

## Every Graph Tells a Story

### Purpose

Students will solve problems involving linear functions, graph the solution, and investigate results of changes in the variables.

### Materials

*For the teacher:* transparency copy of Black Line Master (BLM) *Plant Graph*

*For each student:* copy of BLMs *Plant Graph* and *Brrr*, graph paper

### Activity

#### A. Introduction

1. Explain to students that graphs can be used to represent many different things.
2. Show students the BLM *Plant Graph* transparency.
3. Ask the students to tell you what they think the graph means. Accept all logical responses and make appropriate comments. (Student comments should include something about growth of the plant, water consumption, or sunlight required for growth.) Stress that as the  $x$  values increase the graph also increases.
4. Say: "What if I told you that this graph represents plant growth? The plant was 3 cm high the first time I measured it and each day the plant grew 2 cm more. Does this explanation seem logical to you?" Allow students to comment on your description of the graph.

#### B. Class Activity

1. Explain that graphs of ordered pairs that form a straight line represent a special kind of function and that the functions can be written as a *linear equation*. Tell students that all ordered pairs that satisfy the equation lie on the straight line.
2. Tell students to use the following facts to write a linear equation: John jogs daily. He knows that so far he has jogged 15 miles. He jogs exactly 3 miles per day.
3. Guide students through writing the linear equation. A starting point is to look at the number of miles jogged as of today [15]. Then, the number of miles jogged as of one day from today [18]. Then, the number of miles jogged as of two days from today [21], and so on.

(continued)

### EXTENDING THE ACTIVITY



As part of a long-term class project, assign groups of students to track rainfall totals for a three-month period. Find weather-related snapshots in magazines or on the Internet. Have groups paste snapshots and plot the cumulative rainfall data on poster board to create a classroom display. Ask students to investigate whether or not the data represents a linear function.

### connecting across the curriculum



#### English/ Language Arts

Provide a graph for students to interpret. Ask them to write their interpretation as a story in their math journals and edit each other's stories.

**Standards Links**  
6.6.1, 6.6.5, 6.7.4

**Activity (continued)**

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4. Assist students in discovering a pattern to be the number of days from today times 3 added to 15 [ $3x + 15$ ]. The resulting linear equation is  $y = 3x + 15$ .
5. Graph the ordered pairs on the overhead using the origin as today and the  $x$  values for number of days from today. The  $y$  values are the total number of miles jogged as of that day. [(0, 15), (1, 18), (2, 21)]
6. Connect the points to form a straight line. Ask students what they notice about the resulting line as the number of days increase. [The total number of miles jogged increases.]
7. Ask students to find the total number of miles jogged as of 10 days from today. [Students should substitute the value 10 for  $x$  in the equation  $y = 3x + 15$  for an answer of 45.]
8. Ask students to look at the graph to estimate how many days ago John started jogging. [Students should notice that the line crosses the  $x$ -axis at  $-5$ . John started jogging 5 days ago.]

**C. Group Activity**

1. Break the class into groups of three or four students.
2. Give each student a copy of the BLM *Brrr*.
3. Walk about the room to answer questions and guide students while they complete the activity.
4. Allow time for students to complete the activity, and ask for volunteers to share solutions with the class.

**Classroom Assessment**

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**Basic Concepts and Processes**

During the activity and when reviewing the BLM, discuss the following questions with your students to gauge their understanding of the Standard Indicators:



How do you go about writing an equation for a story problem?



