GSE Algebra 1   Unit 1—Equations and Inequalities   Notes

You try!
*Write the **verbal statement** as an **inequality**.*

1. Two times a number is <u>less than</u> eight. $2x < 8$

2. Three more than a number is <u>greater than or equal to</u> ten. _____

3. Twice the sum of a number and twelve is <u>more than</u> 42. $2(x+12) > 42$

4. One fifth of a number is <u>at least</u> twenty. _____

5. x is <u>at most</u> 30 $x \le 30$

6. the sum of 5x and 2x is <u>exceeds</u> 14 _____

7. the product of x and y is <u>less than or equal to</u> 4 _____

8. 5 <u>less than</u> a number y is <u>under</u> 20 $y - 5 < 20$

$$y - 5 < 20$$

9. Sara goes to Fredonia University. She has $900 in her savings account. She needs to buy a small laptop computer before the next semester. The laptop costs $600. Every 2 weeks she withdraws $60 from her savings account for food. How many times can Sara withdraw money for food? Write an inequality to explain.

$$900 - 60x \le 600$$

$$\begin{array}{r} 900 - 60x \le 600 \\ -900 \qquad -900 \\ \hline \dfrac{-60x}{-60} \le \dfrac{-300}{-60} \\ x \ge 5 \end{array}$$

10. You want to rent a limousine for a trip to the city. The limo costs $700 for the night and $0.15 per mile. You have no more than $750 to spend. Write an inequality that represents this scenario. How many miles can the limo travel?

11. Joan needed $100 to buy a graphing calculator for her math class. Her neighbor will pay her $5 per hour to babysit and her Father gave her $10 for mowing the lawn. What is the minimum amount of hours she will need to babysit in order for her to buy her calculator?

⭐ 12. Mrs. Scott decided that she would spend <u>no more than $120</u> to buy a <u>jacket</u> and a <u>skirt</u>. If the price of the jacket was <u>$20 more than 3 times the price of the skirt.</u> Find the highest possible price of the skirt?

$j = (20 + 3x)$ $(20 + 3x) + (x) \le 120$ $\underbrace{\quad}_{Jacket} + \underbrace{\quad}_{skirt} \le 120$

$S = (x)$ $x \le 25$ $\begin{array}{r} 20 + 4x \le 120 \\ -20 \qquad -20 \\ \hline 4x \le 100 \end{array}$

⭐ 13. Stephanie weighs 3 times as much as Rachel. Both weights are whole numbers and the sum of their weights is <u>less than</u> 160 pounds. Find the greatest possible weight for each girl.

Steph : $3x$ $\underbrace{3x}_{Steph} + \underbrace{x}_{Rach} < 160$ Steph : 120

Rach : x $4x < 160$ Rach : 40

$$x < 40$$

Algebra 1   Unit 1: Algebraic Expressions & Equations   Notes

Isolating a Variable

Isolating a variable simply means to solve for that variable or get the variable "by itself" on one side of the equal sign (usually on the left). Sometimes we may have more than one variable in our equations; these type of equations are called **literal equations**. We solve literal equations the same way we solve "regular" equations.

Steps for Isolating Variables

1. Locate the variable you are trying to isolate.
2. Follow the rules for solving equations to get that variable by itself.

Practice:

1. Solve the equation for b: $a = bh$

$$\frac{a}{h} = b$$

2. Solve the equation for b: $y = mx + b$

$$-mx \quad -mx$$
$$y - mx = b$$

3. Solve the equation for x: $2x + 4y = 10$

$$-4y \quad -4y$$
$$\frac{2x}{2} = \frac{10 - 4y}{2}$$
$$x = 5 - 2y$$

4. Solve the equation for m: $y = mx + b$

$$-b \qquad -b$$
$$\frac{y - b}{x} = \frac{mx}{x}$$
$$\frac{y - b}{x} = m$$

5. Solve the equation for w: $p = 2l + 2w$

$$-2l \quad -2l$$
$$\frac{p - 2l}{2} = \frac{2w}{2}$$
$$\frac{p - 2l}{2} = w$$
$$\boxed{\frac{p}{2} - l = w}$$

6. Solve the equation for a: $\frac{a}{2} - 1 = b$

$$+1 \quad +1$$
$$2 \cdot \frac{a}{2} = (b + 1) \cdot 2$$
$$a = 2(b + 1)$$

Your Turn:

7. Solve the equation for y: $6x - 3y = 15$

$$-6x \qquad -6x$$
$$\frac{-3y}{-3} = \frac{15 - 6x}{-3}$$
$$y = -5 + 2x$$

8. Solve the equation for h: $V = \frac{1}{3}Bh$

$$\frac{V}{B} = \frac{\frac{1}{3}Bh}{B}$$
$$3 \cdot \frac{V}{B} = \frac{h}{3} \cdot 3$$
$$\frac{3V}{B} = h$$