**ALGEBRA 1**

**Math Maintenance Assignment**

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Welcome to Algebra 1! In order to ensure success in this course, this is a mandatory summer assignment packet. This packet is due on the first day of your math class whether it occurs in the first or second semester. While it is best to not put the assignment off to the last minute, you want to complete the assignment close enough to the start of your course so that the ideas are fresh. There will be an assessment on this material the first week of class, after the packet has been reviewed.

All topics in this assignment should be a review and performed without the use of a calculator. You should not only be familiar with the topics but you should know them well enough to be tested on them. This is material that will not be taught in the course. It is expected that you come in with a strong understanding of these topics. If you are unsure of how to do these problems, feel free to seek help with them. There are many websites with helpful videos including Khan Academy, YouTube, MathisFun.com, PurpleMath.com, Shmoop.com, and Algebrahelp.com.

Give us your best work while giving yourself the opportunity to get off to a great start! We look forward to having you in class!!

Sincerely,

The Math Department

**ALGEBRA 1**

**ALL WORK IS TO BE DONE <u>WITHOUT</u> THE USE OF A CALCULATOR.**

## INTEGERS – ADD & SUBTRACT

Exercises: Solve the following problems.

1. (-4) + (-5) =
2. –9 – (-2) =
3. 6 - (-9) =
4. (-6) – 7 =
5. 7 – (-9) =
6. 15 – 24 =
7. (-5) + (-8) =
8. –15 + 8 – 8 =
9. 14 + (-4) – 8=

## INTEGERS – MULTIPLY & DIVIDE

The rules for multiplying integers are:

*Positive · Positive = Positive* *Negative · Negative = Positive*

*Positive · Negative = Negative* *Negative · Positive = Negative*

The rules for dividing integers are the same as multiplying integers.

Exercises: Solve the following problems.

1. $4 \cdot (-3) \cdot 6 =$
2. $5\ (-12) \cdot (-4) =$
3. $(4)(-2)(-3) =$
4. $\frac{4(-3)}{8} =$
5. $\frac{-48}{2^3} =$
6. $\frac{-12}{2} + 8 =$
7. $-6\ (9 - 11) =$
8. $(-4 + 7)\ (-1 + 3) =$
9. $2(-12 + 5) + 3 =$

**ORDER OF OPERATIONS**

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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

Examples:

$$\begin{aligned} & 12+15\div 5-2 \\ &= 12+\underline{15\div 5}-2 \\ &= \underline{12+3}-2 \\ &= \underline{15-2} \\ &= 13 \end{aligned}$$

$$\begin{aligned} & 2^3\times 10-3+9\div 3 \\ &= \underline{2^3}\times 10-3+9\div 3 \\ &= \underline{8\times 10}-3+\underline{9\div 3} \\ &= \underline{80-3}+3 \\ &= \underline{77+3} \\ &= 80 \end{aligned}$$

$$\begin{aligned} & 3(10^2-4\times 5^2)+15 \\ &= 3(\underline{10^2}-4\times \underline{5^2})+15 \\ &= 3(100-\underline{4\times 25})+15 \\ &= \underline{3(100-100)}+15 \\ &= \underline{3(0)}+15 \\ &= \underline{0+15} \\ &= 15 \end{aligned}$$

Exercises: Simplify

1. $2^4-3(3^2-8)$
2. $4^2-4(5^2-32\div 8\cdot 4)$
3. $(8\cdot 5\div 10+2)(2^3-8\div 4)$
4. $\dfrac{48-24\div 2^3}{3+2\cdot 6}$
5. $[15-3(4^2-10)+25\div 5]$

## EVALUATING EXPRESSIONS

The key to evaluating algebraic expressions is to substitute a number for each variable and perform the arithmetic operations.

Exercises: Evaluate each expression given that: **x= 5** **y= - 4** **z=6**

1. x+4
2. $y - 3$
3. $2x^2$
4. $5z + 4$
5. $xz + y$
6. $2(x + y) - z$

## SOLVING EQUATIONS – INVERSE OPERATIONS

The key in equation solving is to isolate the variable, to get the letter by itself. In one-step equations, we merely undo the operation - addition is the opposite of subtraction and multiplication is the opposite of division. Remember the golden rule of equation solving: *If we do something to one side of the equation, we must do the exact same thing to the other side.*

Examples:

1. x + 4 = 3
   -4 -4
   x = -1
   *Check* : -1+4=3

3. r – 8 = 9
   +8 +8
   r = 17
   *Check* 17 - 8 = 9

2. $\frac{8a}{8} = \frac{16}{8}$
   a=2
   *Check* : 8(2) = 16

4. $7 \cdot \frac{y}{7} = 4 \cdot 7$
   y = 28
   *Check* : $\frac{28}{7} = 4$

Exercises: Solve the following problems.

