Dear Advanced Algebra Students:

This is the Advanced Algebra Summer Packet. It is important that you review some essential algebraic concepts before starting the Advanced Algebra course. This packet is designed to help you with that review.

Complete these problems, showing all of your work to support your answers. If necessary, you can use loose- leaf paper to show your work. Write your final answer in the spaces provided in this packet. During the first couple of days of class, your packet and all supporting work will be collected and evaluated. We will take some time during the first couple days of class to go over any questions you have about the pre-requisite skills. You will then be tested on the work from the summer packet. It is always great to start a course with a good grade, so invest some time and energy during this vacation to prepare for an exciting semester of Advanced Algebra.

If you need a refresher on how to solve certain types of problems, look for "key words" next to the 🔍 to help you do an online search for help on various topics.

You will need a graphing calculator in order to successfully complete this course. We recommend a TI-83 or TI-84. Please make sure you bring your calculator with you for the first day of class. We begin work right away!

Have an enjoyable, relaxing summer. We're looking forward to seeing you during the next school year. If you have any questions, please contact the math department.
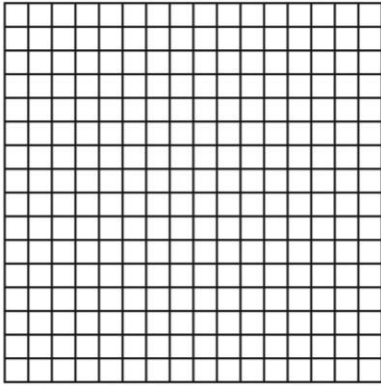
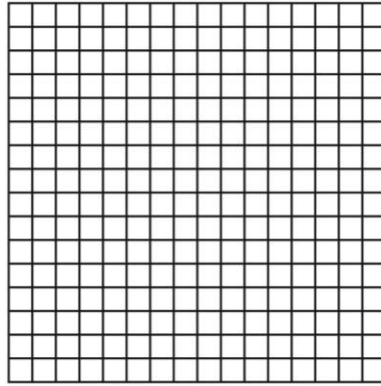## A. Graph the following: YOU NEED TO PUT IN THE X-AXIS AND THE Y-A-XIS!

🔍 _**Key words:**_ _Graphing lines; Graphing quadratic equations; Graphing inequalities_
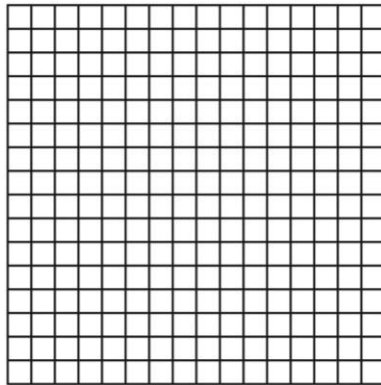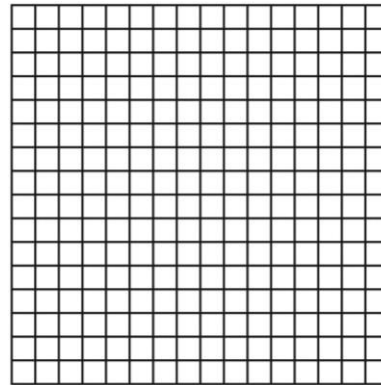
1) $3x + 4y = 12$

2) $x = 2$ and $y = 4$

3) $6x + 12y \leq -24$
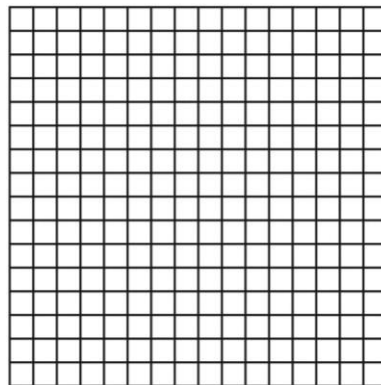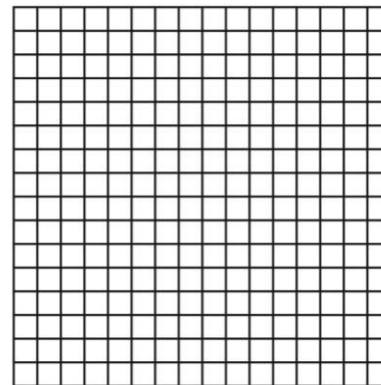
4) $-4x + 2y = 10$

