Math for the Win: Connecting Sports With Mathematics

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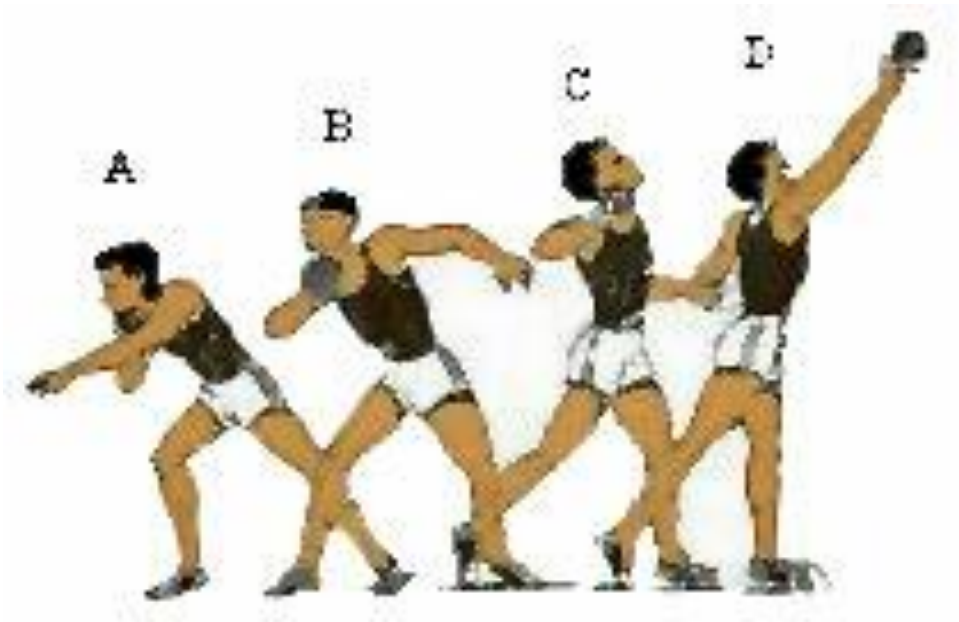
What can we learn from shot put?

