

Lesson: Building Understanding of Rate of Change/Slopes Using Alice

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Grade Level: 8

Subject: Math

Overview:

- This lesson is about determining the rate of change and transforming it into a linear representation, thus determining slope from a linear function
- Students will investigate real-world situations that relate to rate of change, and create their own real-world situations using technology
- Alice concepts focus on moving an object (a certain number of meters), and the use of duration. For example if you move an object 4 meters in 1 second, it is the same as moving an object 2 meters in 0.5 seconds.

Objectives and Goals:

- NCSCOS Grade 8 Mathematics
 - Competency Goal 5: The learner will use linear relations and functions
 - Objective 5.01 (c): Find, identify, and interpret the slope (rate of change) and intercepts of a linear relation
- NCSCOS Grade 8 Computer/Technology Skills
 - Competency Goal 3: The learner will use a variety of technologies to access, analyze, interpret, synthesize, apply, and communicate information
 - Objective 3.07: Plan, design, and develop a multimedia product using data (e.g., graphs, charts, database reports) to present content information

Anticipatory Set (5 min):

- Ask the class to raise their hands to contribute to a discussion of what they already know about slope. Write a list on the board of the meanings/examples they provide. Point out any similarities and differences.

Direct Instruction (15 min):

- Provide a definition of rate of change and slope
- Provide examples of motion:
 - Mary walks 30 meters in 15 seconds...her rate of change is 2 m/s
 - Johnny runs 100 feet in 20 seconds...his rate of change is 5 ft/s
 - A kangaroo hops 28 yards in 14 seconds...it's rate of change is 2 yd/s
- Discuss independent/dependent variables and positioning on the axes
- Construct a graph on a coordinate grid for one of the previous examples

Guided Practice (10 min):

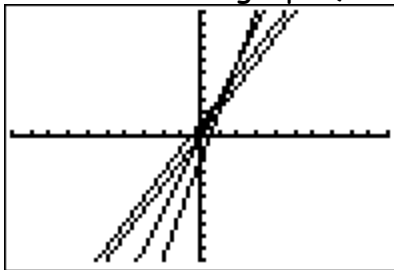
- Show example world rateOfChange.a2w: world with race between kangaroo, turtle, cow, hare
- Discuss the rate of change of the four characters, leading into the following expressions:

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Plot1 Plot2 Plot3
\Y1 2X+1
\Y2 3X
\Y3 4X-2
\Y4 2X
\Y5
\Y6 =
\Y7 =

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- Create a graph (time vs. position)



Closure (5 min):

- How can you tell the rate of change from an expression?
- Explain how to use your expression to create a graphical representation of position.

Independent Practice:

- Create an Alice world with the following requirements
 - 3-4 characters (animals/people) involved in a race
 - All starting at different positions
 - All have different rate of change
- Write expressions for the animals/people in Alice world
- Graph time vs. position on the same coordinate grid using different colors to represent different characters

Required Materials and Equipment:

- Graph paper/graphing calculator
- Computer with Alice software
- Data projector
- Colored pencils/markers

Assessment

- Use rubric