SUMMER ASSIGNMENT FOR Pre-AP ALGEBRA II/TRIGONOMETRY
Bring to school the 1st day of class!

This summer assignment is designed to ensure that you are prepared for Pre-AP Algebra II/ Trigonometry. Most of the assignment is a review of topics students learned in Algebra I and Geometry. There are a couple topics that are extensions of Algebra I material that some students may or may not have had before. Those topics have information/key points provided in a double box and resources identified for the PurpleMath website. If you want to be successful during Algebra II/Trig, you must be able to understand and apply this information throughout next year. The assignment may be completed with another student but be certain that YOU understand how to complete every problem. The answers will be available online through SchoolMessenger after school begins or you can email Ms. Bussian at bussiae@pwcs.edu and I will send them to you. Be sure to check every problem. Neatly show all work for each problem, using a pencil. Graphing calculators should not be used. The assignment is due the second week of school. There may be limited time for questions in class. You will have a quiz covering all the material from the summer assignment as well.

If you need to review these topics or see examples of problems, I recommend the website www.purplemath.com/modules/index.htm, which lists many Algebra review topics. If, after reviewing, you need further assistance, please e-mail Ms. Bussian with questions. Reminder: The assignment should be brought to school on the first day of class.

### Factoring:

Always look for a greatest common factor first:

\[ a^2b + ab = ab(a + 1) \]

Perfect Square Trinomials: \[ a^2 - 2ab + b^2 = (a-b)^2 \]

or \[ a^2 + 2ab + b^2 = (a+b)^2 \]

Difference of Squares: \[ a^2 - b^2 = (a-b)(a+b) \]

Sum of Cubes: \[ a^3 + b^3 = (a+b)(a^2 - ab + b^2) \]

Difference of Cubes: \[ a^3 - b^3 = (a-b)(a^2 + ab + b^2) \]

### PurpleMath Topics:

- Beginning Algebra Topics:
  - Simple Factoring

- Intermediate Algebra Topics:
  - Factoring Quadratics
  - Special Factoring Formulas

Factor the following expressions.

1. \[ 6xy^2 - 4x^2y \]
2. \[ ax - ay + bx - by \]
3. \[ 2ax + 6ay + bx + 3by \]
4. \[ a^2 - 3a - 10 \]
5. \[ x^2 - 8x + 15 \]
6. \[ 2x^2 + 5x + 3 \]
7. \[ 4y^2 - 23y + 15 \]
8. \[ 8x^2 - 10x - 3 \]
9. \(4x^3 - x\)  

10. \(18m^3 - 8mn^2\)  

11. \(128m^3 + 2n^3\)  

12. \(8x^3 - 27\)  

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**Solve Quadratics:**  
By Factoring: If \((x + k)\) is a factor of \(f(x)\), then \(x = -\frac{k}{j}\) is a solution to \(f(x) = 0\).  

Quadratic Formula: \(x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\)  

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**PurpleMath Topic:**  
Intermediate Algebra Topics:  
- Solving Quadratic Equations  
- Quadratic Formula  

Solve the following quadratic equations showing the requested method. Simplify when possible.

13. Solve by factoring: \(2x^2 - 3x - 2 = 0\)  

16. Solve by factoring: \(x^2 = 11x\)  

14. Solve by factoring: \(y^2 - 2y + 1 = 0\)  

17. Solve by quadratic formula: \(2x^2 + 5x - 1 = 0\)  

15. Solve by factoring: \(x^2 - 16 = 0\)  

18. Solve by quadratic formula: \(3y^2 - 2y - 5 = 0\)
19. Solve the system using substitution:
\[
\begin{align*}
2x + y &= 5 \\
x + 3y &= 5
\end{align*}
\]

22. Solve the system using elimination:
\[
\begin{align*}
x - 3y &= -5 \\
2y + 3x + 4 &= 0
\end{align*}
\]

20. Solve the system using substitution:
\[
\begin{align*}
3x &= 2y - 6\frac{1}{2} \\
4x + y &= 6
\end{align*}
\]

23. Write a system of equations and solve: The line with equation \( y + ax = c \), passes through the points \((1, 5)\) and \((3, 1)\). Find \(a\) and \(c\).

21. Solve the system using elimination:
\[
\begin{align*}
2x + 5y &= 24 \\
4x + 3y &= 20
\end{align*}
\]

24. Write a system of equations and solve: The curve \( y = ax^2 + bx \) passes through \((2, 0)\) and \((4, 8)\). Find \(a\) and \(b\).
25. Find the slope and y-intercept and hence graph \( y = \frac{1}{2} x + 6 \).

