Incoming Algebra II Summer Packet 2025

Welcome to Algebra II! To keep you prepared for this class in August, you must complete this packet in its entirety. It will be turned in for your first grade the first Friday of school. Prior to each review section, you will see a few example problems as well as a link to a video for additional help. A quiz on this material will be taken the first FULL week of school. Make sure to show all work and you may use a calculator, but steps MUST still be shown.
Sincerely,
UHS Math Department

Topic #1 Algebraic Expressions

(Remember, algebraic expressions do not have an equal sign so we can only simplify them if variables are involved or evaluate them if not variables are included and NOT solve them for a variable!)

Evaluating Algebraic Expressions

1. Substitute the given values for the variables in the expression
2. Evaluate the expression using the order of operations
   - Parentheses/Brackets (inside to outside)
   - Exponents
   - Multiplication/Division (left to right)
   - Addition/Subtraction (left to right)

ex: $9x^2 - 4(y + 3z)$ for $x = -3, y = 2, z = 5$

$9(-3)^2 - 4(2 + 3 \cdot 5)$

$9(-3)^2 - 4(2 + 15)$

$9(-3)^2 - 4 \cdot 17$

$9 \cdot 9 - 4 \cdot 17$

$81 - 4 \cdot 17$

$81 - 68 = \boxed{13}$

The Distributive Property

1. Multiply the number outside the parentheses by each term in the parentheses.
2. Keep the addition/subtraction sign between each term.

ex: $5(8x - 3)$

$5(8x - 3)$

$5(8x) - 5(3)$

$\boxed{40x - 15}$

Simplifying Algebraic Expressions

1. Clear any parentheses using the Distributive Property
2. Add or subtract like terms (use the sign in front of each term to determine whether to add or subtract)

ex: $2(3x - 4) - 12x + 9$

$2(3x - 4) - 12x + 9$

$6x - 8 - 12x + 9$

$\boxed{-6x + 1}$

Helpful links:
https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:foundation-algebra/x2f8bb11595b61c86:intro-variables/v/variables-and-expressions-1

https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:foundation-algebra/x2f8bb11595b61c86:substitute-evaluate-expression/v/evaluating-expressions-in-two-variables-with-decimals-and-fractions

Evaluate each expression for the following values: $a = 9, b = -3, c = -2, and\ d = 7$. Show all work.		
1. $\frac{a+3d-c}{2b}$	2. $(2a - b)^2 - d(4a + c)$	3. $0.6b + 2[8 - (c + 3a)]$

Simplify each expression, showing all work.		
1. $2(4x + y) - 2(x + 4y)$	2. $(12 + 3d)(-2) + 24d - d$	3. $20f - 4(5f + 4) + 16$

Topic #2 Solving one Variable Equations

Helpful Videos: https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:solve-equations-inequalities/x2f8bb11595b61c86:linear-equations-variables-both-sides/v/solving-equations-2

https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:solve-equations-inequalities/x2f8bb11595b61c86:linear-equations-parentheses/v/solving-equations-with-the-distributive-property

Solving Multi-Step Equations

1. Clear any parentheses using the Distributive Property
2. Combine like terms on each side of the equal sign
3. Get the variable terms on the same side of the equation by adding/subtracting a variable term to/from both sides of the equation to cancel it out on one side
4. The equation is now a two-step equation, so finish solving it as described above

ex: $5(2x - 1) = 3x + 4x - 1$

$10x - 5 = 3x + 4x - 1$

$10x - 5 = 7x - 1$

$-7x \quad -7x$

$3x - 5 = -1$

$+5 \quad +5$

$\frac{3x}{3} = \frac{4}{3}$

$\boxed{x = \frac{4}{3}}$

Solve each equation, showing all steps needed.

1. $2x - 14 = 13x + 11$	2. $-2(d - 8) = 40$	3. $-8y - 4 = -2(3y + 2)$

Topic #3 Exponent Rules

Product of Exponents: https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-numbers-operations/cc-8th-exponent-properties/v/exponent-properties-involving-products

Power of Powers: https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-numbers-operations/cc-8th-exponent-properties/v/products-and-exponents-raised-to-an-exponent-propertiesn

Division of Exponents: https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-numbers-operations/cc-8th-exponent-properties/v/exponent-properties-involving-quotients

Exponent Rules

Zero Exponent: Any base raised to the zero power equals 1.

Ex: $(-9)^0 = \boxed{1}$

Negative Exponent: Move the base to the opposite side of the fraction bar and make the exponent positive.

Ex: $3^{-4} = \frac{1}{3^4} = \boxed{\frac{1}{81}}$

Monomial x Monomial: Multiply the coefficients and add the exponents of like bases.

Ex: $(-2x^3)(8x^{-5}) = -16x^{-2} = \boxed{\frac{-16}{x^2}}$

Monomial ÷ Monomial: Divide the coefficients and subtract the exponents of like bases.

Ex: $\frac{4ab^3}{4a^2b^2} = 1a^{-1}b^1 = \boxed{\frac{b}{a}}$

Power of a Monomial: Raise each base (including the coefficient) to that power. If a base already has an exponent, multiply the two exponents.

