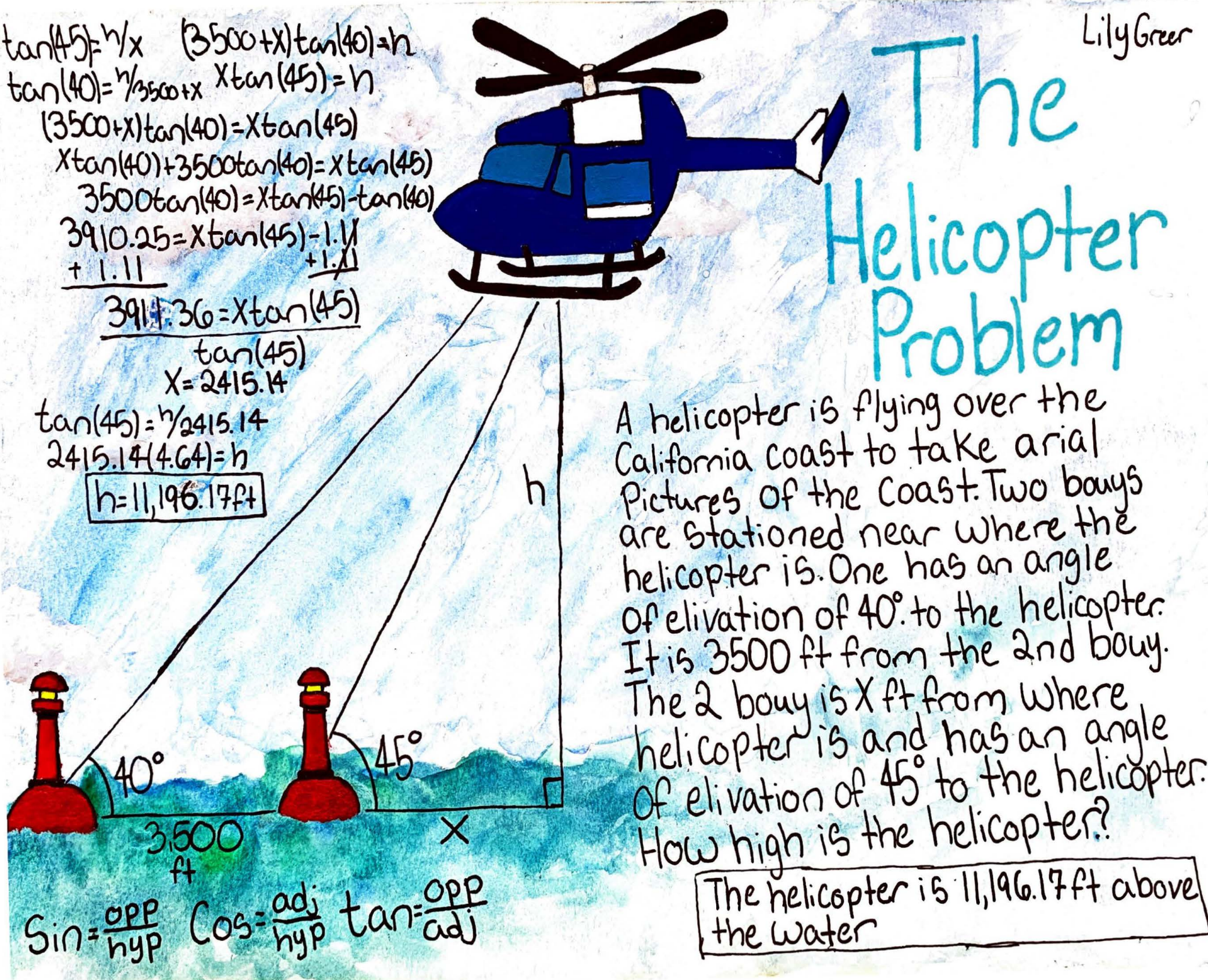
$\frac{\tan(45)}{\tan(45)}$

$X=2415.14$

$\tan(45)=h/2415.14$

$2415.14(4.64)=h$

$h=11,196.17$ ft



$\sin=\frac{opp}{hyp}$ $\cos=\frac{adj}{hyp}$ $\tan=\frac{opp}{adj}$

The helicopter is 11,196.17 ft above the water

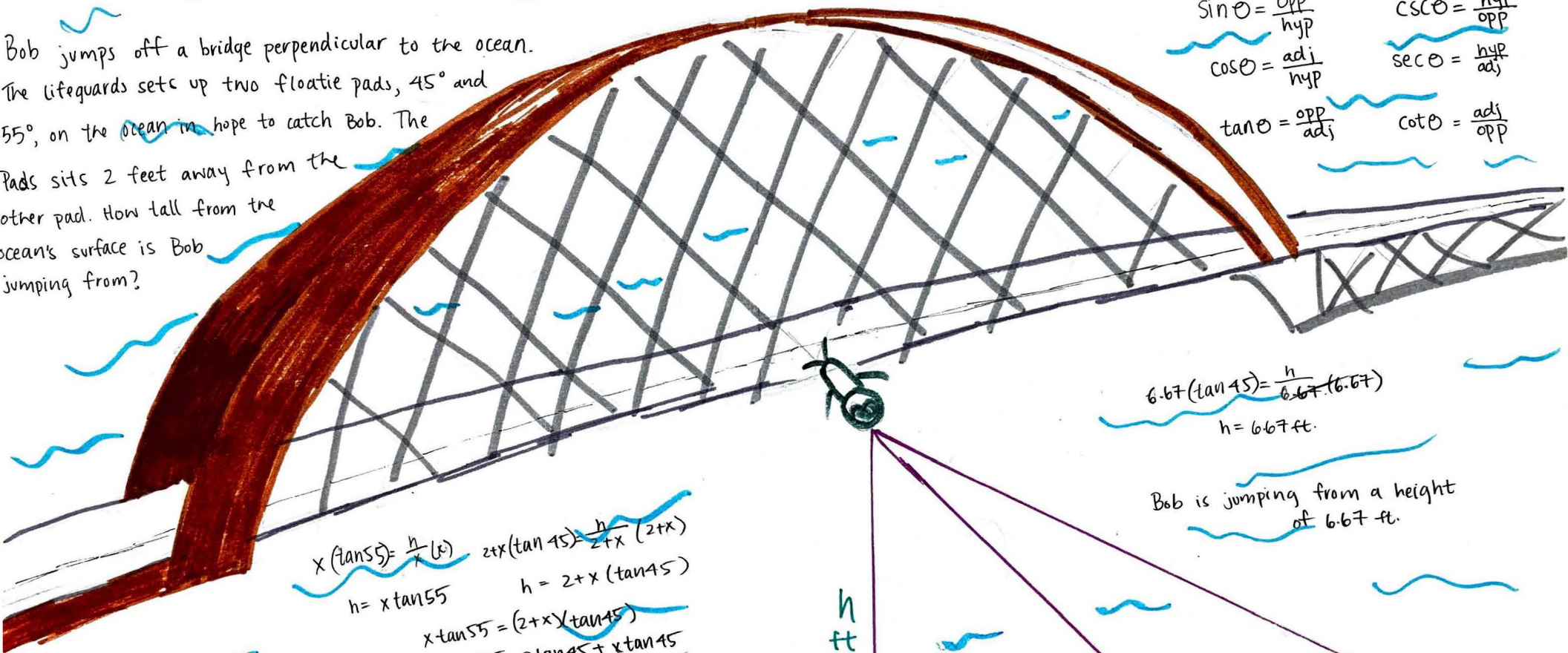
6 Trig Functions:

