**Dear Prospective Pre-Calculus Students and Guardians,**

Transitioning from Algebra 2 to Pre-Calculus can be a rewarding yet challenging step in a student's math journey. Success in Pre-Calculus often depends on a strong understanding of key concepts from both Algebra 2 and Geometry. To help bridge this gap, the Pre-Calculus team has developed a brief review packet focusing on the topics students most commonly find difficult to recall.

While this summer assignment is **not required**, it is **strongly recommended**. Completing the review can significantly increase your readiness for Pre-Calculus and may be turned in for **extra credit** during the second week of school. To receive full extra credit, please show all work on a separate sheet of paper and attach it to the completed packet.

Experience has shown that students who take the time to review over the summer tend to perform better in Pre-Calculus. Those who skip this step are more likely to struggle, sometimes realizing their knowledge gaps only after the course drop period—when it's harder to make adjustments.

To support students further, we've included a YouTube playlist with short, helpful videos to refresh the concepts as you work through the packet.

After students have enjoyed a well-earned break from school, we recommend encouraging them to begin the review sometime in July. Doing so can ease the transition into Pre-Calculus, reduce stress and anxiety, and minimize time spent on nightly homework during the school year.

We truly hope you have a restful, enjoyable summer and return ready to dive into the exciting world of Pre-Calculus. We're looking forward to meeting you in the fall!

Warm regards,
**The Pre-Calculus Teaching Team**


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

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

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

B. **Solve** equations:

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

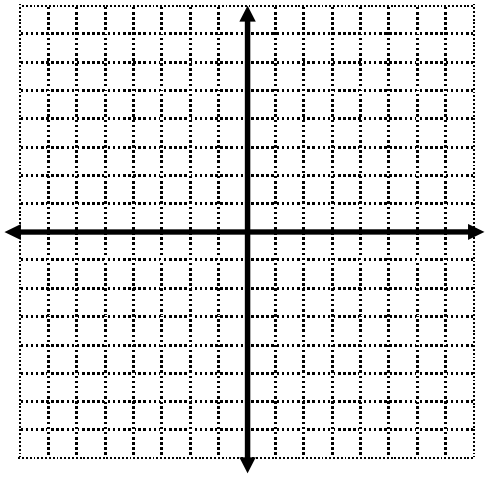
4. $2(5x-9)=3-8(x+2)$

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

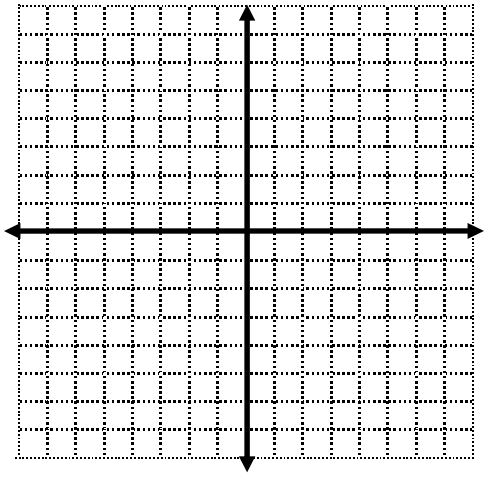
5. In which quadrant is (5, -4)?

Sketch the graph of the following linear equations:

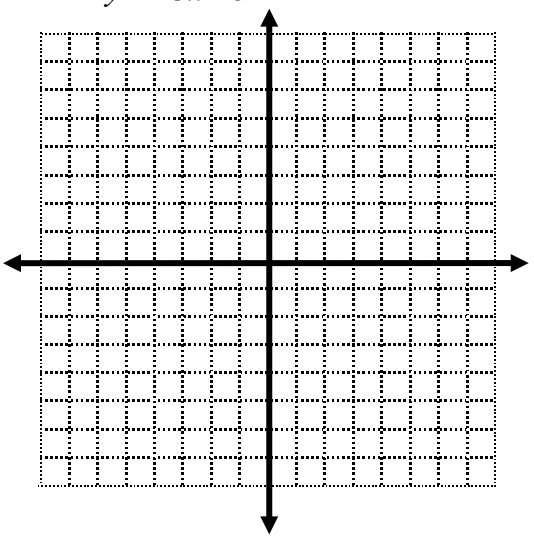
6. $x=-5$



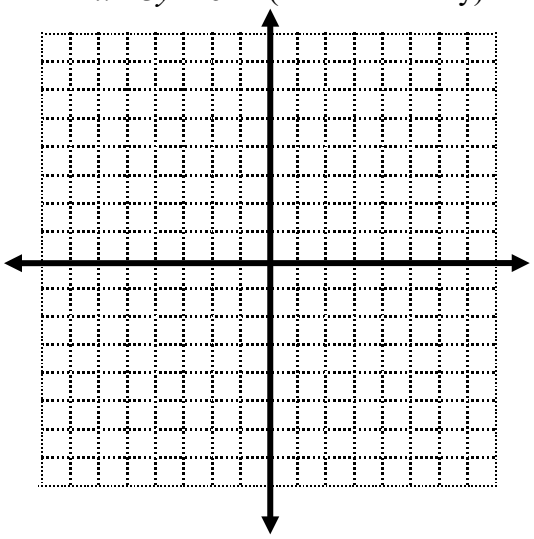
7. $y=3$



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.

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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. $x^{-7} \times x^9$

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

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

34. $(-5m)^0$

35. $\dfrac{y^4}{6x^3} \times \dfrac{12x^2}{xy}$

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

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.) $6\sqrt[5]{x^3}$ 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. $x=\sqrt{2x+3}$ 63. $\sqrt[3]{3x}=\sqrt[3]{x-4}$

64. $2\sqrt{x}-3=-7$ 65. $\sqrt{2x-3}=\sqrt{4x-7}$

**J. <u>Rational Expressions:</u>**

66. Simplify Complex Fractions using the LCD Method

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

67. Simplify Complex Fractions - Multiply by the Reciprocal Method

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

## Section 3 - *Common Errors in Algebra*

Many Algebra errors come from not mastering the differences between the rules of addition and multiplication! Test yourself by doing the following problems. Check your answers by substituting numbers for the variables. There may be more than one correct form of the answer.

### I. Errors Involving Parentheses

**A. Distributing a negative sign**

**1.** $3-(x-2)=$ **a)** $3-x-2$ **b)** $1-x$ **c)** $5-x$

**2.** $\frac{3x}{x+2}-\frac{x+1}{x+2}=$ **a)** $\frac{2x+1}{x+2}$ **b)** $\frac{2x-1}{x+2}$

**3.** . $\frac{3x+2}{5x}-\frac{2(x+1)}{5x}=$ **a)** $\frac{1}{5}$ **b)** $\frac{x+1}{5x}$ **c)** $\frac{x+4}{5x}$

**B. Distributing Left and Right**

**1.** $4(x+2)(2)=$ **a)** $8x+16$ **b)** $4x+4$ **c)** $4x+16$

**C. DO NOT distribute exponents over addition or subtraction**

Does $(a+b)^2=a^2+b^2$ ?

Convince yourself: Does $(3+4)^2=3^2+4^2$?

**D. DO NOT distribute when there is only multiplication**

**1.** $\left(\frac{1}{2}\right)(a)(b)=$ **a)** $\left(\frac{1}{2}a\right)\left(\frac{1}{2}b\right)$ **b)** $\left(\frac{1}{2}\right)ab$ **c)** $\frac{1}{2}(ab)$ **d)** $\frac{ab}{2}$