1. $x + 8 = 10$
2. $x - (-3) = 4$
3. $5y = 25$
4. $\frac{x}{9} = 3$
5. $a - 7 = -3$
6. $g + 2 = -8$
7. $-6p = 18$
8. $3 + x = 13$
9. $-9 + a = -5$

**ROUNDING NUMBERS**

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1) Underline the place value in which you want to round.

2) Look at the number to the right of that place value you want to round

3) *If the number to the right of the place value you want to round is less than 5, keep the number the same and drop all the other numbers

*If the number to the right of the place value you want to round is 5 or more, round up and drop the rest of the numbers.

Example: Round the following numbers to the tenths place

1. 23.1246 — 2 is less than 5 so keep the 1 the same — 23.1

2. 64.2685 — 6 is greater than 5 so add one to the 2 — 64.3

3. 83.9721 — 7 is greater than 5 so add one to the 9 — 84

Exercises: Round the following numbers to the tenth place.

1. 18.6231_____ 2. 25.0543 _____

3. 3.9215 _____ 4. 36.9913_____

5. 15.9199 _____ 6. 0.2658 _____

7. 17.1083 _____ 8. 9.993 _____

## FRACTIONS

**Write the fractions in lowest terms.**

**1.** $\frac{8}{24}$ **2.** $\frac{-4}{-8}$ **3.** $\frac{15}{50}$ **4.** $\frac{-5}{5}$

**Find each sum or difference. Write your answer in simplest form.**

**1.** $\frac{2}{3}+\frac{4}{3}$ 2. $\frac{-4}{7}+\frac{5}{7}$ 3. $\frac{3}{10}-\frac{4}{5}$ 4. $\frac{8}{9}+\frac{1}{2}$ 5. $\frac{-2}{3}-\frac{2}{5}$

**Find each product or quotient. Write your answer in simplest form.**

**1.** $\frac{-5}{6}\cdot\frac{6}{15}$ 2. $\frac{5}{7}\cdot\frac{3}{2}$ 3. $\frac{-3}{4}\div\left(\frac{-9}{16}\right)$ 4. $\frac{2}{9}\cdot\frac{3}{16}\cdot\frac{3}{6}$

## ALGEBRAIC TRANSLATIONS

Translating from English to Mathematics

Key words for Translations:

| Add | Subtract | Multiply | Divide | Inequalities | Variable | = |
|---|---|---|---|---|---|---|
| Plus<br>Sum<br>Longer Than<br>Greater Than<br>Together<br>Total<br>Increased<br>More Than<br>In all<br>And | Decreased<br>Smaller<br>Less than<br>Difference<br>Reduced<br>Differ<br>Fewer<br>Shorter Than<br>Minus<br>Diminished | Per<br>For Every<br>For each<br>Triple<br>Multiplied<br>Of<br>Times<br>Twice<br>Double | One-third<br>Quotient<br>Divided by<br>Each part<br>Half as much<br>Spilt equally | < is less than<br>> is greater than<br>≤ is less than or equal to<br>≥ is greater than or equal to | a number<br>some number<br>quantity | Same as<br>Equals<br>Is<br>Total<br>Was<br>Result<br>Outcome<br>Answer |

Examples

- 3 less than 5 times a number **5n-3**
- 3 less than 5 times a number is 22 **5n-3=22**
- The quotient of a number and 4 $\frac{n}{4}$
- Four plus three times a number is less than eight $4+3n<8$

Exercises: Translate each phrase into a mathematical statement.

1. Seven plus four times a number is greater than or equal to 9.
2. Two times a number decreased by 2 is 49.
3. One half of a number is equal to 14.
4. 6 less than 4 times a number
5. x decreased by 4
6. 12 less than 9 times a number is -3.
7. Nine increased by a number is -5.

