5.2 Selling Balloons

Finding Intercepts of a Graph

Objectives

In this lesson, you will:

- Interpret the meaning of intercepts in a problem situation.
- Find intercepts graphically.
- Find intercepts algebraically.

Key Terms

- *x*-intercept
- *y*-intercept

Take Note

Recall from Lesson 1.2 that the *profit* is the amount of money that you have left after you subtract the costs from the amount of money that you make.

SCENARIO Your local community group wants to raise money to fix one of the playgrounds in your area. Your group decides to sell balloons because they are popular with young children.

Problem 1 Making a Difference

Your group buys a box of Mylar balloons with zoo animals printed on them for $10 and decides to sell the balloons for $2 each.

A. What is your profit if your group sells 30 balloons? Show all your work and use a complete sentence in your answer.

B. What is your profit if your group sells 5 balloons? Show all your work and use a complete sentence in your answer.

C. What is your profit if your group sells 3 balloons? Show all your work and use a complete sentence in your answer.

D. What does your answer to part (C) mean in terms of the problem situation? Use complete sentences in your answer.

E. Write an equation for the problem situation. Use *x* to represent the number of balloons sold and use *y* to represent the profit in dollars.

Investigate Problem 1

1. Use your equation to find the value of *y* when *x* is 7. Show all your work and use a complete sentence in your answer.

Use your equation to find the value of *y* when *x* is –9. Show all your work and use a complete sentence in your answer.

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Investigate Problem 1

Does an x-value of –9 make sense in the problem situation? Use complete sentences to explain.

Use your equation to find the value of y when x is 25. Show all your work and use a complete sentence in your answer.

2. Use your equation to find the value of x when y is 10. Show all your work and use a complete sentence in your answer.

Use your equation to find the value of x when y is –16. Show all your work and use a complete sentence in your answer.

Use your equation to find the value of x when y is –10. Show all your work and use a complete sentence in your answer.

3. Write the ordered pairs that you created in Question 2.

4. Write three more sets of ordered pairs that satisfy your equation.

5. Use the grid on the next page to graph the ordered pairs in Questions 3 and 4. Then create a graph of your equation. Use the bounds and intervals given below. Be sure to label your graph clearly.

Variable quantity	Lower bound	Upper bound	Interval
Balloons sold	–5	10	1
Profit	–16	14	2

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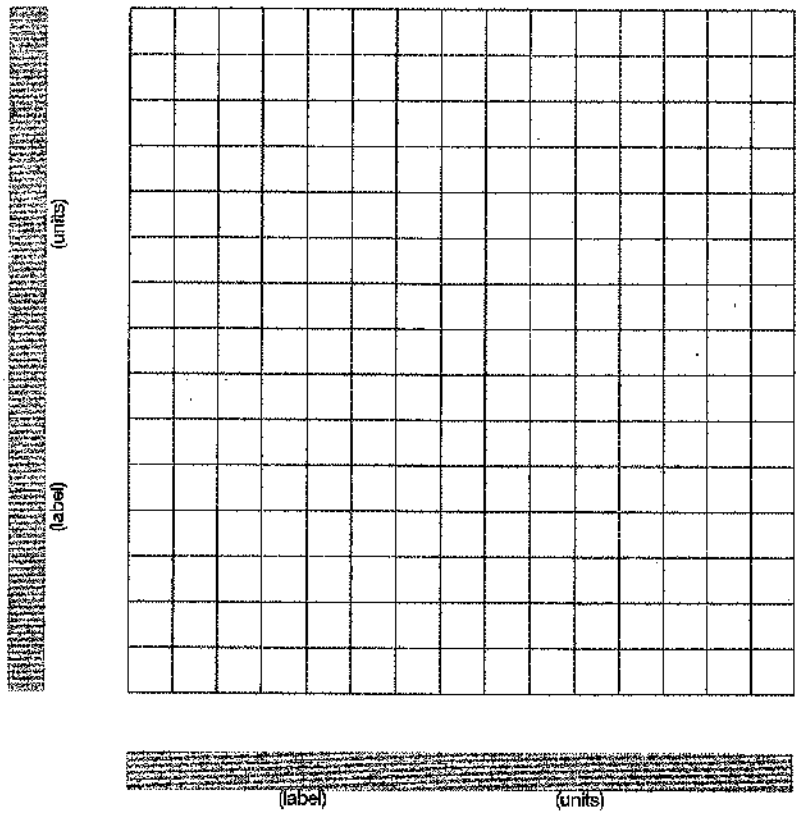
Investigate Problem 1



6. Use complete sentences to explain what a point on your graph represents in the problem situation.

7. Name the point where your graph crosses the *x*-axis. What does this point tell you about the relationship between the profit and the number of balloons sold? Use complete sentences in your answer.

