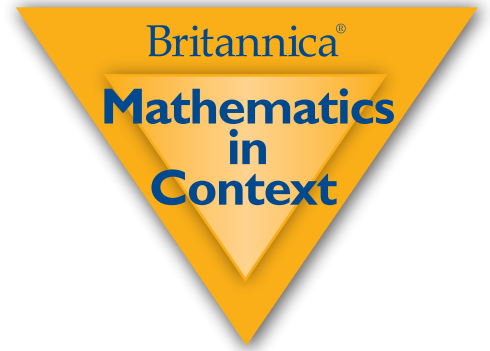# Grade 8
TN Lesson:
Contextual Graphs

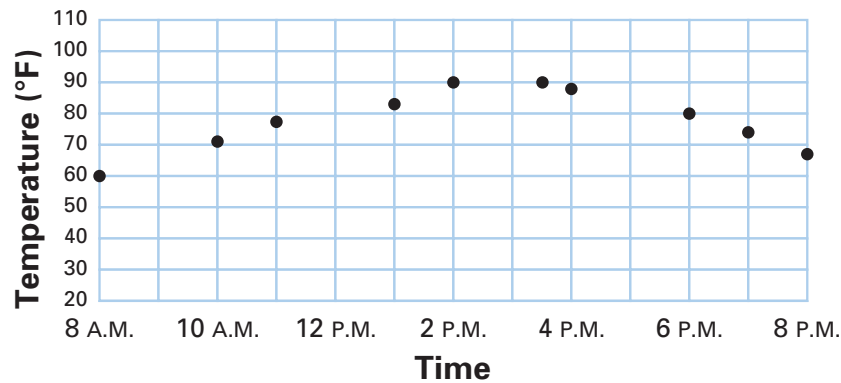**Use with MiC unit *Graphing Equations* after page 20**

TN Standard: MA.8.SPI 0806.1.2

Interpret a qualitative graph representing a contextual situation.
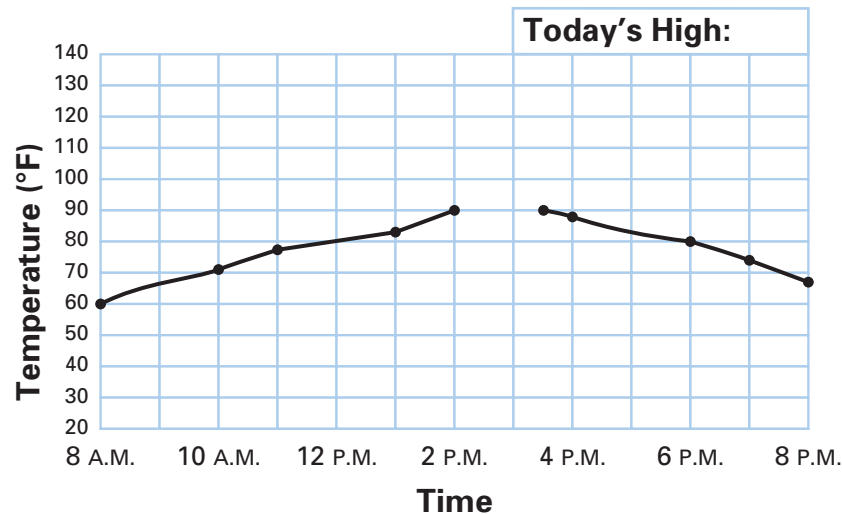
Contextual Graphs

High for the Day

Look at the dots in the diagram on the left showing the temperatures from Mark's table.

Below are three possibilities for what might have happened to the temperature between 2:00 P.M. and 3:30 P.M.

1. For each possibility, fill in the line graph between 2:00 P.M. and 3:30 P.M. and record the high. Use the three graphs on **Student Activity Sheet 1.**

Possibility a
Between 2:00 P.M. and 3:30 P.M., the temperature stayed at 90°F.

Possibility b
Between 2:00 P.M. and 3:30 P.M., it got even hotter than 90°F.