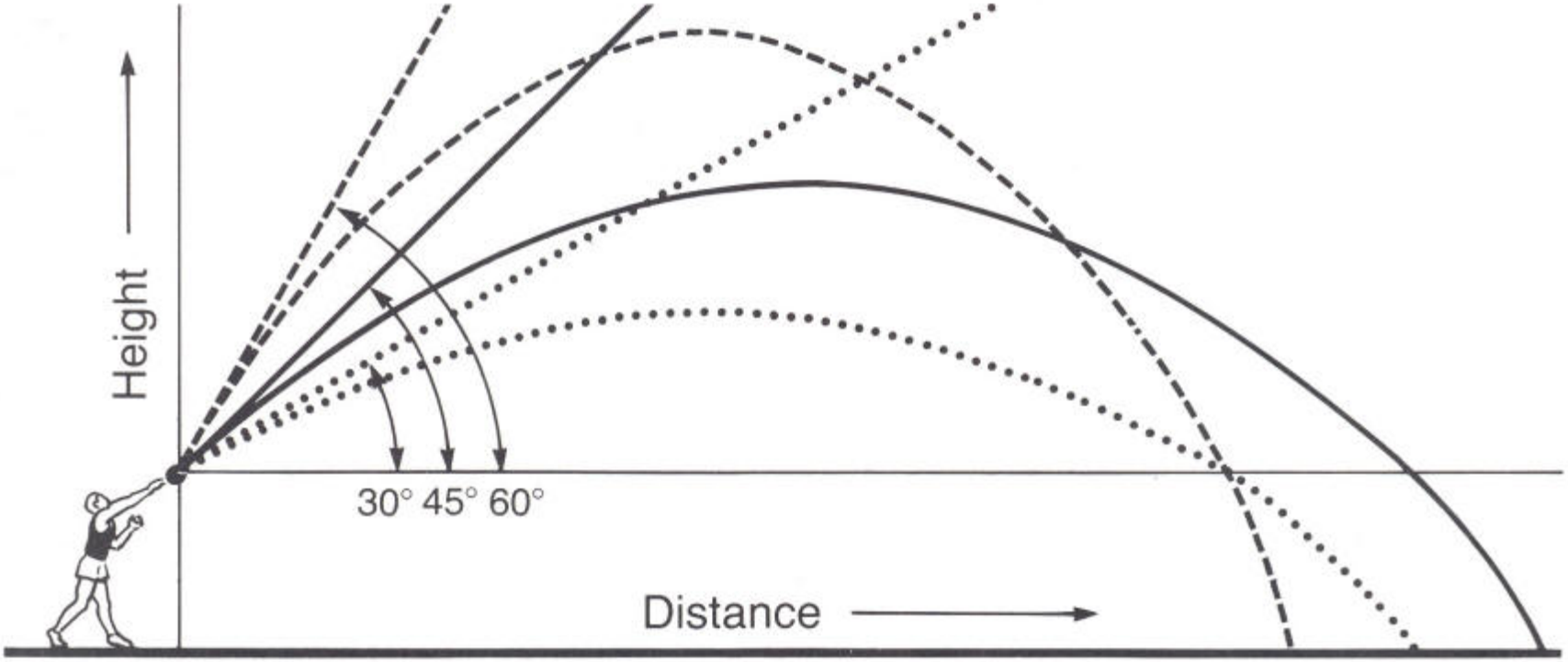
Shot Put Throw

What is mathematically important about this picture?



https://www.brianmac.co.uk/shot/shot1.jpg

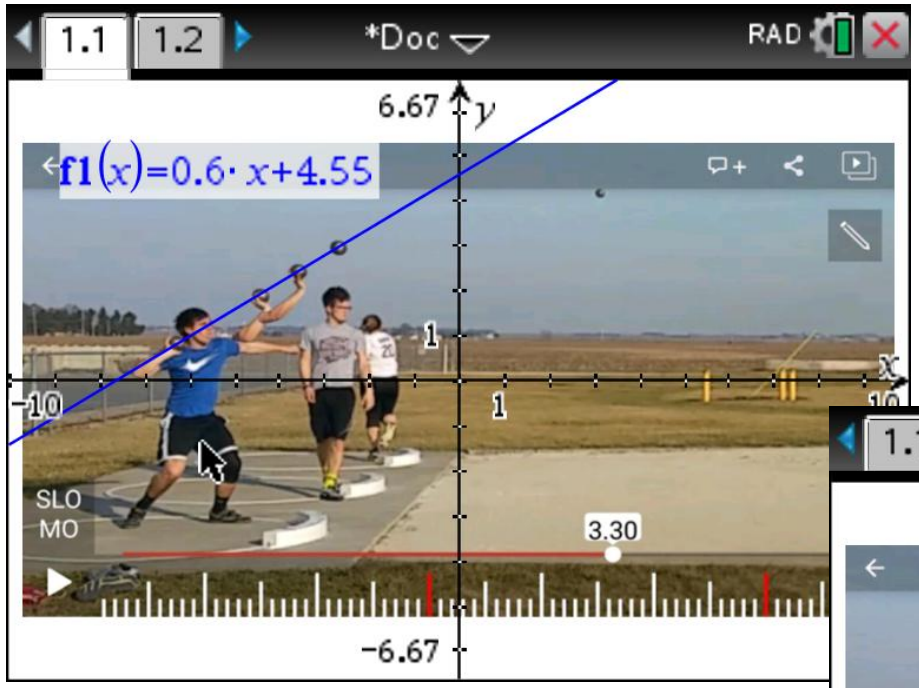
What is mathematically important about this picture?

