WSCA Summer Assignment
Algebra II

Summer Math Instructions and Information

Please read and follow all instructions. If you do not, you may lose points on the assignment.

1. Each class has 6-8 topics to review from previous classes. I have provided worked-out examples of each topic and a list of student problems for you to complete.

2. All the problems are to be completed in the packet. You may do your work on the same page as the problems, or use a separate sheet of paper.

3. Please number the problems as you complete them and circle/box your final answers.

4. Please staple your completed problems in the same order that they are posted online and put your name on the front page.

5. Please draw ALL graphs on graph paper OR graphs printed off the internet (you can Google search "Blank Coordinate Plane").

Algebra 1: You should do all problems without a calculator. Many of these topics will be reviewed during the first two weeks of school and you WILL NOT be able to use a calculator for the first quiz and test.

How will you be graded?

1. There will NOT be a quiz on the material during the first week of school. Instead, you will hand in all completed problems by the 2nd day of school (any day after the 2nd will result in loss of points). Two problems from each section will be graded on accuracy. The rest will be graded for completion.

2. Your completion grade is based on an attempt of every problem. You should show your work and use the examples provided to complete each problem. You will not receive completion credit for writing random numbers as your answers.

3. You will not know which problems will be graded for accuracy, so treat each problem as if it were being graded.

Topic: Graphing Lines in slope-intercept form and standard form.

Example Problems:

Graph the equation of the line. State the slope and y-intercept.

1. $y = \frac{1}{2}x + 2 \Rightarrow$ slope-intercept form

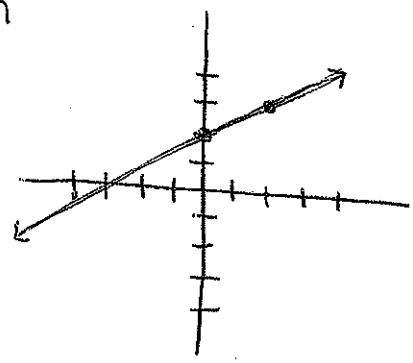
$y = mx + b$

m → slope, b → y-int.

① Graph the y-int. (0, 2)

② Starting at the y-int, use the slope to count the rise and run spaces to the 2nd point. $\frac{1}{2}$ → rise / run

③ Connect the points.



y-int: (0, 2)

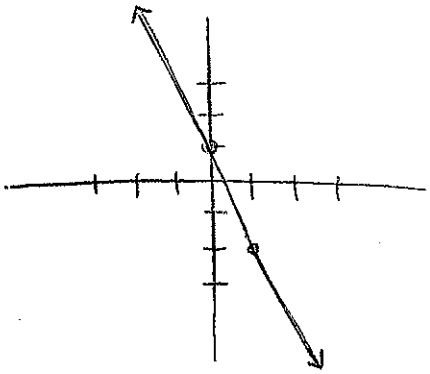
slope: $\frac{1}{2}$

2. $y = -3x + 1$

① (0, 1)

② $\frac{-3}{1}$ → rise / run

③ Connect.



y-int: (0, 1)

slope: -3

Graph the equation of the line. State the slope, x-intercept, and y-intercept.

3. $3x - 2y = 12 \Rightarrow$ Standard Form $Ax + By = C$

Find x-int: $y = 0$

$3x - 2(0) = 12$

$3x = 12$

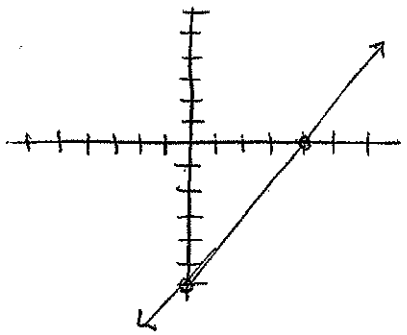
$x = 4$ $(4, 0)$

Find y-int: $x = 0$

$3(0) - 2y = 12$

$-2y = 12$

$y = -6$ $(0, -6)$



y-int: $(0, -6)$

x-int: $(4, 0)$

To find the slope: Change equation to slope-intercept form OR use the slope formula to find the slope between the two intercepts.

Change to slope-int form: $3x - 2y = 12$

$-3x \quad -3x$

$$\frac{-2y}{-2} = \frac{-3x + 12}{-2}$$

$y = \frac{3}{2}x - 6$ slope: $\frac{3}{2}$

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

$(0, -6)$ $(4, 0)$

x_1, y_1 x_2, y_2

$$m = \frac{0 - (-6)}{4 - 0} = \frac{6}{4} = \frac{3}{2} \Rightarrow \text{slope}$$

Student Problems: You may work on a separate piece of paper, or do your work directly on this sheet. Please use a pencil and include your work. I have chosen 2-4 problems to grade for accuracy. The rest will be graded for completion.

