UNIT 3: SACK RACE: QUANTITATIVE

Activity 1: Sack Race
(SCSRU3A1.8xv & SackRace_SRU3A1.smw)

UNIT DESCRIPTION:

In this unit, students will make a motion for Actor B by manipulating, adding, and deleting segments to define a piecewise linear function for Actor B. Students will be creating a story depicting what occurs within their race. You do not need to group students for this activity, but you may choose to pair them to verify the validity of their first drafts.

FOCUS:

The primary focus should be on slope as rate of change and piecewise functions. This activity allows exploration of multiple types of slope; i.e., positive slope, negative slope, or zero slope for students to build their understanding of varying rate. This activity also allows for exploration of intersections of linear functions leading to an understanding of solutions to systems of equations. There is no one correct answer to this activity and students should focus on what conditions determine a correct answer. This activity will not create a class collection of functions that have a pattern or create a "nice" picture. Students' creativity will set the tone for the discussion. You may choose specific students to display their graph and discuss their story one at a time. You want students to pick out the correlation between the action and the function. For example, if someone reads a story where their Actor stops, there should be a segment with a zero slope.

Grouping Suggestion:

This activity does not rely on assigning group or count-off numbers, so it is not necessary to group students. However, you may want to pair students so they can share technology questions and answers and eventually verify each other's first drafts.

EXTENSIONS:

Ask students to create races with more rigid criteria. For example: Ask students to create a race with Actor A that ends in a tie, but Actor B travels at 3 different velocities; ask students to create a race with Actor A that ends in a tie, but Actor B stops twice and travels backwards once; ask students to create a race with Actor A that ends in a tie, but Actor B never travels backwards.

CLASS DISCUSSION

BEGIN WITH THE COMPUTER TEACHER DOCUMENT

You may decide to start with the calculator document as is or create an exciting race before hand to discuss with students. A third option is to create a race with input from the students as part of your introduction.
You should at least introduce adding and manipulating segments to control Actor B's function. You may want to create a story that contains some falls or mishaps, possibly some disorientation resulting in running in the wrong direction. This will spark some creativity in students and get them thinking about their options in creating their scenarios.

Activity Dialogue:

What do you expect to happen when you run the animation?

How long will Actor A travel?

In which direction will Actor A travel? At what rate? What will Actor A's velocity be?

Where does Actor A start?

Where does Actor A end? When does Actor A end?

Actor B has been ignored because the students are going to be changing Actor B's motion. Students are asked make an Exciting Sack Race that ends in a tie between Actor A and Actor B. Each student will be Actor B and will be able to edit Actor B by adding segments and manipulating segments of Actor B's position graph. But that is not all the students will also be creating a story to go along with this race.

What does it mean to end in a tie?

What is an exciting race? (Lay some ground rules, create a graph and story so that students will understand what kind of control they have.)

Students will be editing functions in the same way you have.
F3: Edit: POS ▸ B ▸ GrphEdit will enable editing and provide access to Add, Insert, Delete and PtEdit. Pressing the Enter key will exit the menu and accept any changes. You may allow students to use Point Edit (PtEdit), but it is not necessary. (PtEdit allows the student to specify a coordinate pair.)

Once you have completed an appropriate introduction, have students Sign In.

Once students have signed in, you may 

. (**<u>Do not</u>** start activity unless all students are logged in.)

This is your opportunity to monitor group progress and determine what students are thinking and/or struggling with. Try not to answer questions directly, give students ways of using the motion to answer their questions. For example, "Is

this story correct?" Answer: "Run the animation, does your Actor do what you say it does? How do you know?"

Remind Students:

Remind students to press the Enter key to exit the Edit Menu. Also remind students that the 2nd and left or right arrow will allow them to edit the next or previous segments.

Teacher Motion Dialogue:

Once students have completed their motions and corresponding stories, collect their work. In addition, you may want to pair student up and have them swap and verify each other's stories and motions.

Ask students:

What do you expect to see in the World?

How many Actors will there be?

Where will the Actors be positioned before we start the animation?

In which direction will the Actors travel when we start the animation?

How fast will the Actors travel? For how long?

Where will the Actors be positioned at the end of the animation?

Once the students have determined what they should see, run the animation.

Ask students:

Is this what we expected? Why or why not? (Try to remind students to be specific.)

Create a dialogue about whom

Teacher Graph Dialogue:

Refer to the class set of graphs.

Ask students:

What do you expect to see in the Coordinate Plane?

How many functions should we see?

Will the functions intersect at all?

Could they intersect in at any points other than (0, 0) or (10, 20)? How do you know?

Refer back to any errors in the motion that would change what they should see.

Try to get students to connect what was happening in the motion to the functions and graphs.

Create a dialogue about what each function represents and how students have determined this.