7th Grade Advanced Math

Book 1: Linear Equations

Block 1: Expressions & Equations

Guided Practice

(notes)

Name: _____

Period: _____

You may use your guided notes on the test!

Lesson 1 – Order of Operations

Warm Up – Find the value of each power.

9^2 $\qquad\qquad$ 2^3 $\qquad\qquad$ 1^5 $\qquad\qquad$ $(-7)^2$ $\qquad\qquad$ $(-3)^3$

Vocabulary

Order of Operations _____

_____

Absolute Value _____

Order of Operations

1. Find the value of expressions inside **grouping symbols** such as_____, _____,and
   _____.

2. Find the value of all _____,.

3. _____,and _____, from left to right.

4. _____,and _____, from left to right.

Find the value of the following expressions.

$8(-3+7) - 2 \cdot 5$ $\qquad$ $5^2 + |3 - 8| \div 5$ $\qquad$ $2 \cdot 5 + 3(2 - 6)$ $\qquad$ $\dfrac{(-5-3)^2}{6-4} - 50$ $\qquad$ $\dfrac{|-15+1|}{7-5} + 8$

Jakim's family took a vacation to California. The plane tickets cost a total of $840, the hotel cost $250 and gas cost $130. There are 5 people in Jakim's family.

a. Write an expression that could be used to find the cost per person.

b. Find the cost per person.

Whitney went to the movies with 3 of her friends. It cost $8 for them to get there on the subway. The total movie admission cost $30. They bought $2 worth of snacks per person. How much did they spend per person for the entire outing?

Lesson 2 – Evaluating Expressions

Warm Up – Find the value of each expression.

$$4 \cdot 8 - 2 \cdot 6 + 1 \qquad \frac{(4+2)^2}{5-9} \qquad 5|-2 + (-3)| + 10$$

Vocabulary

Etymology _____

    Etymon - _____

    Logy - _____

Algebraic Expression _____

    Algebra - _____

    Expression - _____

Equation_____ _____

    Equation - _____

Evaluating Expressions

Rewrite the expression by replacing the variables with the given values, and then follow the order of operations to compute the value of the expression.

$2x - 8$ when $x = 4$

$\dfrac{-5(m + y)}{m}$ when $m = -2$ and $y = 10$

$5x + 1$ when $x = 3$

$(a + b)^2 - a$ when $a = 5$ and $b = -2$

x	$-3x + 7$	Output
-2		
0		
4		
9		

x	$9 - 4x$	Value
-3		
0		
2		
5		

State whether the equation is true or false for the values of the variables given.

$3x + 2y = 8$ when $x = 2$ and $y = 1$

$-5x + 9 = y$ when $x = 6$ and $y = -21$

$y = \dfrac{1}{2}x + 1$ when $x = 8$ and $y = 17$

$5x - 3y = 10$ when $x = 3$ and $y = 2$

$2x + 7 = y$ when $x = -4$ and $y = -1$

Lesson 3 – The Distributive Property

Warm Up – State whether the equation is true or false for the values of the variables given.

$6x - 4y = 22$ when $x = 5$ and $y = 2$ $x + 5 = y$ when $x = 6$ and $y = 11$ $y = -3x - 1$ when $x = -2$ and $y = -7$

Vocabulary

Term _____

_____

Constant _____

Con - _____

Stan - _____

Coefficient _____

Co - _____

Efficient - _____

Expression - _____
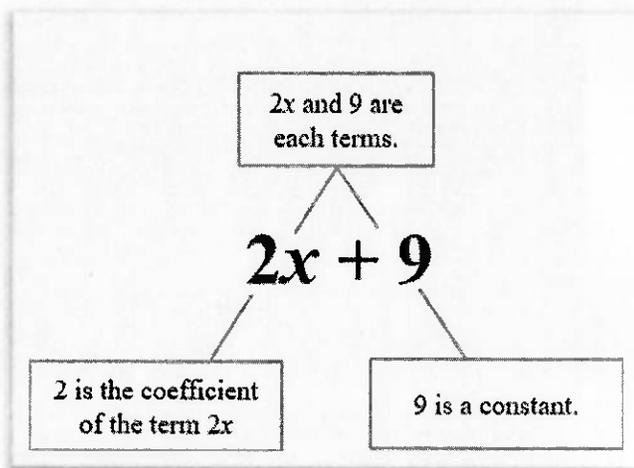
Distributive Property _____

Dis - _____

Distribute - _____

Property - _____

Proprius - _____

Like Terms - _____

_____

Equivalent Expressions - _____

_____

Equivalent - _____

Expression - _____

2x and 9 are each terms.

$$2x + 9$$

2 is the coefficient of the term 2x

9 is a constant.

