Lesson 2.4 : Creating and Solving Inequalities

I. Vocabulary and Symbols

A. Inequality = A statement that compares two expressions that are not strictly equal by using an inequality sign.

B. Inequality Signs

Symbol	Meaning
$<$	is less than
$\leq$	is less than or equal to
$>$	is greater than
$\geq$	is greater than or equal to
$\neq$	is not equal

II Creating Inequalities from Verbal Descriptions

A. Example 1

Nora is planning a birthday party for her little sister, Colleen. Nora's budget will allow her to spend no more than $50 for party supplies. Eight children, including Colleen, will attend the party, and Nora wants to determine how much she could spend on party favors for each child. She will also purchase a cake for $10. Write an inequality that represents the situation, and find possible solutions.

- Let c represent the cost of a party favor for each child. Now write an expression for the total cost of the party as a function of c.

$$8c + 10$$

- Which inequality symbol should be used to represent the phrase "no more than"?

$$\leq$$

- Write the inequality that represents Nora's budget goal.

$$8c + 10 \leq 50$$

- Could she buy $6 party favors for all of her guests without going over budget?

$$8 \cdot 6 + 10 = 58$$

$$58 \not\leq 50$$

No, because it would be $58!

B. Example 2: Trina is buying 12 shirts for the drama club. She will choose a style for the blank shirts and then pay an additional charge of $2.75 for each shirt to have the club logo. If Trina cannot spend more than $99, how much can she spend on each blank shirt?

Write and ~~s~~solve an inequality to find the possible cost of each blank shirt.

- Let s represent the cost of each blank shirt.
- Write an inequality to represent the situation.

$$12(s+2.75) \leq 99$$

Solve $12(s+2.75) \leq 99$.

$12s + 33 \leq 99$ Distributive Property

$12s + 33 - 33 \leq 99 - 33$ Subtraction Property of Inequality.

$12s \leq 66$

$\frac{12s}{12} \leq \frac{66}{12}$ Division Property of Inequality.

$s \leq 5.5$

C. Properties and Inequalities Changes

1) Distributive Property = If a, b, and c are real numbers, then $a(b+c) = ab + ac$.

2) The Inequality sign must be reversed when multiplying or dividing both sides of an inequality by a negative number.

D. Example 3: Sergio needs to buy gifts for 8 friends. He wants to give the same gift to all his friends and he plans to have the gifts wrapped for an additional charge of $1.50 each.

If Sergio spends at least $70, he will receive free shipping on his order. Write and solve an inequality to determine how much Sergio needs to spend on each gift in order to receive free shipping.

→ Let g be the cost of one gift.

→ Write an inequality to represent the situation.

$$8(g + 1.50) \geq 70$$

$8g + 12 \geq 70$ Distributive Property

$8g + 12 - 12 \geq 70 - 12$ Subtraction Property of Inequality.

$8g \geq 70 - 12 = 58$ Simplify

$8g \geq 58$

$\frac{8g}{8} \geq \frac{58}{8}$ Division Property of Inequality

$g \geq 7.25$

Sergio must spend $7.25 on each gift.

E. Example 4: The Daily Info charges a fee of $650 plus $80 per week to run an ad. The People's Paper charges $145 per week. For how many weeks must an ad run for the total cost at the Daily Info to be less expensive than the cost at the People's Paper? Let w be the number of weeks the ad runs in the papers.

- Write an inequality to represent the situation.

$650 + 80w < 145w$

$650 + 80w - 80w < 145w - 80w$ Subtraction Property of Inequality

$650 < 65w$ Simplify

$\frac{650}{65} < \frac{65w}{65}$ Division Property of Inequality

$10 < w$ Simplify

- The total cost at the Daily Info is less than the cost at the People's Paper if the ad runs for more than 10 weeks.

F. Example 5: The Home Cleaning Company charges $312 to power-wash the siding of a house plus $12 for each window. Power Clean charges $36 per window, and the price includes power-washing the siding. How many windows must a house have to make the total cost from The House Company less expensive than Power Clean? Let w be the number of windows.

- Write an inequality to represent the situation.

$312 + 12w < 36w$

$312 + 12w - 12w < 36w$ Subtraction Properties of Inequality

$\frac{312}{36} < \frac{36w}{36}$ Simplify → Division Property of Inequality

$13 < w$

- A house must have more than 13 windows for The House Cleaning Company to be less expensive than Power Clean.

Homework 8
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