$\sin\theta = \frac{opp}{hyp}$ $\quad \csc\theta = \frac{hyp}{opp}$

$\cos\theta = \frac{adj}{hyp}$ $\quad \sec\theta = \frac{hyp}{adj}$

$\tan\theta = \frac{opp}{adj}$ $\quad \cot\theta = \frac{adj}{opp}$

Bob jumps off a bridge perpendicular to the ocean. The lifeguards setc up two floatie pads, 45° and 55°, on the ocean in hope to catch Bob. The Pads sits 2 feet away from the other pad. How tall from the ocean's surface is Bob jumping from?



$x(\tan 55) = \frac{h}{x}(x)$

$h = x\tan 55$

$2+x(\tan 45) = \frac{h}{2+x}(2+x)$

$h = 2+x(\tan 45)$

$x\tan 55 = (2+x)(\tan 45)$

$x\tan 55 = 2\tan 45 + x\tan 45$

$-x\tan 45 \quad -x\tan 45$

$x\tan 55 - x\tan 45 = 2\tan 45$

$x(\tan 55 - \tan 45) = 2\tan 45$

$\frac{(\tan 55 - \tan 45)}{(\tan 55 - \tan 45)} = \frac{2\tan 45}{(\tan 55 - \tan 45)}$

$x = 4.67$ ft.

$6.67(\tan 45) = \frac{h}{6.67}(6.67)$

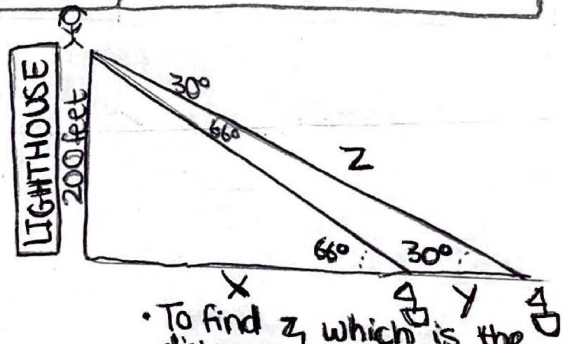
$h = 6.67$ ft.

Bob is jumping from a height of 6.67 ft.

A BOAT AFLOAT

From the top of a 200 feet lighthouse, a woman observes a boat moving towards her. If the angle of depression of the boat changes from 30° to 66° during the period of observation, how far does the boat travel? And determine the distance from the woman to the boat's new location?

$\sin(x) = \frac{\text{opposite}}{\text{hypotenuse}}$	$\cos(x) = \frac{\text{adjacent}}{\text{hypotenuse}}$	$\tan(x) = \frac{\text{opposite}}{\text{adjacent}}$



- To find y, which is how much the boat travelled, you...

$$\tan(30°) = \frac{200}{x+y}$$

$$\frac{x+y\tan(30)}{\tan(30)} = \frac{200}{\tan(30)}$$

$$x+y = 346.41 \text{ feet}$$

$$\tan(66) = \frac{200}{x}$$

$$\frac{x\tan(66)}{\tan(66)} = \frac{200}{\tan(66)}$$

$$x = 89.05 \text{ feet}$$

$$y = 346.41 - 89.05 = \boxed{157.4 \text{ ft}}$$

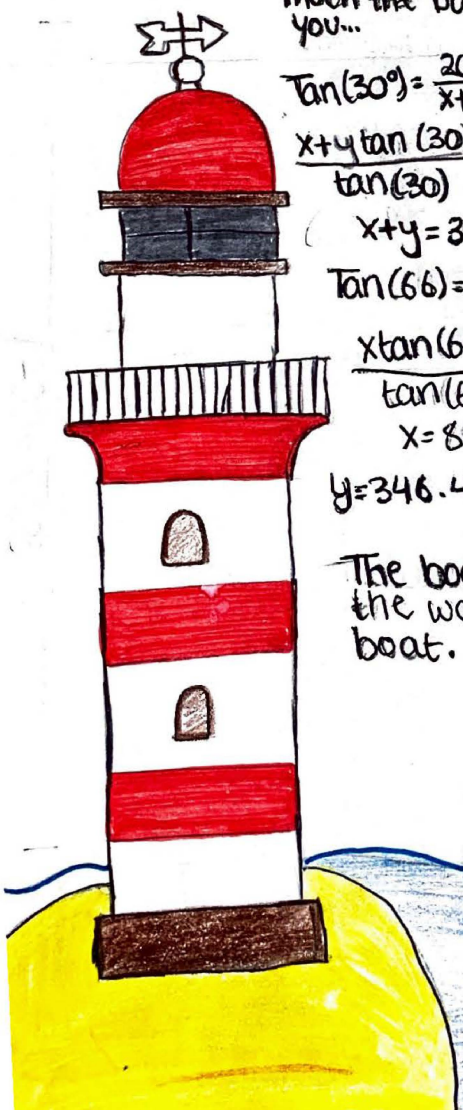
- To find z, which is the distance from the woman to the new location of the boat you...

