

Objectives

In this lesson, you will:

- Investigate different representations for problem situations.
- Determine values from graphs.
- Write equations.
- Identify variable quantities.



SCENARIO You are looking for a part-time job. Pat-E-Oh Furniture is hiring furniture assemblers. The job, to remove furniture parts from shipping containers and assemble furniture, pays \$8 an hour. After your interview, the company offers you the job and you decide to take it.

Problem I**Earnings at Pat-E-Oh Furniture**

- A.** During the summer, you can work eight hours per day for 5 days each week. How much money will you earn after one week of work? Use a complete sentence in your answer.
- B.** During the school year, you can only work 4 hours each day. How much money will you earn after one day? Use a complete sentence in your answer.
- C.** You want to buy a bicycle for \$372. If you save every cent you earn, how many hours must you work in order to make enough money to buy the bicycle? Use a complete sentence to explain how you found your answer.
- D.** If you save only half of the money you earn, how many hours must you work to make enough money to buy the bicycle? Use a complete sentence to explain how you found your answer.

If you could work 6 hours each day, how many days would it take you to earn enough money to buy the bicycle? Use a complete sentence to explain how you found your answer.

Key Terms

- labels
- units
- bar graph
- bounds
- graph
- algebraic equation
- solution

Investigate Problem 1

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1. You can keep track of the amount of money that you earn in a table. Whenever you create a table, begin by creating a row of **labels** that contains written descriptions for each column of numbers. You should also include a row of **units** that identifies the standard measurements in which each column of numbers is measured.

The table below shows the number of hours that you have worked for the first five weeks on the job. Complete the table. Copy the values into the table on page 28.

Labels	Week	Time worked	Earnings
Units		hours	dollars
	Week 1	11.5	
	Week 2	20	
	Week 3	16	
	Week 4	10	
	Week 5	9.5	

Use a complete sentence to explain how you found your earnings for each week.

Use the information in the table to answer Questions 2 through 5.

2. During which week did you earn the greatest amount of money? Use a complete sentence in your answer.

During which week did you earn the least amount of money? Use a complete sentence in your answer.

3. How much more money did you earn during Week 2 than during Week 3? Use a complete sentence in your answer.
4. How much money did you earn during the first five weeks on the job? Use a complete sentence in your answer.

Take Note

Recall that to find the average of a set of numbers, find the sum of the numbers and divide the sum by the number of elements in the set.

Take Note

Whenever you see the share with the class icon, your group should prepare a short presentation to share with the class that describes how you solved the problem. Be prepared to ask questions during other groups' presentations and to answer questions during your presentation.



Investigate Problem 1

5. What were your average earnings per week?

How did you find your answer? Use a complete sentence to explain.

6. Use the space below to create a **bar graph** of the data from the table in Question 1. The bar graph should display the earnings for each week. Clearly label the graph and add a title.



7. What information can you determine immediately from the bar graph?
8. Can you use the bar graph to determine the number of hours that you need to work to earn \$100? Use complete sentences to explain.
9. What information does a bar graph illustrate well? Use complete sentences to explain.
10. What information does a bar graph not illustrate well? Use complete sentences to explain.

Investigate Problem 1



11. Create a graph of the data in the second and third columns of the table in Question 1. First, set the **bounds** of the graph. The *lower and upper bounds* determine the portion of the graph that you will see.

The data that you are graphing should be greater than the lower bounds and less than the upper bounds. Decide whether this is true for the bounds chosen below. Use complete sentences to explain your decision.