Possibility c
After 2:00 P.M., there was a severe thunderstorm, which caused the temperature to drop. When the storm was over, the temperature rose again. At 3:30 P.M., it was again 90°F.

You have looked at three possibilities for the outside temperatures between 2:00 P.M. and 3:30 P.M. and the corresponding graphs.

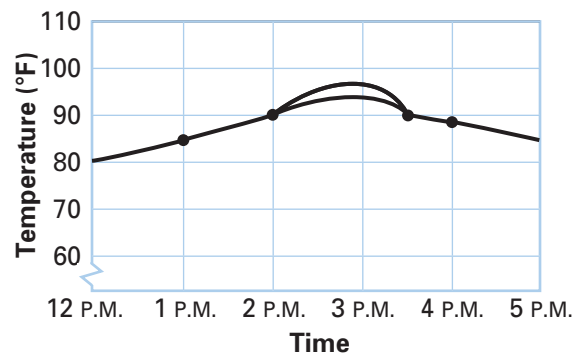**2.** Are there any other possibilities? If so, how many?

Each graph below shows just the part of the graph between noon and 5:00 P.M. Every graph shows a different situation between 2:00 P.M. and 3:30 P.M.

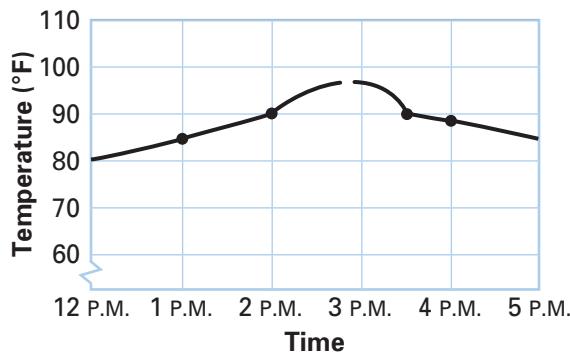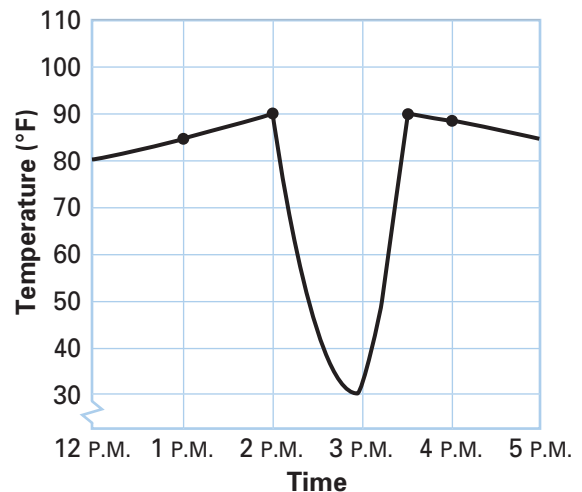**3.** Explain why these situations are not likely to have occurred.

a.
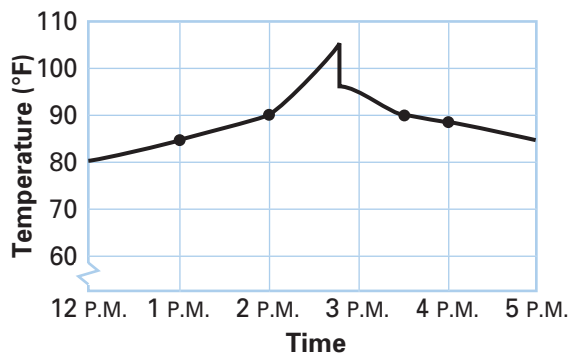
b.

c.

d.

The Weather Journal

During one hot week of summer vacation, Amber made a weather journal.

Monday: It was a beautiful day. The sun was shining all morning and it got fairly hot. We decided to go hiking but did not take our jackets. Suddenly, the wind started to blow and it got chilly. It even rained for a while. Lucky for us, the sun came back, and our clothes could dry.

