Summer Break Packet

This packet covers all of the prerequisite skills needed for your Algebra I class. You are responsible for completing this packet before the first day of school, and a reminder that **this packet will be graded!**

Central Tendencies
(Mean, Median, Mode, and Range)

Mean is the sum of the values in a set of data divided by the number of values.

Median is the middle value of a set of data written in ascending order. If there are two middle values, the median is the mean of those values.

Mode is the most frequent value in a set of data.

Range is the difference between the greatest and least value in a set of data.

Exercises:

Find the mean, median, mode, and range of each set of data.

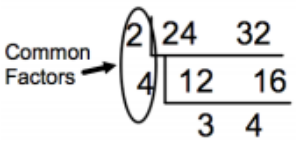
1. 20, 45, 87, 34, 105, 12
2. 4, 12, 33, 99, 36, 74, 54
3. 22, 64, 33, 91, 127, 100, 83
4. 34, 23, 54, 45, 19, 20
5. 56, 102, 124, 45, 89, 78

GCF & LCM

Example:

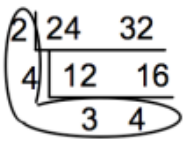
Find the Greatest Common Factor (GCF) and Least Common Multiple (LCM) of 24 and 32.

GCF



GCF= 2 x 4 = 8

LCM



LCM = 2 x 4 x 3 x 4 = 96

Find the GCF

1. 24, 6
2. 48, 20
3. $3x^2$, 2x
4. $7x^2y^2$, 21y

Find the LCM

1. 2, 3
2. 12, 4
3. 10x, 5x
4. $3x^2y$, $5xy^2$

Fractions
(Addition, Subtraction, Multiplication, and Division)

Simplify each expression

1. $\frac{25}{5}$
2. $\frac{10}{120}$
3. $\frac{15x^2}{3x}$
4. $\frac{10a^3b^4}{2a^8b^2}$

Solve for x

1. $\frac{6}{12} = \frac{x}{3}$
2. $\frac{2}{8} = \frac{x}{2}$

Write as an improper fraction

1. $5\frac{3}{5}$
2. $3\frac{1}{3}$

Write as mixed numbers

1. $\frac{9}{2}$
2. $\frac{-41}{7}$

Simplify each expression

1. $\frac{2}{5} + \frac{7}{5}$
2. $\frac{6}{4} - \frac{10}{12}$
3. $\frac{7}{2} * \frac{4}{7}$

4. $\frac{8}{2} \div \frac{3}{2}$

5. $\frac{10}{5} + \frac{3}{20}$

6. $\frac{1}{3} - \frac{5}{2}$

7. $\frac{3}{2} * \frac{7}{10}$

8. $\frac{9}{8} \div \frac{3}{2}$

Order of Operations

When several operations are indicated in a numerical expression, proceed in the following order: work within the parentheses, expand each power, multiply and divide (whichever comes first), and finally, add or subtract (whichever comes first).

PEMDAS ("**P**lease **E**xcuse **M**y **D**ear **A**unt **S**ally") is an acronym that provides a good way to remember your order of operation.

P: Parentheses
E: Exponents
MD: Multiply or Divide, whichever comes first
AS: Add or Subtract, whichever comes first

Simplify each expression

1. $7^2 - (3+8)$

2. $2(7 - 10) + 5^2$

3. $3(5^2 - 3^2) - 7(2^2 + 4^2)$

4. $|-37| - 23$

5. $\frac{48-2(5^2)}{6(2-3^2)}$

Working with Integers

Adding and Subtracting:

1st: Rewrite all subtraction as addition then…

- If the integers have the same signs, add their absolute values. The sum will have the same sign of the addends.
- If the integers have different signs, subtract their absolute values. The sum has the sign of the addend with the greater absolute value.

Multiplying and Dividing:

- The product or quotient of two integers having the same sign is positive.
- The product or quotient of two integers having different signs is negative.

Simplify each expression

1. 12 – 3
2. 22 + 19
3. 3 * 32
4. $24 \div 4$
5. There is a 10° drop in temperature over the past hour. If it is 74° now, what was the temperature an hour ago?
6. It is −23° now. The temperature will drop 10° in two hours. What will the temperature be in two hours?

Evaluating Expressions and Formulas

To evaluate an expression, first replace the variable by a given value. Then simplify the resulting numerical expression.

Evaluate the expression when $x = -2$ and $y = 5$.

1. $x + y$
2. xy^2
3. $x^2 - y^2$
4. $2x(3 + y)$
5. $5x - 3y + x^2$

Properties of Operations

Commutative Property of Addition:
$a + b = b + a$

Commutative Property of Multiplication:
$a \times b = b \times a$

Associative Property of Addition:
$(a + b) + c = a + (b + c)$

Associative Property of Multiplication:
$(a \times b) \times c = a \times (b \times c)$

Identity Property of Addition:
$a + 0 = a$

Identity Property of Multiplication:
$a \times 1 = a$

Name the property illustrated by each expression.

