

Name: \_\_\_\_\_

## PreCalculus Summer Packet

Congratulations on finishing the year and completing Algebra II! I'm excited to have each of you in PreCalculus with me this coming year! Until then, I hope you have an amazing and rejuvenating summer. Just in case you get a little bored over the summer (or even if you don't get bored...), I have this wonderful packet for you to complete as you prepare for Precalc. This packet is to be completed and submitted on the first day of class for credit. The problems should review content that you have already learned in Algebra II. If anything looks unfamiliar or you forget a skill, feel free to get help from a friend or find internet resources that can help teach you. There is a formula sheet on the last page. Have fun, and don't leave this until the night before...! —Mrs. Sprague

A. **Evaluate** using order of operations:

1.  $\frac{3xy^2 - 1}{3x^3y + 1}$  when  $x = -3$ ,  $y = -2$

2.  $-x^2 - 4x$  when  $x = -1$

B. **Solve** equations:

3.  $-3(3x + 2) = 6(-3 - 2x) - 2$

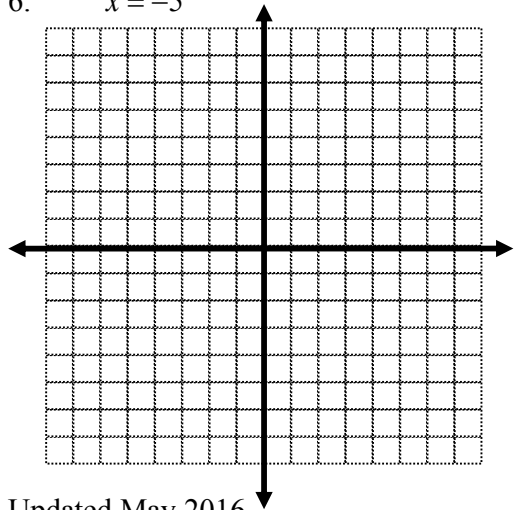
4.  $2(5x - 9) = 3 - 8(x + 2)$

C. **Linear Equations** - Sketch graphs, write linear equations using slope and intercept:

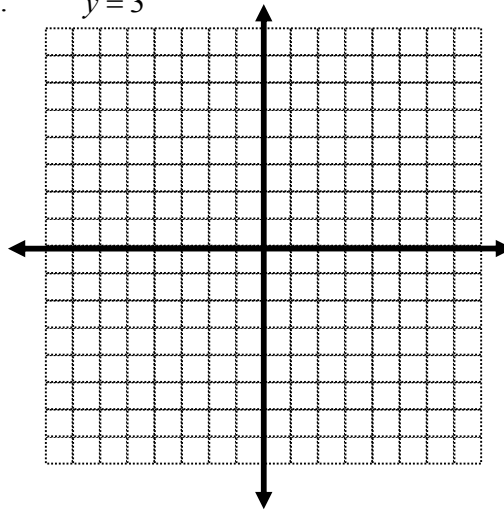
5. In which quadrant is  $(5, -4)$ ?

Sketch the graph of the following linear equations:

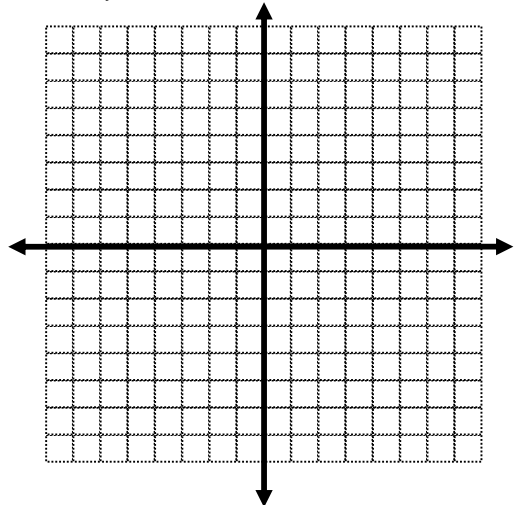
6.  $x = -5$



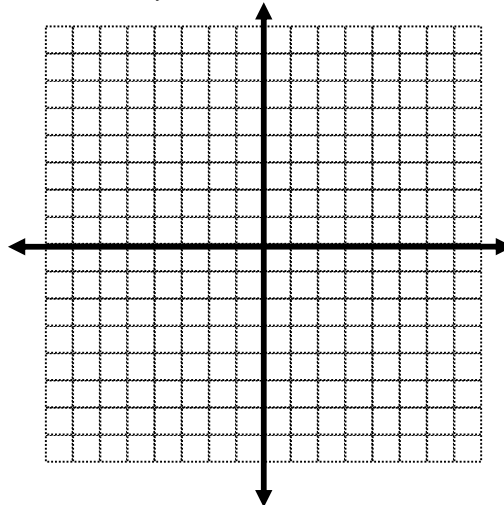
7.  $y = 3$



8.  $y = -3x + 5$



9.  $2x - 3y = 6$  (first solve for y)



10. Find the slope of  $(-15, 11)$  and  $(8, -4)$  \*\* (formula sheet at the end)

11. Find the intercepts of  $-4x - 3y = 16$

 $x$ -intercept: \_\_\_\_\_ $y$ -intercept: \_\_\_\_\_

12. Rewrite in slope-intercept form:  $-4x - 3y = 1$

slope: \_\_\_\_\_

 $y$ -intercept: \_\_\_\_\_

13. Write an equation of the line containing  $(1, 1)$  and  $(2, -2)$ .

14. Write an equation of the line passing through  $(7, 2)$  and having a slope of 0.

15. Write an equation of the line having an undefined slope (no slope) and passing through the point  $(-2, 5)$ .

D. Add, Subtract and Multiply Polynomials:

16.  $(2x^2 + 3x - 4) - (x^2 + x - 1)$

17.  $(2x^2 - 3x) + (3x + 2) - 2(3x^2 - 2x)$

18.  $2x(4x^2 - 3x + 2)$

19.  $(4x - 7)(3x + 2)$

20.  $(2x - 5)^2$

21.  $(x - 3)(x^2 + 2x - 3)$

E. Factoring - Greatest Common Factor, Trinomials, Difference of Squares:

When you factor, first look for a **GCF**.

