One-Step Inequalities

Solving One-Step Inequalities (REVIEW): Remember, solving an inequality is similar to solving an equation. You want to get the variable alone on one side of the inequality. When multiplying or dividing each side of the inequality by a *negative number,* **the direction of the inequality symbol is reversed.**

Example: Since you are dividing the variable by -7, the direction of the inequality symbol is reversed.

$$-7x \geq 42$$
$$\frac{-7x}{-7} \leq \frac{42}{-7}$$
$$x \leq -6$$

Two-Step Inequalities

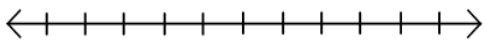
Solving Two-Step Inequalities: Solving two-step inequalities involves the same steps as solving two-step equations.
Remember, if both sides of an inequality are multiplied or divided by a negative number, the inequality symbol must be reversed.

Example:

$$-2x + 4 \leq 3$$
$$-2x + 4 \leq 3$$
$$-4 \quad -4$$
$$-2x \leq -1$$
$$\frac{-2x}{-2} \geq \frac{-1}{-2}$$
$$x \geq \frac{1}{2}$$

Solve and graph.

$7y - 4 > 24$



Understanding Formulas

Understanding Formulas: Formulas are special equations that show relationships between quantities.

Example: $A = l \cdot w$

You can use this formula to find the area of a rectangle by multiplying the length and the width. You can rewrite the formula so that you can find the length using the width and the area of a rectangle.

Solve for l in the formula $A = l \cdot w$

$A = l \cdot w$

$\frac{A}{w} = \frac{l \cdot w}{w}$

$\frac{A}{w} = l$

This new formula tells you that you can divide the area by the width to find the length of a rectangle.

Solve for w.

$A = l \cdot w$

Rewriting an Equation in Function Form

Rewriting an Equation in Function Form: An equation with two variables is written in *function form* if one of its variables is isolated on one side of the equation. The isolated variable is the output and is a function of the input.

Example: The equation $y = x + 5$ is in function form and x is the input and y is the output. Rewrite the equation so that y is a function of x.

$$\begin{array}{rcl} y & = x & + \ 5 \\ -5 & & - \ 5 \\ \hline y - 5 & = x & \end{array} \quad \text{or} \quad x = y - 5$$

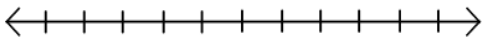
1. In Wilton Middle School, for every 24 students, there must be at least one teacher. There are 400 students in the school. At least how many teachers are there?

2. Julie plans to buy a new car. She can make a down payment of $5,500. She wants to buy a car that is $18,700. She wants to pay off the car in five years. At least how much does she need to pay per month?

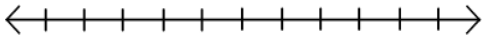
3. The greater of two consecutive integers is at least 5 less than twice the smaller number. What could the greater number be?

4. Solve and graph each inequality.

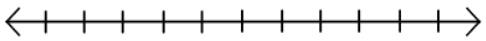
   a) $-2m + 1 < 9$



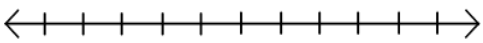
   b) $2y - 6 > 3y - 5$



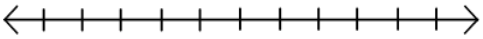
   c) $3(n + 5) \leq 4n + 9$



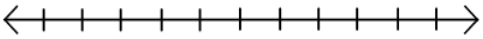
d) $6(x + 2) - 4 \leq -10$



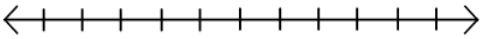
e) $3(x + 1) - 8 < 5(x - 3)$



f) $9x + 3 \leq 7x - 25$



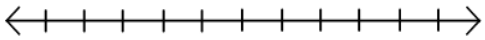
g) $\frac{2}{3}x + 8 \leq \frac{1}{3}x - 1$



5. Falana has $192 in her savings account. Since she is not using the account, the bank charges a monthly fee of $5. The bank will close the account when the balance goes below $50. Write and solve an inequality to find how many months until the bank closes her account.