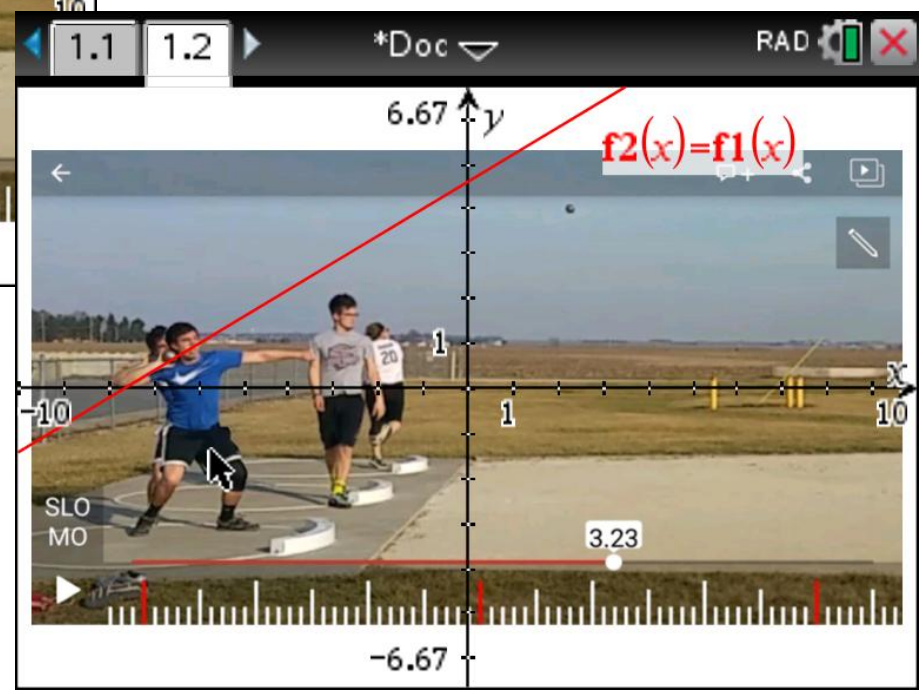


The parabolic flight path for various release angles

http://www.coachr.org/biomechs3.jpg

Studying the Release





Did the shot put land short or long?

Project Guidelines

- Video an object in motion through the air.
- Screenshot the object in at least 3 different positions from the video.
- Choose an interesting question for your audience that can be answered by using the points and the quadratic model.
- Make a clear conclusion where the mathematics performed and the video agree.

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Modeling Motion of Basketball

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Student Work

$$a + b + c = 10$$
$$-c = -8$$

$$49a + 7b + c = 14$$
$$-c = -8$$

$$a + b = 2$$

$$49a + 7b = 6$$

$$a + b = 2 \longrightarrow -7 - 7b = -14$$

$$49a + 7b = 6 \longrightarrow 49a + 7b = 6$$

$$42a = -8$$

$$a = -\frac{4}{21}$$

$$-\frac{4}{21} + b = 2 \qquad \mathrm{b} = \frac{46}{21} \qquad \mathrm{c} = 8$$