Name the point where your graph crosses the *y*-axis. What does this point tell you about the relationship between the profit and the number of balloons sold? Use complete sentences in your answer.

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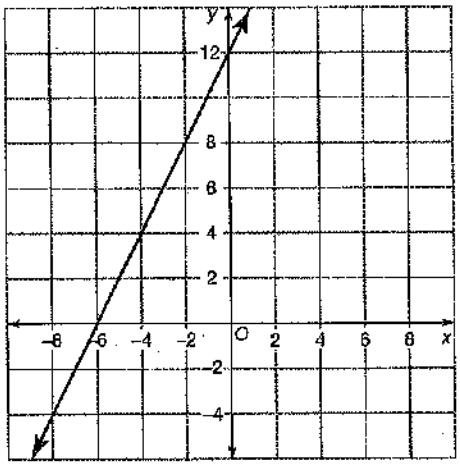
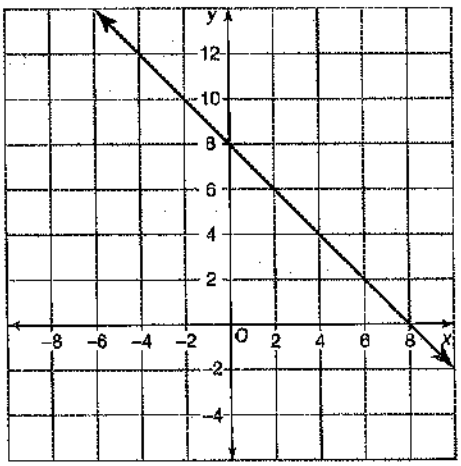
Investigate Problem 1

8. **Just the Math: Intercepts** In Question 7, you found the *intercepts* of the graph. The ***x*-intercept** of a graph is the *x*-coordinate of the point where the graph crosses the *x*-axis. The ***y*-intercept** of a graph is the *y*-coordinate of the point where the graph crosses the *y*-axis. Name the *x*- and *y*-intercepts of the graph in Question 5. Use a complete sentence in your answer.

Find the *x*- and *y*-intercepts of each graph below.





9. What do you notice about a point that contains the *x*-intercept? What do you notice about a point that contains the *y*-intercept? Use complete sentences in your answer.

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Investigate Problem 1

10. Just the Math: Finding Intercepts Algebraically If you know the equation of a graph, you can *algebraically* find the intercepts. To *algebraically* find the *x*-intercept, find the value of *x* when *y* is 0. For instance, the *x*-intercept of the graph of $y = 2x + 4$ is –2 because:

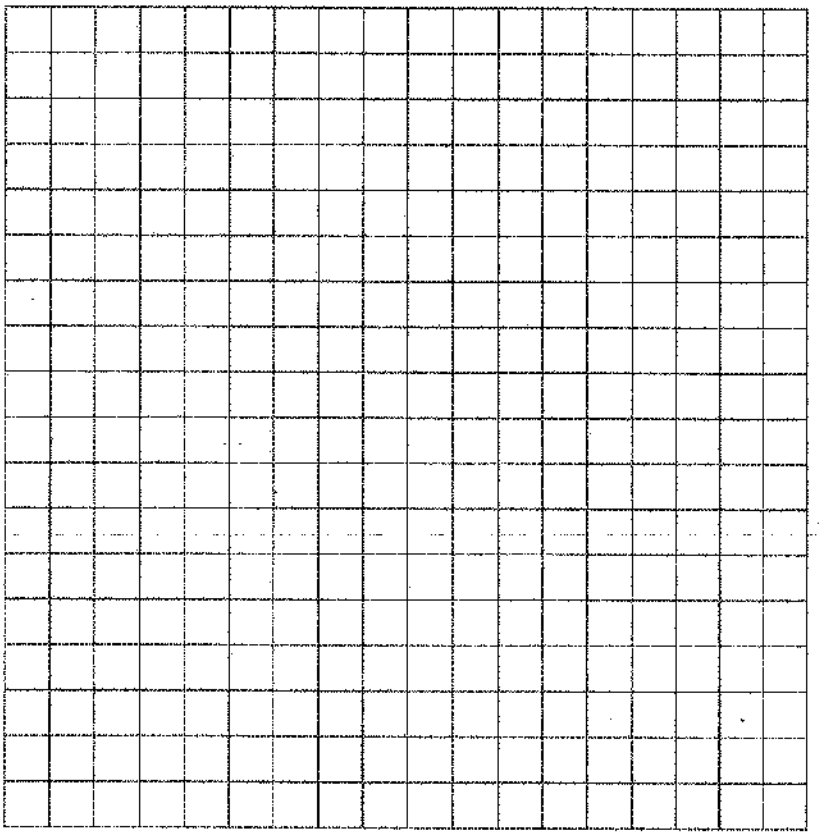
$0 = 2x + 4$	Substitute 0 for *y*.
$-4 = 2x$	Subtract 4 from each side.
$-2 = x$	Divide each side by 2.