Ex: $(3x^3y^2)^3 = 3^3x^9y^6 = \boxed{27x^9y^6}$

Power of a Quotient: Raise each base (including the coefficients) to that power. If a base already has an exponent, multiply the two exponents.

Ex: $\left(\frac{5a^3b}{2c^{-1}}\right)^2 = \frac{5^2a^6b^2}{2^2c^{-2}} = \boxed{\frac{25a^6b^2c^2}{4}}$

1. $x^6 \cdot x^4$	2. $(5^3)^2$	3. $-6a^2b^{-4}c \cdot 4ab^2$
4. $\frac{a^3b^{-6}}{c^{-2}}$	5. $\frac{24d^5f^{-5}g^8}{36d^{-3}f^9g^2}$	6. $(8w^3x^2)^0$

Topic #4 Simplifying Radicals

Helpful Link

Here are the steps to simplify a square root that is not in simplest form:

A. Determine a perfect square that will evenly divide into the radicand (part underneath the square root symbol).
B. Write the radicand as the product of the perfect square and another factor.
C. Take the square root of the perfect square and place it on the outside of the radical. Leave the remaining factor underneath the square root symbol.
D. Repeat steps A – C until no remaining perfect square will evenly divide into the radicand.

Examples:

$\sqrt{50} = \sqrt{25 \bullet 2}$
$= 5\sqrt{2}$

$\sqrt{48} = \sqrt{4 \bullet 12}$
$= 2\sqrt{12}$
$= 2\sqrt{4 \bullet 3}$
$= 2 \bullet 2\sqrt{3}$
$= 4\sqrt{3}$

or

$\sqrt{48} = \sqrt{16 \bullet 3}$
$= 4\sqrt{3}$

$\sqrt{72} = \sqrt{9 \bullet 8}$
$= 3\sqrt{8}$
$= 3\sqrt{4 \bullet 2}$
$= 3 \bullet 2\sqrt{2}$
$= 6\sqrt{2}$

or

$\sqrt{72} = \sqrt{36 \bullet 2}$
$= 6\sqrt{2}$

1. $10\sqrt{96}$	2. $7\sqrt{600}$	3. $-3\sqrt{405}$
4. $\sqrt{125n}$	5. $7\sqrt{96m^3}$	6. $\sqrt{28x^3y^3}$

Topic #5 Linear Equations and Slope

https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:linear-equations-graphs/x2f8bb11595b61c86:two-variable-linear-equations-intro/v/2-variable-linear-equations-graphs

https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:linear-equations-graphs/x2f8bb11595b61c86:slope/v/introduction-to-slope

Finding Slope from 2 Points

Slope Formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$

Special Cases:

$\frac{0}{\#}$ → slope = 0 $\frac{\#}{0}$ → slope is undefined

Ex: Find the slope of the line that passes through the points (-9, -3) and (7, -7)

$m = \frac{-7-(-3)}{7-(-9)} = \frac{-4}{16} = \boxed{-\frac{1}{4}}$

Slope-Intercept Form

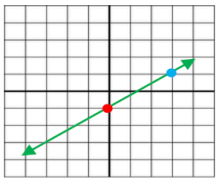
$y = mx + b$

m = slope & b = y-intercept

Graphing from Slope-Intercept Form:

1. Make a point at the y-intercept.
2. Use the slope $\left(\frac{\text{rise}}{\text{run}}\right)$ to make more points.
3. Connect the points to form a line.

Ex: Graph $y = \frac{2}{3}x - 1$

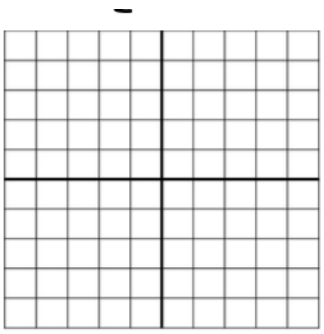
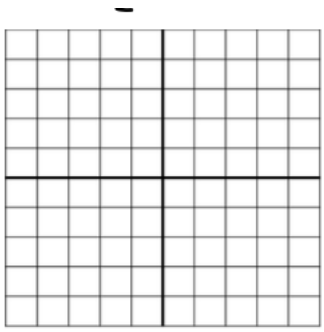
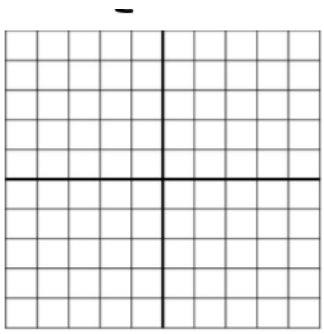


y-intercept is -1
slope = $\frac{2}{3}$, (so from the y-intercept go up 2 & right 3)

Find the slope of the line that passes through the pair of points.

1. $(9,-3) and\ (9,8)$	2. $(-8,5) and\ (3,-6)$	3. $(7,-1) and\ (15,9)$

Graph each line.