$$\sin(66) = \frac{200}{z}$$

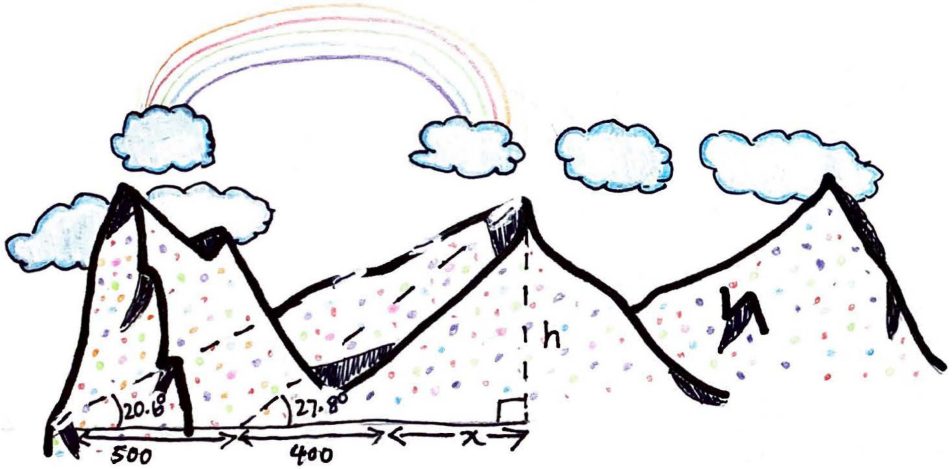
$$\frac{z\sin(66)}{\sin(66)} = \frac{200}{\sin(66)}$$

$$z = \boxed{218.9 \text{ ft}}$$

The boat travelled 157.4 feet, which means that the woman is now 218.9 feet away from the boat.



One day, Jackson want to take his girlfriend Joyce have a thrilling adventure. The place is called "Rainbow Macaron Mountain," which Jackson and Joyce need to climb to the top of mountain. The Rainbow Macaron Mountain is 400 ft from the base of a mountain measures the angle of elevation from the ground to the top of the mountain to be 27° 48'. Jackson and Joyce then walks 500 ft straight back and measures the angle of elevation to now be 20° 36'. How tall is the Rainbow Macaron Mountain?



$\frac{h}{x+400} = \tan 27°(48/60) = \tan 27.8° \rightarrow h = (x+400)\tan 27.8°$

$\frac{h}{x+400+500} = \tan 20(36/60) = \tan 20.6° \rightarrow h = (x+900)\tan 20.6°$

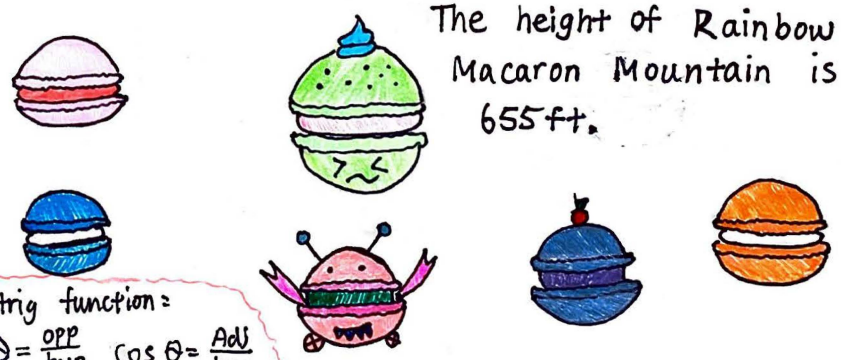
$h = (x+400)\tan 27.8° = (x+900)\tan 20.6°$

$x \tan 27.8° - x \tan 20.6° = 900 \tan 20.6° - 400 \tan 27.8$

$\rightarrow x = \frac{900 \tan 20.6° - 400 \tan 27.8°}{\tan 27.8° - \tan 20.6°} = 842 ft$

$h = (842 + 400)\tan 27.8° = 1242(.5272) = 655 ft$

The height of Rainbow Macaron Mountain is 655ft.



six trig function:

