# Regina Summer Math Review

## For students who will be taking

# Algebra 1

Completed review packet due the first day of classes

# Algebra 1 Summer Review Packet

Welcome to Algebra 1!

This packet is designed to strengthen skills you learned so you are ready to apply them in Algebra 1. It is important that you are ready with these skills as they are necessary for success in Algebra 1. Having these skills mastered will help you be able to focus on the new Algebra topics as they are presented. It is also necessary that you are competent in arithmetic skills: addition, subtraction, multiplication, and division of whole numbers, decimals and fractions without a calculator as well as with one. If you need more practice in any of the skills listed, Kahn Academy, You Tube, and math.com are resources available to you online.

The materials are separated into sections so you can work a little at a time if you wish. This will help your math skills stay sharp all summer and you will be ready for the first topic in Algebra 1.

SHOW YOUR WORK. These are not calculator problems.

Finish this packet and bring it with you the first day of classes.

Section 1: Numbers, Variables, and Expressions

Section 2: The Distributive Property

Section 3: Simplifying Algebraic Expressions

Section 4: Solving One-Step Equations

Section 5: Solving Two-Step Equations

Section 6: Graphing in the Coordinate Plane

Section 7: Geometry: Shapes and Formulas

Materials needed for Algebra 1:

- Scientific Calculator (TI-30xIIS preferred)
- Accordion Folder Pocket/Binder for Math only
- Pencils

## Section 1: Numbers, Variables, and Expressions

Use the order of operations to evaluate expressions:

Step 1: Simplify the expressions inside grouping symbols

Step 2: Calculate any exponents

Step 3: Do all multiplications and/or divisions as they occur reading from left to right

Step 4: Do all additions and/or subtractions as they occur reading from left to right

Examples:

$6 \cdot 5 - 10 \div 2$

$= 30 - 5$ Multiply and Divide

$= 6$ Subtract

$4(3 + 6) + 2 \cdot 11$

$= 4(9) + 2 \cdot 11$ Simplify inside parentheses

$= 36 + 22$ Multiply

$= 58$ Add

Practice:

1. $6 + 3 \cdot 9 - 5$
2. $26 - 4 \cdot 9$
3. $2(6 + 2) - (-12) \div 4$
4. $3\{(2 + 7) \div 9\} - 3$
5. $22 \div 11 \cdot 6 + 4$
6. $\frac{67+13}{34-29}$
7. $8 \cdot 7 - 100 \div 5 + (-5)$
8. $22 \div (-11) + \frac{9}{2} - 1$
9. $-2(7 + 3) \div 4 + 1$
10. $6 - 5 + 3 \cdot 4/(-2)$

An algebraic expression is a combination of variables, numbers, and at least one operation. To evaluate an algebraic expression, replace the variable(s) with numbers and follow the order of operations.

Examples. Evaluate each expression if r = 6 and t = 2

| | | | |
|---|---|---|---|
| $8t - 2r =$ | | $3(r - t) =$ | |
| $= 8(2) - 2(6)$ | substitute in the values | $= 3(6 - 2)$ | substitute in values |
| $= 16 - 12$ | multiply | $= 3(4)$ | math inside parentheses |
| $= 4$ | subtract | $= 12$ | multiply |

Practice: Evaluate each expression if w = 2, x = 10, y = 5, and z = -1

1. $w - x + yz =$
2. $\frac{x}{y} =$
3. $2x + 4z =$
4. $xy + z^w =$
5. $x(2 + z) =$
6. $\frac{x+y}{z} =$
7. $\frac{z(x-y)}{w} =$
8. $-3z + 2x =$
9. $\frac{x}{w} + \frac{y}{z} =$
10. $-z + wxy =$

## Section 2: The Distributive Property

The Distributive Property lets us seem to avoid the order of operations by multiplying before doing the addition or subtraction inside parentheses. It really lets us consider the multiplication as telling us how many of the values inside the parentheses we have.

Example: $3(x + 4)$ means we have 3 of the values $x + 4$. That means we have 3 xs and 3 fours. That gives us $3x$ and $3(4) = 3x + 12$

$2(5x - 6)$ means we have 2 5xs and 2 negative sixes. That means we have $2(5x)$ and $2(-6) = 10x - 12$

$-4(2x - 7)$ means we have $(-4)(2x)$ and $(-4)(-7) = -8x + 28$

The same process works if our problem looks like $(3n - 5)(8)$. We have $3n(8)$ and $(-5)(8) = 24n - 40$

Use the Distributive Property to write each expression as an equivalent sum or difference. Show your steps

1. $7(x + 11) =$
2. $-20(19 + x) =$
3. $-6(x - 1) =$
4. $22(n + 10) =$
5. $-9(n - 2) =$
6. $(x + 11)(-3) =$
7. $-1(r + 27) =$
8. $-1(n - 15) =$
9. $18(-2x + 3) =$
10. $(k - 21)(-5) =$

## Section 3: Simplifying Algebraic Expressions

**Important vocabulary:**

**Term:** a number, a variable, or a product of numbers and variables (like 3x, -4n, 27, 8xy)
**Coefficient:** the numerical part of a term that also includes a variable (like 3, -4, and 8 above)
**Constant:** a term without a variable (like 27 above)
**Like terms:** terms that contain exactly the same variable (like 3x and 7x, y and -1/2y, 4xy and -8xy)
**Expression:** a group of terms without an equal sign (like 3x + 4)

To simplify an expression, combine all like terms. It is helpful to change all subtraction to adding the opposite before trying to combine like terms. When an algebraic expression has no like terms and no parentheses, we say it is in simplest form.

