

Citizen Schools – Right On Target apprenticeship – WOW!

Agenda

Step, time	Activity	Role
1.	Introduction	Adnan + Haggai
2.	Key lessons learned in the apprenticeship:	
1 min.	Some factors that DON'T affect target shooting: <ul style="list-style-type: none">- Size and weight of balls	Show Clip + Explain:
1 min.	Some factors that DO affect target shooting: <ul style="list-style-type: none">- Friction and air resistance	Show simulation + Explain:
1 min.	Some factors that DO affect target shooting: <ul style="list-style-type: none">- Velocity and angle (show 2 possible angles)	Show simulation + Explain:
1 min.	The laws of physics and math are true everywhere: <ul style="list-style-type: none">- The best angle to shoot the farthest on earth and on the moon	Show simulation + Explain:
3. 1 min.	Setting and hitting a target Ask the audience for velocity and angle settings	Setup: Ask for values: Run:
4. 1 min.	We don't need to guess how to hit a target. We can calculate it: Angle = 45 Target-distance = 35 Target-height = 15 $V = ?$	Calculate + Explain: Set up + run:

Total time: ~6-7 min.

Step, time	Activity	Role	Responsible
1.	Introduction		Adnan + Haggai
2.	Key lessons learned in the apprenticeship:		
1 min.	Some factors that DON'T affect target shooting: <ul style="list-style-type: none"> - Size and weight of balls 	Show Clip + Explain: http://www.youtube.com/watch?v=Z789eth4lFU&feature=related	Amanda
1 min.	Some factors that DO affect target shooting: <ul style="list-style-type: none"> - Friction and air resistance 	Show simulation + Explain: http://www.employees.org/~hmark/math/ejs/freefall_with_air_resistance.html	Jose
1 min.	Some factors that DO affect target shooting: <ul style="list-style-type: none"> - Velocity and angle (show 2 possible angles) 	Show simulation + Explain: Velocity = 20, angle = 45 and 72 http://www.employees.org/~hmark/math/ejs/TargetTraining.html	Brandon
1 min.	The laws of physics and math are true everywhere: <ul style="list-style-type: none"> - The best angle to shoot the farthest on earth and on the moon 	Show simulation + Explain: Velocity = 20, angle = 30, 45, 60 Earth and Moon http://www.employees.org/~hmark/math/ejs/RightOnTarget.html	Jesus + Eric
3. 1 min.	Setting and hitting a target Ask the audience for velocity and angle settings	http://www.employees.org/~hmark/math/ejs/RightOnTarget.html Setup: angle = 45, distance = 35, height = 15, guess V (don't give the answer. Calculate it later) Ask for values: Run:	Crystal
4. 1 min.	We don't need to guess how to hit a target. We can calculate it: Angle = 45 Target-distance = 35 Target-height = 15 V = ?	Calculate + Explain: http://employees.org/~hmark/math/ejs/VelocityCalculator.html angle = 45, distance = 35, height = 15 (answer is V = 24.75) Set up + run: http://www.employees.org/~hmark/math/ejs/RightOnTarget.html	Bryant

Cue cards for WOW!

1. Introduction – Adnan + Haggai

- a. Thanking everyone for coming
- b. Thanking the kids for working hard and well to prepare
- c. The kids will present some of the things they learned and ask the audience to participate

2. Some things affect target shooting, and some things don't

- a. Do ball/bullet size and weight affect the movement?
 - i. Ask the audience for predictions
- b. Show the clip:
 - i. <http://www.youtube.com/watch?v=Z789eth4lFU&feature=related>
- c. Summarize/explain what we saw

3. Some things affect target shooting, and some things don't

- a. How does air resistance or friction affect the movement?
- b. Run the simulation:
- c. <http://TabletopProjectile-1>
- d. Summarize/explain what we saw

4. Some things affect target shooting, and some things don't

- a. How velocity and angle are very important
- b. Run the simulation:
 - i. Set up v_1 and a_1
 1. Run
<http://ltd.stanford.edu/~hmark/math/ejs/RightOnTarget.html>
 - ii. Set up a_2
 1. Run
- c. Summarize/explain what we saw

5. The laws of physics and math are the same everywhere (Earth and Moon)

- a. The best angle to shoot, if you want to go the farthest
- b. Run the simulation:
 - i. Make sure we are on Earth. Set up $v = 20$ and $a = 15, 30, 45, 60, 75$
 1. Run
<http://ltd.stanford.edu/~hmark/math/ejs/RightOnTarget.html>
 - ii. Switch to the moon. Set up $v = 20$ and $a = 15, 30, 45, 60, 75$
 1. Run
- c. Summarize/explain what we saw

6. Hitting a target

- a. Set the target-distance = , target-height = and shooting angle = 45.
- b. Ask the audience to predict the velocity needed in order to hit the target
 - i. Run <http://ldt.stanford.edu/~hmark/math/ejs/RightOnTarget.html>
- c. Repeat with a couple of additional velocities

7. Calculate hitting a target

- a. Set the target distance, target height and shooting angle
- b. Calculate V based on the formula
- c. Set the calculated V
- d. Run <http://ldt.stanford.edu/~hmark/math/ejs/RightOnTarget.html>

8. Closing – Adnan + Haggai

- a. Thank guests and kids