Matching-Put the letter of the algebraic expressions that best matches the phrase.

| | |
|---|---|
| _____ 1. Two more than a number | A. $2x$ |
| _____ 2. Two less than a number | B. $x + 2$ |
| _____ 3. Half of a number | C. $2 - x$ |
| _____ 4. Twice a number | D. $x - 2$ |
| _____ 5. Two decreased by a number | E. $\frac{x}{2}$ |

**GRAPHING**

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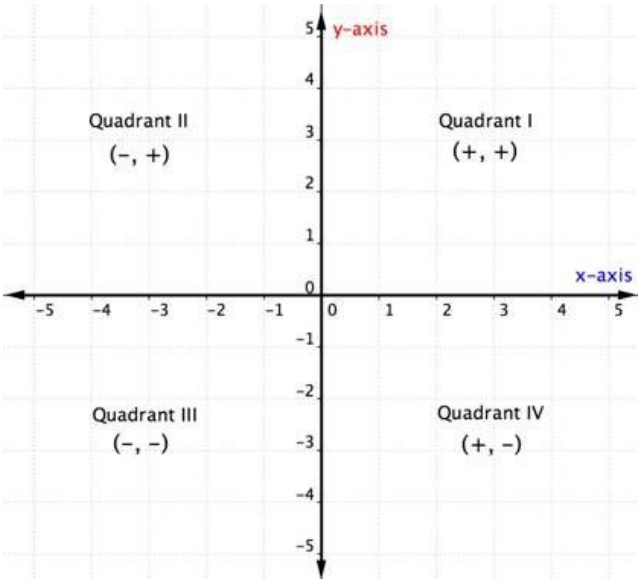
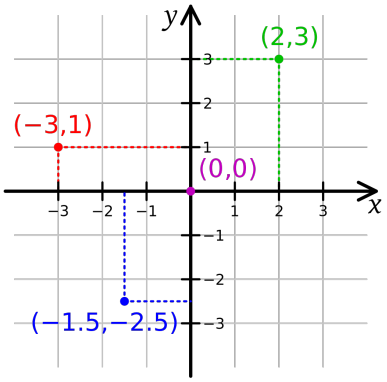
Points in a plane using 2 numbers, called a coordinate pair. The first number is called the x-coordinate. The x-coordinate is positive if the point is to the right of the origin and negative if the point is to the left of the origin. The second number is called the y-coordinate. The y- coordinate is positive if the point is above the origin and negative if the point is below the origin.

The x-y plane is divided into 4 quadrants (4 sections) as described below.

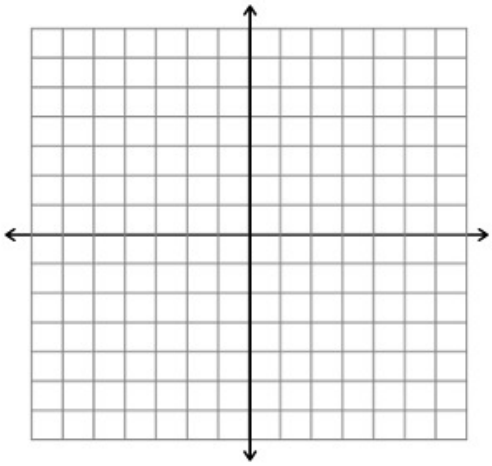


Example



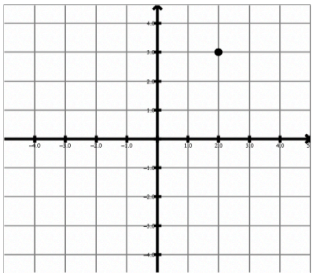

Plot each point on the graph below. Remember, coordinate pairs are labeled (x, y). Label each point on the graph with the letter given.

1. A (2, 6)
2. B (-2, 0)
3. C (-4, 2)
4. D (-3, -1)
5. E (0, 5)

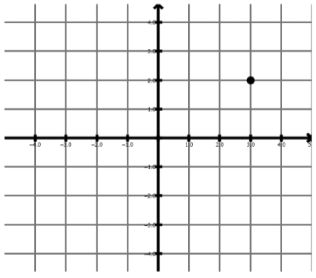


Determine the coordinates for each point below:

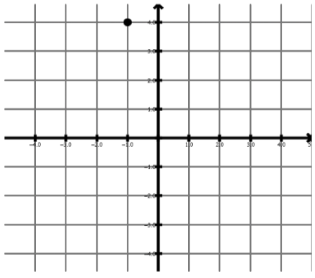
**Example**. ( 2 , 3 )



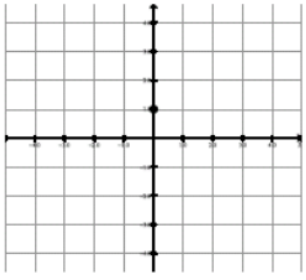
1. (_____, _____)



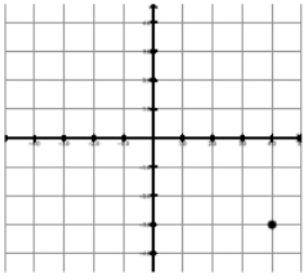
2. (_____,_____)



3. (_____, _____)



4. (_____, _____)



5. (_____, _____)