**Exponents**



The \_\_\_\_\_\_\_\_\_\_\_\_\_\_of a number says how many times to use the

\_\_\_\_\_\_\_\_\_\_ as a\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a multiplication problem.

**33 = \_\_\_\_\_ x \_\_\_\_\_ x \_\_\_\_\_ = \_\_\_\_\_\_\_**

Try These:

28 =

82=

54=

What is the mistake?

32 = 6

**Order of Operations**

P E MD AS

 Steps

|  |  |
| --- | --- |
| **1** | **G** |
| **2** | **E** |
| **3** | **M**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ OR **D**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**WHICHEVER OPERATION COMES FIRST****FROM LEFT TO RIGHT** |
| **4** | **A**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ OR **S\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****WHICHEVER OPERATION COMES FIRST****FROM LEFT TO RIGHT** |

Try Some: Show each step!

8 − 3 × 1 + 25 (28 − 42) × 5 14 × 6 ÷ 3 4 x 32

 2 + 4

 15 + (53 - 7) 92 + (33 × 10) 7(24 + 6) Area = 32

**What are the mistakes?**

2(2 + 23 x 4) = 2(2 + 6 x 4)

 = 2(8 x 4)

 =2(32)

 =64

Describe the mistake:

Redo correctly:

Advanced:

3 x 9 – 52 + 3(4/2) = 3 x 42+ 3(4/2)

 = 3 x 16 + 12/2

 = 48 + 6

 = 54

Describe the mistake:

Redo correctly:

 **Writing Algebraic Expressions**

These terms are used to describe mathematical operations.

**Addition Subtraction Multiplication Division**

 **+ - x ÷**

|  |  |  |  |
| --- | --- | --- | --- |
| sum | difference | product | quotient of |
| more than | less than | times | divided by |
| increased by | fewer than | multiplied by |  |
| total | decreased by |  |  |
| added to |  |  |  |

You can use the terms above to write word phrases for algebraic expressions, and algebraic expressions for word phrases.

Word Phrase Algebraic Expression

the sum of m and 17 **m + 17**

the difference of x and 12 **x − 12**

3 times w **3w**

the quotient of q and 6 **x ÷ 6** or **x**

 **6**

**You try**: Identify the operation you should use and then write the expression.

6 increased by *y* the quotient of 8 and *e*

3 less than *h* 4 times *w*

the difference of *s* and 8 *r* divided by 2

5 more than *n* the product of 6 and *m*

**Write 2 word phrases that explains each expression.**

*n* ***+*** 8

*3x*

*w – 2*

\_r\_

 **9**

**Pair Share – Check your partners work , are your statements correct?**



Parts of an Equation

\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a symbol for a number we don't know yet. It is usually a letter like x or y, but it can be any letter.

A number on its own (without a variable) is called a \_\_\_\_\_\_\_\_.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a number used to multiply a variable (4*x* means 4 times x, so 4 is a coefficient)

\_\_\_\_\_\_\_\_\_\_\_\_ is a symbol (such as +, ×, -, /) that represents an operation (ie you want to do something with the values).



A**\_\_\_\_\_\_\_\_\_\_\_\_\_\_is** either a single number or a variable, or numbers and variables multiplied together.

An **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**is a group of terms (the terms are separated by + or - signs)

**Equivalent Expressions**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: when two expressions name the same number regardless of which value is substituted into them.

**PAIR Share – What does equivalent mean?**

Write a second expression that is equivalent to the first expression. Hint: Think of the distributive property.

**3(2 + *x*) = 24*x* + 18*y*=**

***y + y + y* = 3(*x + y)***

**Area = side(side)**

Equations

An \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is a number sentence that states that two or more expressions or terms are equal.