For any numbers a, b and c:

$$a(b + c) = a \cdot b + a \cdot c$$

$$a(b - c) = a \cdot b - a \cdot c$$

Use the Distributive Property to simplify each expression.

$$2(x + 6)$$

$$\frac{1}{4}(y - 20)$$

$$-5(3x - 1)$$

$$9(x + 4)$$

$$-2(4x - 7)$$

Use mental math to simplify each expression.

$$4(103)$$

$$998 \cdot 7$$

$$8(6.5)$$

Simplify by combining like terms.

$3x - 2y + 4 - 2x + x + 4y$

$-4a + 5b + 3b - 2b + a$

$-5(2x - 1) + 3x - 2$

$2(3y - 5) + 8 - 6y$

Lesson 5 – Solving Two-Step Equations

Warm Up – Write an equation for each statement and solve to determine the unknown number.

1. The sum of a number and twenty is eighty-seven.

2. The quotient of a number and four is negative six.

3. A number decreased by three tenths is one and two tenths.

✓ To isolate the variable in a two-step equation you must perform two inverse operations.

Reminder:

Operation	Inverse Operation
Addition	Subtraction
Subtraction	Addition
Multiplication	Division
Division	Multiplication

✓ The inverse operations must undo the order of operations. That means you start by undoing addition or subtraction. Then use inverse operations to remove any multiplication or division.

ORDER OF OPERATIONS

1. Grouping Symbols (Fraction Bar, Absolute Value, Parentheses)
2. Exponents (Powers)
3. Multiplication & Division (from left to right)
4. Addition & Subtraction (from left to right)

Evaluating Expressions

Solving Equations

Solve the following Equations and check your work.

Solve:

$8x - 3 = 85$

Check:

$8x - 3 = 85$

$-34 = 6 - 4x$

$-2 = \dfrac{x}{9} + 5$

$\dfrac{x}{5} + 11 = 17$

Eight more than 3 times a number is 29. Write and solve an equation to find the value of the number.

Ten less than six times a number is eight. Write an equation and solve to find the value of the number.

Lesson 6 – Solving Multi-Step Equations

Warm Up – Solve each equation and check your work

Solve: 30 = 4x + 10

$$-12 + \frac{x}{9} = -15$$

0.7x – 2.1 = 0

Check: 30 = 4x + 10

$$-12 + \frac{x}{9} = -15$$

0.7x – 2.1 = 0

Solving Multi-Step Equations

1. Simplify each side of the equation by distributing and combining like terms, when necessary.

2. If variables are on both sides of the equation, balance the equation by moving one variable term to the opposite side of the equals sign using inverse operations.

3. Follow the process for solving one- and two-step equations to get the variable by itself.

Solve:

4(2x – 7) = 20

Check:

4(2x – 7) = 20

$2(5x + 3) = 26$ $2(5x + 3) = 26$

$-2x + 9 = 4x - 15$ $-2x + 9 = 4x - 15$

$-3(x + 2) = x - 10$ $-3(x + 2) = x - 10$

Katie opened a coffee cart to earn some extra money. Her one-time equipment start-up cost was $460. It costs her $1 to make each cup of coffee. She plans to sell the cups of coffee for $3. How many cups will she need to sell before she breaks even?

Gary opened a booth at the farmer's market selling ceramic mugs. His start-up costs were $280. It costs him $0.50 to make each mug. He sells each mug for $4.50. How many mugs will he need to sell before he breaks even?

Lesson 7 – Solving Linear Inequalities

Warm Up – Solve each equation for x.

$33 = 5(x + 8) + 3$ $2m + 3(m - 8) = 1$ $3x + 10 = 9x - 26$

Check:

$$33 = 5(x + 8) + 3 \qquad 2m + 3(m - 8) = 1 \qquad 3x + 10 = 9x - 26$$

Determining the Number of Solutions to a Linear Equation   A linear equation in one variable has…

One solution if, when solved, the variable is _____.