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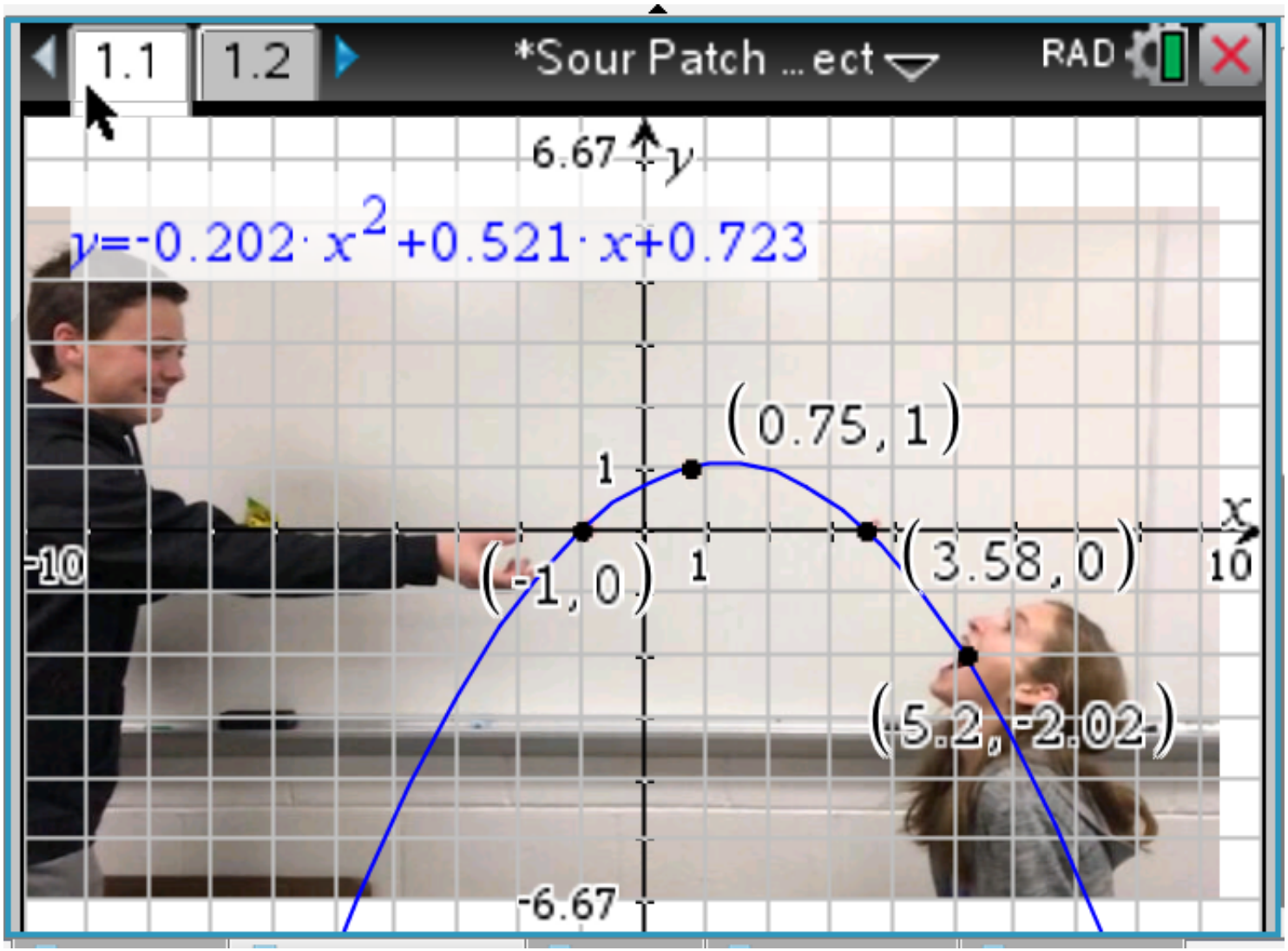
Student conclusion:

» Our parabola did hit all of the points that we had predicted but did not go in the basket. Our solving of the problem and the final answer are correct to fit the points we predicted but the ball did not go in the hoop because our points were not as accurate as they could have been.

Sour Patch Project



Student conclusions:

- Before doing this project, I never paid attention to all the parabolic motions I encounter on an everyday basis. Now, it's hard to watch a basketball game without thinking, "Parabola! Parabola! Oh look, another parabola!"
- I did not know that you can use mathematical equations to predict if a moving object will hit it's target or not.
- I could not believe how much I learned regarding technology, and how big of a part it played in putting this project together.

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Tennis and Tweeting

http://tinyurl.com/jz4xkl5

#stemandsports #T3Learns

Other ideas?