$\sin\theta = \frac{opp}{hyp}$, $\cos\theta = \frac{Adj}{hyp}$,

$\tan\theta = \frac{opp}{Adj}$

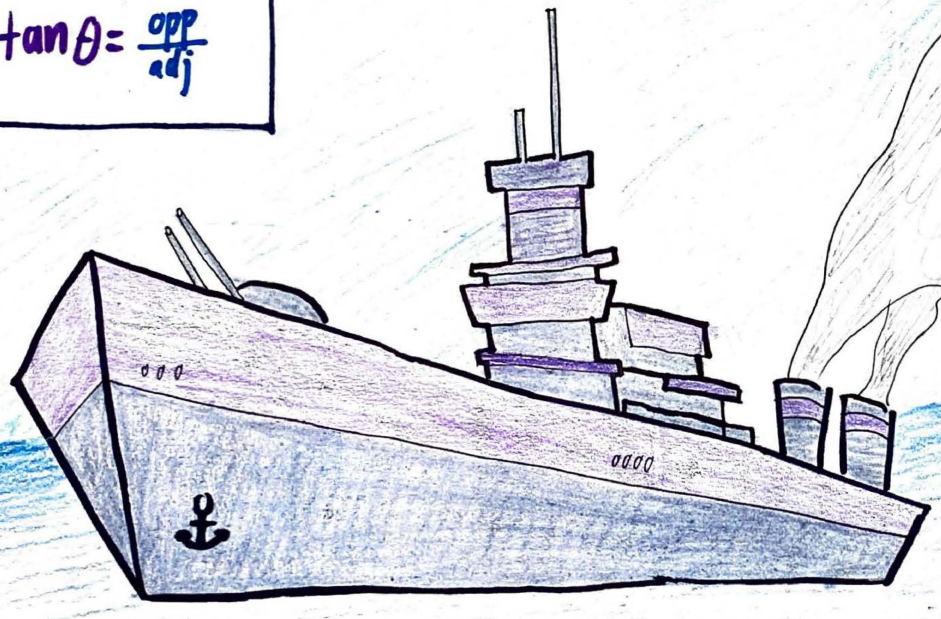
LOST SHIP

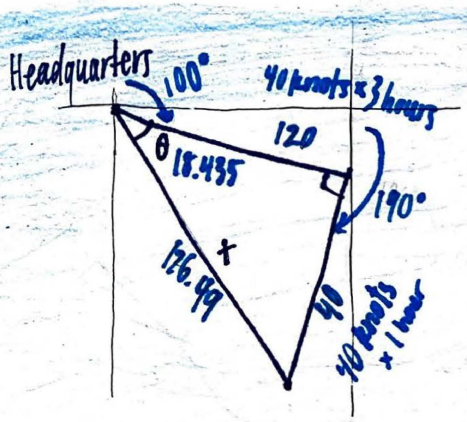
$\sin\theta = \frac{opp}{hyp}$

$\cos\theta = \frac{adj}{hyp}$

$\tan\theta = \frac{opp}{adj}$

A stranded government naval ship travelled at 40 knots from Headquarters with an angle of depression of 100° for 3 hours and then changed to a course of 190° for 1 hour. Find the distance and the bearing from Headquarters to the lost ship.





$a^2+b^2=c^2$

$\sqrt{120^2+40^2} = 120.49$

$x = 126.49$

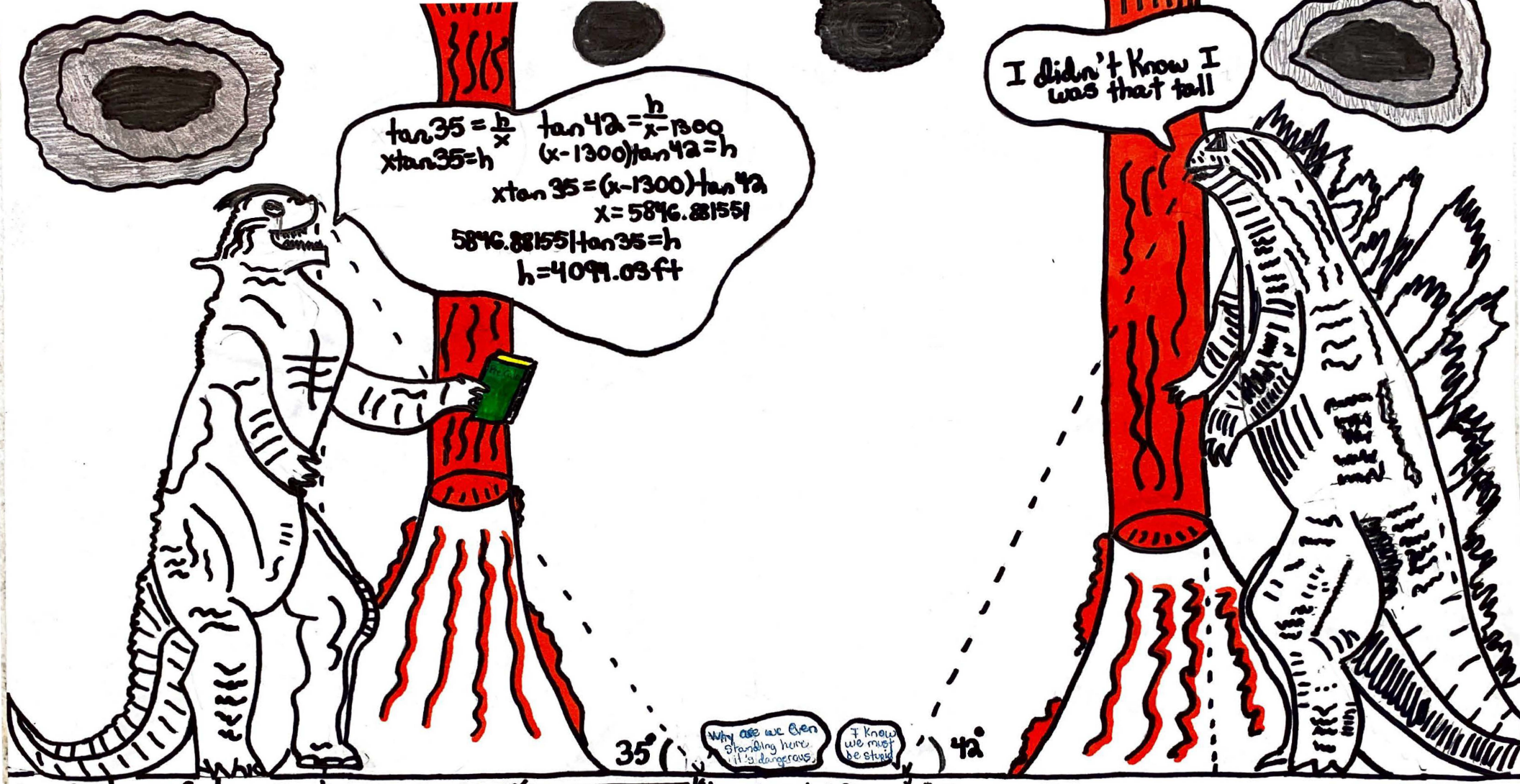
$\tan^{-1}\frac{40}{120} = \theta$

$18.435 \approx \theta$

bearing:

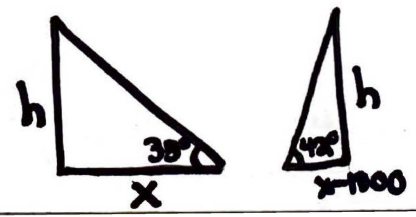
$100 + 18.435 =$ 118.435°

The lost ship is 126.49 nautical miles away and the bearing is 118.435°



$\sin\theta = \frac{y}{r}$	$\csc\theta = \frac{r}{y}$
$\cos\theta = \frac{x}{r}$	$\sec\theta = \frac{r}{x}$
$\tan\theta = \frac{y}{x}$	$\cot\theta = \frac{x}{y}$
$\sin\theta = \frac{\text{opp}}{\text{hyp}}$	$\csc\theta = \frac{\text{hyp}}{\text{opp}}$
$\cos\theta = \frac{\text{adj}}{\text{hyp}}$	$\sec\theta = \frac{\text{hyp}}{\text{adj}}$
$\tan\theta = \frac{\text{opp}}{\text{adj}}$	$\cot\theta = \frac{\text{adj}}{\text{opp}}$

Mr. K's dream was always to be like godzilla. To achive his dream he created and drank a serum that made him into godzilla. To compare heights he had on of his friends stand x distance away from him with a 35° angle of elevation. He had his other friend stand 1300 ft closer to godzilla than the other friend to Mr. Kay with an elevation angle of 42°. What was the shared height of godzilla and K-zilla.