No solution if, when solved, the equation makes _____(e.g., 4 = 5).

Infinitely many solutions if, when solved, the equation makes _____
_____(e.g., 12x = 12x).

*e.g. = short for the Latin phrase exempli gratia, which translates to "for example"

Solve for x. Does the equation have one solution, no solution or infinitely many solutions?

$$6x + 12 = 2x - 5 + 4x + 17 \qquad 3x + 1 = 4x - 3 \qquad 3x + 4 + 7x = 5(2x + 1)$$

$$-2x + 12 + 10x = 4(2x + 3) \qquad 8(x + 2) - 5 = 6(x - 1) + 23 \qquad 3(x - 6) + 12 = 6(x + 1) - 3x$$

Lesson 8 – Linear Inequalities

Warm Up – Solve each equation for the variable.

$$\frac{h}{2} + 5 = 7$$

$$8y + 1 = -15$$

$$0.5x - 4 = 10$$

Check:

$$\frac{h}{2} + 5 = 7$$

$$8y + 1 = -15$$

$$0.5x - 4 = 10$$

Vocabulary

Inequality _____

< _____   > _____

Example :   **Example:**

≥ _____   ≤ _____

Example :   **Example:**

Write an inequality for each statement.

a. Carla's weight (*w*) is greater than 100 pounds.

b. Vicky has at most $500 in her savings account. Let *m* represent the amount of money in Vicky's account.

c. Quinton's age is greater than 40 years old. Let *a* represent Quinton's age.

Write an inequality for each statement.

a. Sharon earns at least 8 dollars (*d*) per baby-sitting job.

b. Kenny does less than 10 hours (*h*) of homework per week.

c. Rayanna is more than 48 inches (*i*) tall.

Solutions to an inequality can be graphed on a number line.

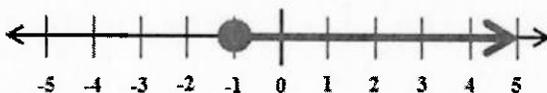For < or >, use an **OPEN** circle to graph the inequality:

$x > -1$
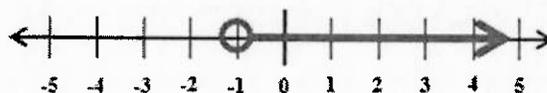
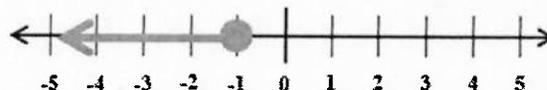$x < -1$
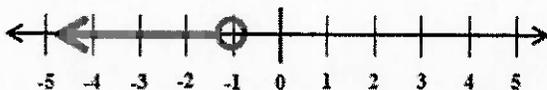
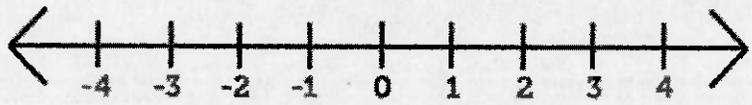For ≤ or ≥, use a **CLOSED** circle to graph the inequality:

$x \geq -1$

$x \leq -1$

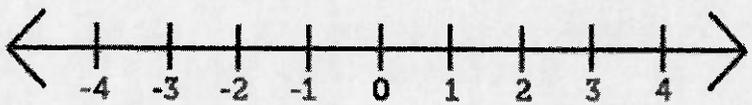**Solve the inequality and graph its solution on a number line.**
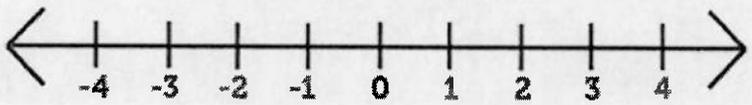
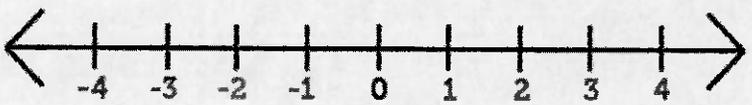$\frac{x}{4} + 2 \geq 3$

$4x + 5 > 21$

$6x + 3 < 2x - 5$

$2x - 5 \leq 4x - 7$

$-4x + 7 \leq 19$

$9 \geq -3x + 15$