When graphing, please use graph paper or print blank graphs off the internet.

Graph the equation of the line. State the slope and the y-intercept.

1. $y = 2x + 4$
2. $y = \frac{3}{4}x - 1$
3. $y = -\frac{5}{3}x + 2$
4. $y = -4x - 1$

Graph the equation of the line. State the slope, x-intercept, and y-intercept.

5. $5x + 15y = 30$
6. $8x - 7y = 28$
7. $-2x + 4y = -4$
8. $-x - 3y = 9$

Topic: Write Equations of Lines

Example Problems:

Write an equation of the line using the given information.

Steps

1. Find the slope
2. Find the y-intercept
3. Plug the numbers into slope-intercept form: $y = mx + b$

1. Contains the points $(9, -2)$ and $(4, 3)$

① $m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad x_1\ y_1 \quad x_2\ y_2$

$= \frac{3-(-2)}{4-9} = \frac{5}{-5} = -1$

② Use $m = -1$ and one of the points.

Pick $(4, 3)$.

$y = mx + b$

$3 = -1(4) + b$

$3 = -4 + b$

$7 = b$

③ $y = -1x + 7$

Student Problems: You may work on a separate piece of paper, or do your work directly on this sheet. Please use a pencil and include your work. I have chosen 2-4 problems to grade for accuracy. The rest will be graded for completion.

Write an equation of the line using the given information.

* Remember, if the slope is given, you get to skip step #1.

Contains the points:

1. $(4,-3)$ and $(2,3)$
2. $(-1,3)$ and $(0,8)$
3. $(-7,-3)$ and $(-3,5)$
4. $(-2,-4)$ and $(2,4)$

Contains the point and has the given slope:

5. $(3,1)$, slope: 2
6. $(3,-2)$, slope: $\frac{1}{3}$
7. $(4,2)$, slope: $\frac{1}{2}$
8. $(2,5)$, slope: -2

Topic: Solve Systems of Equations Algebraically

Example Problems:

Solve the system using the substitution method.

$x+2y=6$
$3x-4y=28$

① Solve for one variable in one of the equations

$x+2y=6$
$-2y \quad -2y$
$x=-2y+6$

② Substitute result of step 1 into other equation.

$3x-4y=28$
$\uparrow$
$3(-2y+6)-4y=28$
$-6y+18-4y=28$
$-10y+18=28$
$-10y=10$
$y=-1$

③ Substitute result of step 2 into either equation.

$x+2y=6$
$\uparrow$
$x+2(-1)=6$
$x-2=6$
$x=8$

$\boxed{(8,-1)}$

Solve the system using the elimination method.

$x - 3y = -9$
$5x - 2y = 7$

① Choose a variable and multiply one (or both) equation so the coefficients are the same number, but different signs.

$(x - 3y = -9) \cdot -5 \Rightarrow -5x + 15y = 45$
$5x - 2y = 7 \Rightarrow +\ 5x - 2y = 7$

② Add the equations together. Solve for the remaining variable.

$\frac{13y}{13} = \frac{52}{13}$

$y = 4$

③ Substitute result of step 2 into one of the original equations.

$x - 3y = -9$
$\uparrow$
$x - 3(4) = -9$
$x - 12 = -9$
$+12 \quad +12$
$x = 3$ $\boxed{(3, 4)}$

* If both variables drop out and you end up with two numbers equalling each other, the answer is either no solution (when the numbers are not

Student Problems: You may work on a separate piece of paper, or do your work directly on this sheet. Please use a pencil and include your work. I have chosen 2-4 problems to grade for accuracy. The rest will be graded for completion.

Solve the systems of equations algebraically. You may choose the method.

