LESSON 16

Name Key

8.F.5

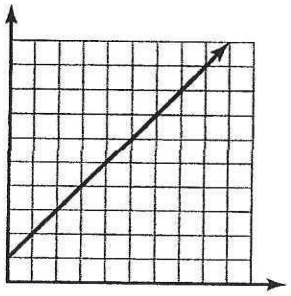
#68

Describing Functional Relationships from Graphs

1 GETTING THE IDEA

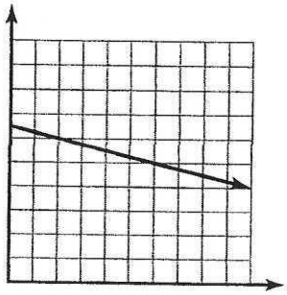
The graph of a **linear function** is a line. If the line rises from left to right, the function is said to be an increasing function. If it falls from left to right, the function is said to be a decreasing function.

straight line



Increasing Linear Function

positive slope

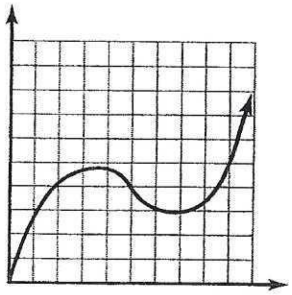


Decreasing Linear Function

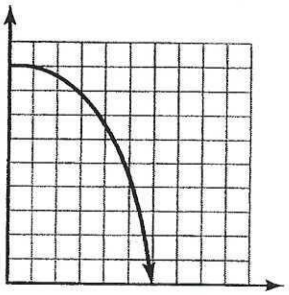
negative slope

The graphs of **nonlinear functions** may be increasing, decreasing, or a combination of increasing and decreasing.

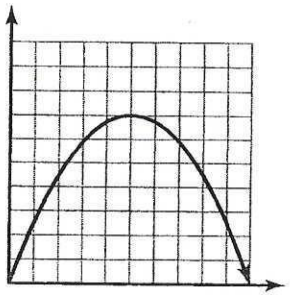
not a straight line



Increasing Nonlinear Function



Decreasing Nonlinear Function

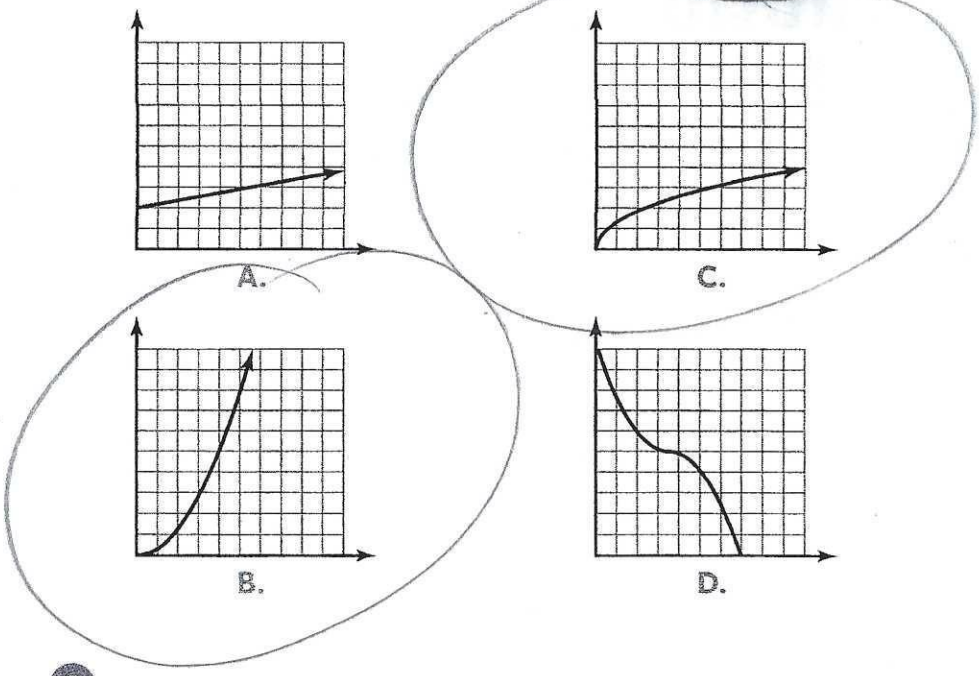


Nonlinear Function that Increases and then Decreases

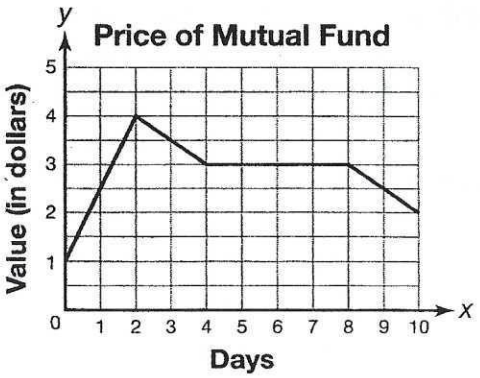
3 LESSON PRACTICE

1 Select a graph that represents an increasing nonlinear function. Circle all that apply.

positive slope → NOT a straight line



2 The graph shows the price of a mutual fund over a period of 10 days.



Linear = Constant rate of change

NON-linear = variable rate of change

Part A

Use words from the box to complete each sentence.