12. Use the grid and the numbers in the “Interval” column to write a sentence that describes an interval.

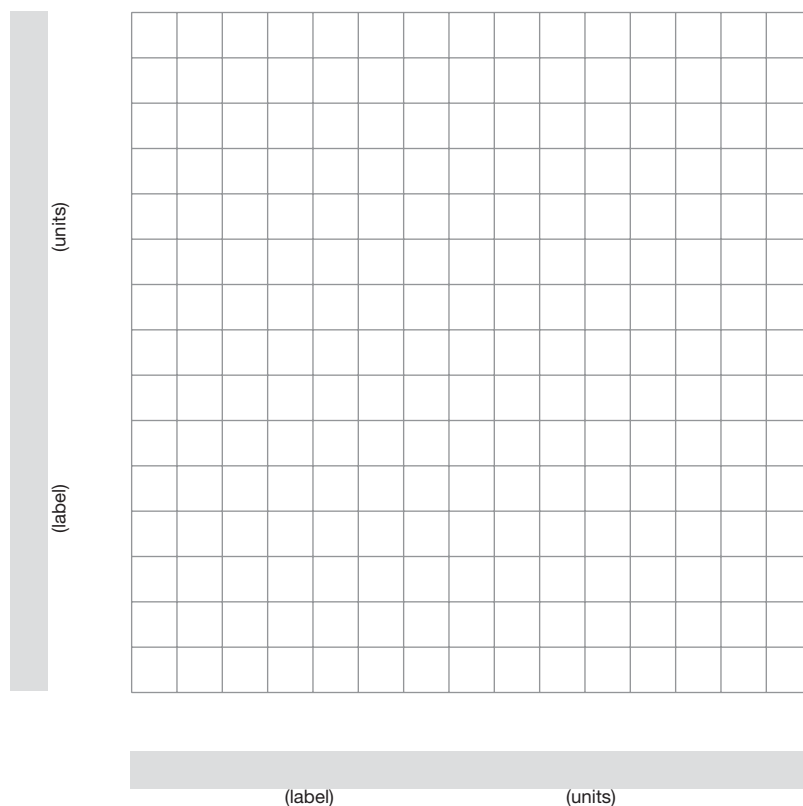
13. Use the bounds and intervals to label the grid below. Then create a graph of the data from the table in Question 1.

Week	Time worked	Earnings
	hours	dollars
1	11.5	
2	20	
3	16	
4	10	
5	9.5	

Variable quantity	Lower bound	Upper bound	Interval
Time worked	0	30	2
Earnings	0	300	20

Take Note

In order for someone to better understand a graph that you create, you may want to add a title to your graph. The title should describe what the graph is showing.



Take Note

When you approximate, you find a result that is nearly, but not exactly, the value.

Investigate Problem 1

Use the graph to answer the following questions.

- 14.** Approximate the amount of money that you would earn if you worked 10 hours. Use a complete sentence to explain how you found your answer.

Approximate the amount of money that you would earn if you worked 22 hours. Use a complete sentence to explain how you found your answer.

Approximate the amount of money that you would earn if you worked $3\frac{1}{2}$ hours. Use a complete sentence to explain how you found your answer.

Are any of your answers in Question 14 exact answers?
Use complete sentences to explain your reasoning.

- 15.** In this problem situation, what information does the graph illustrate well? Use a complete sentence in your answer.
- 16.** Use the graph to determine whether there is a number pattern in this problem. If there is a pattern, use complete sentences to describe the pattern.

Investigate Problem 1

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17. Write an expression that you can use to find the earnings for any number of hours worked. Let h represent the number of hours worked. Use a complete sentence in your answer.
18. You want to determine your exact earnings for 40 hours of work. Would you use your graph or the expression in Question 17? Use complete sentences to explain your reasoning.



19. **Just the Math: Writing Equations** In Question 17, you wrote an algebraic expression to represent the earnings for any number of hours of work. You can also write an *algebraic equation* to generalize a problem situation. You can create an **algebraic equation** by writing an equals sign (=) between two algebraic expressions.

In this problem situation, suppose the earnings are \$120. Write an algebraic equation for this situation by using the expression that you wrote in Question 17.

Suppose the earnings are \$200. Write an algebraic equation for this situation by using the expression that you wrote in Question 17.

20. **Just the Math: Solutions of Equations** When you replace the variable in an equation with a number, you create a statement that is either true or false. If you create a true statement, the number that you used is a **solution** of the equation. Replace the variable in the equation $200 = 8h$ with the number 25. Then decide whether 25 is a solution of the equation $200 = 8h$. Show all your work. Write a complete sentence that explains your answer.

Decide whether the value of the variable is a solution of the equation.

$$225 = 5x$$

$$x = 45$$

$$204 = 32w$$

$$w = 6$$

$$108 = 12c$$

$$c = 9$$