1. $x-y=1$
   $x+y=5$

2. $x+2y=6$
   $3x+6y=8$

3. $2x-3y=-6$
   $y=-3x+2$

4. $x+y=4$
   $-2x+3y=7$

5. $-9x+3y=-3$
   $3x-2y=-4$

6. $x-4y=-4$
   $x+10y=-16$

7. $2x+9y=3$
   $5x+4y=26$

Topic: Properties of Exponents

Example Problems:

Product Property: $x^m \cdot x^n = x^{m+n}$

$x^5 \cdot x^2 = x^7$

Quotient Property: $\frac{x^m}{x^n} = x^{m-n}$

$\frac{x^8}{x^3} = x^{8-3} = x^5$

Power of a Power: $(x^m)^n = x^{mn}$

$(x^5)^3 = x^{15}$

Power of a Product: $(xy)^m = x^m y^m$

$(x^2y)^5 = x^{10}y^5$

Negative Exponent: $x^{-m} = \frac{1}{x^m}$

$\frac{1}{x^{-m}} = x^m$

Examples:

1. $(3x^2y^{-2})(-2x^3y^{-4})$

$-6x^5y^{-6}$

$\boxed{\frac{-6x^5}{y^6}}$

2. $\left(\frac{y^7}{2z^{12}y^3}\right)^4$

$\frac{y^{28}}{16z^{48}y^{12}}$

$\boxed{\frac{y^{16}}{16z^{48}}}$

* $2^4 = 2 \cdot 2 \cdot 2 \cdot 2 = 16$

Student Problems: You may work on a separate piece of paper, or do your work directly on this sheet. Please use a pencil and include your work. I have chosen 2-4 problems to grade for accuracy. The rest will be graded for completion.

Simplify the expressions:

1. $(-2x^3)(5xy^4)$

2. $\dfrac{x^5 y^4}{x y^{-4}}$

3. $\left(\dfrac{2x^4}{y^2}\right)^3$

4. $\left(\dfrac{3x^4}{y^{-2}}\right)^5$

5. $(a^{-3}b^2)^4 \cdot (-2a^3b^7)^3$

6. $\left(\dfrac{15x^2y^{-2}}{-3xy^{-3}}\right)^2$

7. $\left(\dfrac{y^3}{z^4}\right)^{-2} \cdot \left(\dfrac{y^{-4}}{2z}\right)^3$

8. $\left(\dfrac{8y^{-1}}{x^2z^3}\right) \cdot \left(\dfrac{2x^2y}{3z^2}\right)^2$

Topic: Adding, Subtracting, and Multiplying Polynomial Expressions

Example Problems:

1. Adding - Combine like terms

$(-2x^2 - 3x^3 + 5x + 4) + (-2x^3 + 7x - 6)$

$\boxed{-5x^3 - 2x^2 + 12x - 2}$

2. Subtracting - Distribute the negative sign, then combine like terms.

$(-6x^3 - 6x^2 + 7x - 1) - (3x^3 - 5x^2 - 2x + 8)$

$(-6x^3 - 6x^2 + 7x - 1) + (-3x^3 + 5x^2 + 2x - 8)$

$\boxed{-9x^3 - x^2 + 9x - 9}$

3. Multiplying - Distribute all terms in the first polynomial to all terms in the second polynomial. (You can also use the box method I taught in Algebra 1).

$(2x - 5)(3x^2 + 5x - 2)$

$6x^3 + 10x^2 - 4x - 15x^2 - 25x + 10$

$\boxed{6x^3 - 5x^2 - 29x + 10}$

Box:

	$2x$	-5
$3x^2$	$6x^3$	$-15x^2$
$5x$	$10x^2$	$-25x$
-2	$-4x$	10

$\boxed{6x^3 - 5x^2 - 29x + 10}$

Student Problems: You may work on a separate piece of paper, or do your work directly on this sheet. Please use a pencil and include your work. I have chosen 2-4 problems to grade for accuracy. The rest will be graded for completion.

1. $(x^3+x^2+x+1)+(2x^3+3x^2+x+3)$
2. $(5x^3-7x^2+11x+18)+(8x^2-2x^3-5+20x)$
3. $(x^4+5x^2+x)-(x^4+2x^3+x-4)$
4. $(1-5x+x^3)-(2x^4+5x^3-10x^2)$
5. $(x+2)(x-7)$
6. $(8x-7)(2x^2-x+5)$
7. $(2x+3)(x^2-5x+4)$
8. $(x^2+5x-1)(8x^2+7x+3)$

Topic: Factor and Solve Quadratic Equations

Example Problems:

Factor the following expressions:

Method #1: Find GCF (Greatest Common Factor)

$8x^2 - 4x$ GCF: $4x$

$4x(2x-1)$

Method #2: x^2+bx+c - Find two numbers that add to "b" and multiply to "c"