Between $x = 0$ and $x = 2$, the function is increasing.

Between $x = 2$ and $x = 4$, the function is decreasing.

Between $x = 4$ and $x = 8$, the function is constant.

Between $x = 8$ and $x = 10$, the function is decreasing.

increasing → pos slope
decreasing → neg slope
constant → zero slope

Part B

Is the function represented by the graph linear or nonlinear? (has different slopes) Explain your reasoning.

NON-linear. Has a variable rate of change (The graph is NOT a single straight line)

increasing/positive slope

3 A hot air balloon rises steadily for 15 minutes until it is 2,000 feet above the ground. It then flies at this altitude for 30 minutes. Over the next 15 minutes, the balloon drops 500 feet. It flies at this new altitude for 30 minutes. Then the balloon takes 30 minutes to return to the ground.

Draw a graph of the function that represents the situation.

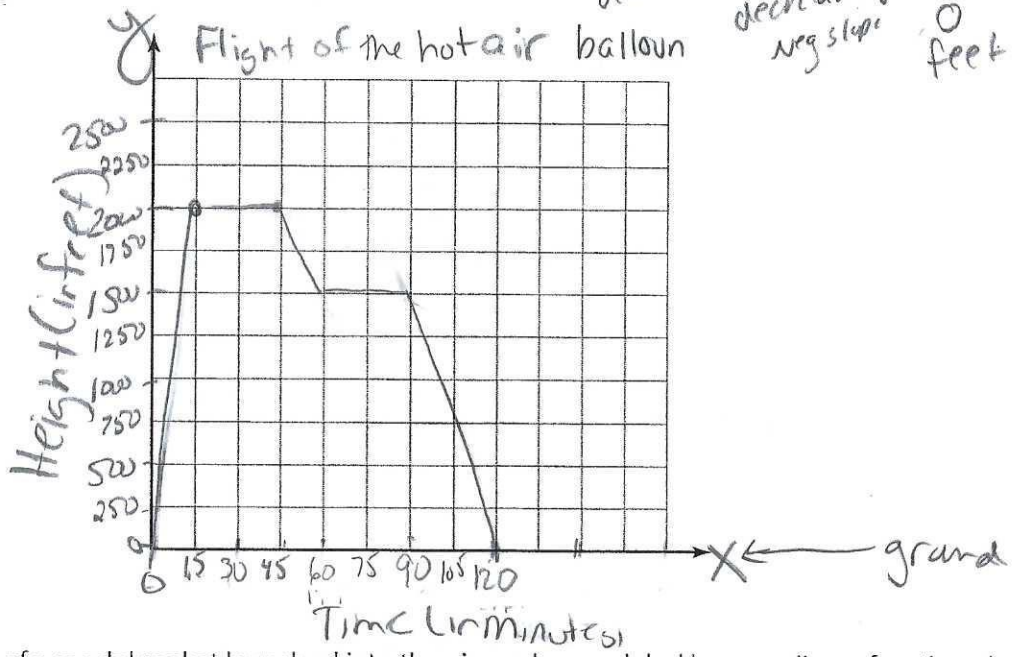
constant / zero slope

constant

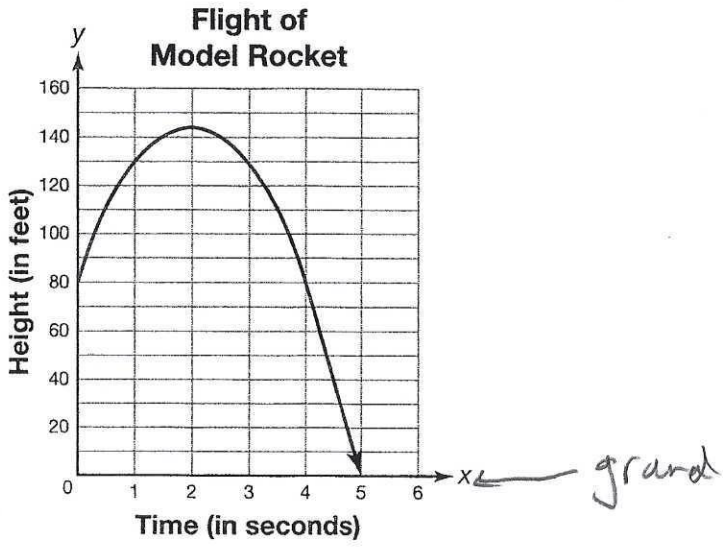
decreasing/neg. slope

decreasing/neg slope

0 feet

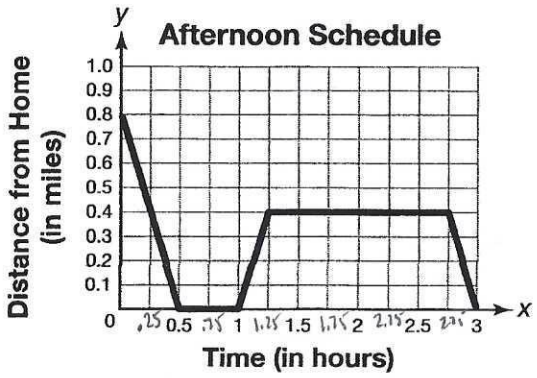


4 The height of a model rocket launched into the air can be modeled by a nonlinear function. A graph of the function is shown below. Interpret the graph in terms of the situation it models. Use the words *increasing* and *decreasing* in your description, as well as specific values from the graph.



The rocket was launched from a point 80 feet above the ground. It's height increased for 2 seconds & then decreased for 3 seconds until it reached the ground 5 seconds after it was launched. It reached a height of a little more than 140 feet at 2 seconds into the flight.

