Algebra 3/Trigonometry

Name:_____   Date:_____Period:_____

Are you ready for Algebra 3?
Summer Packet

Required for all Algebra 3/Trigonometry Students

The Algebra 3/Trigonometry course prepares students for Pre-Calculus and college math courses. In order to accomplish this, the course is taught at a significantly faster pace than Algebra 2, and students often find it difficult to adjust. To make the transition easier, spend time this summer practicing and reviewing the Algebra topics in this packet.

You will be given a QUIZ based on the contents of this packet at the beginning of your Algebra 3/Trigonometry Course.

There is a formula sheet and answers to the problems at the end of this packet.
If you are unsure how to do any problem, check the Internet for help. Go to google.com and type "Algebra Tutorial," and the words that describe the problem type.

A. Evaluate using the 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 the equations:
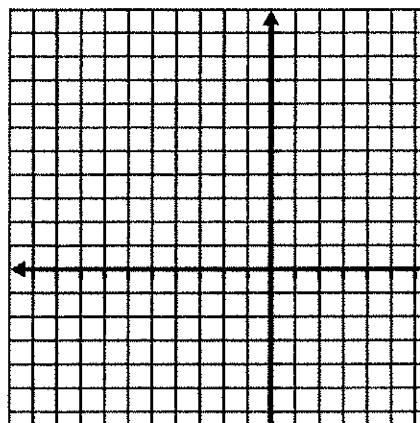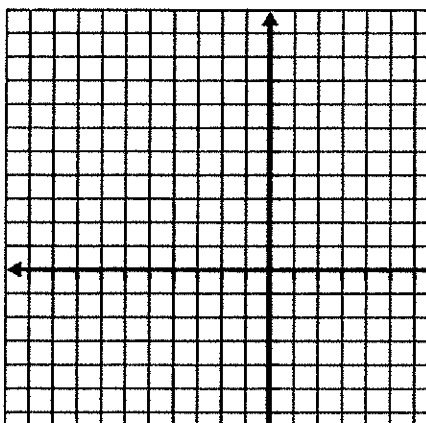
3. $-3(3x+2)=6(-3-2x)-2$

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

C. Linear Equations: Sketch graphs, write linear equations using slope and intercepts

5. In which quadrant is (5, -4)?
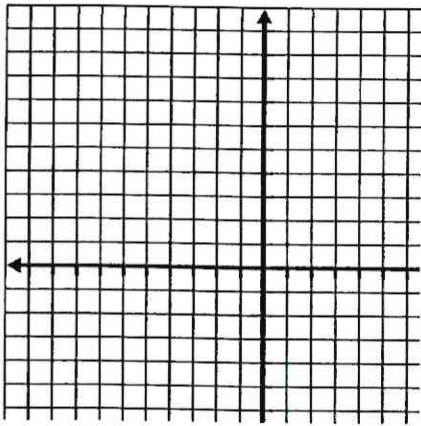
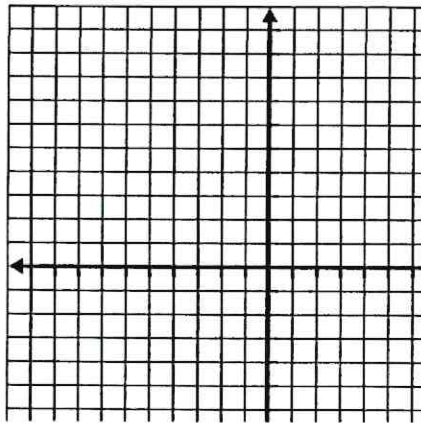Sketch the graph of the following linear equations:

6. $x=-5$

7. $y=3$

Algebra 3/Trigonometry

8. $y = -3x + 5$

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

10. Find the slope of (-15, 11) and (8, -4)

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

x- intercept: _____

y-intercept:_____

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

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. $\left(2x^2 + 3x - 4\right) - \left(x^2 + 1 - 1\right)$

17. $\left(2x^2 - 3x\right) + \left(3x + 2\right) - 2\left(3x^2 - 2x\right)$

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

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

20. $\left(2x - 5\right)^2$

21. $\left(x - 3\right)\left(x^2 + 2x - 3\right)$

E. Factoring: Greatest Common Factor, Trinomials, and Difference of Squares
When you factor, first look for a GCF. Then look for special factors, like the difference of squares: $a^2 - b^2 = \left(a + b\right)\left(a - b\right)$, or the sum or difference of 2 cubes, or if there are four 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, ie, what 2 numbers give you a product of ac and a sum of b? Use those numbers to help you factor the trinomial?

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

Algebra 3/Trigonometry
F. Simplify Using Exponent Rules

30. $\left(3\right)^4\left(3\right)^2$

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

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

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

34. $\left(-5m\right)^0$

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

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

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

G. Quadratic Equations:

38. Solve $\dfrac{1}{2}x^2 = 8$

In #39-40, solve using the quadratic formula and simplify.

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

40. $3x^2 + 2x - 2 = 0$

In #41-42, solve using the quadratic formula and simplify.