Example:

Simplify $6x - 5 - 2x + 7$

First change subtraction to adding the opposite: $6x + (-5) + (-2x) + 7$
Now we can move like terms together: $6x + (-2x) + (-5) + 7$
Now combine like terms: $6x + (-2x) = 4x$, and $(-5) + 7 = 2$
So $6x - 5 - 2x + 7$ simplifies to $4x + 2$

Practice:
Simplify each expression

1. $9m + 3m$
2. $5x - x$
3. $8y + 2y + 5y$
4. $4 + m - 3m$
5. $10 - 4x + 2x - 3$
6. $13n + 7n + 2n$
7. $3y + 1 + 5 + 4y$
8. $8x - 4 - x + 5$
9. $5h - 3g + 2g - h$
10. $m + 4m + 2m + 7$

## Section 4: Solving One-Step Equations

In solving any equation we want to "undo" any math that puts numbers with the variable whose value we want. We always look to see what math is used in the equation and use the inverse operation to isolate the variable.

For example: $x + 5 = 13$

We want the x by itself, but there is a 5 with it connected by addition. If we subtract 5 from each side, that will get the x by itself as we want.

$x + 5 = 13$
$-5 \quad -5$
$x = 8$

We can always check to see if we have found the correct answer by substituting the value we found in for the variable and seeing if both sides of the equation have the same value.

Check: $8 + 5 = 13$, $13 = 13$ so we have the correct solution.

To solve $x - 11 = 15$, we would add 11 to both sides of the equation

$x - 11 = 15$
$+11 \quad +11$
$x = 26$ check: $26 - 11 = 15$ Yes!

To solve $3x = 21$, divide both sides of the equation by 3 getting $x = 21$

To solve $x \div 8 = 4$, multiply both sides of the equation by 8 getting $x = 32$

Practice. Show your steps and check:

1. $t + 5 = 14$
2. $n - 24 = 81$
3. $t + 19 = 215$
4. $2n = 25$
5. $3x = 123$
6. $11y = 132$
7. $n \div 10 = 27$
8. $y - 128 = 208$
9. $x/7 = 8$
10. $x + 14.9 = 37.2$

## Section 5: Solving Two-Step Equations

In solving an equation where there are two operations we want to "undo," we would do the inverse of any addition or subtraction, then the inverse of any multiplication or division. Remember to do the same math to both sides of the equation.

For example: $2x + 5 = 13$ We want the x by itself, but there is a 5 with it connected by addition and a 2 connected by multiplication. First subtract 5 from each side, then divide both sides of the equation by 2 to isolate the x.

$$2x + 5 = 13$$
$$\underline{\quad -5 \quad -5}$$
$$\frac{2x}{2} = \frac{8}{2}$$
$$x = 4$$

We can always check to see if we have found the correct answer by substituting the value we found in for the variable and seeing if both sides of the equation have the same value.

Check: $2(4) + 5 = 13$, $13 = 13$ so we have the correct solution.

*Remember that a fraction is just a division.

Practice. Show your steps and check:

1. $3x - 5 = 1$
2. $2x + 11 = 39$
3. $\frac{1}{2}x - 4 = 20$
4. $15 + 7x = 64$
5. $\frac{y}{4} + 18 = 27$
6. $6 + 4y = 34$
7. $11 = 3y - 13$
8. $17 - 5x = 2$
9. $125 = 8x + 59$
10. $12x + 24 = 0$

## Section 6: Graphing in the Coordinate Plane

When locating points on a coordinate plane, we use a pair of values called coordinates to tell us where to place the point. The coordinates are written this way: (x , y) where the x-value tells us how many spaces horizontally to travel away from the origin and the y-value tells us how many spaces vertically to travel away from the origin. The coordinates A(-3, 5) mean to go 3 spaces left of the origin and then 5 spaces up. Mark the point and call it A.

1. Graph the following points on the coordinate grid provided. Mark each point with the letter given.

A(-2, 6)

B(4, -7)

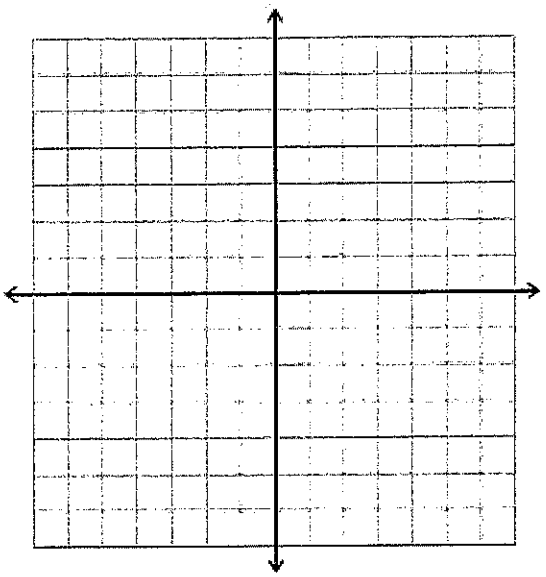
C(0, 2)

D(1, 6)

E(-4, -7)

F(-5, 0)

G(4, -4)



2. Write the coordinates of the points on the graph.

A _____

B _____

C _____

D _____

E _____

F _____

G _____