Tuesday: It was sunny all day today. It seemed warmer than yesterday. According to the weather forecast, tomorrow will be even hotter.

Wednesday: Today was hot, even blistering at times. At 5:00 P.M., a thunderstorm finally cooled things off.

Thursday: Yesterday's thunderstorm made a mess of the good weather. It rained all day, with temperatures below 65°.

Friday: Today was partly cloudy. There were waves of warm and cold temperatures. The last warm period was the longoest.

Saturday: The weather was good all day, except around 11:00 A.M. During the afternoon, it was partly cloudy, but it never got really cold.

Amber also made a temperature graph for each day.

a.

b.

c.

d.

e.

f.
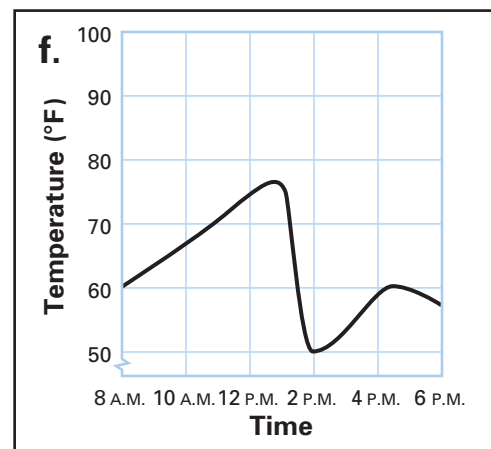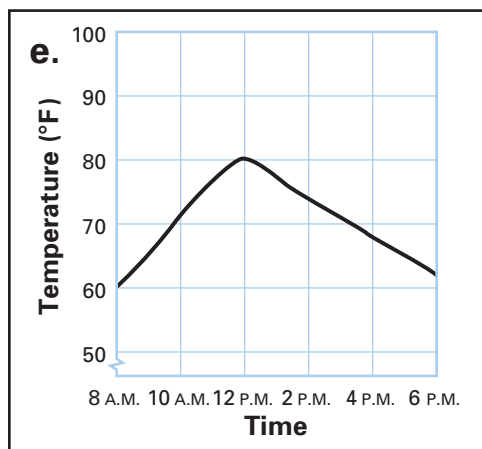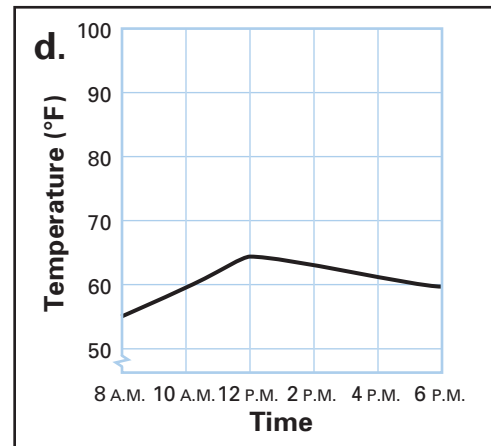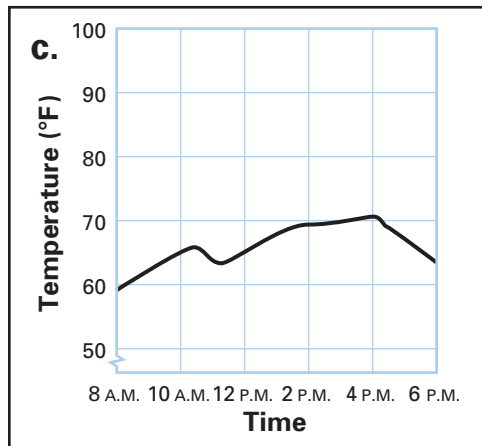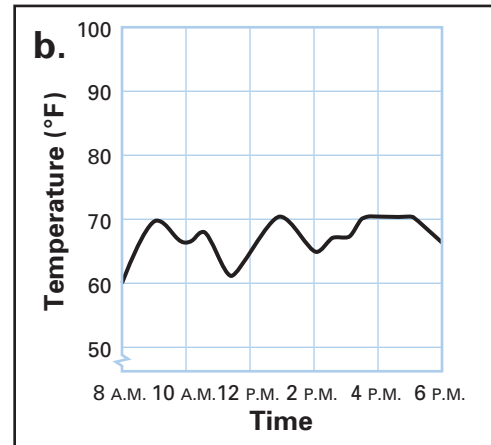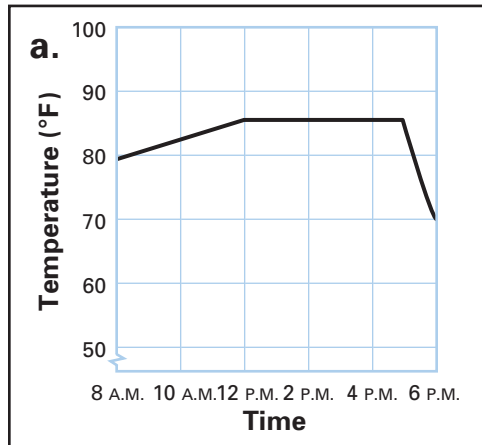
4. Which graph belongs to which day? How do you know?

