

# Dynamic Motion Simulations + Wireless Networks = Amazing Algebra Learning

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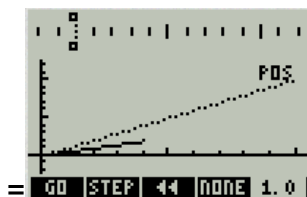
## Goals:

Introduce the basic features of **MathWorlds for the TI-83/84+ families**  
Introduce the ideas of **Mathematical Performance** in a Connected SimCalc Classroom  
Introduce **Participatory Aggregation** – Varying Linear Functions By Student  
Demonstrate **CBR Motion detector** (if time)

## Part I: Introducing Piecewise Linear Functions

First we will demonstrate a simple use of the MathWorlds software to give you a flavor of what it can do, then the workshop will be hands-on. These instructions serve as a guide as we work through the various activities.

1. From the APPS menu, Choose **3. MthWrlds**  
Then **2. Friday Session** -- Then **1. Piecewise WarmUp** then **2. Piecewise Editing** to get a screen similar to



2. **Exploring Animation Mode and its SoftKeys**

What do we see? What's going on?

GO **GO** RESET **←** STEP **STEP** MARKS **NONE** -> **MARK**  
STEP-TIME [Rightmost SoftKey]

3. **Introducing Numeric Readout – the STAT key**

4. **Switching From Animation to Function Edit Mode Using the MODE and DEL Keys**  
The Mode Map

5. Making An Exciting Sack Race – Adding Segments & Dragging HotSpots to Make a Piecewise Linear Function Model that can be the basis for a *Mathematical Performance*

6. Discuss the power of connecting expression with new kinds of mathematical functions for students. Examine slope in a qualitative as well as quantitative way. Wireless connectivity brings every student's work into a public display for examination and discussion.

## Part II: Introducing $Y=mX+b$ Functions and Participatory Aggregation

1. If you had Paused MathWorlds using  $2^{\text{nd}}$ -**STO**, choose the **MthWrlds** App from the APPS menu, which will Resume MathWorlds exactly where you were when you pressed  $2^{\text{nd}}$ -**STO**. To quit the document you are now in, press  $2^{\text{nd}}$ -**QUIT**. This brings you back to the menu. Press UP to get to a higher level and then choose **3. Linear Functions** and then **1. StagStartStagFinish**. This should yield a screen similar to



If you are starting fresh, then you will need to choose 2. Friday Session first.

2. Which object goes with which graph?
3. How fast is A moving? (We can drop MARKS.) And What is A's formula? (including A's domain)
4. What is B's Y-Intercept? What is B's Initial Position?
5. We now want to edit B's function so need to press the **MODE** or **DEL** key to get to **Function Edit Mode**. Because B is defined algebraically, there are **NO** hotspots and there is **BalP** in the rightmost **SoftKey** instead of **BPOS**. To change B's function, you need to press the **PRGM** key.
6. Your job is to change B's formula so that:  
B starts with initial Position 4 times your Count-Off Number and finishes in a tie with A
7. When you have changed the coefficient of X, the constant term, and domain as needed, then press the **STO** key to see the graphical result of your changes. Does it fit your expectations? If not, press **PRGM** and re-edit B's formula. If it seems OK, press the **MODE** key to return to Animation Mode and animate your solution to see that it does what you want.
8. When you have the graphs, formulas and motion you want, save your work and Pause MathWorlds so we Can Collect, Display and Discuss your functions!  
**Press  $2^{\text{nd}}$ -STO and follow the instructions on the  $2^{\text{nd}}$ -STO Handout**
9. We will show what your B functions look like when aggregated on a common graph, and then when animated in Java MathWorlds.
10. Note how the special  $Y = 0X + 16$  case is contextualized in the sequence of formulas, the sequence graphs and aggregated motion!
11. We will illustrate some additional aggregations or repeat with a CBR example if there is time.