For example: 3x = 9 c + 7 = 15 63/n = 9 41 – r = 17

Solving equations:

**It is a balancing act!**



**In order keep the equation balanced or equal remember:**

**What you do to one side – you must also do to the other side!**

**Inverse Operations – undoes what has been done!**

|  |  |  |  |
| --- | --- | --- | --- |
| n + 3 = 12n + 3 = 12 -3 -3n + 0 = 9 n = 9 | x – 5 = 31x – 5 = 31 +5 +5x – 0 = 36 x = 36 |  6n = 48 6n = 48 6 6 1n = 8 n = 8 |  x = 2 1212(x) = 2(12) 12 1x = 24 x = 24 |

We often refer to this process as “isolating the variable.”

**Pair Share: Discuss with your partner why this process is often referred to as “isolating the variable.**

**You try:**

|  |  |
| --- | --- |
| 3x = 9  | n + 7 = 15  |
| 63 = 9 n | r - 41 = 17  |
| *Hint: Always do the addition and subtraction first when there is more than one term on either side of the equal sign.* |
| 6x – 1 = 35 |  n + 8 = 43 5  |
| 3x + 5 = 18 | 7 + n = 10 5 |

An *\_\_\_\_\_\_\_\_\_\_\_\_\_* contains Unlike the equations you have worked with, an inequality may have many solutions.

Inequalities

 <\_\_\_\_\_\_\_\_\_\_\_\_\_ >\_\_\_\_\_\_\_\_\_\_\_\_ < \_\_\_\_\_\_\_\_\_\_\_\_\_\_

 > \_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_ ≠ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**PAIR SHARE – discuss the meaning of inequality. How does the prefix change the meaning?**

**The *solutions of an inequality* are the values that make the inequality\_\_\_\_\_\_\_\_. They can be graphed on a number line. An \_\_\_\_\_\_\_\_circle shows that the number below it is not a solution. A \_\_\_\_\_\_\_\_\_\_circle shows that the number below it is a solution.**





**1.** Graph the inequality *x*—4.

Graphing Inequalities

**a.** Write the inequality in words.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**b.** Will the circle at **—**4 be open or closed?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**c.** Graph the solution.



**2.** Graph the inequality *x***—** 1.

**a.** Write the inequality in words. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**b.** Will the circle at **—**1 be open or closed? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**c.** Graph the solution.



**3.** Graph the inequality *x* ***<*** 4.

**a.** Write the inequality in words. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**b.** Will the circle at 4 be open or closed? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**c.** Graph the solution.



Writing Inequalities

Write an inequality for each situation and graph it on a number line:

1. No more than 38 students work in the car-wash fundraiser.



1. There are more than 4.5 grasshoppers on the windshield.



1. A sign reads, “Maximum height of vehicles is 14 feet”



PARTNER WORK

Create a situation for an inequality, write the inequality, and graph it on the number line.

Situation:

Inequality:



Sets

**A *\_\_\_\_\_\_* is a collection of related things. When a set is listed, it's members are usually listed between curly brackets, like these: { }
Here are a few sets:**1. Members of a class whose names start with L: {Lacy, Luke, Lauren}
2. Days of the week:

 {Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday}
3. Colors of the rainbow: {red, orange, yellow, green, blue, indigo, violet}
4. Whole numbers between 3 and 10: {4, 5, 6, 7, 8, 9}
5. Daily high temperatures in the first week of February:

 {53, 48, 49, 55, 44, 51, 54}

Which value/s from the following **set** makes the following equations and inequalities true?

Remember there can be **several** values that might work for inequalities.

**{0, 1, 2, 3, 4, 5}**

 3x = 12 3x > 12 3x < 12

 3x - 1 = 8 3x +2 > 8 3x – 2 < 12

You are going to Disneyland to go on their new wild ride. The height requirement is 62 inches or taller. Write an inequality to represent the height requirement where x = height.

Using Inequalities

 x \_\_\_\_ 62 inches

Graph the inequality on the number line.



Write an inequality if you are shorter than 62 inches, where *x* = your height, that shows how high the heels on your shoes need to be for you to meet the height requirement.

 x + 4 \_\_\_ 62 inches

The maximum speed limit on an interstate is 75 miles per hour. Write an inequality that describes the speed, where x represents the speed of a car, which is breaking the speed limit.

 x \_\_\_\_ 75 mph

Graph the inequality on the number line.