Due to unseasonably heavy rains, Nelson's town experienced severe flooding last spring. Nelson kept a journal in which he drew the following graphs showing the height of the river that runs through town.

Day 1

Day 2

Day 3

Day 4
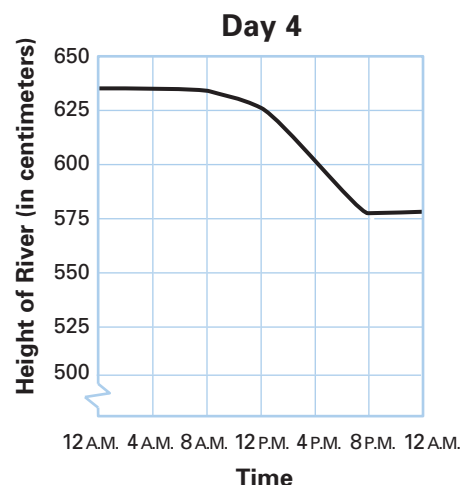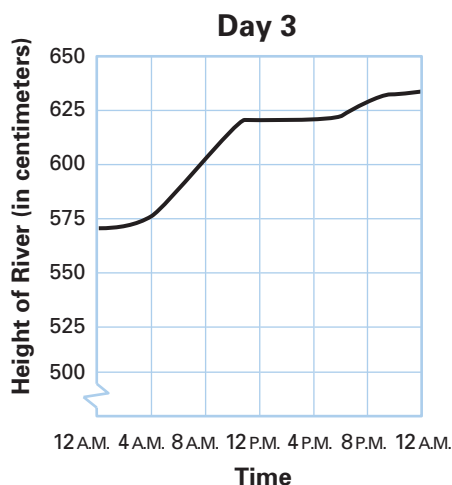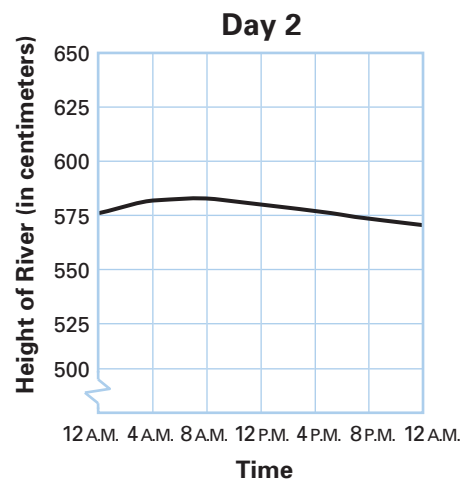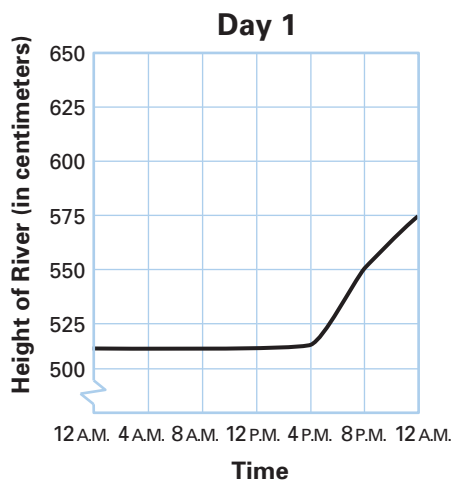
1. Write journal entries for each day, describing what happened according to the graphs above.

