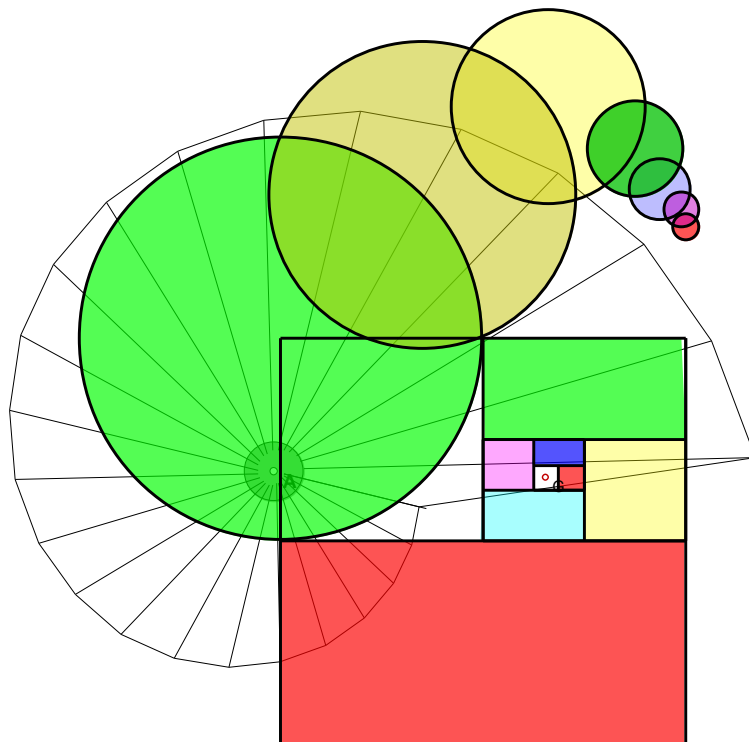


# SUMMER REVIEW

## *Algebra Review for*

### Geometry



This packet was designed for you to review your Algebra 1 skills to make sure you are well prepared for the start of your Geometry course.

**Sample examples:**

1. Simplify

a)

$$5 - (w + 4)$$

$$5 - w - 4$$

$$\text{ans: } 1 - w$$

b)

$$-(5xyz) + (-3xyz)$$

$$-5xyz - 3xyz$$

$$\text{ans: } -8xyz$$

c)

$$x^3y^4 + 3x + 2x^3y^4 - 5x$$

$$\text{ans: } 3x^3y^4 - 2x$$

2. Evaluate when  $a = 2$  and  $b = -5$

a)

$$b^3 - a^2$$

$$(-5)^3 - (2)^2$$

$$-125 - 4$$

$$\text{ans: } -129$$

b)

$$a - b^2$$

$$2 - (-5)^2$$

$$2 - 25$$

$$\text{ans: } -23$$

**Practice:**

1. Simplify

a)  $-8 + (3x - 4) - (6x + 2)$

b)  $r^3v^5y + 3r^3 - 4r^3v^5y - 5r^3$

2. Evaluate when  $r = 3$  and  $q = -2$

a)  $rq + q^2$

b)  $3rq^3 + r^2q$

**II. Literal Equations**

**Sample examples:**

1. Solve for the underlined variable.

a)

$$A = \pi \underline{r}^2$$

$$\frac{A}{\pi} = \underline{r}^2$$

$$\text{ans: } \sqrt{\frac{A}{\pi}} = r$$

b)

$$A = \frac{1}{2} h(b_1 + \underline{b}_2)$$

$$2A = h(b_1 + b_2)$$

$$\frac{2A}{h} = b_1 + b_2$$

$$\text{Ans: } \frac{2A}{h} - b_1 = b_2$$

c)