@idomath @TracyWingert

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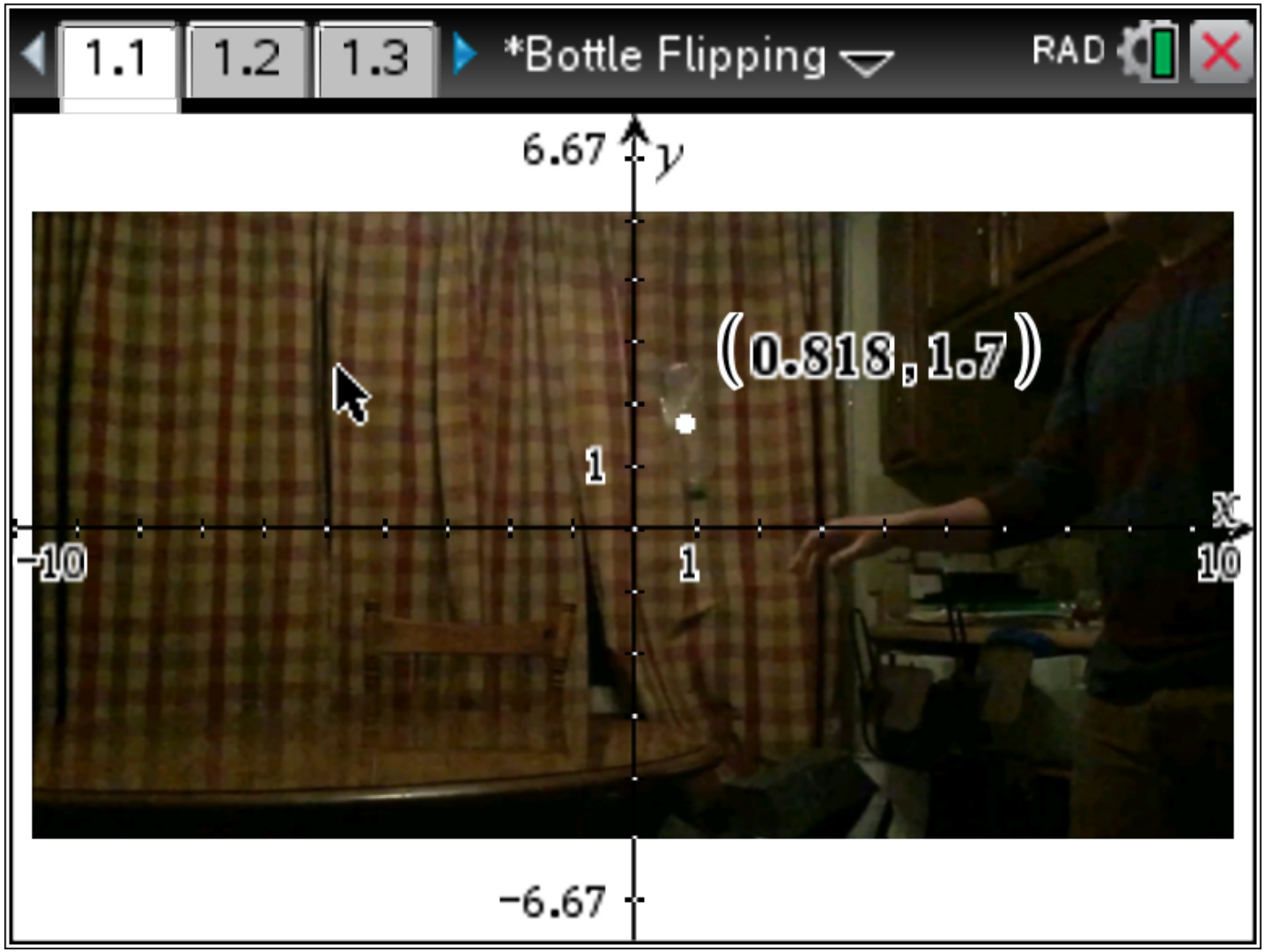
Bottle Flipping



Student conclusions:

» During this project I learned that bottle flipping has a lot more math involved in it than I originally thought. It turns out that it does not follow a parabola unless tracked by the center of mass, which is constantly changing due to the water sloshing on the inside of the bottle.

What do students take from this?

- Modeling can be done with different approaches
- Value of precision
- Perseverance
- Satisfaction of a job well done
- Problems that start as “math problems” can easily become “science problems”

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