

SUMMER ASSIGNMENT FOR IGCSE ALGEBRA II/TRIGONOMETRY

Bring to school the 1st day of class! It does not have to be completed until the second week of school.

This summer assignment is designed to ensure that you are prepared you for IGCSE Algebra II/ Trigonometry. Nothing on the summer assignment is new. Everything is a review of topics students learned in Algebra I and Geometry. 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 are available online through GroupFusion (Mrs. Grandy or Ms. Raghianti) or you can email Mrs. Grandy or Ms. Raghianti at grandyca@pwcs.edu or ragghima@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. There will be a quiz on the summer assignment during the second week of school.

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. The last sets of problems are all a review of topics you did at the end of the year in IGCSE geometry. If, after reviewing, you need further assistance, please e-mail Mrs. Grandy at grandyca@pwcs.edu or Ms. Raghianti at ragghima@pwcs.edu with questions or to make arrangements to meet.

Factoring:

Always look for a greatest common factor *first*:

$$a^2b + ab = ab(a+1)$$

Perfect Square Trinomials: $a^2 - 2ab + b^2 = (a-b)^2$

$$\text{or } a^2 + 2ab + b^2 = (a+b)^2$$

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. $6xy^2 - 4x^2y$

5. $x^2 - 8x + 15$

2. $ax - ay + bx - by$

6. $2x^2 + 5x + 3$

3. $2ax + 6ay + bx + 3by$

7. $4y^2 - 23y + 15$

4. $a^2 - 3a - 10$

8. $8x^2 - 10x - 3$

9. $4x^3 - x$

11. $128n^3 + 2n^3$

10. $18m^3 - 8mt^2$

12. $8x^3 - 27$

Solve Quadratics:

By Factoring: If $(jx + k)$ is a factor of $f(x)$, then

$$x = -\frac{k}{j} \text{ is a solution to } f(x) = 0.$$

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

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:
 $3y^2 - 2y - 5 = 0$

Systems of Equations:

The solution to a system of equations, $\begin{cases} f(x) \\ g(x) \end{cases}$,
is the point of intersection, (x, y) , of the functions.

PurpleMath Topics:

Advanced Algebra Topics:

- Solving Systems of Linear Equations
Sections:
Substitution (p. 4)
Elimination/addition (p. 5)
- System-of-equation Word Problems

19. Solve the system using substitution:

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

22. Solve the system using elimination:

$$\begin{cases} x - 3y = -5 \\ 2y + 3x + 4 = 0 \end{cases}$$

20. Solve the system using substitution:

$$\begin{cases} 3x = 2y - 6\frac{1}{2} \\ 4x + y = 6 \end{cases}$$

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:

$$\begin{cases} 2x + 5y = 24 \\ 4x + 3y = 20 \end{cases}$$

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 .

Lines:

$$\text{slope: } m = \frac{y_2 - y_1}{x_2 - x_1}$$

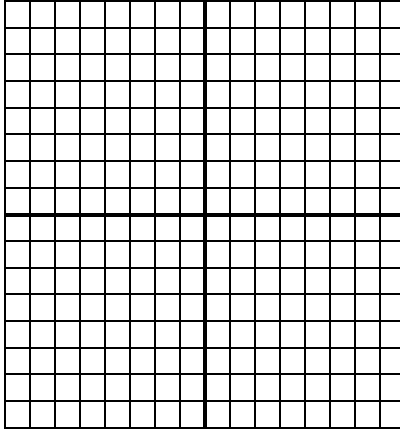
$$\text{equation of a line: } y = mx + b$$

PurpleMath Topics:

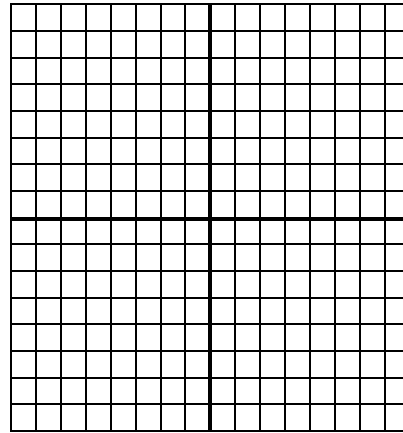
Beginning Algebra Topics:

- Slope of a Straight Line
- Straight-line Equations
- Graphing Straight-line Equations

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.