1. $2 \times 4 = 4 \times 2$
2. $1y = y$
3. $5 + 0 = 5$
4. $4 + 2 + 5 = 5 + 4 + 2$
5. $2 \times 7 \times 8 \times 10 = 10 \times 2 \times 7 \times 8$

Solving Multi-Step Equations

Procedure: To solve multi-step equations…

1. Fully simplify both sides of the equation
2. Get all variables to one side of the equation.
3. Use inverse operations to isolate the variable

undo addition and subtraction first

Ex.

$$2x+3=7$$
$$-3 \quad -3$$
$$\frac{2x}{2} = \frac{4}{2}$$
$$\boxed{x = 2}$$

Ex.

$$2(x + 5) = 3x - 5$$
$$2x + 10 = 3x - 5$$
$$-2x \qquad -2x$$
$$10 = x - 5$$
$$+5 \qquad +5$$
$$\boxed{x = 15}$$

Solve each equation

1. $2x - 7 = 7$
2. $3x + 10 = 40$
3. $x + 5 = 2x - 3$
4. $10 - 10x = 5x + 5$
5. $5x - 15 = 3x + 2$
6. $10x = 5$
7. $4x + 3 = 15$
8. $x + 6 = 13x$
9. $12x + 2 = 5x - 7$
10. $x - 4 = x - 3$

Solving Multi-Step Inequalities

Note: Solve a multi-step inequality just like you would solve a multi-step equation. However, if you multiply or divide both sides of an inequality by a negative number, then the inequality sign reverses.

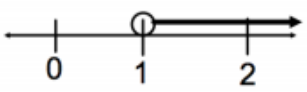
Ex.

$2x + 5 > 7$

$-5 \quad -5$

$\frac{2x}{2} > \frac{2}{2}$

$\boxed{x > 1}$



Ex.

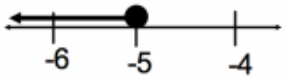
$10 \leq -2(x - 4)$

$10 \leq -2x + 8$

$-8 \quad -8$

$\frac{10}{-2} \leq \frac{-2x}{-2}$

$\boxed{-5 \geq x \text{ or } x \leq -5}$



Exercises

Find and graph the solution set of each inequality.

1. $x - 3 > 7$
2. $3x + 1 < 40$
3. $x < 2x - 3$
4. $10 - 10x > + 5$
5. $6x - 15 > 3x$
6. $50x < 5$
7. $2x + 3 > 15$
8. $x - 12 < 13x$
9. $2x + 1 > 5x - 7$
10. $4x - 4 < x - 1$

Linear Functions

Tell whether each ordered pair is a solution of the equation.

1. $2x + y = 5$ (2,1)
2. $4x – 3y = 10$ (4,3)

Find the intercepts of the equations graph.

3. $2x + 6x = -24$
4. $10x – 3y = 30$

Find the slope, given the points on the line

5. (3, 2) and (5, 6)
6. (2, 1) and (7, 10)

Identify the slope and y-intercept of the line with the given equation.

7. $3x + 6y = 36$
8. $2x – 12y = 48$

Write an equation of the line that is parallel to the given line and passes through the given point.

9. $y = -2x+6$ (0, -4)
10. $-2x + 3y = 12$ (3, 2)

Graph each equation

11. $Y = 2x – 7$
12. $Y = 5x + 1$

Polynomials

Examples

A polynomial is in **Standard Form** if it is simplified and the terms are arraigned so the degree of each term increases (or stays the same) from left to right.

Find the difference:

$(6x^2 - 5x + 2) - (-3x^2 - 8x + 3)$

First: Turn the expression into an addition problem by distributing the negative to the second expression.

$(6x^2 - 5x + 2) + (3x^2 + 8x - 3)$

Then: Combine like terms

$(6x^2 + 3x^2) + (-5x + 8x) + (2 + -3) = 9x^2 + 3x - 1$

Find the product:

$3x(2x^2 - 5) = 3x(2x^2) + 3x(-5) = 6x^3 - 15x$

Find the quotient:

$$\frac{8r^4 + 4r^2 - 6r}{2r} = \frac{8r^4}{2r} + \frac{4r^2}{2r} + \frac{-6r}{2r} = 4r^3 + 2r - 3$$

Find the product using the F.O.I.L. method (F: first, O: outer, I: inner, L: last):

$(2x - 3)(x + 5) = 2x(x) + 2x(5) - 3(x) - 3(5) = 2x^2 + 7x - 15$

Write the polynomial in standard form

1. $2x - 3 + 5x^2$
2. $10 - 2x^2 + 12$

Find the sum or difference

3. $(2x^2 + 3x - 10) + (5x^2 - 6x + 4)$
4. $(10x^2 + 2x - 1) - (3x^2 + 3x + 12)$

Find the product or quotient.

5. $3x(x - 9)$
6. $(x - 2)(x + 3)$
7. $\frac{2x^2+5x}{x}$
8. $(x + 5)(x - 5)$
9. $2x^2(x^2 + 10)$