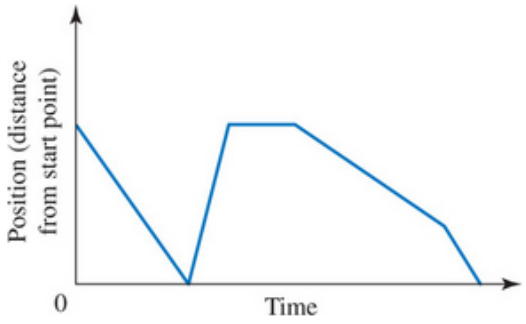
Homework on Interpreting Graphs – Sowder et al, Chapter 14

1

The following graph shows a new journey taken by Wile E. Coyote:



a. Write a story that could be represented by this graph. (Remember that this graph shows Wile E.'s distance from a starting point, such as his cave. It is not a graph of the total distance traveled.)

b. Construct a new graph of the relationship represented in the given graph. This time, graph the total distance traveled over time.

c. Finally, construct a speed-time graph of the relationship represented in the given graph.

2

Graphs can involve numbers, of course. Suppose Wile E. Coyote leaves his cave walking at a constant speed of 8 ft/s for 10 seconds. Then he runs in the same direction at a constant speed of 12 ft/s for 5 more seconds. He realizes that he forgot something at home, turns around, and walks back to his cave at a constant speed of 5 ft/s.

a. How long does it take Wile E. Coyote to get back to the cave once he turns around and starts walking back home?

b. Graph Wile E.'s distance from the cave over time (i.e., make a position-time graph). You may want to create a table of values first.

c. Sketch a second graph, this time graphing Wile E.'s total distance traveled over time. You may want to create a table of values first.

d. Compare the two graphs. How are they alike? Different?

e. How can you determine Wile E. Coyote's speed from each graph?

3

Many times, motion graphs (such as position-time graphs) can give an algebraic equation.

a. Suppose Wile E. Coyote walks at a constant speed of 4 ft/s away from his cave. Graph the relationship between his distance from the cave over time (i.e., as time passes). Then write an equation representing this relationship.

b. Suppose Wile E. Coyote is at a boulder about 20 feet from his cave. He starts walking in a direction that is away from both the boulder and the cave at a constant speed of 4 ft/s. Graph the relationship between his distance from the cave and time. Then write an equation representing this relationship.