5) $6 < 3x + 3y$

6) What is the point where the two lines interest?
$$2x - y = 6$$
$$x + 2y = -2$$

B. Are the following lines parallel, perpendicular or neither? Explain your answer.

🔍 **_Key words:_** _Writing linear equations; parallel and perpendicular lines_

7) $2x - 4y = 16$ and $6x + 3y = -4$

_____

8) $-5x + 15y = 10$ and $3x - 9y = 12$

_____

C. Find the distance and midpoint between the two points.

🔍 **_Key words:_** _Distance and midpoint formulas_

9) $(-4, -2)$ and $(1, -5)$ 10) $(-3, 3)$ and $(2, -7)$

Distance: _____   Distance: _____

Midpoint: _____   Midpoint: _____

D. Simplifying the following using the laws of exponents.

🔍 **_Key words:_** _Simplifying exponent expressions; Laws of exponents_

11) _____ $(6x^3 y^4)^{-2}$ 12) _____ $\dfrac{4x^4 y^7}{8x^5 y^3}$

13) _____ $\left(\dfrac{3c^3 d^4}{5}\right)^3$ 14) _____ $\dfrac{12x^{-3} y^{-5}}{3x^{-6} y^4}$

15) _____ $5^5 * 5^0 * 5^{-3}$ 16) _____ $\dfrac{x^{10}}{3y^4} * \dfrac{9x^2 y^2}{x^4 y^3}$

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E. Simplifying radical expressions.

17) _____ $\sqrt[3]{125}$ 18) _____ $\sqrt[4]{81x^6y^8}$

19) _____ $\sqrt[3]{9xy^6} * \sqrt[3]{6x^{10}}$ 20) _____ $\sqrt{12a^3b^2} * \sqrt{3ab^3}$

21) _____ $\sqrt{72}$ 22) _____ $\sqrt{108x^{13}y^{24}}$

F. Simplify the following polynomial expressions.
  🔍 **_Key words:_** _Simplifying polynomials; adding, subtracting, multiplying polynomials_

23) _____ $(2x^2 + 6x + 3) + (3x^2 + 4x - 4)$

24) _____ $(2x + 7)(x - 5)$

25) _____ $(3x - 2)^2$

26) _____ $(4x + 3)(x^2 - 2x + 5)$

27) _____ $(5x - 3)(x + 1)(x + 6)$

G. Factor the following completely.
🔍 ***Key words:*** *Factoring: polynomials, binomials, quadratic expressions*

28) _____ $x^2 + 8x + 15$

29) _____ $3x^2 + 11x - 4$

30) _____ $x^2 - 121$

31) _____ $x^3 - 64$

32) _____ $x^3 + 5x^2 + 8x + 40$

H. Solve the following equations and inequalities
🔍 ***Key words:*** *Solving: equations and quadratic equations*

33) _____ $2x^2 - 5x = 7$

34) _____ $3y^2 + 2y = 5 - 4y$

35) _____ $-4(x + 2)^2 = -20$

36) _____ $-5(2x - 1) = 3(x + 4)$

37) _____ $5\big(2 - (2x - 4)\big) = 2(5 - 3x)$

Advanced Algebra Summer Packet

I. Problem Solving: 🔍 ***Key words:*** *Solving linear and quadratic word problems*

38) You pay $38.50 for a sweater that is marked 30% off the regular price. What is the regular price of the sweater? How much did you save by buying it on sale?

39) A candy factory needs a box that has a volume of 30 cubic inches. The width should be 2 inches less that the height and the length should be 5 inches greater than the height. What should the dimensions of the box be?

40) Last year the volleyball team bought pairs socks for $5 per pair and shorts for $17 per pair. They spent $315. This year socks are $6 per pair and shorts are $18 per pair. The same number of socks and shirts now cost $342. Use a system of two equations to determine how many pairs of each item were purchased?

41) The sum of two numbers is 12. The difference of the same two numbers is -4. Find the two numbers.