Day 5

Time	Height of River
4:00 A.M.	600 cm
8:00 A.M.	580 cm
12:00 P.M.	575 cm
4:00 P.M.	575 cm
8:00 P.M.	555 cm
12:00 A.M.	565 cm

On the fifth day of flooding, Nelson kept track of the height of the river using the chart to the left.

2. a. Draw a line graph using the data from this table.
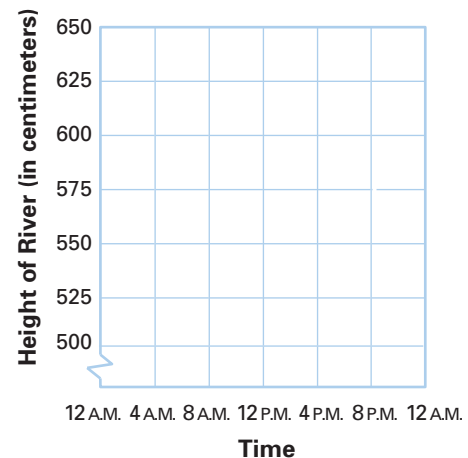
b. Draw another possible line graph based on the data from the table, with the additional information that it rained from 12:00 P.M. to 2:00 P.M. and then the sun came out for the rest of the day.
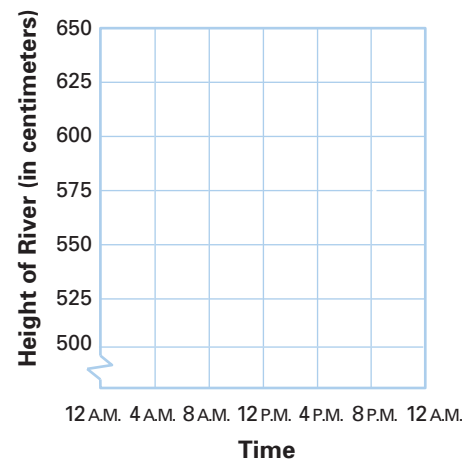
1. Possibility a: Between 2:00 P.M. and 3:30 P.M., the temperature stayed at 90°F.

Today's High:

Temperature (°F)

Time

Possibility b: Between 2:00 P.M. and 3:30 P.M., it got even hotter than 90°F.

Today's High:

Temperature (°F)

Time

Possibility c: After 2:00 P.M. there was a severe thunderstorm, which caused the temperature to drop. When the storm was over, the temperature rose again. At 3:30 P.M., it was again 90°F.

Today's High:

Temperature (°F)

