We're Shipping Out!
Solving and Graphing Compound Inequalities

2.4

LEARNING GOALS

In this lesson, you will:

- Write simple and compound inequalities.
- Graph compound inequalities.
- Solve compound inequalities.

KEY TERMS

- compound inequality
- solution of a compound inequality
- conjunction
- disjunction

GoodSportsBuys.com is an online store that offers discounts on sports equipment to high school athletes. When customers buy items from the site, they must pay the cost of the items as well as a shipping fee. At GoodSportsBuys.com, a shipping fee is added to each order based on the total cost of all the items purchased. This table provides the shipping fee categories for GoodSportsBuys.com.

Total Cost of Items	Shipping Fee
$0.01 up to and including $20	$6.50
More than $20 up to and including $50	$9.00
Between $50 and $75	$11.00
From $75 up to, but not including, $100	$12.25
$100 or more	$13.10

1. What is the least amount a customer can spend on items and pay $6.50 for shipping?
   $0.01

2. What is the greatest amount a customer can spend on items and pay $6.50 for shipping?
   $20.00

3. What is the shipping fee if Sarah spends exactly $75.00 on items? Explain your reasoning.
   $12.25

4. Harvey says he will spend $13.10 on shipping fees if he spends exactly $100 on items. Is he correct? Explain your reasoning. *Yes*

5. Consider the table of shipping costs to complete each statement using the phrase "greater than," "less than," "greater than or equal to," or "less than or equal to."

a. You will pay $6.50 in shipping fees if you spend:

Greater than or equal to (≥) $0.01, and less than or equal to (≤) $20.00

b. You will pay $9.00 in shipping fees if you spend:

Greater than (>) $20.00, and less than or equal to (≤) $50.00

c. You will pay $11.00 in shipping fees if you spend:

Greater than (>) $50.00, and less than (<) $75.00

d. You will pay $12.25 in shipping fees if you spend:

Greater than or equal to (≥) $75.00, and less than (<) $100.00

e. You will pay $13.10 in shipping fees if you spend:

Greater than or equal to (≥) $100.00

A **compound inequality** is an inequality that is formed by the union, "or," or the intersection, "and," of two simple inequalities.

6. You can use inequalities to represent the various shipping fee categories at GoodSportsBuys.com. If you let x represent the total cost of items purchased, you can write an inequality to represent each shipping fee category. Complete each inequality using an inequality symbol.

   a. $6.50 shipping fees: $x \geq$ $0.01 and $x \leq$ $20

   b. $9.00 shipping fees: $x >$ $20 and $x \leq$ $50

   c. $11.00 shipping fees: $x >$ $50 and $x <$ $75

   d. $12.25 shipping fees: $x \geq$ $75 and $x <$ $100

   e. $13.10 shipping fees: $x \geq$ $100

7. Identify the inequalities in Question 6 that are compound inequalities.

   Which inequalities are joined by an "or" or an "and"?
   a, b, c, and d are compound inequalities.