$$R = wh + \underline{h}$$

$$R = h(w+1)$$

$$\text{ans: } \frac{R}{w+1} = h$$

**Practice:**

1. Solve for the underlined variable.

a)  $V = l \underline{w} h$

b)  $P = 2(l + \underline{w})$

c)  $n = g \underline{h} + jh$

-----**III.**

### Solving Inequalities

**Sample Examples:**

1. Solve each inequality.

a)  $-10x + 4 - 5x > 5$

$$-15x + 4 > 5$$

$$-15x > 1$$

$$\text{ans: } x < -\frac{1}{15}$$

b)  $\frac{-4}{5}r + 9 \geq r - 7$

$$\frac{-9}{5}r + 9 \geq -7$$

$$\frac{-9}{5}r \geq -16$$

$$\text{ans: } r \leq \frac{80}{9}$$

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**Practice:**

1. Solve each inequality

a)  $-2(x+4) \leq 3(x-1)$

b)  $5-t \leq -(-3-t)$

#### IV. Simplifying Monomials

1.  $a^m \cdot a^n = a^{m+n}$

5.  $a^0 = 1$

2.  $\frac{a^m}{a^n} = a^{m-n}$

6.  $a^{-1} = \frac{1}{a}$

3.  $(a^m)^n = a^{mn}$

4.  $(ab)^m = a^m b^m$

#### **Sample Examples:**

1. Simplify the following:

a)  $\left(\frac{4xy^5}{3x^4y^3}\right)^2 = \frac{16x^2y^{10}}{9x^8y^6} = \text{ans } \frac{16y^4}{9x^6}$

b)  $\frac{(2p^2a^3r)^3(-2p^5)^3}{(-p^4r)^3} = \frac{(8p^6a^9r^3)(-8p^{15})}{-p^{12}r^3} = \frac{-64p^{21}a^9r^3}{-p^{12}r^3} = \text{ans } : 64p^9a^9$

#### **Practice Examples:**

1. Simplify the following:

a)  $\left(\frac{3rz^2}{9r^4z^5}\right)^2$

b)  $\frac{(5a^2b)(2ab^3)}{(-15a^4b^7)^1}$

#### V. Multiplying Binomials

#### **Sample Examples:**

1. Simplify:  $(x+4)(x-3)$   
 $= x^2 - 3x + 4x - 12$   
*ans*:  $x^2 + x - 12$

2. Simplify:  $(w-5)^2$   
 $= (w-5)(w-5)$   
 $= w^2 - 5w - 5w + 25$   
*ans*:  $w^2 - 10w + 25$

***Practice Examples:***

1. Simplify:  $(x+6)(x-7)$

2. Simplify:  $(x+12)^2$

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**VI. Factoring**

***Sample Examples:***

1.  $x^2 - 16$   
*ans*:  $(x-4)(x+4)$

2.  $x^2 - 100$   
*ans*:  $(x-10)(x+10)$

*Note: Observe the pattern in questions one and two!*

3.  $x^2 + 12x + 36$   
*ans*:  $(x+6)(x+6)$

4.  $x^2 + 6x + 9$   
*ans*:  $(x+3)(x+3)$

*Note: Observe the pattern on questions three and four!*

5.  $x^2 - 14x + 49$   
*ans*:  $(x-7)(x-7)$

6.  $x^2 - 16x + 64$   
*ans*:  $(x-8)(x-8)$

*Note: Observe the pattern on questions five and six!*

7.  $2x^2 + 2x - 4$   
*ans*:  $(2x+4)(x-1)$   
 or  $2(x+2)(x-1)$

8.  $3x^2 + 10x - 4$   
*ans*:  $(3x-2)(x+4)$

*Note: Observe the pattern on questions seven and eight!*

***Practice Examples:***

Factor:

1.  $x^2 - 144$                       2.  $x^2 + 8x + 16$                       3.  $2x^2 + 7x - 15$

**\*\* Note:** If you are given an equation and the directions ask you to "solve for x", you would simplify both sides, put the equation in standard form, factor the polynomial expression if possible, and then set each binomial equal to zero and solve. For example: (Sample ex. 7)

$$2x^2 + 2x - 4 = 0$$

$$(2x + 4)(x - 1) = 0 \quad \text{or} \quad 2(x + 2)(x - 1) = 0$$

$$2x + 4 = 0 \quad x - 1 = 0 \quad \text{or} \quad x + 2 = 0 \quad x - 1 = 0$$

$$\text{ans: } x = -2 \quad x = 1$$

### VII. Proportions

**Sample Examples:**                      Quadratic Formula:  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Solve for x:

1.  $\frac{2}{x} = \frac{3}{15}$   
 $3x = 30$   
 ans:  $x = 10$

2.  $\frac{2}{x-2} = \frac{x-2}{3}$   
 $6 = (x-2)(x-2)$   
 $6 = x^2 - 4x + 4$   
 $0 = x^2 - 4x - 2$                       cannot be factored  
*Use quadratic formula!*  
 $x = \frac{4 \pm \sqrt{24}}{2} = 2 \pm \sqrt{6}$

**Practice Examples:**

Solve for x:

1.  $\frac{x+1}{7} = \frac{5}{x-1}$

2.  $\frac{x}{3} = \frac{7}{7x}$

### VIII. Midpoint/ Slope/ Distance

Using the points  $A(x_1, y_1)$  and  $B(x_2, y_2)$ , midpoint, slope and distance are defined as:

$$\text{Midpoint: } \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \quad \text{Slope: } \frac{y_2 - y_1}{x_2 - x_1} \quad \text{Distance: } \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

#### **Sample Examples:**

Given P(-4, 7) and Q(3, -2)

1a) Find the midpoint:

$$M = \left( \frac{-4 + 3}{2}, \frac{7 + (-2)}{2} \right)$$
$$\text{ans: } \left( \frac{-1}{2}, \frac{5}{2} \right)$$

1b) Find the slope:

$$m = \frac{7 - (-2)}{-4 - 3}$$
$$\text{ans: } \frac{9}{-7}$$

1c) Find the distance

$$D = \sqrt{(-4 - 3)^2 + (7 - (-2))^2}$$
$$D = \sqrt{(-7)^2 + (9)^2}$$
$$D = \sqrt{49 + 81}$$
$$\text{ans: } \sqrt{130}$$

#### **Practice Examples:**

Given T(6, -5) and U(-1, 10)

1a) Find the midpoint:

1b) Find the slope:

1c) Find the distance:

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### IX. Equations of Lines

Slope Intercept:  $y = mx + b$

Point-Slope:  $y - y_1 = m(x - x_1)$

Parallel lines have the same slope. (Ex: If the slope of a line is 3 then any line parallel to it also has a slope of 3.)

Perpendicular lines have opposite reciprocal slopes. (Ex: If the slope of a line is 3 then any line perpendicular to it has a slope of  $-1/3$ .)

#### **Sample Examples:**

1. Write the equation of the line in slope-intercept form that passes through the point  $(-3, 4)$  and has a slope of 5.

$$y = mx + b$$

$$4 = 5(-3) + b$$

$$4 = -15 + b$$

$$19 = b$$

$$\text{ans: } y = 5x + 19$$

2. Write the equation of the line that passes through  $(4, -2)$  and is parallel to  $y = 6x + 5$ .

$$y = mx + b$$

$$-2 = 6(4) + b$$

$$-2 = 24 + b$$

$$-26 = b$$

$$\text{ans: } y = 6x - 26$$

3. Write the equation of the line that passes through  $(6, -1)$  and is perpendicular to  $y = \frac{1}{3}x + 2$  in slope-intercept form.

$$y = mx + b$$

$$-1 = -3(6) + b$$

$$-1 = -18 + b$$

$$17 = b$$

$$\text{ans: } y = -3x + 17$$

4. Write the equation of the line that passes through  $(-2, 1)$  and  $(4, -3)$  in point-slope form.

$$y - y_1 = m(x - x_1)$$

$$m = \frac{1 - (-3)}{-2 - 4} = \frac{-2}{-6} = \frac{1}{3}$$

$$\text{ans: } y - 1 = \frac{-2}{3}(x + 2)$$

$$\text{or } y + 3 = \frac{-2}{3}(x - 4)$$

### ***Practice Examples:***

1. Write the equation of the line that passes through  $(5, -8)$  and is parallel to  $y = 9x + 4$  in slope-intercept form.

2. Write the equation of the line that passes through  $(-7, 2)$  and is perpendicular to  $8 + 7x = y$  in slope-intercept form.

3. Write the equation of the line that passes through  $(5, -3)$  and  $(4, -2)$  in both slope-intercept and point-slope form.

**Sample Examples:**

Solve algebraically (*Note: Answer must be written as an ordered pair!!*)

1. 
$$\begin{cases} 3x + 4y = 14 \\ 2x + y = 1 \rightarrow y = -2x + 1 \end{cases}$$

*SUBSTITUTION:*

$$\begin{aligned} 3x + 4(-2x + 1) &= 14 \\ 3x - 8x + 4 &= 14 \\ -5x &= 10 \\ x &= -2 \end{aligned}$$
$$\begin{aligned} 3(-2) + 4y &= 14 \\ -6 + 4y &= 14 \\ 4y &= 20 \\ y &= 5 \end{aligned}$$

ans: (-2, 5)

