

### INTRODUCE

Project the sketch for viewing by the class. Expect to spend about 5 minutes.

1. Open **Mellow Yellow.gsp** and go to page “Story 1.”
2. Explain, *Today you’re going to put graphs into motion.* Pointing to Mellow Yellow, explain, *This is Mellow Yellow and she will be walking along this line segment, which represents the path from her house to the corner store. Of course, Mellow Yellow will not always walk in the same way. Sometimes she stops to pick something up or to rest. Sometimes she runs and sometimes she dillydallies.* Press Go! *Can anyone describe what Mellow Yellow did?* Let students talk about the different things they noticed. Encourage them to talk especially about the different speeds at which Mellow Yellow moved. *The graph provides a very nice way of describing Mellow Yellow’s walk, and today you’re going to work on being able to interpret the story a graph can tell.*
3. Show students how the points on the graph can be dragged to different positions and that the resulting walk done by Mellow Yellow will change. Try to avoid giving any of the segments a negative slope for now. Tell students that they will have an opportunity to change the graphs when they get to “Story 3,” but that they should not change them for the first two stories.

### DEVELOP

Expect students at computers to spend about 30 minutes.

4. Assign students to computers and tell them where to locate **Mellow Yellow.gsp**. Distribute the worksheet. Tell students to work through step 5 and do the Explore More question if they have time.
5. Let pairs work at their own pace. As you circulate, here are some things to notice.
  - Students often think that a slower speed means the graph goes down. Make sure students articulate what they see happening to Mellow Yellow’s journey when the graph goes down, and how they can compare slower speeds to faster ones.
  - For worksheet step 3, where students are asked whether the graph corresponds to the story, invite students to think about how they could change the graph so that the story *does* match.
  - For worksheet step 4, encourage students to experiment with different locations of points 1 and 2 if they are having difficulty understanding the relationship of the graph to the movement of Mellow Yellow.

Invite students to change the locations of points 1 and 2, and describe a different story.

- For worksheet step 5, make sure students write out their stories fully. Ask them to connect each “leg” of the trip to the corresponding segment.

## SUMMARIZE

Project the sketch. Expect to spend about 10 minutes.

6. Gather the class. Students should have their worksheets with them. Using page “Fit the Story,” ask students to explain how they used the information in the story to know where to place the points on the graph.
7. Using page “Write a Story,” ask two or three volunteers to describe their stories.
8. Ask students what kinds of motions they were able to create with the graph and also what kind of motions they could not create (such as acceleration).

## EXTEND

1. Explain to students that acceleration and deceleration require nonlinear graphs. Point out that one of the problems with the graphs they used in Sketchpad is that Mellow Yellow would have a hard time starting immediately at a high speed. Instead she would probably start more slowly and accelerate until she achieved a high speed. On the board, draw an example of acceleration and ask students to use these curved lines to draw graphs that would better represent the stories about Mellow Yellow.
2. **What other questions might you ask about graphing motion?**  
Encourage all inquiry. Here are some ideas students might suggest.  
*Why do steeper lines indicate faster speeds?*  
*Can you calculate the actual speed from the steepness of the line?*  
*What if a graphed segment of the trip were vertical?*

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**ANSWERS**

1. Answers will vary. Students should notice that the  $x$ -axis corresponds to the time it takes Mellow Yellow to travel and that the  $y$ -axis corresponds to the distance she has traveled. The  $y$ -coordinate of point *Stop* is just under 1 (mile) and its  $x$ -coordinate is just over 11, so it takes her just over 11 minutes to arrive at the corner store. There are three different slopes, including one that is 0 (corresponding to the horizontal segment) when Mellow Yellow is stopped.
2. In Story 2 Mellow Yellow goes backward and the corresponding segment slopes down.
3. The first segment should have a steeper slope than the last segment because she runs faster at the beginning. The middle segment should have a slope of 0 instead of a negative slope.
4. Answers will vary. Make sure that the first segment has a small positive slope, the second segment has a slope of 0, and the third segment is steeper than the first. Make sure also that Mellow Yellow runs far enough, so that the  $y$ -coordinate of *Stop* is just under 1.
5. Answers will vary. Make sure that the horizontal segments correspond to not moving and that the slopes of the other segments correspond appropriately to the speeds.
6. Answers will vary. Make sure that the  $y$ -coordinate of point *Stop* in both stories is just under 0.5 (miles) and that its  $x$ -coordinate is at 10 or 5 (minutes), depending on the story.