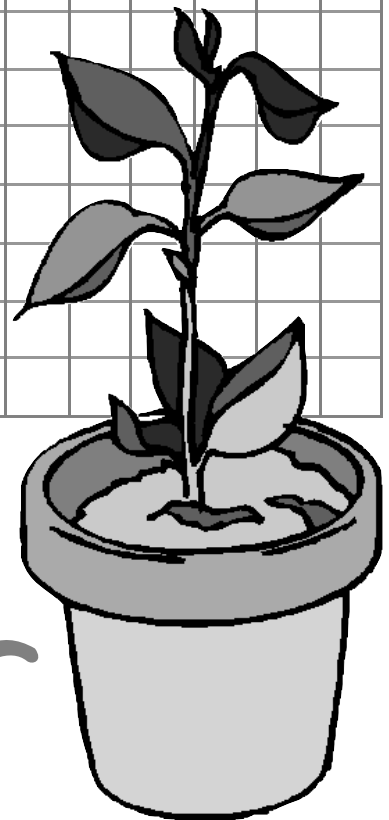
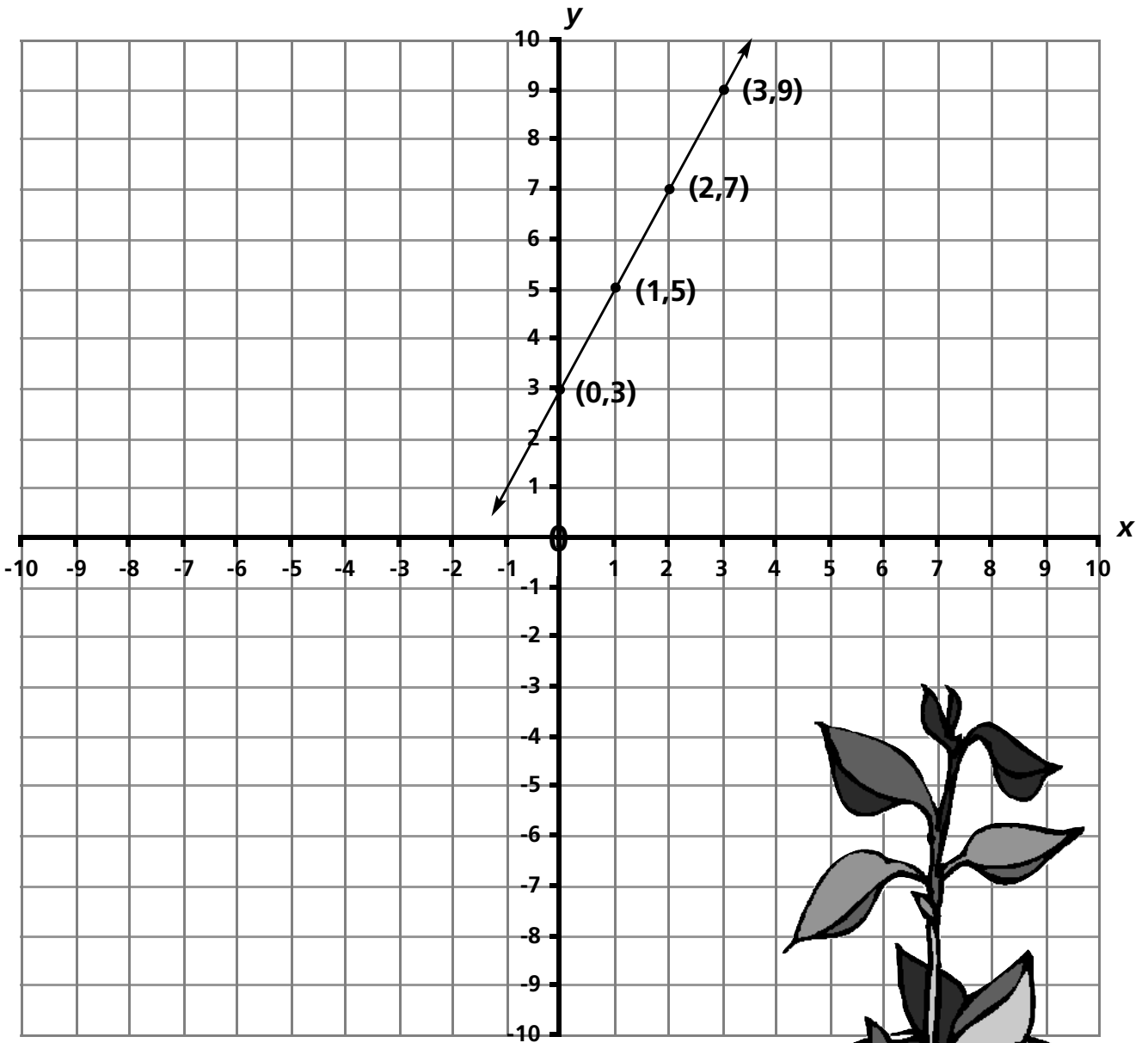
How do you find solutions to an equation?



What is one solution for the equation  $y = x + 5$ ?

Name: \_\_\_\_\_

# Plant Graph



# Plant Graph

## Teacher Directions

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Use a transparency of the BLM *Plant Graph* in the “Introduction” section of the activity.