5 Tyrone created a graph to show how he spent the 3 hours between the time he left school and the time he had dinner. Complete the description of the sequence of events represented by the graph.

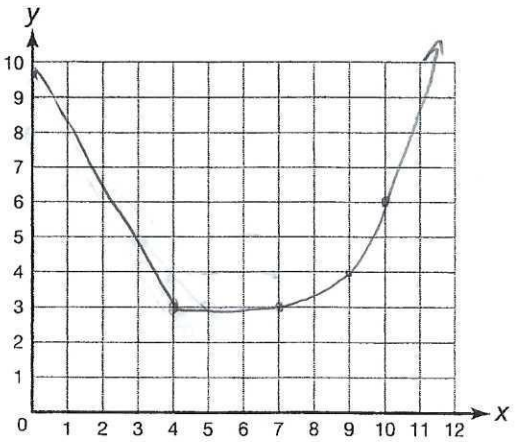


.25 of an hour = 15 minutes
0.5 of an hour = 30 minutes

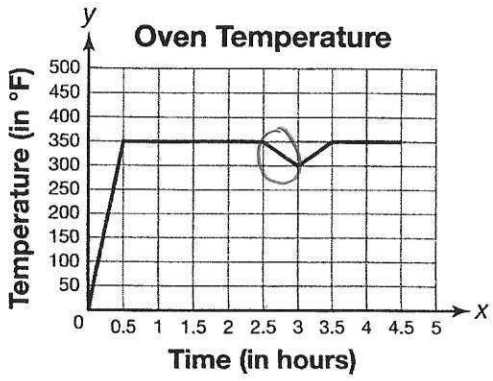
Tyrone left school and walked .8 mile home. He remained at home for 30 minutes. He then walked .4 mile to his friend Ben's house. He and Ben worked on their project for 1.5 hours, at which time Tyrone left and walked home. The walk home took 15 minutes.

6 Graph a function that has the following characteristics on the grid below:

- It is decreasing (Negative) for all values of x between 0 and 4. ✓
- It is constant (zero) for all values of x between 4 and 7. ✓
- It is increasing (positive) for all values of x greater than 7.
- Its graph contains the points (3, 5) and (5, 3).
- A piece of the graph is a curve.



7 Katherine is roasting a large ham in her oven. Partway through the cooking process, she pulls the ham out of the oven to add a glaze. The graph shows the temperature of the oven during the roasting process.



Part A

Circle the part of the graph that represents where the function is decreasing.

→ Negative slope

Part B

Interpret the meaning of the piece of the graph you circled in Part A.

When Katherine took the ham out to add the glaze, the oven lost some of its heat and the temperature dropped (decreased)

8 Mrs. Kim plans to run three errands this morning. She leaves the house at 9:00 a.m., drives 4 miles to the post office, drives 5 miles farther to the drugstore, and returns home, stopping at the library along the way, which is only 1 mile from her house. She spends 10 minutes at each stop, and she is home by 10:00 a.m.

Draw the graph of a function that could represent the situation.