Time

Solutions and Samples

Possibility a | **Today's Extreme High: 90**

Possibility b | **Today's Extreme High: 100**

Possibility c | **Today's Extreme High: 90**
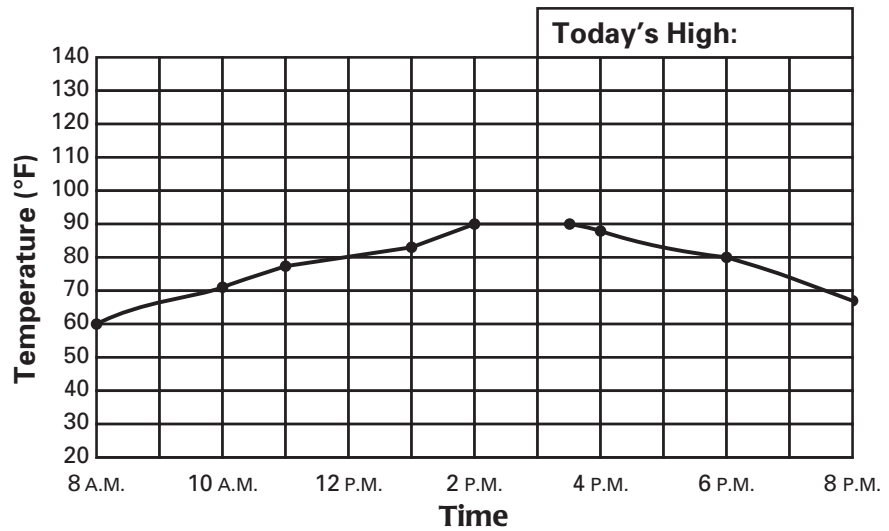