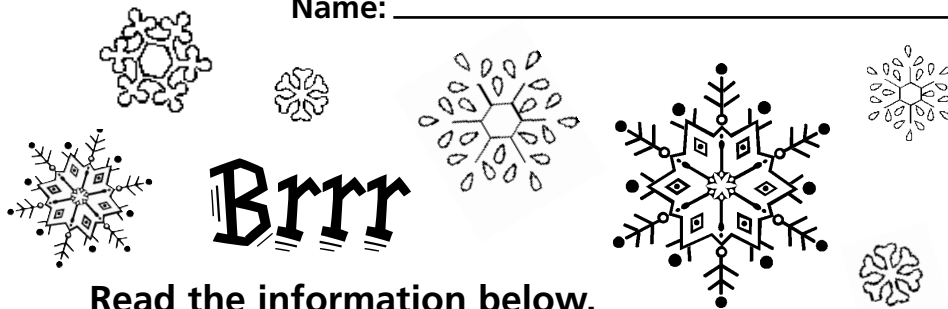
## Answer Key

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Not applicable.



Name: \_\_\_\_\_



Read the information below.  
Use the information to answer the questions.

During the month of January, Gary recorded the temperature every day at noon. On average, the temperature dropped  $2.5^{\circ}\text{F}$  each day. The noon-time temperature on January 10 was  $35^{\circ}\text{F}$ .

1. Write an equation to represent the pattern for the January temperatures.

\_\_\_\_\_

2. Use substitution to find the noon-time temperature on January 15 and January 20.

\_\_\_\_\_

3. Graph this equation on your graph paper. Use January 10 as the origin and the  $x$  values as the number of days from January 10.

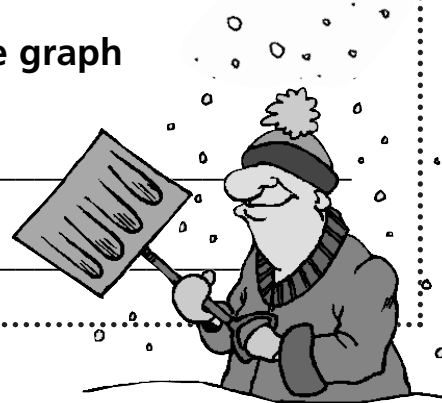
4. Use your graph to predict when the noon-time temperature will reach zero.

\_\_\_\_\_

5. Explain what happens to the direction of the graph as the month progresses.

\_\_\_\_\_

\_\_\_\_\_



# Brrr

## Teacher Directions

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Give one copy of the BLM *Brrr* to each student. Allow students to work in groups of three or four. Walk about the room to guide students through the completion of the activity.

## Answer Key

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1.  $y = 35 - 2.5x$   
(where  $x$  represents the number of days from January 10)

2. for January 15

$$y = 35 - 2.5x$$

$$y = 35 - 2.5 \times 5$$

$$y = 35 - 12.5$$

$$y = 22.5^\circ\text{F}$$

for January 20

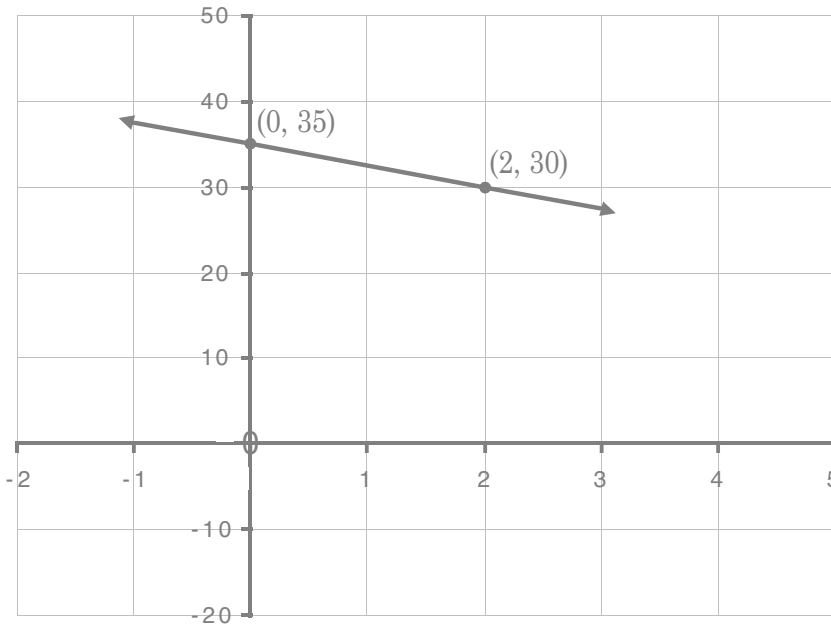
$$y = 35 - 2.5x$$

$$y = 35 - 2.5 \times 10$$

$$y = 35 - 25$$

$$y = 10^\circ\text{F}$$

3.



4. Students should find where the graph crosses the  $x$ -axis. January 24 is the date when the noon-time temperature will reach 0.

5. Student answers will vary. A correct answer should indicate that the graph is decreasing or going down as the month progresses.