To *algebraically* find the *y*-intercept, find the value of *y* when *x* is 0. For instance, the *y*-intercept of the graph of $y = 2x + 4$ is 4 because:

$y = 2(0) + 4$	Substitute 0 for *x*.
$= 0 + 4$	Multiply.
$= 4$	Add.

Algebraically find the intercepts of the graph of the equation. Show all your work. Then graph the equation to check your answer.

$y = 3x - 9$



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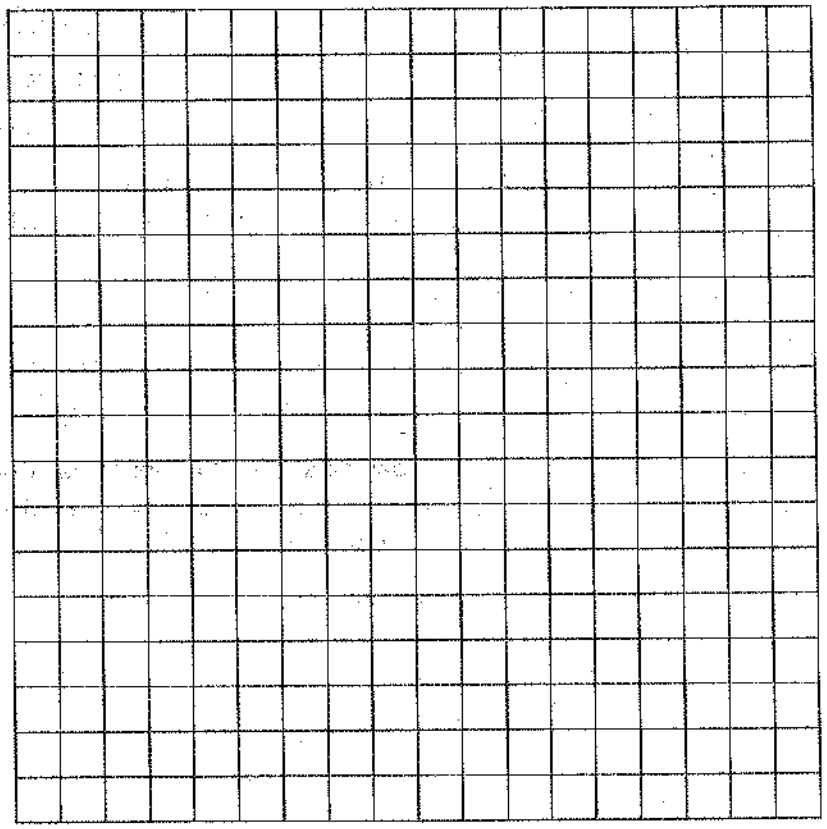
Investigate Problem 1

$y = -4x + 8$



11. Use what you know about *x*-intercepts and *y*-intercepts to complete each statement.

In the ordered pair (6, 0) the _____ is the *x*-intercept.

In the ordered pair (0, –5) the _____ is the *y*-intercept.

A vertical line that does not lie on an axis has one _____ and no _____.

A horizontal line that does not lie on an axis has one _____ and no _____.

A straight line that is neither vertical not horizontal has _____ *x*-intercept(s) and _____ *y*-intercept(s).

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