## II. Errors Involving Fractions

**1. Does** $\frac{a+b}{x}=\frac{a}{x}+\frac{b}{x}$ **?** **Does** $\frac{x}{a+b}=\frac{x}{a}+\frac{x}{b}$ **?**

**2.** $\frac{1}{a}+\frac{1}{b}=$ **a)** $\frac{1}{a+b}$ **b)** $\frac{b+a}{ab}$

**3.** $\frac{x/a}{b}=$ **a)** $\frac{bx}{a}$ **b)** $\frac{x}{ab}$

**4.** $\left(\frac{1}{3}\right)x=$ **a)** $\frac{1}{3x}$ **b)** $\frac{x}{3}$

**5.** $\frac{1}{x}+2=$ **a)** $\frac{1}{x+2}$ **b)** $\frac{1+2x}{x}$

**6.** $\frac{x+1}{x+1}=$ **a)** $1$ **b)** $0$

**7.** $\frac{(x+1)}{(x+1)(x+3)}=$ **a)** $\frac{1}{x+3}$ **b)** $x+3$

**8. Which are possible steps for doing on a calculator** $\frac{50}{(5)(2)}$**?**

**a)** $50\div5\times2$ **b)** $50\div5\div2$ **c)** $50\div(5\times2)$

## III. Errors Involving Exponents

**1.** $\left(x^2\right)^3=$ **a)** $x^5$ **b)** $x^6$

**2.** $x^3\bullet x^5=$ **a)** $x^8$ **b)** $x^{15}$

**3. Does** $4x^2-2x^2=4x^2-(2x)^2$ **?**

4. $\frac{9}{5x^3}=$ **a)** $\frac{9}{5}\left(x^{-3}\right)$ **b)** $\left(\frac{9}{5}\right)x^3$

5. $\frac{7}{\sqrt{2x-3}}=$ **a)** $7(2x-3)^{1/2}$ **b)** $7(2x-3)^{-1/2}$

**6. Which are correct steps for doing on a calculator** $2^{2\cdot3}$**?**

**a)** $2\wedge2\times3$ **b)** $2\wedge(2\times3)$

## IV. ERRORS INVOLVING RADICALS

1. $\sqrt{5x} =$ a) $5\sqrt{x}$ b) $\sqrt{5}x$ c) $\sqrt{5}\cdot\sqrt{x}$

2. **Does** $\sqrt{a^2+b^2} = a+b$**?** **Check: Does** $\sqrt{3^2+4^2} = 3+4$**?**

3. **Does** $\sqrt{(a+b)^2} = a+b$**?** **Check: Does** $\sqrt{(3+4)^2} = 3+4$**?**

4. $\frac{\sqrt{64}}{2} =$ **a)** $\sqrt{32}$ **b)** $\frac{8}{2} or 4$

**5.** $\frac{\sqrt{32}}{2} =$ **a)** $\sqrt{16}$ **b)** $\frac{4\sqrt{2}}{2} or 2\sqrt{2}$

**6. Which are correct calculator steps for** $\sqrt{3^2+4^2}$ **?**

**a)** $\sqrt{}3\text{^}2+\sqrt{}4\text{^}2$ **b)** $\sqrt{(3\text{^}2+4\text{^}2)}$

**c)** $(3\text{^}2+4\text{^}2)\text{^}1\div 2$ **d)** $(3\text{^}2+4\text{^}2)\text{^}(1\div 2)$

## V. ERRORS INVOLVING DIVIDING OUT COMMON FACTORS

### A. When Simplifying Fractions

**1.** $\frac{a+bx}{a} =$ **a)** $1+bx$ **b)** $1+\left(\frac{b}{a}\right)x$ **c)** $1+\frac{bx}{a}$

**2.** $\frac{a+ax}{a} =$ **a)** $a+x$ **b)** $1+x$

**3.** $\frac{2\pm 4\sqrt{3}}{2} =$ **a)** $2\pm 2\sqrt{3}$ **b)** $1\pm 2\sqrt{3}$ **c)** $1\pm 4\sqrt{3}$

**4.** $\frac{12\pm 2\sqrt{3}}{6} =$ **a)** $2\pm\frac{\sqrt{3}}{3}$ **b)** $12\pm\frac{\sqrt{3}}{3}$ **c)** $2\pm 2\sqrt{3}$

**5.** $\frac{4x}{x-4} =$ **a)** $\frac{x}{1-4}$ **b)** -1 **c)** Can't simplify

**6.** $\frac{8x}{2x-4} =$ **a)** $\frac{4x}{x-2}$ **b)** -1 **c)** Can't simplify

# 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 | $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$ |

# Summer Algebra Review Packet Answers

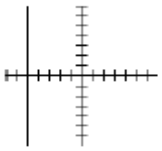
**Please Note:** The answers are posted so that you may check your work and determine if you understand the concepts. To copy these answers without doing the work is a total waste of your time, and will not help you understand the material. Please do your own work!