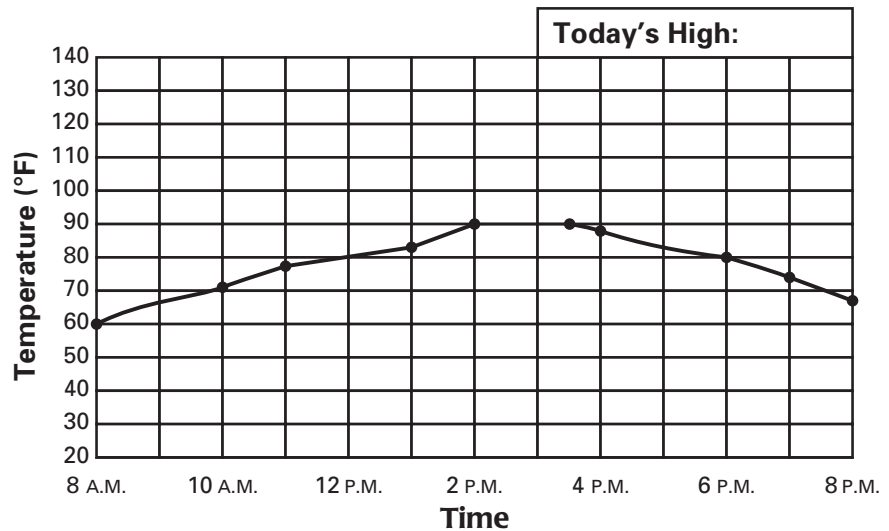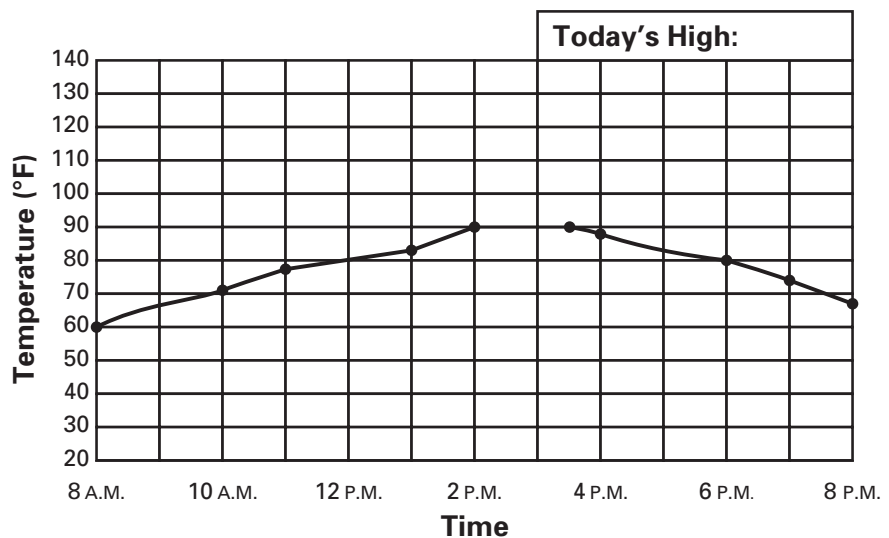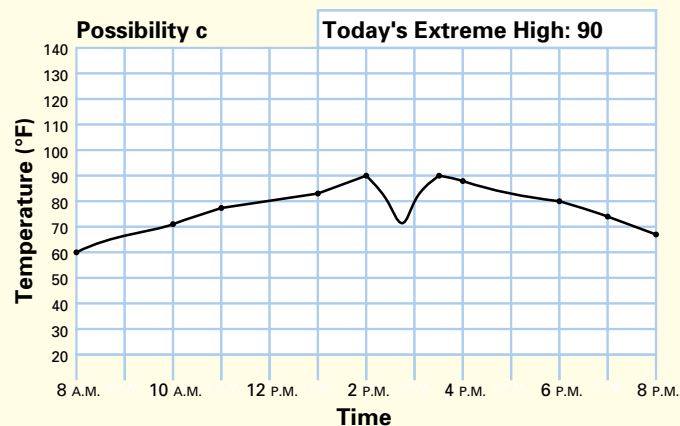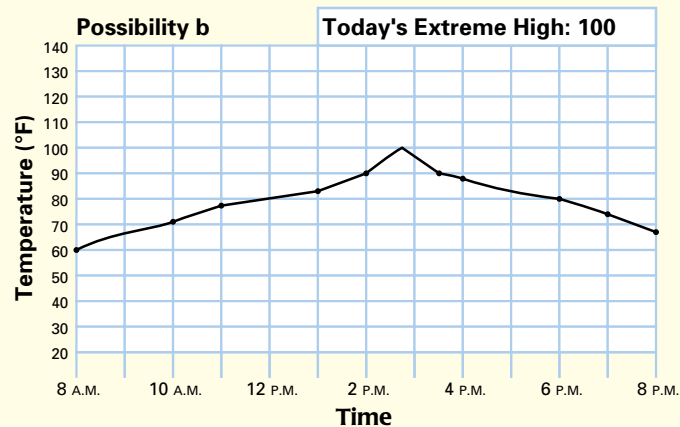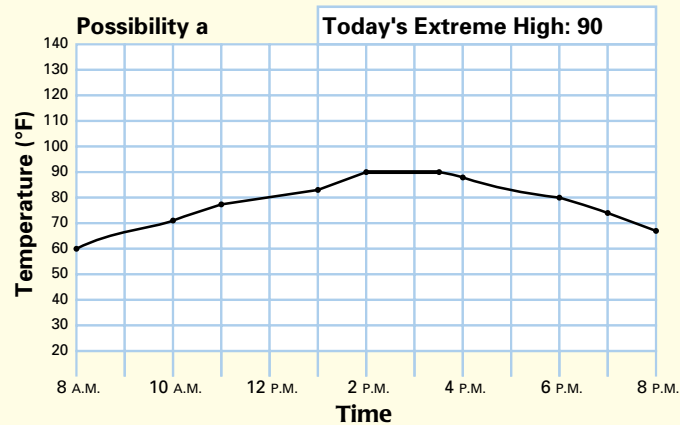
Hints and Comments