After this moment, Godzilla was never the same.

The end...

Or is it?

The Rabbit and the Tree

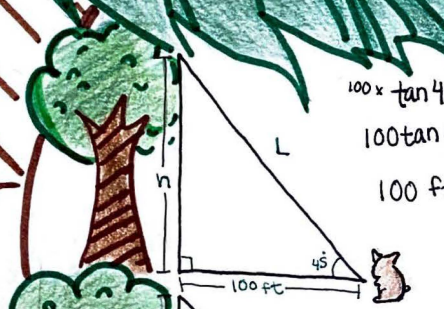
The angle of elevation from a rabbit to the tip of the tree is 45° and it's 100 ft away. What is the height of the tree and the length from the tip of the tree to the rabbit? If the tree is 50 ft tall, what would the length be instead?

SOH-CAH-TOA

$\sin\theta = \frac{opp}{hyp}$

$\cos\theta = \frac{adj}{hyp}$

$\tan\theta = \frac{opp}{adj}$



$100 \times \tan 45 = \frac{h}{100} \times 100$

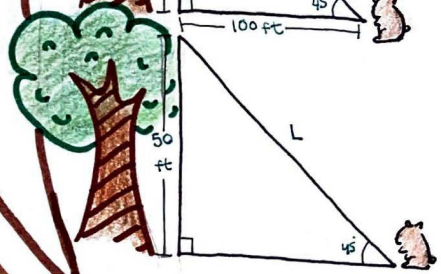
$100 \tan 45 = h$

$100 \text{ ft} = h$

$\cos 45 = \frac{100}{L}$

$L = \frac{100}{\cos 45}$

$L = 141.42 \text{ ft}$



$\sin 45 = \frac{50}{L}$

$L = \frac{50}{\sin 45}$

$L = 70.71 \text{ ft.}$

① The height of the tree is 100 ft tall and the length from the tip to the rabbit's is 141.42 ft.

② if the tree is 50 ft tall, the length from the tip to the rabbit would be 70.71 ft.

Period 2

Xiangyi Li

Variables:

* 3° → 3 degrees
* d → distance
* Convert mins to secs (1 min = 60 secs)
* 42/60 = 0.7
* 95 feet tower

Sin θ = opp/hyp

A firefighter rescue people from a fire that is from 95 feet tower in Canyon Valley Park. He measures the angle of depression to be 3°42'. How far is the fire from the angle?

3°42' = 3.7° ← Angle of Depression

95ft

Sin θ = opp/hyp

cos θ = adj/hyp

tan θ = opp/hyp

csc θ = hyp/opp

sec θ = hyp/adj

cot θ = adj/opp

90°

3.7°

d = 1472.13

The fire is 1472.13 feet away from the tower in Canyon Valley Park.

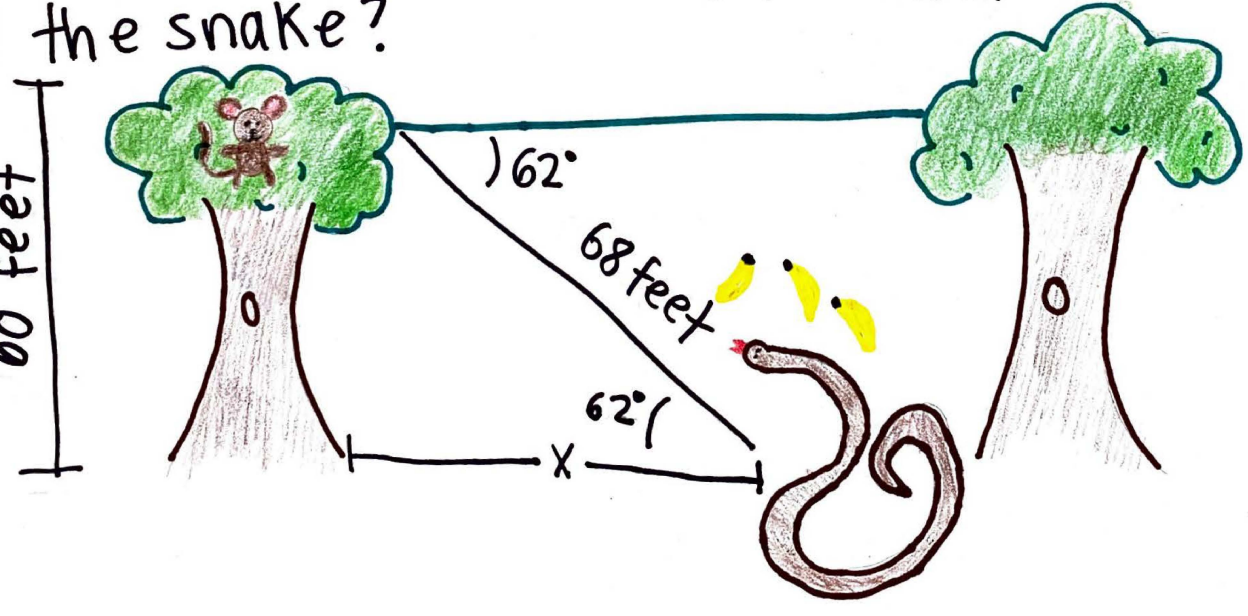
3° + (42/60) = 3.7°

d * tan(3.7) = 95

$\frac{d \tan(3.7)}{\tan 3.7} = \frac{95}{\tan 3.7}$

d = 1469.06 f

There is a monkey in a 60 ft tall tree throwing bananas at a snake below that is 68 ft away at a diagonal distance from the monkey. The angle of depression from the top of the tree and a vine that connects it to another tree is 62°. What is the distance between the base of the tree and the snake?



