Citizen Schools – Acing Racing apprenticeship – WOW!

Agenda

Step, time	Activity	Role
1. 5 min.	Introduction	Tom + Haggai
2. 5 min.	Key subjects covered in the apprenticeship	
	--- CNN video and graphs + animation - explanation	Explain:
	--- Animation (flipbook) – show video	Explain:
3. 5 min.	Explaining the main points of Sage racing program	Explain:
4. 5 min.	Setting/running race 1 – 2 rockets with different speeds (400, 500) and the slower rocket having a head start 200 (result: the faster rockets will win)	Setup: Ask for prediction: Run: Explain/review:
5. 5 min.	Setting/running race 1 – 2 rockets with different speeds (400, 500) and the slower rocket having a head start 600 (result: the rockets will tie)	Setup: Ask for prediction: Run: Explain/review:
6. 5 min.	Closing	Tom + Haggai

Total time: 30 min.

Cue cards for WOW!

1. **Introduction – Tom + Haggai**
    a. Thanking everyone for coming
    b. Thanking the kids for working hard and well to prepare
    c. Generally, topics we covered:
        i. Using graphs to explain complex phenomena
        ii. Using animation to explain complex phenomena
        iii. Using racing situations for math about distance, time, speed
        iv. Using computer programming to build and run races and predict their outcomes

2. **CNN video explanation –**
   http://www.gapminder.org/videos/hans-rosling-on-cnn-us-in-a-converging-world/
    a. Explain –
        i. The video shows how the population in different countries improved over time
        ii. It shows how the people in these countries improved their life spans (years lived), and their income (salary earned) – the two graph axes
    b. Start the video – run it **from the animation start** until the **breaking of China** into territories
    c. Explain –
        i. the movement is from the "poor and sick" corner to the "rich and healthy" corner
        ii. Summarize – the graphing and animation show very clearly and very nicely the idea of how countries evolve and develop over time (from "poor and sick" to "healthy and wealthy")

3. **YouTube flipbook animation –**
   http://www.youtube.com/watch?v=je4U98AQVhA&NR=1
    a. Explain – we will see how animation can be created by drawing many pictures, with small differences between each picture or frame, and quickly flipping through them, which will create the sense of movement or animation
    b. Show the YouTube video – 1 minute
    c. Explain – in the apprenticeship, we learned how to make animations with a program called Sage, which created pictures and put them together into something like a flip book, to show a race of two rockets.

4. **Explain the Sage racing program –**
    a. We learned in the apprenticeship how to write a program in a computer language called Sage
    b. Using this computer program, we created 2 rockets that race against each other, and the slower rocket has a head start; it is closer to the finish line.
    c. The race shows each rocket moving at a certain speed, and starting at a certain place, racing towards the finish line
    d. Show - on the computer screen, the lines creating the rockets, and the variables speed, head start, and finish line
    e. Explain – we created the animation with the while loop, and the animate functions
    f. Show - on the computer screen, the lines creating the loop and the animation

5. **Setting/running race 1**
    a. Explain –
        i. We are going to show you a race between the two rockets, and we'll ask you to predict the outcome.
        ii. We will have one rocket (blue) traveling at 400 mph, and the other one (red) at 500 mph.
        iii. The slower rocket (blue) will have a head start of 200 miles, which means that it will be closer to the finish line.
    b. Setup –
        i. On the computer screen, put in the values for **speed1=400, speed2=500, head_start1=200**
    c. Ask for predictions for the race outcome –
        i. Which rocket is going to win the race, and **why**?
        ii. It is important to think of why, because this makes it more than just a guess
        iii. Does everyone agree that this will be the result? Anyone thinks differently?
    d. Run the race and explain –
        i. Run the race – make sure the audience pays attention to the race
        ii. Explain – even though the slower rocket had a head start, the faster rocket (red) still wins.
        iii. This is because the red rocket has to cover 3000 miles at 500 mph (so it will take 6 hours: 3000 divided by 500)
        iv. The blue one has to cover 2800 miles (3000 minus 200 which is the head start) at 400 mph (so it will take 7 hours: 2800 divided by 400)

6. **Setting/running race 2**
    a. Explain –
        i. We will not change the speed of the rockets, but we will give the slower rocket (blue) a **bigger** head start.
    b. Set up –
        i. On the computer screen, put in the values for **speed1=400, speed2=500, head_start1=600**
    c. Ask for predictions - Oscar
    d. Run and Explain –
        i. Run the race – make sure the audience pays attention to the race
        ii. Explain – now that the slower rocket had a bigger head start, the rockets will get to the finish line at the same time.
        iii. This is because the red rocket has to cover 3000 miles at 500 mph (so it will take 6 hours: 3000 divided by 500)
        iv. The blue one has to cover 2400 miles (3000 minus 600 which is the head start) at 400 mph (so it will also take 6 hours: 2400 divided by 400)

7. **Closing – Tom + Haggai**
    a. Thank guests and kids