

4.4 Pulling It All Together

Writing Equations for Linear Relationships

Throughout this Unit, you have learned several ways to model linear relationships. You have also learned ways to move back and forth between tables, graphs, and equations to solve problems. The next Problem pulls some of these ideas together.

Problem 4.4



- A** Today is Chantal's birthday. Her grandfather gave her some money as a birthday gift. Chantal plans to put her birthday money in a safe place and add part of her allowance to it each week. Her sister, Chanice, wants to know how much their grandfather gave her and how much of her allowance she is planning to save each week. As usual, Chantal does not answer her sister directly. Instead, she wants her to figure out the answer for herself. She gives her these clues:

After five weeks, I will have saved a total of \$175

After eight weeks, I will have saved \$190.

1. How much of her allowance is Chantal planning to save each week?
2. How much birthday money did Chantal's grandfather give her?
3. Write an equation for the total amount of money A Chantal will have saved after n weeks. What information do the y -intercept and coefficient of n represent in this context?

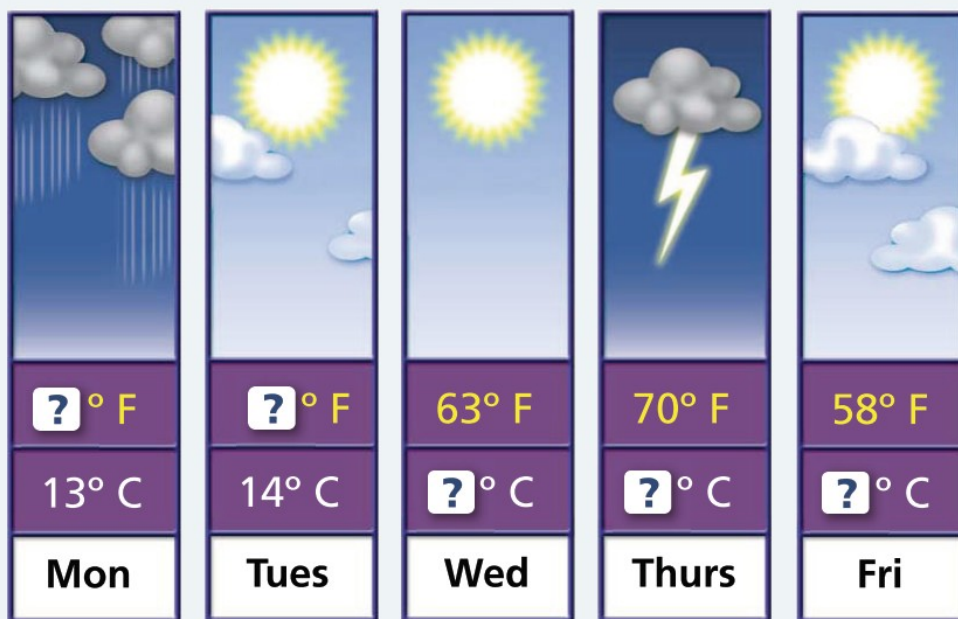
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Problem 4.4 *continued*

- B** In the United States, temperature is measured using the Fahrenheit scale. Some countries, such as Canada, use the Celsius temperature scale. In cities near the border of these two countries, weather forecasts present the temperature using both scales.

The relationship between degrees Fahrenheit and degrees Celsius is linear. Two important reference points for this relationship are:

- Water freezes at 0°C , which is 32°F .
 - Water boils at 100°C , which is 212°F .
1. Use this information to write an equation relating degrees Fahrenheit and degrees Celsius.
 2. How did you find the y -intercept? What does the y -intercept tell you about this situation?
 3. A news Web site uses the image below to display the weather forecast. However, some of the temperatures are missing. Use your equation from part (1) to find the missing temperatures.



Problem 4.4 *continued*

- C** Square tiles were used to make the pattern below:



Figure 1

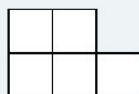


Figure 2

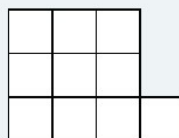


Figure 3

1. Write an equation that gives the perimeter P of the n th figure.
 2. Compare your equation with that of your classmates. Are the expressions for perimeter equivalent? Explain.
 3. Is the relationship linear? Explain.
 4. Hachi observed that there was an interesting pattern for the number of square tiles needed to build each figure.
 - a. What pattern might she have observed?
 - b. Write an equation that gives the number of square tiles T in the n th figure.
 - c. Is this relationship linear?
- D**
1. Look back to the equations you wrote in Question A, part (3); Question B, part (1); and Question C, part (1). Without graphing any of the equations, describe what the graph of each would look like. Which variable would be on the x -axis? Which variable would be on the y -axis? Would the line have a positive slope or a negative slope?
 2. When it is helpful to represent a relationship as an equation? A table? A graph?

ACE Homework starts on page 98.