Materials

Student Activity Sheet 1 (one per student)

Overview

Students complete the missing part of a graph in three different ways, according to given scenarios.

Comments About the Problems

1. The purpose of this problem is for students to focus on interpolation and to reflect on what is possible and likely, and what is not. For possibilities **b** and **c,** students might exaggerate by drawing huge peaks. Make sure they know that such situations are unlikely. The temperature might even fluctuate up and down although that is not likely in a period of one and a half hours.

Solutions and Samples

2. Answers will vary. Sample student response:

No. The only possibilities are higher temperatures, lower temperatures, and the same temperature. What can vary are the actual high and low.

3. a-d. Explanations will vary. Sample explanations:

a. The drop at 2:40 P.M. is too sudden. It appears to drop 10° in one minute.

b. There cannot be two temperatures for the same time.

c. There seems to be no temperature for 10 minutes. There should be dots for each moment in between 2:00 P.M. and 3:00 P.M.

d. The change in temperature is very unlikely, since the drop is too deep. Outside temperature cannot drop from 90°F to 30°F and rise from 30°F to 90°F in 1 1/2 hours.

Hints and Comments

About the Mathematics

Some of the situations shown in problem 3 are impossible. Graphs of situations that deal with a continuous process of change over time do not have "holes." And it is not possible for there to be two values at a single time.

Planning

You may want to start with a class discussion about the meaning of the jagged line on the vertical axis, which indicates that the axis does not begin at zero. This would also be a nice opportunity to review the concepts of horizontal and vertical axes.

Formative Assessment

3. This problem assesses students' ability to recognize some of the limitations of line graphs.

Materials

weather data illustrated in graphs from local newspapers, optional (two or three graphs per class)

Overview

Students read weather journals compiled over a period of five days. There are no problems on this page for students to solve.

Writing Opportunity

Bring in local weather charts, such as from a newspaper, and have each student write a story based on the graphs. This activity may be assigned as homework.

Solutions and Samples

4. Graph **a:** Wednesday

Graph **b:** Friday

Graph **c:** Saturday

Graph **d:** Thursday

Graph **e:** Tuesday

Graph **f:** Monday

Explanations will vary. Sample explanations:

Monday has to be graph **f** because graph **f** shows a sudden temperature drop before it then gets warmer again.

Tuesday is graph **e**, a nice warm day.

Wednesday is graph **a** because it shows a hot day with a sudden temperature drop at 5:00 P.M. (Notice that graph **a** shows a hotter day than graph **e**.)

Thursday has to be graph **d** — a cool day with temperatures below 65°.

Friday has to be graph **b** because this graph shows lots of ups and downs with one long warm period.

Saturday is graph **c**. It shows a nice day with some cooling off before noon and then it gets warmer again.

Hints and Comments

Overview

Students match each of five different graphs with one of the stories on the previous page.

Formative Assessment

This problem assesses students' ability to tell the story depicted by a line graph in terms of the context.

This problem may encourage students to look more globally at significant shapes in the graphs (decrease, increase, maximum, minimum, and constancy).

Ask students how they organized their work and how they matched the graphs and the stories. Did they read a story and then look for a matching graph, or vice versa? What pair did they find first?

Contextual Graphs 4T

Contextual Graphs

1. Answers will vary. Sample responses:

Day 1 On day 1 the height of the river was about 513 centimeters until it started to rain in the afternoon. At 4 P.M. the river began to rise. At 12 A.M. the height was already 575 centimeters.

Day 2 During the night, it stopped raining, but the water level didn't drop very much. It stayed at a height of about 575 centimeters.

Day 3 At 4 A.M. it started raining again, and the water level went from about 575 to 620 centimeters. It stayed at this level from about 10 A.M. until 6 P.M. Then it went up again, possibly due to the water that came from a higher mountain area.

Day 4 During the night the water level stayed at about 630 centimeters. Then around 8 A.M., the water level dropped visibly. At 8 P.M. the water level seemed to stabilize at 575 centimeters.

2. a.

Height of River
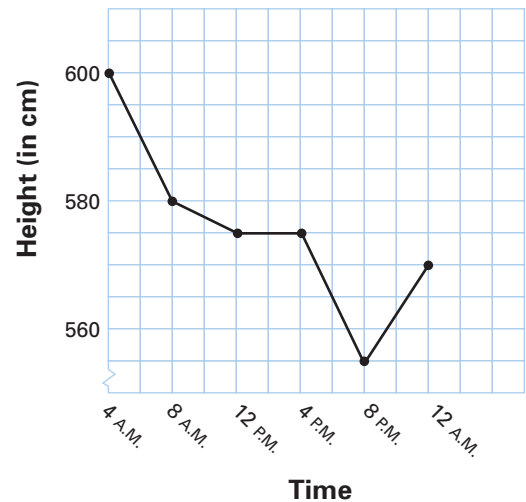
b. Graphs will vary, depending on how the river rises and falls between 12 P.M. and 4 P.M.

Sample graph:

Height of River