$x^2 - 6x + 8$

$(x-2)(x-4)$

8

$1 \quad 8$

$(2 \quad 4)$ Both negative

Method #3: ax^2+bx+c - Factor by grouping

$2x^2 + x - 6$

$2 \cdot -6 = -12$

$2x^2+4x-3x-6$

$2x(x+2) - 3(x+2)$

$(2x-3)(x+2)$

$1 \quad 12$

$2 \quad 6$

$(-3 \quad 4)$

Method #4: Difference of Squares

$a^2 - b^2 = (a-b)(a+b)$

$4x^2 - 81$

$(2x)^2 - (9)^2$

$(2x-9)(2x+9)$

Solve the following equations:

Method #1:

$9x^2+6x=0$

$3x(3x+2)=0$

$3x=0 \quad 3x+2=0$

$\boxed{x=0 \quad x=\frac{-2}{3}}$

Method #2:

$x^2+6x-27=0$

$(x-3)(x+9)=0$

$x-3=0 \quad x+9=0$

$\boxed{x=3 \quad x=-9}$

-27

$1 \quad 27$

$-3 \quad 9$

Method #3:

$5x^2+34x+24=0 \quad 5\cdot 24 = 120$

$30 \quad 4$

$5x^2+30x+4x+24=0$

$5x(x+6)+4(x+6)=0$

$(5x+4)(x+6)=0$

$5x+4=0 \quad x+6=0$

$\boxed{x=-4/5 \quad x=-6}$

Method #4:

$36x^2-1=0$

$(6x)^2-(1)^2=0$

$(6x-1)(6x+1)=0$

$6x-1=0 \quad 6x+1=0$

$\boxed{x=1/6 \quad x=-1/6}$

Student Problems: You may work on a separate piece of paper, or do your work directly on this sheet. Please use a pencil and include your work. I have chosen 2-4 problems to grade for accuracy. The rest will be graded for completion.

Factor the quadratic expressions completely.

1. $8x^2 - 32x$
2. $x^2 + 17x + 42$
3. $3x^2 - 17x + 20$
4. $9x^2 - 100$

Solve the quadratic equations by factoring.

5. $15x^2 + 50x = 0$
6. $x^2 + 8x - 48 = 0$
7. $2x^2 - 3x - 9 = 0$
8. $64x^2 - 49 = 0$

Topic: Unit Conversion

Example Problems: Use the given conversions below to convert the following quantities.

Conversions

1 hour = 3600 seconds	1 mile = 5280 feet	1 yard = 3 feet
1 meter = 3.28 feet	1 km = 0.62 miles	1 light second = 300,000,000 meters
1 kg = 2.2 lbs	1 lb = 0.45 kg	1 quart = 0.946 liters
1 m/s = 2.2 miles/hour	1 foot = 12 inches	1 inch = 2.54 cm = 25.4 mm

1. 565,900 seconds into days.

① Start by writing your initial value over 1.

$$\frac{565{,}900 \text{ sec}}{1}$$

② Use the unit converters above to begin changing the given unit (sec) to the new unit (days). I will go from seconds to hours and then hours to days.

$$\frac{565{,}900 \text{ sec}}{1} \cdot \frac{1 \text{ hr}}{3600 \text{ sec}} \cdot \frac{1 \text{ day}}{24 \text{ hours}} = \frac{565{,}900}{86400}$$

I put seconds on the bottom so both seconds would cross each other out.

I put hours on the bottom so both hrs would cross each other out.

Divide your #'s.

$$= \boxed{6.550 \text{ days}}$$

2. 22647 inches into miles

$$\frac{22647 \text{ in}}{1} \cdot \frac{1 \text{ foot}}{12 \text{ inch}} \cdot \frac{1 \text{ mile}}{5280 \text{ ft}} = \frac{22647 \text{ mile}}{63360}$$

$$= \boxed{0.357 \text{ miles}}$$

3. 100 yds into meters

$$\frac{100 \text{ yds}}{1} \cdot \frac{3 \text{ feet}}{1 \text{ yd}} \cdot \frac{1 \text{ meter}}{3.28 \text{ ft}} = \frac{300 \text{ meter}}{3.28}$$

$$= \boxed{91.463 \text{ meters}}$$

Student Problem: You may work on a separate piece of paper, or do your work directly on this sheet. Please use a pencil and include your work. I have chosen 2-4 problems to grade for accuracy. The rest will be graded for completion.

Convert the following quantities:

1. 2678 cm into feet
2. 1.00 yds into cm.
3. 17 years into minutes
4. 2678 cm into feet
5. 100 meters into miles.