26. Find the slope and y-intercept and hence graph \( 3y + x - 9 = 0 \).

27. Find the equation of the line that passes through \((2, 3)\) with a slope of 2.

28. Find the equation of the line that passes through \((3, -3)\) and \((9, -1)\).

Literal Equations:
Use the properties of equations to isolate the indicated variable in a formula.

Solve the literal equation for the letter in square brackets.

29. \( cb - ay + c = 5 \) \([c]\)

30. \( abx + cd = ex \) \([x]\)

31. \( \sqrt{\frac{a}{w+a}} = w \) \([a]\)
Properties of Exponents:
\[
ax^{-n} = \frac{a}{x^n} \quad (x^m)^n = x^{mn}
\]
\[
(x^m)(x^n) = x^{m+n} \quad x^0 = 1
\]

PurpleMath Topics:
Beginning Algebra Topics:
- Exponents:
  - Basic Rules
  - Negative Exponents
- Simplifying with Exponents

Simplify the following expressions using the properties above. Leave no negative exponents.

32. \(2x^{10} \times x^{-3}\)

33. \(4w \div 2w^3\)

34. \((d^4)^{\frac{1}{2}}\)

Rational Exponents:
\[
s\sqrt{x^n} = x^{\frac{n}{s}}
\]

PurpleMath Topics:
Beginning Algebra Topic:
- Exponents:
  - Fractional Exponents

Simplify the following expressions using the property above. Express radicals as fractional exponents.

38. \(\sqrt[3]{m}\)

39. \(\sqrt[n^4]{9}\)

40. \(\sqrt{t^5}\)

41. \(\frac{15}{5\sqrt{b^{-6}}}\)
Rational Expressions:
- You must have a common denominator to add or subtract fractions.
- The denominator of a fraction cannot equal zero.

Simplify completely. State any restrictions.

42. \(\frac{3x + 21}{6x}\)

43. \(\frac{3xy}{9xy - 6x}\)

44. \(\frac{x^2 + 2x}{x^2 - 2x}\)

45. \(\frac{x^2 + 2x}{x^2 + 4x + 4}\)

46. \(\frac{x^2 - 3x}{x^3 - 27}\)

47. \(\frac{2x}{2} - \frac{x}{4}\)

48. \(\frac{5}{2x} + \frac{4}{2}\)

49. \(\frac{2x - 3}{7} + \frac{x + 4}{3}\)

50. \(\frac{5}{x + 2} + \frac{6}{x - 2}\)
Variation:
- **Direct**: the variable \( y \) varies directly as \( x \) if there is a nonzero constant \( k \) such that \( y = kx \) (the direct variation equation, where \( k \) is called the constant of variation).
- **Inverse**: Two variables, \( x \) and \( y \), have an inverse-variation relationship if there is a nonzero constant \( k \) such that \( xy = k \), or \( y = \frac{k}{x} \).

51. If \( y \) varies directly as \( x \), find the constant of variation \( (k) \) when \( y = 24 \) and \( x = 8 \). What is \( y \) when \( x = 15 \)?

52. If \( y \) varies inversely as \( x \), find the constant of variation \( (k) \) when \( y = 10 \) and \( x = 3 \). What is \( x \) when \( y = 6 \)?

53. (Weather) Your distance from lightning varies directly with the time it takes you to hear thunder. If you hear thunder 10 seconds after you see lightning, you are about 2 miles from the lightning. Write an equation for the relationship between time and distance.

Absolute Value Equations:
- Absolute value can never be negative (distance from zero)

To solve an equation in the form \( |A| = b \), where \( A \) represents a variable expression and \( b > 0 \), solve \( A = b \) and \( A = -b \).

Solve each equation. Check your solution.

54. \( 4|k + 1| = 16 \)

56. \( \frac{1}{2}a + 1 = 5 \)

55. \( 2|z| - 5 = 1 \)

57. \( -3n + 2 = 6 \)
Solving Inequalities:

A solution to an inequality is any number that makes the inequality true.

Solve each inequality and graph its solution.

58) \(5n + 40 < -5(-4 + 3n)\)

\[
\begin{array}{c}
\text{Graph 1:}
\end{array}
\]

59) \(2x + y \leq -3\)

\[
\begin{array}{c}
\text{Graph 2:}
\end{array}
\]

Sketch the solution to each system of inequalities.

60) \(x - 6y < -12\)
\(x + y > -5\)

\[
\begin{array}{c}
\text{Graph 3:}
\end{array}
\]