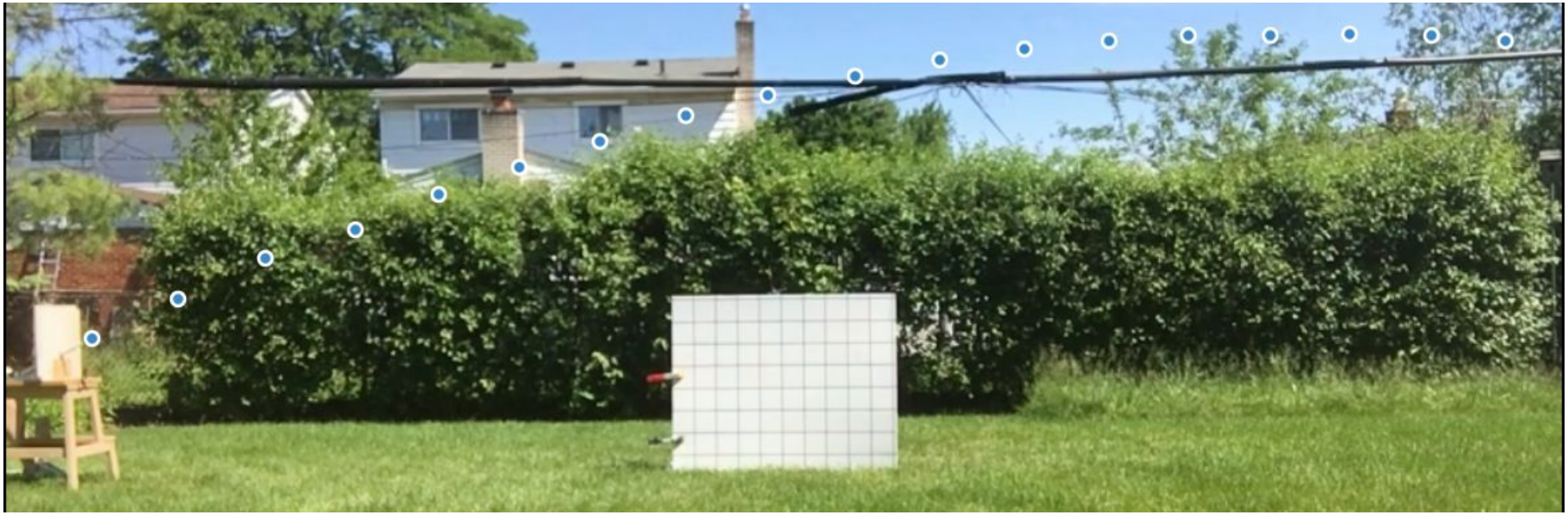
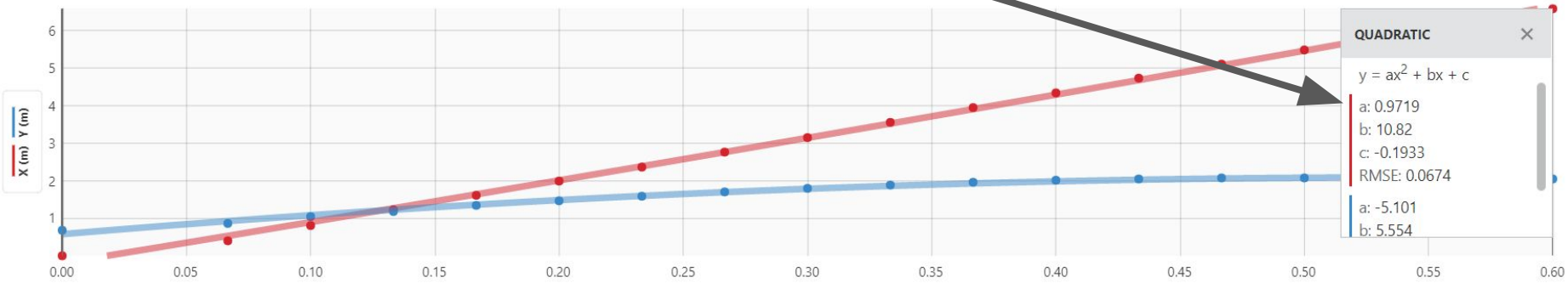
How I used math to find how far it went:

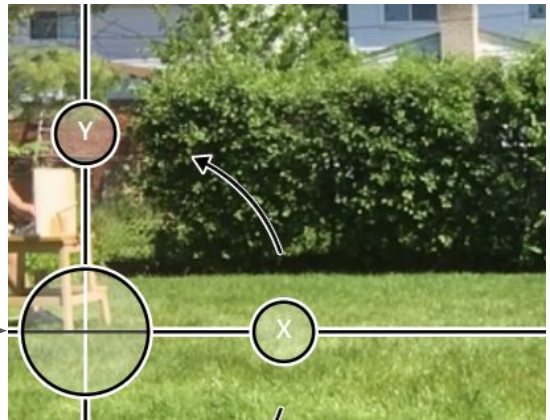


Distance = ???

The app fits a curve to the points and gives us the equations of the curves



NOTE: I set the origin so that y = 0 is along the ground where the payload will land.



We have two equations:

One to tell us the X position at each time, and one to tell us the Y position at each time.