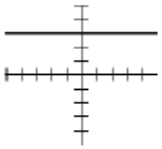
1. $\frac{-37}{163} \approx -.227$

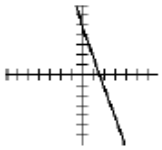
2. 3

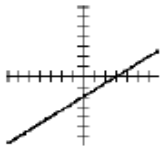
3. $x = \frac{-14}{3}$

4. $x = \frac{5}{18}$ 5. IV

6. 

7. 

8. 

9. 

10. $m = \frac{-15}{23}$

11. $x-\text{int}: -4$
    $y-\text{int}: -16/3$

12. $slope: -4/3$
    $y-\text{int}: -1/3$

13. $y = -3x+4$

14. $y = 2$

15. $x = -2$

16. $x^2+2x-3$

17. $-4x^2+4x+2$

18. $8x^3-6x^2+4x$

19. $12x^2-13x-14$

20. $4x^2-20x+25$

21. $x^3-x^2-9x+9$

22. $(x+7)(x-7)$

23. $(x+7)(x-3)$

24. $(x-8)^2$

25. $2x(x+4)(x-4)$

26. $(2x+3)(x-4)$

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

28. $(x-2)(x^2+2x+4)$

29. $3xy^3(6xy^2-10x^2y+1)$

30. 729

31. $x^2$

32. $y^{10}$

33. $16x^8$

34. 1

35. $\frac{2y^3}{x^2}$

36. $\frac{y^4}{3x^2}$

37. $\frac{1}{-8x^3y^9}$

38. $x = \pm 4$

39. $x = -2 \pm \sqrt{7}$

40. $x = \frac{-2 \pm \sqrt{28}}{6} = \frac{-1 \pm \sqrt{7}}{3}$

41. $x(x-5) = 0; x = 0, 5$

42. $(x-5)(x+2) = 0; \quad x = 5, -2$

43. $3i$

44. $i\sqrt{7}$

45. $-2i$

46. $-i\sqrt{15}$

47. $9i^2 = -9$

48. 4

49. $-3$

50. 1

51. $x = \pm 3i$

52. $x = \pm i\sqrt{7}$

53. $16+2i$

54. $-7-7i$

55. $10i+6i^2 = -6+10i$

56. $10+13i+4i^2 = 6+13i$

57. $\sqrt{9} = 3$

58. a) $6x^{3/5}$ b) $(6x^3)^{1/5}$

59. $3\sqrt{2}+2\sqrt{2}-4\sqrt{2} = \sqrt{2}$

60. $3xy^2$

61. $4x^2\sqrt{x}$

62. $x^2 = 2x+3$ *so* $(x-3)(x+1) = 0$
    *So* $x = 3$ $(x \neq -1,$ *extraneous* $)$

63. $3x = x-4$ *so* $x = -2$

64. **no solution**

65. $2x-3 = 4x-7$ *so* $x = 2$

66. $\frac{4}{3x+10}$

67. $\frac{(4x+1)(x-1)}{(x+1)(4x-1)}$

**Answers to *Common Errors in Algebra***

**I. A. 1. c 2. b 3. a**
**B. 1. a**
**C. NO!!!**
**D. 1. b or c or d**

**II. 1. Yes, No**
**2. b**
**3. b**
**4. b**
**5. b**
**6. a**
**7. a**
**8. b or c**

**III. 1. b**
**2. a**
**3. NO!!**
**4. a**
**5. b**
**6. b**

**IV. 1. c**
**2. NO!!**
**3. Yes**
**4. b**
**5. b**
**6. b or d**

**V. A. 1. b or c**
**2. b**
**3. b**
**4. a**
**5. c**
**6. a**