Write an inequality that represents if a driver isn’t breaking the speed limit.

x \_\_\_\_ 75 mph

**Dependent Variable**

Dependent & Independent Variables

A variable that depends on one or more other variables. For equations such as y = 3x – 2, the dependent variable is y. The value of y depends on the value chosen for x. Usually the dependent variable is isolated on one side of an equation.

**Independent Variable**

A variable in an equation that may have its value freely chosen without considering values of any other variable. For equations such as

y = 3x – 2, the independent variable is x. The variable y is not independent since it depends on the number chosen for x.

**PAIR SHARE – DISCUSS DEPENDENT AND INDEPENDENT VARIABLES**

**Complete the function tables:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Y = 2x

|  |  |
| --- | --- |
| XInputIndependent | YOutputDependent |
| 0 |  |
| 3 |  |
| 5 |  |
| 8 |  |

Y = 56 x

|  |  |
| --- | --- |
| X | Y |
| 2 |  |
| 4 |  |
| 7 |  |
| 8 |  |

 | y = 3x – 2

|  |  |
| --- | --- |
| X | Y |
|  1 |  |
| 2 |  |
| 3 |  |
| 4 |  |

Y = 4(x – 1)

|  |  |
| --- | --- |
| X | Y |
| 1 |  |
| 3 |  |
| 6 |  |
| 8 |  |

 |

Graphing a Function

Using tables and graphs

 A parking garage charges $3.50 per hour to park. The function rule: *c* ***=*** 3.5 *h* shows how the number of hours *h,* relates to the
parking charge *c. Complete the function table and g*raph the function.



|  |  |
| --- | --- |
| hours  | charge |
| 1 |  |
|  2 |  |
| 3 |  |
|  | $14 |

Your neighbors would like you to babysit. They are willing to pay you $4.25 per hour. The function rule: p=4.00 h, shows how the number of hours relates to the total wage you will earn. *Complete the function table and g*raph the function.



|  |  |
| --- | --- |
| hours  | charge |
| 1 |  |
|  2.5 |  |
|  | $12 |
| 4.5 |  |
| 5 |  |
|  |  |
|  |  |

 **Input x**

**Function rule**

**Output y**



|  |
| --- |
| **Exponent -** a number that says how many times to use the base as a factor in a multiplication problem.VOCABULARY |
|  Example: 3**3 =** 3 x 3 x 3 |
| **Term –**  a single number or a variable, or numbers and variables multiplied together. |
| http://www.mathsisfun.com/algebra/images/expression-term.gif Example:  |
| **Expression –** a group of terms (the terms are separated by + or - signs) |
| http://www.mathsisfun.com/algebra/images/expression-term.gif Example: |
| **Variable -** a symbol for a number we don't know yet. It is usually a letter like x or y, but it can be any letter. |
|  Example: 3***x*** + 5 = 20 |
| **Constant -**  A number on its own (without a variable) |
|  Example: 3x + **5** = 20 |
| **Operator -** a symbol that represents an operation (ie you want to do something with the values). |
|  Example: such as +, ×, ÷, - |
| **Equivalent Expression -**  when two expressions name the same number regardless of which value is substituted into them. |
|  Example: 24x + 16 = 8(3x + 2) |
| **Equation -** a number sentence that states that two or more expressions or terms are equal. |
|  Example: 3x = 9 c + 7 = 15 63/n = 9 41 – r = 17  |
| **Inequality -**  contains and inequality may have many solutions. |
|  Example: 3x > 5 |
| **Set -** is a collection of related things. |
|  Example: Whole numbers between 3 and 10: {4, 5, 6, 7, 8, 9} |
| **Dependent Variable -**  A variable that depends on one or more other variables. |
|  Example: y = 3x – 2, the dependent variable is y because it depends on the value of x. |
| **Independent Variable -**  A variable in an equation that may have its value freely chosen without considering values of any other variable. |
|  Example: y = 3x – 2, the independent variable is x. The variable y is not independent since it depends on the number chosen for x. |
| **Function –** an expression involving one or more variables.  |
|  Example: y = 5x + 7 |