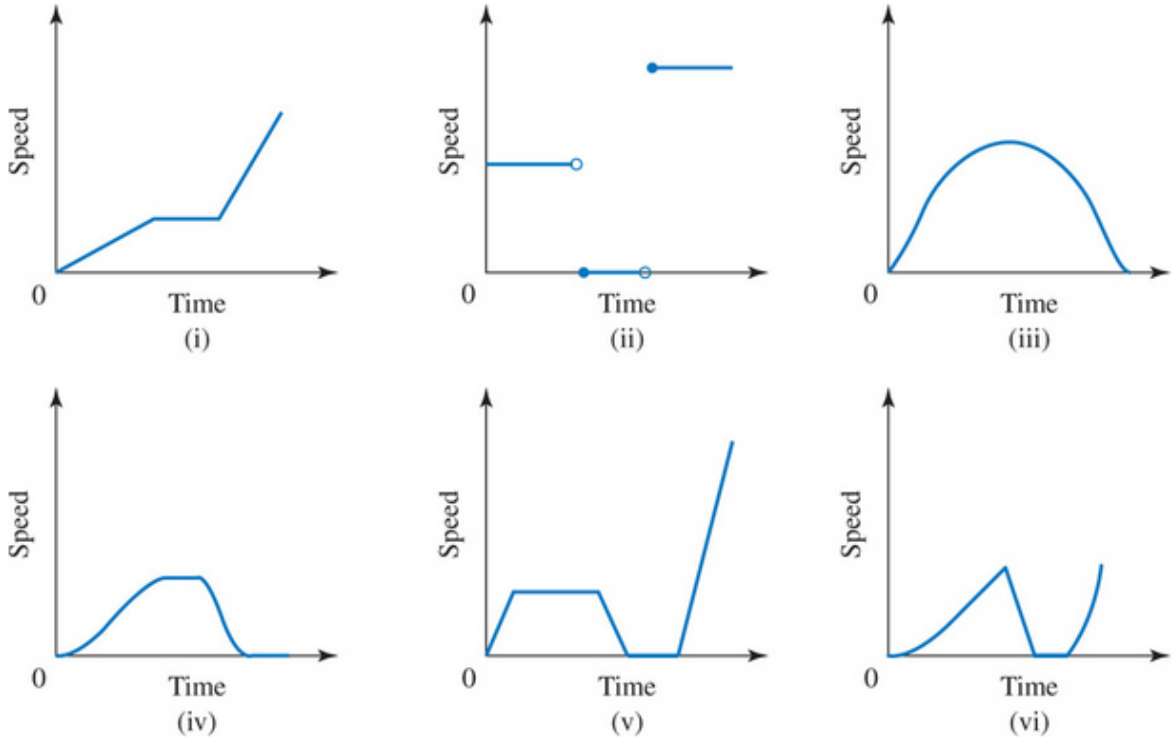
c. Suppose Wile E. Coyote walks toward his cave at a rate of 4 ft/s from a cliff that is 56 feet from the cave. Graph the relationship between his distance from the cave and time. Then write an equation representing this relationship. How are the graphs from parts (a–c) alike and different? Why?

d. How are the equations from parts (a–c) alike and different? Why?

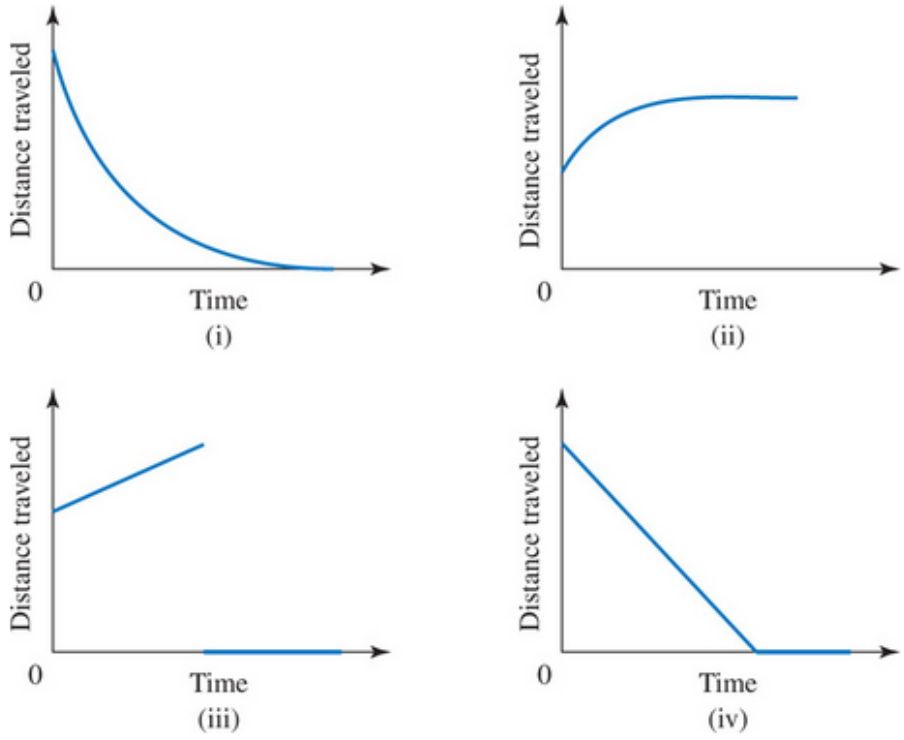
4

For each of the following situations, circle *one* graph on the following page that best represents the situation. Explain why you selected that graph.