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

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

Algebra 3/Trigonometry
H. Complex (Imaginary) Numbers:
Simplify.

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: $9^{\frac{1}{2}}$

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. $\sqrt{16x^5}$

Algebra 3/Trigonometry
Solve (check for extraneous solutions).

62. $4\sqrt{2x} + 3 = 7$

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

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

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

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. $\dfrac{3x}{x+2} - \dfrac{x+1}{x+2} =$ a. $\dfrac{2x+1}{x+2}$ b. $\dfrac{2x-1}{x+2}$

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

B. Distributing Left and Right

1. $4(x+2) \cdot 2$ 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. $\left(\dfrac{1}{2}\right)(ab)$ a. $\left(\dfrac{1}{2}a\right)\left(\dfrac{1}{2}b\right)$ b. $\left(\dfrac{1}{2}\right)ab$ c. $\dfrac{1}{2}ab$ d. $\dfrac{ab}{2}$

II. Errors Involving Fractions

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

2. $\dfrac{1}{a} + \dfrac{1}{b} =$ a. $\dfrac{1}{a+b}$ b. $\dfrac{b+a}{ab}$

Algebra 3/Trigonometry

3. $\dfrac{\sfrac{x}{a}}{b} =$ a. $\dfrac{bx}{a}$ b. $\dfrac{x}{ab}$

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

5. $\dfrac{1}{x} + 2 =$ a. $\dfrac{1}{x+2}$ b. $\dfrac{1+2x}{x}$

6. $\dfrac{x+1}{x+1} =$ a. 1   b. 0

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

8. Which are the possible steps for simplifying the following expression on a calculator?

$\dfrac{50}{5 \times 2}$

   a. $50 \div 5 \times 2$ b. $50 \div 5 \div 2$ c. $50 \div 5 \times 2$

III. Errors Involving Fractions

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

2. $x^3 \cdot x^5$ a. x^8 b. x^{15}

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

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

5. $\dfrac{7}{\sqrt{2x-3}}$ a. $7\left(2x-3\right)^{\frac{1}{2}}$ b. $7\left(2x-3\right)^{-\frac{1}{2}}$

6. Which are the correct steps when using the calculator? $2^{2 \cdot 3}$
   a. $2 \wedge 2 \times 3$ b. $2 \wedge \left(2 \times 3\right)$

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. $\dfrac{\sqrt{64}}{2}$

   a. $\sqrt{32}$

   b. $\dfrac{8}{2}$ *or* 4

5. $\dfrac{\sqrt{32}}{2}$

   a. $\sqrt{16}$

   b. $\dfrac{4\sqrt{2}}{2}$ *or* $2\sqrt{2}$

V. Errors Involving Dividing Out Common Factors

1. $\dfrac{a+bx}{a}$

   a. $1+bx$

   b. $1+\left(\dfrac{b}{a}\right)x$

   c. $1+\dfrac{bx}{a}$

2. $\dfrac{a+ax}{a}$

   a. $a+x$

   b. $1+x$

3. $\dfrac{2\pm4\sqrt{3}}{2}$

   a. $2\pm2\sqrt{3}$

   b. $1\pm2\sqrt{3}$

   c. $1\pm4\sqrt{3}$

4. $\dfrac{12\pm2\sqrt{3}}{6}$

   a. $2\pm\dfrac{\sqrt{3}}{3}$

   b. $12\pm\dfrac{\sqrt{3}}{3}$

   c. $2\pm2\sqrt{3}$

5. $\dfrac{4x}{x-4}$

   a. $\dfrac{x}{1-4}$

   b. -1

   c. Can't simplify

6. $\dfrac{8x}{2x-4}$

   a. $\dfrac{4x}{x-2}$

   b. -1

   c. Can't simplify

ALGEBRA 3/TRIGONOMETRY
FORMULA SHEET

Slope of a line $\qquad m = \dfrac{y_2 - y_1}{x_2 - x_1}$

Slope-Intercept Form of a Line $\qquad y = mx + b$

Point-Slope Form of a Line $\qquad (y - y_1) = m(x - x_1)$

Vertex Form of a Quadratic $\qquad y = a(x - h)^2 + k$

Quadratic Formula $\qquad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Discriminant $\qquad b^2 - 4ac$

x-coordinate of the Vertex of a Parabola $\qquad x = \dfrac{-b}{2a}$

Pythagorean Theorem $\qquad a^2 + b^2 = c^2$

Distance Formula $\qquad d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Midpoint Formula $\qquad \left(\dfrac{x_2 + x_1}{2}, \dfrac{y_2 + y_1}{2} \right)$

Direct Variation $\qquad y = kx \;\; or \;\; \dfrac{y}{x} = k$

Inverse Variation $\qquad y = \dfrac{k}{x} \;\; or \;\; xy = k$

Joint Variation $\qquad z = kxy$

Difference of Two Cubes $\qquad a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Sum of Two Cubes $\qquad a^3 + b^3 = (a + b)(a^2 - ab + b^2)$