$\sin\theta = \frac{opp}{hyp}$	$\csc\theta = \frac{hyp}{opp}$
$\cos\theta = \frac{adj}{hyp}$	$\sec\theta = \frac{hyp}{adj}$
$\tan\theta = \frac{opp}{adj}$	$\cot\theta = \frac{adj}{opp}$

$$\cos 62 = \frac{x}{68}$$

$$68\cos 62 = x$$

$$x = 32$$

The snake is 32 feet away from the base of the tree.

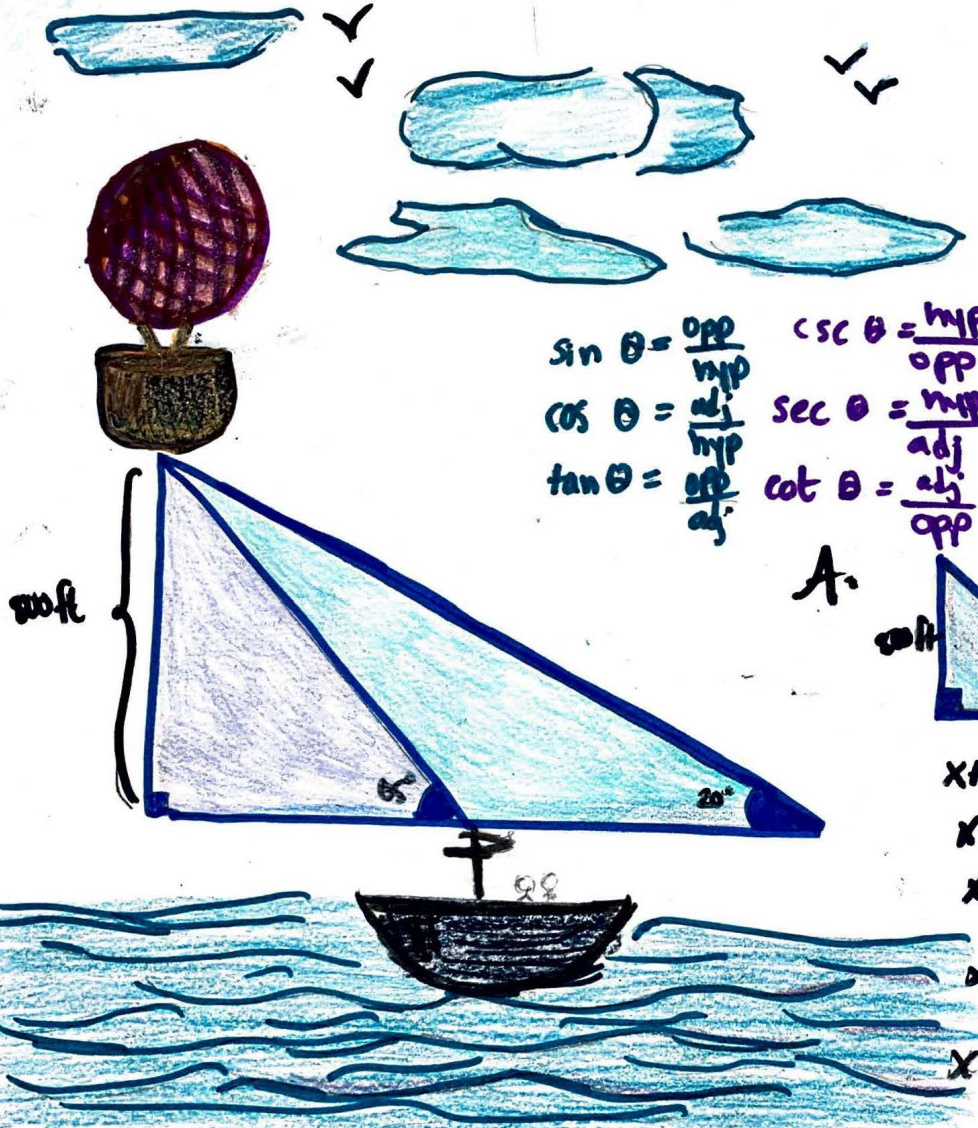
The Balloon is So Fast !!

Q. A Balloon is hovering 800 ft above a lake. The balloon is spotted by a boat crew as they look upwards at angle of 20°. 25 sec later, the crew has to look at an angle of 65° to observe the balloon. How fast was the boat traveling across the Lake?

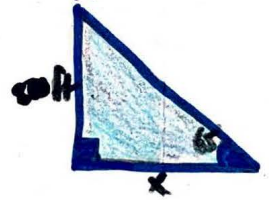
$\sin\theta = \frac{opp}{hyp}$ $\quad csc\,\theta = \frac{hyp}{opp}$

$\cos\theta = \frac{adj}{hyp}$ $\quad sec\,\theta = \frac{hyp}{adj}$

$\tan\theta = \frac{opp}{adj}$ $\quad cot\,\theta = \frac{adj}{opp}$



A.