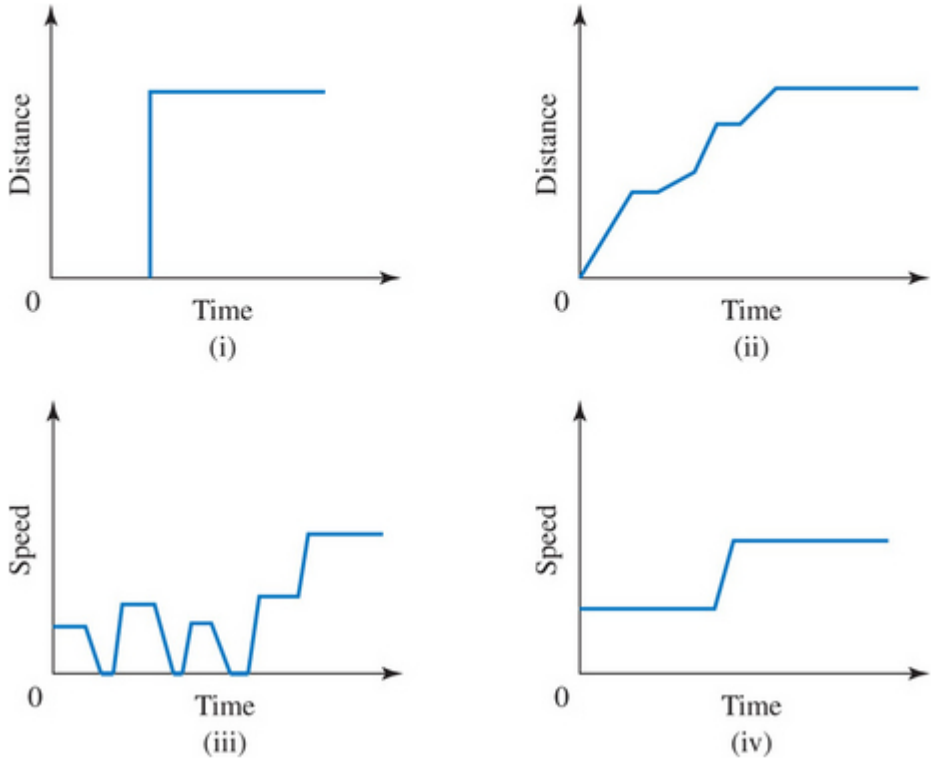
a. Tanya starts to run up Mount Soledad on Mountain Road. She begins at a stand-still and quickly gets up to a comfortable yet slow pace. She runs at this constant rate until she gets to the top of Mount Soledad. She slows to a stop and enjoys the view for about 15 minutes. Then she runs down the steep side of the mountain on Capri Road, going faster and faster until she reaches her top speed.



b. A train pulls into a station and then stops to let off its passengers.

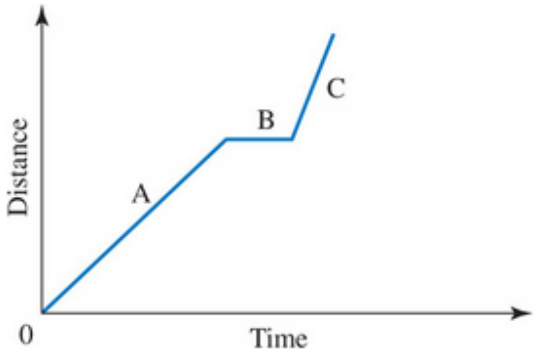


c. Armando scales a rock wall at a very slow and erratic pace, stopping many times. When he reaches the top, he walks along the plateau at a brisk yet constant rate.



5

The following graph represents Jordan's bike trip:



a. Which segment of Jordan's trip took the most time? How do you know?