Let:

X = X position (m)

Y = Y position (m)

t = time (s)

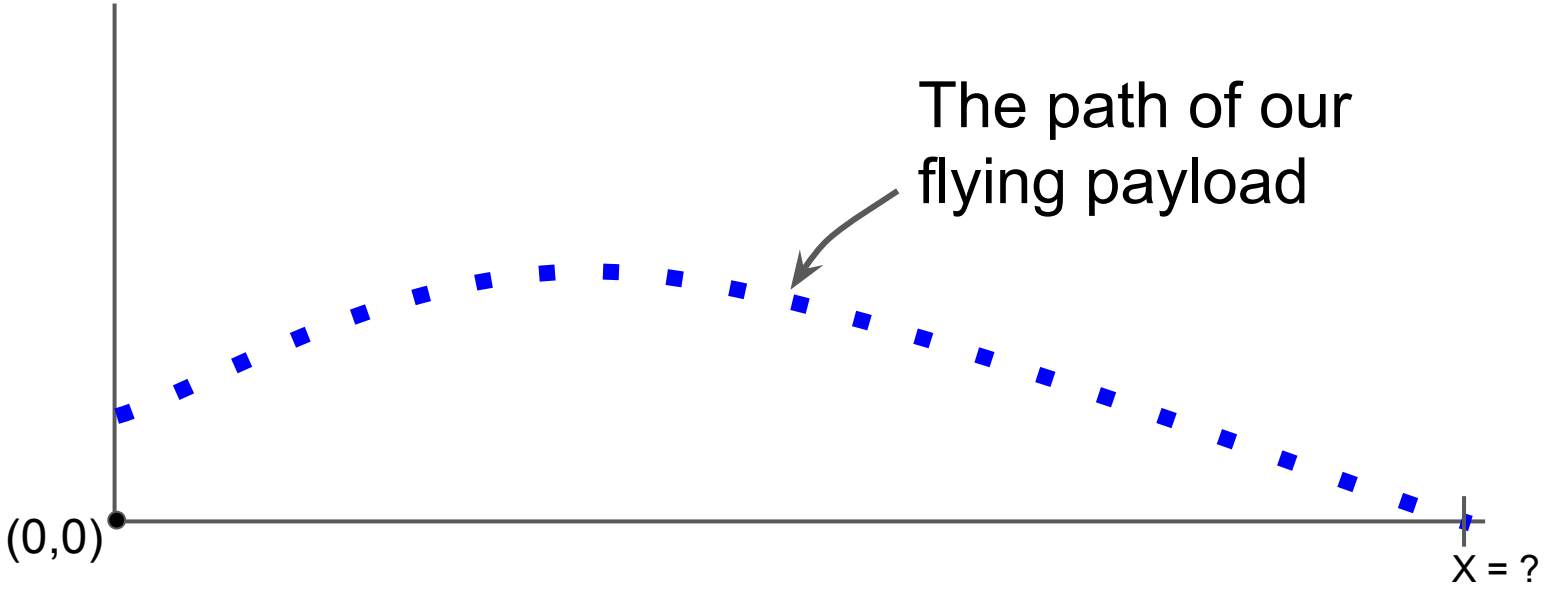
$X = 0.9719t^2 + 10.82t - 0.1942$

$Y = -5.101t^2 + 5.554t + 0.5754$

(These are the equations that make the red and blue lines on the previous slide).

Now the fun part!

We want to find the distance where our payload hits the ground:



Since we set the ground as y = 0, we can easily solve one of our equations. This gives us the time when the payload hit the ground:

$Y = -5.101t^2 + 5.554t + 0.5754 = 0$

I used WolframAlpha.com to solve the equation:

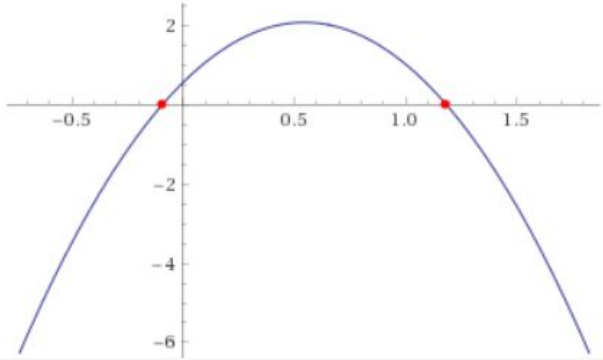
WolframAlpha computatio intelligence

0=-5.101t^2+5.554t+0.5754

Input:

$0 = -5.101\,t^2 + 5.554\,t + 0.5754$

Root plot:



Solutions:

$t \approx -0.0952657$

$t \approx 1.18407$

It must be the positive solution since the payload didn't travel back in time!

Now we calculate the X position using the other equation:

$X = 0.9719t^2 + 10.82t - 0.1942$

$X = 0.9719(1.184)^2 + 10.82(1.184) - 0.1942$

$X = 14.9$ meters

Your Turn:

How many seconds was this payload in the air before it hit the ground? How far did it go?

ASSIGNMENTS AND MESSAGES

6/10/20:

1. Review today's slides (posted as .pdf)
2. Complete the Exit Ticket (click here).

The position equations are:

$X = 1.063t^2 + 8.326t + 0.02498$

$Y = -5.044t^2 + 2.82t + 0.8837$