$\tan 65° = \frac{800}{x}$

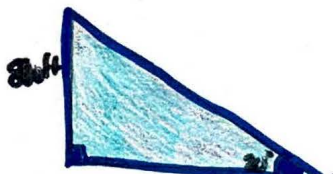
$x \tan 65° = \frac{800}{x} \times x$

$x \tan 65° = 800$

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

$x = \frac{800}{2.14}$

$x = 373.83\,ft$



$\tan 20° = \frac{800}{y}$

$y = \frac{800}{\tan 20°}$

$y = \frac{800}{0.364}$

$y = 2,197.80\,ft$

$2,197.80 - 373.83$

$=$

1,823.97 ft in 25s

Speed $= \frac{\text{Distance}}{\text{Time}}$

$= \frac{1,823.97\,ft}{25\,s}$

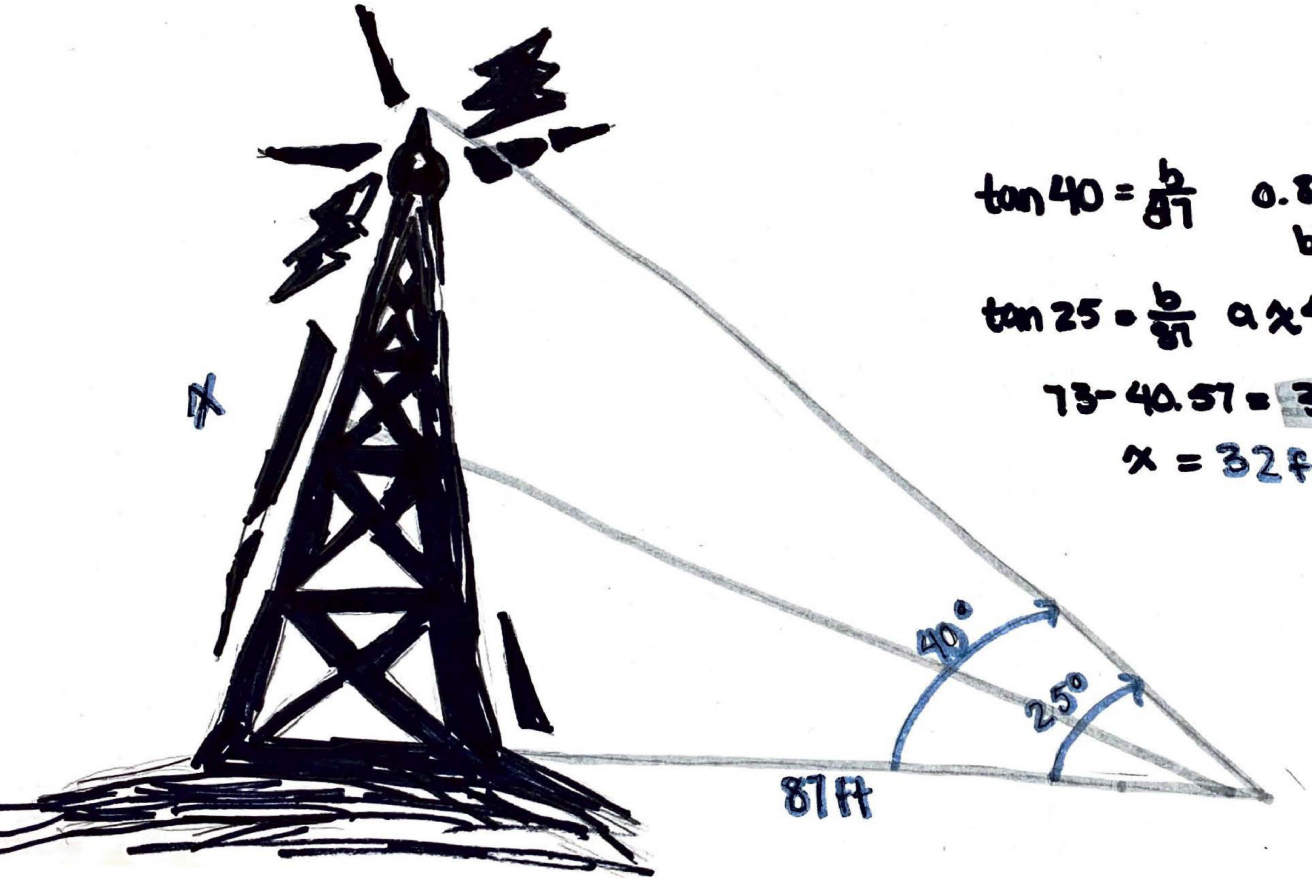
$= 72.96\,ft/s$

- The boat travels 1,823.97 ft in 25s
- The boat travels at a speed of 72.96 ft/s

sin	opp / hyp	csc	hyp / opp
cos	adj / hyp	sec	hyp / adj
tan	opp / adj	cot	adj / opp

Radio Frenzy

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



$\tan 40 = \frac{b}{87}$ $0.8390 = \frac{b}{87}$

$b = 73$

$\tan 25 = \frac{b}{87}$ $a \approx 40.57$

$73 - 40.57 = 32.4329$

$x = 32\text{ft}$

The height of the tower is 32 ft

Ok.

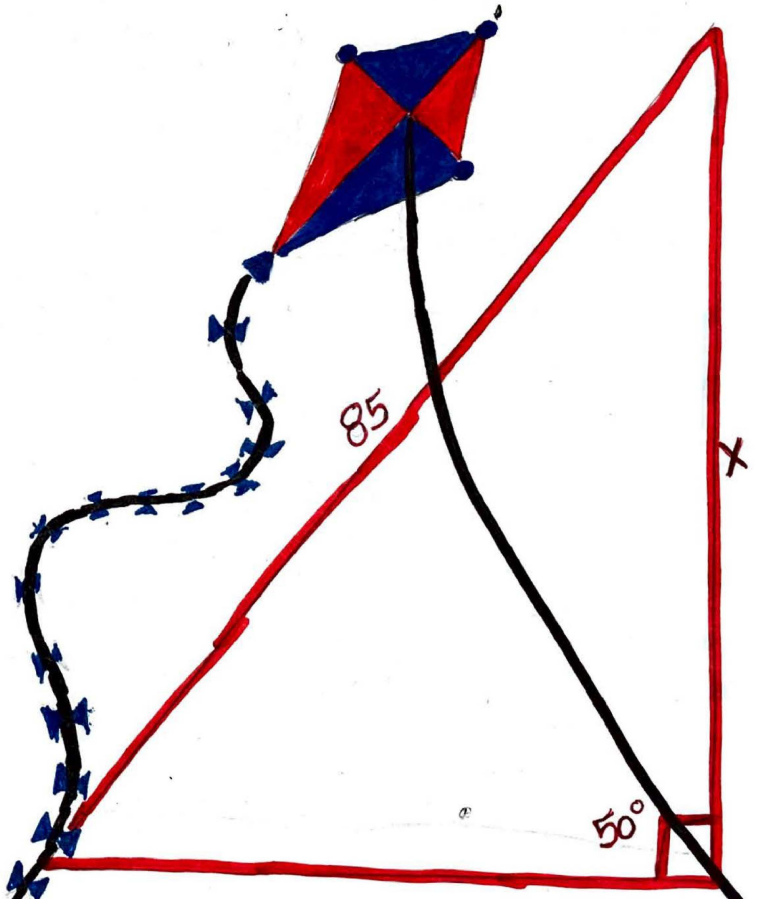
100

How High is The Kite?