6. Arianna's mom deposits $80 in her lunch money account. Lunch costs $2.50 per day. Write and solve an inequality to determine when there will be less than $20 in the account.

7. Hamid has read 60 pages of the book he will be using for a book report. If he reads 45 pages per hour, how many hours will it take him to read at least 375 pages of the book? Define a variable, and then write and solve an inequality to represent the situation. Graph the solution on a number line.



8. If 16 times a number is decreased by 4, the result is less than 76. What is the number?

9. Joshua's planning to buy a car. He wants his payment to be less than $200 per month. He wants to pay off the car in 3 years. If he can make a down payment of $7,000, what is the most he will pay for the car?

10. An amusement park charges $9 for admission and $1.40 for each ride. You go to the park with $23. Write an inequality that represents the possible number of rides you can ride. What is the maximum number of rides you can ride?

11. The sum of three consecutive odd integers is at most 251. What could be the greatest integer?

12. Solve for each variable.

    a) Solve for x: $x - y = 10$

    b) Solve for b: $y = mx + b$

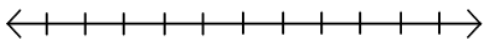
    c) Solve for h: $V = \frac{1}{3}\pi r^2 h$

13. The Drama Club is planning a sparing musical. The price of a ticket is $4.75. Club members estimate that the entire production will cost $1100.00. If they have $610.75 left from fund-raising, how many tickets must they sell to at least break even?

14. Nilsa is working on a 60-minute math test. There are 20 questions on the test. If it takes her 20 minutes to complete 12 of the questions, what is the greatest amount of time on average she can spend on each of the remaining 8 questions?

    a) Write an inequality for the problem situation and solve it.

    b) Graph the solution.



15. Write and solve an inequality to represent each situation.

a) Twenty-two more than 4 times a number is less than 82.

b) Louie has 20 more than half as many baseball cards as Gerardo does. Together they have at least 350 cards.

c) Zasha spent $5 on packages of gum. How many more packages of gum that cost $1.20 each can she buy if she has a $20 bill?

d) There are x giraffes at the zoo. The number of elephants is 4 less than three times the number of giraffes, and there are more than 23 elephants.

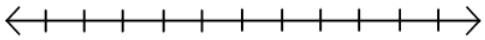
e) Dolores and four friends went to a buffet dinner. The total cost was at most $130 including the $20 tip they left. How much did each pay for the buffet?

f) George rented a bike for 4 hours. There was a $10 deposit to pay in addition to the hourly rate. What was the hourly rate if the total came to less than or equal to $65?

16. Rewrite the equation so that y is a function of x.

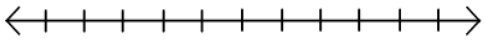
a) $\frac{y}{4} - 5 = -8x$ b) $x - 4y = -2x + 5$ c) $-2x + 5y - 10 = -12$

17. Joanne must complete a 4-question math quiz in 90 seconds or less. If she spends 30 seconds on the first question, what is the greatest amount of time on average she can spend on each of the remaining 3 questions? Write and solve an inequality to solve the problem. Then graph the solution.



18. *Multiple choice*: Which situation can be represented by the inequality $4x - 25 \leq 125$?
    A. Frank bought four tires for x dollars each. He paid $25 in shipping for a total less than or equal to $125.
    B. Frank bought 25 tires for x dollars each. He paid $4 in shipping for a total less than or equal to $125.
    C. Frank bought four tires for x dollars each. He had a coupon for a $25 discount. The total came to less than or equal to $125.
    D. Frank bought x tires for $25 each. He paid $4 in tax for a total less than or equal to $125.

19. An athlete wants to maintain a net caloric intake of no more than 2,000 calories for the day. Write and solve an inequality to determine how many hours she must train if she burns an average of 750 calories per hour and eats a total of 8,000 calories. Then graph the solution on a number line.



20. Write a short note to a friend explaining when to reverse the inequality sign when you are solving an inequality.