Day 6 - Compound Inequalities – Notes

Scenario: GoodSportsBuys.com is an online store that offers discounts on sports equipment to high school athletes. When customers buy items from the side, 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. The table below 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

Think About It...

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 Michael spends \$75? Why?
12.25 because it says "from 75..."

Using the inequality symbols you learned yesterday, fill in the boxes to represent each shipping fee category if x represents the total cost of items purchased.

	Compound Inequalities	Compact Form
a. \$6.50 shipping fees:	x [≥] \$0.01 and x [≤] \$20	$0.01 \le x \le 20$
b. \$9.00 shipping fee	x [>] \$20 and x [≤] \$50	$20 < x \le 50$
c. \$11.00 shipping fee	x [>] \$50 and x [<] \$75	$50 < x < 75$
d. \$12.25 shipping fee	x [≥] \$75 and x [<] \$100	$75 \le x < 100$
e. \$13.10 shipping fee	x [≥] \$100	$x \ge 100$

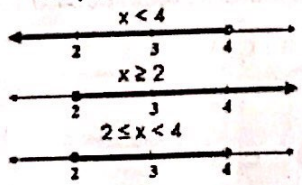
When two simple inequalities are combined into one statement using the words OR or AND, the result is a **compound inequality**. Compound inequalities that use the word AND can be written in compact form. Compound inequalities that use the word OR cannot be put into compact form; the word OR must be used.

Difference between AND & OR:

AND means "intersection"

- A number is a solution of the compound inequality if it is a solution to **both** of the inequalities.

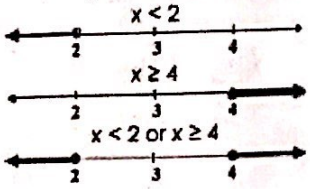
Graph $x < 4$ and $x \ge 2$



OR means "union"

- A number is a solution of the compound inequality if it is a solution to **one** of the inequalities.

Graph $x < 2$ or $x \ge 4$

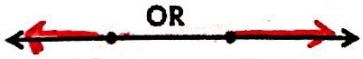


Compound Inequalities in Graph Form:

AND

Smallest number ≤ x ≤ largest number

OR

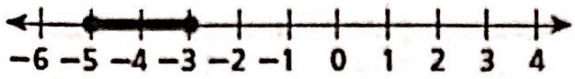


x ≤ smallest number or x ≥ largest number

Writing Compound Inequalities from a Graph

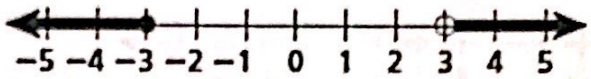
Practice: Identify each of the numbers as an AND or OR compound inequality. Then write the compound inequality.

a. $-5 \leq x \leq -3$



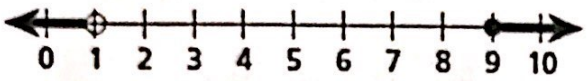
Possible Solutions: $-4, -3.5, -3$

b. $x \leq -3$ OR $x > 3$



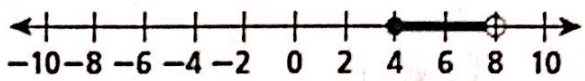
Possible Solutions: $-5, -3, 4$

c. $x < 1$ or $x \geq 9$



Possible Solutions: $0, 10$

d. $4 \leq x < 8$



Possible Solutions: $4, 5, 7$

Writing Compound Inequalities from a Context

Practice: Define a variable for each unknown quantity and write a compound inequality for each scenario.

1. Water becomes non-liquid when it is 32° F or below, or when it is at least 212° F. Write an inequality to describe water in its non-liquid form.

$W \leq 32$ or $W \geq 212$

2. Every day, a female needs to eat at least 1500 calories, but less than 1800 calories. Write an inequality to describe the amount of calories a female should have per day.

$1500 \leq x < 1800$

3. Each type of fish thrives in a specific range of temperatures. The optimum temperatures for sharks range from 18 degrees Celsius to 22 degrees Celsius. Write an inequality that represents the temperatures where sharks will NOT thrive.

$18 \leq x \leq 22$ Survive

$x < 18$ or $x > 22$ will not survive