2. 
$$\begin{cases} 2x + 7y = 13 \\ 4x - 7y = -16 \end{cases}$$

*ELIMINATION / LINEAR COMBINATION*

$$\begin{aligned} 2x + 7y &= 13 \\ +4x - 7y &= -16 \\ \hline 6x &= -3 \\ x &= \frac{-1}{2} \end{aligned}$$
$$\begin{aligned} 2\left(\frac{-1}{2}\right) + 7y &= 13 \\ -1 + 7y &= 13 \\ 7y &= 14 \\ y &= 2 \end{aligned}$$

ans:  $\left(\frac{-1}{2}, 2\right)$

**Practice Examples:**

1. Solve the system using substitution:

$$\begin{cases} 3x - y = 10 \\ 5x + 2y = 2 \end{cases}$$

2. Solve the system using elimination:

$$\begin{cases} 2x + 5y = 9 \\ 4x - 7y = -16 \end{cases}$$

**Sample Examples:**

Simplify

1. $\sqrt{20}$ $\sqrt{5 \cdot 4}$ ans: $2\sqrt{5}$	2. $\sqrt{\frac{25}{36}}$ $\frac{\sqrt{25}}{\sqrt{36}}$ ans: $\frac{5}{6}$	3. $4\sqrt{32}$ $4\sqrt{16 \cdot 2}$ $4 \cdot 4\sqrt{2}$ ans: $16\sqrt{2}$	4. $4\sqrt{5} + 3\sqrt{5} - 6\sqrt{5}$ $(4 + 3 - 6)\sqrt{5}$ ans: $\sqrt{5}$
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5.  $8\sqrt{3} + 7\sqrt{2} - 6\sqrt{3}$     *Note: You can only combine like radicals!!!*  
 $(8 - 6)\sqrt{3} + 7\sqrt{2}$   
ans:  $2\sqrt{3} + 7\sqrt{2}$

6. $4\sqrt{5} \cdot 6\sqrt{3}$ $(4 \cdot 6)\sqrt{(5 \cdot 3)}$ ans: $24\sqrt{15}$	7. $8\sqrt{2} - 4\sqrt{8} + 5\sqrt{18}$ $8\sqrt{2} - 4\sqrt{4 \cdot 2} + 5\sqrt{9 \cdot 2}$ $8\sqrt{2} - 8\sqrt{2} + 15\sqrt{2}$ ans: $15\sqrt{2}$	8. $\frac{2}{\sqrt{3}}$ $\frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$ ans: $\frac{2\sqrt{3}}{3}$
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**Practice Examples:**

Simplify

1. $\sqrt{44}$	2. $\sqrt{\frac{3}{9}}$	3. $4\sqrt{10} - 5\sqrt{10} + 8\sqrt{10}$	4. $6\sqrt{7} \cdot 2\sqrt{3}$
5. $5\sqrt{27} + 4\sqrt{3} - \sqrt{12}$	6. $\frac{4}{\sqrt{6}}$		

## I. Simplifying and Evaluating Expressions

1a)  $-3x - 14$

1b)  $-3r^3v^5y - 2r^3$

2a)  $-2$

2b)  $-90$

## II. Literal Equations

1a)  $w = \frac{V}{lh}$

1b)  $l = \frac{P}{2} - w$

1c)  $h = \frac{n}{g + j}$

## III. Solving Inequalities

1a)  $x \geq -1$

1b)  $t \geq 1$

## IV. Simplifying Monomials

1a)  $\frac{1}{9r^6z^6}$

1b)  $\frac{-2}{3ab^3}$

## V. Multiplying Binomials

1.  $x^2 - x - 42$

2.  $x^2 + 24x + 144$

## VI. Factoring

1.  $(x-12)(x+12)$

2.  $(x+4)(x+4)$

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

### VII. Proportions

1.  $\pm 6$

2.  $\pm\sqrt{3}$

### VIII. Midpoint/ Slope/ Distance

1a)  $\left(\frac{5}{2}, \frac{5}{2}\right)$

1b)  $\frac{-15}{7}$

1c)  $\sqrt{274}$

### IX. Equations of Lines

1.  $y = 9x - 53$

2.  $y = \frac{-1}{7}x + 1$

3. slope-intercept form:  $y = -x + 2$

point-slope form:  $y + 3 = -1(x - 5)$  or

$y + 2 = -1(x - 4)$

### X. Systems of Linear Equations

1.  $(2, -4)$

2.  $\left(-\frac{1}{2}, 2\right)$

### XI. Simplifying Radicals

1.  $2\sqrt{11}$

2.  $\frac{\sqrt{3}}{3}$

3.  $7\sqrt{10}$

4.  $12\sqrt{21}$

5.  $17\sqrt{3}$

6.  $\frac{2\sqrt{6}}{3}$