Then look for **special factors**, like the **difference of 2 squares**:

$$a^2 - b^2 = (a + b)(a - b),$$

OR the **sum or difference of 2 cubes** (formulas are on the last page)

OR, if there are 4 terms, **factor by grouping**.

If you are factoring a trinomial, either factor by trial and error, or perhaps you remember finding the product and sum on  $ax^2 + bx + c$ , i.e., what 2 numbers give you a product of  $ac$  and a sum of  $b$ ? Use those numbers to help you factor the trinomial. Video: <http://tinyurl.com/j6e45en>

22.  $x^2 - 49$

23.  $x^2 + 4x - 21$

24.  $x^2 - 16x + 64$

25.  $2x^3 - 32x$

26.  $2x^2 - 5x - 12$

27.  $x^3 + 5x^2 - 9x - 45$

28.  $x^3 - 8$

29.  $18x^2y^5 - 30x^3y^4 + 3xy^3$

F. **Simplify Using Exponent Rules:**

30.  $(3)^4(3)^2$

31.  $x^{-7} \cdot x^9$

32.  $\frac{y^{15}}{y^5}$

33.  $(-2x^2y^0)^4$

34.  $(-5m)^0$

35.  $\frac{y^4}{6x^3} \cdot \frac{12x^2}{xy}$

36.  $\frac{5x^2}{y^{-3}} \cdot \frac{1}{15x^4y^{-1}}$

37.  $(-2xy^3)^{-3}$

G. **Quadratic Equations**

38. Solve  $\frac{1}{2}x^2 = 8$ . (Isolate and use square root property)

In #39-40, solve using **quadratic formula** and simplify:

39.  $x^2 + 4x - 3 = 0$

40.  $3x^2 + 2x = 2$

In #41-42, **factor** to find all **real** solutions:

41.  $x^2 - 5x = 0$

42.  $x^2 - 3x - 10 = 0$

**H. Complex (Imaginary) Numbers:****Simplify** the following:

43.  $\sqrt{-9}$

44.  $\sqrt{-7}$

45.  $-\sqrt{-4}$

46.  $-\sqrt{-15}$

47.  $(3i)^2$

48.  $-(2i)^2$

49.  $3i^2$

50.  $i^4$

**Solve** the equation:

51.  $x^2 = -9$

52.  $x^2 = -7$

**Perform** the indicated operation:

53.  $(9 + 3i) + (7 - i)$

54.  $(1 - 6i) - (8 + i)$

55.  $2i(5 + 3i)$

56.  $(5 + 4i)(2 + i)$

**I. Radicals and Rational Exponents:**

57. Write in radical form and simplify:  $9^{1/2}$

58. Write in rational exponent form: a.)  $6\sqrt{x^3}$  b.)  $\sqrt[5]{6x^3}$

59. Simplify, then add like radicals:  $\sqrt{18} + \sqrt{8} - 4\sqrt{2}$

**Simplify:**

60.  $\sqrt[3]{27x^3y^6}$

61.  $\sqrt{16x^5}$

**Solve** (check for extraneous solutions):

$$62. \quad x = \sqrt{2x+3}$$

$$63. \quad \sqrt[3]{3x} = \sqrt[3]{x-4}$$

$$64. \quad 2\sqrt{x}-3=-7$$

$$65. \quad \sqrt{2x-3} = \sqrt{4x-7}$$

### **J. Rational Expressions:**

66. Divide Rational Expressions (Multiply by Reciprocal, Factor, Simplify)

$$\frac{x^2+6x+8}{x^2+3x} \div \frac{x^2+x-2}{4x^2+12x}$$

67. Simplify Complex Fractions using the LCD Method (Video - <http://tinyurl.com/z67adhs> )

$$\frac{\frac{2}{3x}}{\frac{1}{2} + \frac{5}{3x}}$$

68. Simplify Complex Fractions - Multiply by the Reciprocal Method (Video - <http://tinyurl.com/j2pq7jy> )

$$\frac{\frac{1}{x} + \frac{3}{x+1}}{\frac{3}{x-1} + \frac{1}{x}}$$

## ALGEBRA II FORMULA SHEET

Slope of a Line	$m = \frac{y_2 - y_1}{x_2 - x_1}$
Slope Intercept Form of a Line	$y = mx + b$
Point Slope Formula	$(y - y_1) = m(x - x_1)$
Vertex Form of a Quadratic	$y = a(x - h)^2 + k$
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Discriminant	$b^2 - 4ac$
x-coordinate of the Vertex of a Parabola	$x = \frac{-b}{2a}$
Pythagorean Theorem	$a^2 + b^2 = c^2$
Distance Formula	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Midpoint Formula	$\left( \frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right)$
Direct Variation	$y = kx \text{ or } \frac{y}{x} = k$
Inverse Variation	$y = \frac{k}{x} \text{ or } xy = k$
Joint Variation	$z = kxy$
Difference of Two Cubes	$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
Sum of Two Cubes	$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$