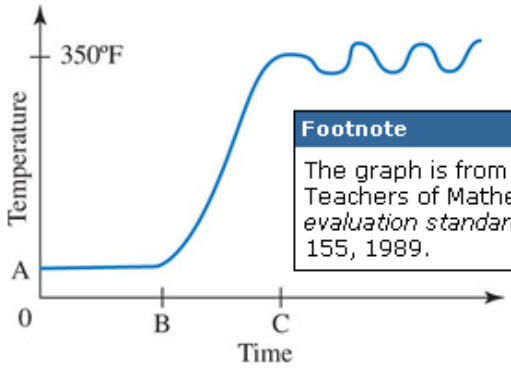
b. During which segment of his trip did Jordan go the farthest? How do you know?

c. During which segment of his trip did Jordan travel the fastest? How do you know? Use distance and time in your argument.

d. Explain how you know that Jordan stopped during segment B. Use time and distance in your argument.

6

Interpret the following graph[5] that gives information about an oven. Why is the last part of the graph wiggly?

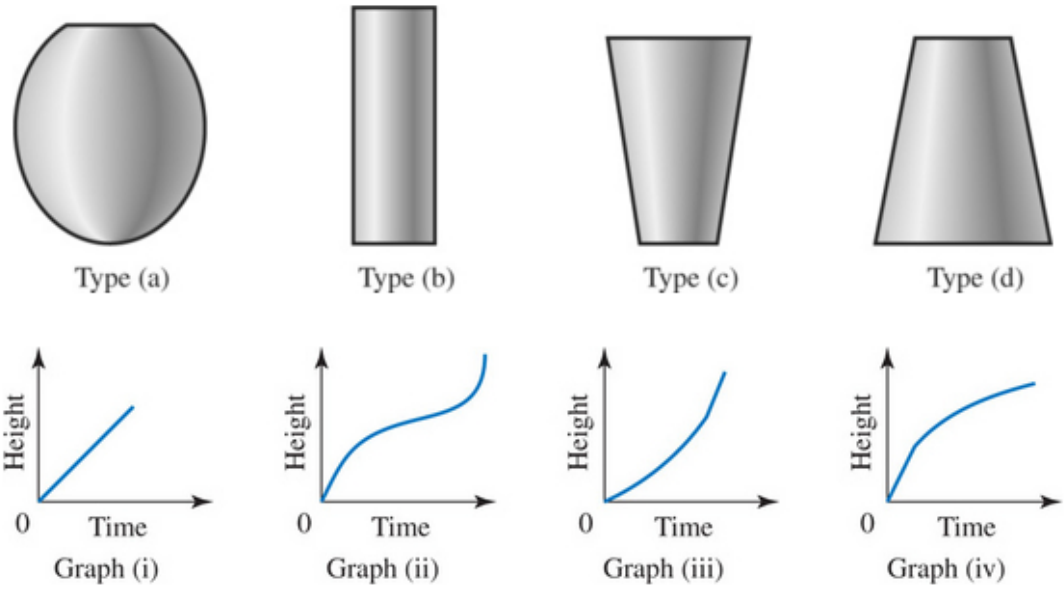


Footnote [X]

The graph is from the National Council of Teachers of Mathematics, *Curriculum and evaluation standards for school mathematics*, p. 155, 1989.

7

One floral shop uses four types of vases. Below are side-view drawings of the types and four graphs that indicate the water level height, as the empty vases are filled with water. Match the vases and graphs and explain your choices.



8

Verona ran 100 meters today in 20 seconds.

a. Make a distance-time graph of Verona's run, assuming that she ran at a steady rate from the start.

b. What is the slope of the line you graphed?

c. The following day, she shaves 2 seconds off her previous day's run. Graph this run on the same set of axes as in part (a). What is the slope of the line showing this run?

d. Walt ran the 100 meters slower than Verona on either day. On the graph, draw a line that could indicate Walt's run.

e. Why is the assumption of steady speeds not realistic for most races?