PurpleMath Topic:

Beginning Algebra Topics:

- Solving Literal Equations

Solve the literal equation for the letter in square brackets.

29. $cb - ay + c = 5$ [c]

31. $\sqrt{\left(\frac{a}{w+a}\right)} = w$ [a]

30. $abx + cd = ex$ [x]

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. $2x^{10} \times x^{-3}$

35. $5y^{-2} \times 10y^{-5}$

33. $4w \div 2w^3$

36. $(4h)^2 \div (16h)^0$

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

37. $p^{\frac{5}{4}} \div p^{\frac{1}{4}}$

Square Roots and
Cube Roots

PurpleMath Topics:

Beginning Algebra Topic:

- Exponents:
 - Fractional Exponents

Simplify the following expressions using the property above.

38. $\sqrt[3]{54}$

39. $\sqrt{28t^5}$

Matrices:

- You must have cooperating dimensions to add, subtract and multiply matrices.

- If 2×2 matrix $\mathbf{A} = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$, then its

$$\text{inverse } \mathbf{A}^{-1} = \frac{1}{ad - cb} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}.$$

PurpleMath Topics:

Advanced Algebra Topics:

- Matrix Addition and Subtraction
- Matrix Multiplication

Perform the indicated operation, or state “not possible”

$$40. -4 \begin{pmatrix} -4 & 1 \\ 2 & 5 \\ -2 & 1 \end{pmatrix}$$

$$42. \begin{pmatrix} 4 & -5 \\ 1 & 8 \end{pmatrix} \begin{pmatrix} 5 & -2 \\ 1 & 1 \\ 3 & -2 \end{pmatrix}$$

$$41. \begin{pmatrix} 4 & 5 \\ 2 & 4 \end{pmatrix} \begin{pmatrix} 5 & 2 \\ 3 & -4 \end{pmatrix}$$

$$43. \begin{pmatrix} 1 & 4 \\ 7 & -5 \end{pmatrix} - \begin{pmatrix} 1 & 6 \\ -5 & -2 \end{pmatrix}$$

44. Given $\mathbf{A} = \begin{pmatrix} -3 & 2 \\ 1 & 0 \end{pmatrix}$ and $\mathbf{AX} = \begin{pmatrix} -5 & 0 \\ 1 & 2 \end{pmatrix}$, where \mathbf{X} is a (2×2) matrix, determine matrix \mathbf{X} :

Law of Sines:

$$\bullet \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Law of Cosines:

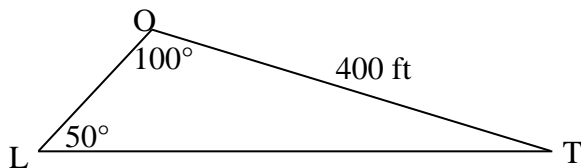
- $a^2 = b^2 + c^2 - 2bc \cos A$
- $b^2 = a^2 + c^2 - 2ac \cos B$
- $c^2 = a^2 + b^2 - 2ab \cos C$

MathWarehouse.com

- <http://www.mathwarehouse.com/trigonometry/law-of-sines-and-cosines.php>

Solve each triangle or state that no triangle exists.

45. A buyer is interested in purchasing the triangular lot with vertices LOT in the figure below. But unfortunately, the marker at point L has been lost. The deed indicates that side TO is 400 ft and that the angle at O is 100° and that the angle at L is 50° . What is the distance from L to T?



46. Solve for $\angle Z$ in triangle XYZ if $\angle X = 85^\circ$, $x = 48$, and $y = 56$.

47. Solve for $\angle C$ in triangle ABC if $\angle A = 59^\circ$, $a = 37$, and $b = 38$.

Vectors

- Add or subtract vectors using either the Parallelogram Method or The Nose-to-Tail Method.

48. Express each vector in terms of **a**, **b**, and **c**.

a. \vec{AC}

b. \vec{CA}

c. \vec{DA}

d. \vec{BD}