$\sin A = \frac{opp}{hyp}$ $\cos A = \frac{adj}{hyp}$ $\tan A = \frac{opp}{adj}$

$\csc A = \frac{hyp}{opp}$ $\sec A = \frac{hyp}{adj}$ $\cot A = \frac{adj}{opp}$

Elizabeth took a trip to the park with her brand new kite she got for her birthday. The kite was flying at an elevation of about 50°. Ignoring the sag of the string, find the height of the kite if 85m of string has been left out.



The Height of the kite is 65m

Use $\frac{opp}{hyp}$ ⇒ Sin

Using the 50° angle as a reference, we know hypotenuse & opposite

$\sin 50°$

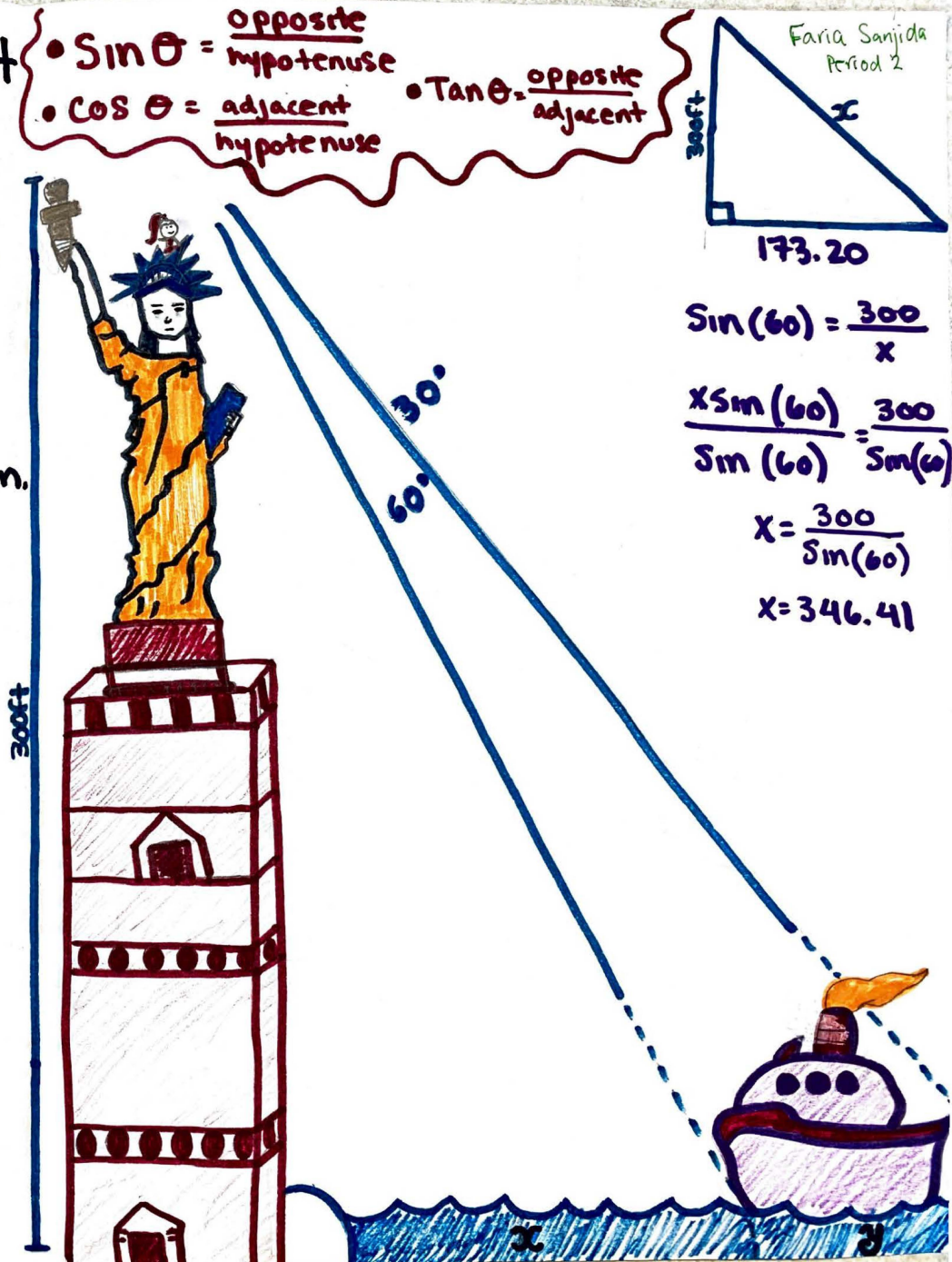
$85(\sin 50) = x$

$85(.7660) = x$ $x \simeq 65.1$

Faria Sanjida
Period 2

From the top of the 300ft Statue of Liberty's crown, a lady looks over the moving ferry that's coming towards her. If the angle of depression of the ferry changes from 30° to 60° during the period of observation, how far does the ferry travel? And determine the distance from the lady to the ferry's new location.

- $\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$
- $\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$
- $\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$



$$\sin(60) = \frac{300}{x}$$

$$\frac{x\sin(60)}{\sin(60)} = \frac{300}{\sin(60)}$$

$$x = \frac{300}{\sin(60)}$$

$$x = 346.41$$

$$\tan(30°) = \frac{300}{\tan(30)}$$

$$\frac{x + y\tan(30)}{\tan(30)} = \frac{300}{\tan(30°)}$$

$$x + y = \frac{300}{\tan(30)}$$

$$x + y = 519.61$$

$$\tan(60) = \frac{300}{x+y}$$

$$\frac{x\tan(60)}{\tan(60)} = \frac{300}{\tan(60)}$$

$$x = \frac{300}{\tan(60)}$$

$$x = 173.20$$

$$y = 346.41$$

$$y = 519.61 - 173.20 = 346.41$$