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

Standard Form

$Ax + By = C$

A, B, & C are integers & A is not negative

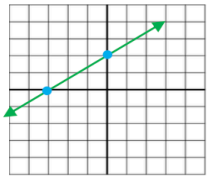
Graphing Using Intercepts:

1. Find the x-intercept by substituting 0 for y.
2. Find the y-intercept by substituting 0 for x.
3. Make a point at each intercept and then connect the points to form a line.

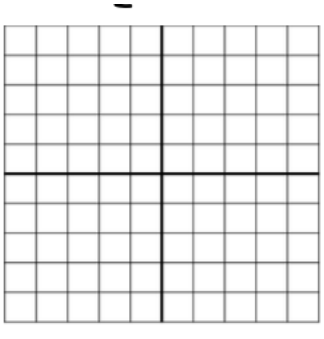
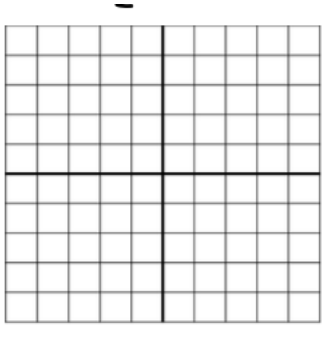
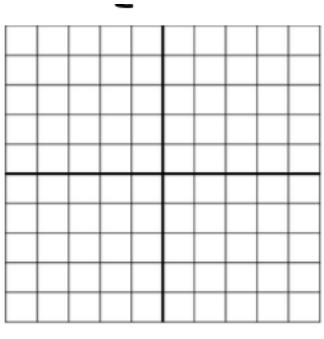
Ex: Graph $2x - 3y = -6$

x-intercept: $2x - 3(0) = -6$
$2x = -6 \rightarrow x = -3$
$(-3, 0)$

y-intercept: $2(0) - 3y = -6$
$-3y = -6 \rightarrow y = 2$
$(0, 2)$



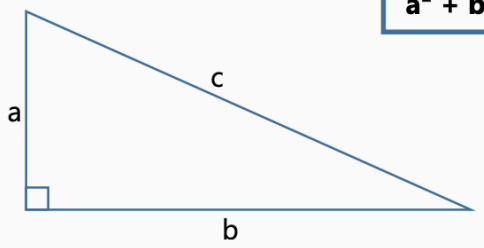
Graph the line by finding the x and y intercepts.

1. $2x - y = -2$	2. $x + y = 4$	3. $3x + 4y = -12$
		

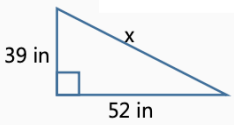
Topic #6 Pythagorean Theorem Review

The Pythagorean Theorem

$a^2 + b^2 = c^2$



Example:



$39^2 + 52^2 = x^2$

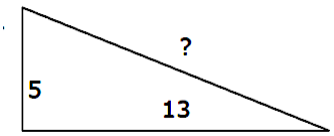
$1521 + 2704 = x^2$

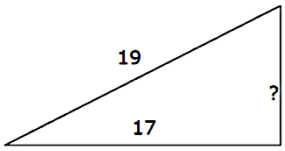
$4225 = x^2$

$\sqrt{4225} = \sqrt{x^2}$

$65 \text{ in} = x$

Solve the following using the Pythagorean theorem. Assume all triangles are right triangles. Round answers if needed to the nearest tenth.

1. 

2. 

3. a = 8 ; b =_____ ; c = 10

4. a = _____ ; b = 2 ; c = 4

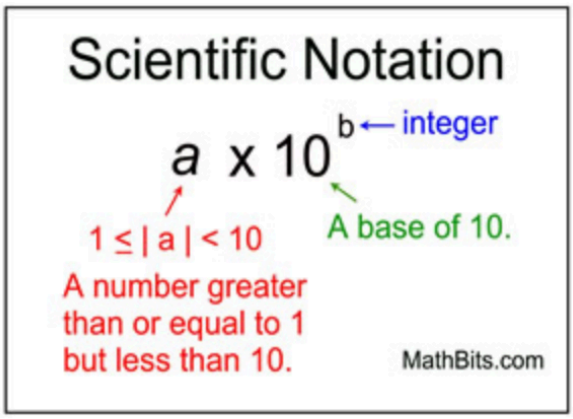
5. Ms. Green tells you that a right triangle has a hypotenuse of 13 and a leg of 5. She asks you to find the other leg of the triangle. What is your answer?

6. Two joggers run 8 miles north and then 5 miles west. What is the shortest distance, to the nearest tenth of a mile, they must travel to return to their starting point?

Topic #7 Scientific Notation Review

[Helpful Notes #1]

[Helpful Notes #2]



Note: Since we are dealing with | **a** |, the a could be either **positive** (3×10^5) or **negative** (-3×10^5).

- To Multiply: $(n\times10^a)\bullet(m\times10^b)=(n\bullet m)\times10^{a+b}$

Multiply the numbers out front and add the exponents.

- To Divide: $\dfrac{n\times10^a}{m\times10^b}=\dfrac{n}{m}\times10^{a-b}$

Divide the numbers out front and subtract the exponents.

- To ADD or SUBTRACT two numbers in scientific notation, the exponents on the power of 10 must be the same. You may need to "adjust" the numbers, moving them out of scientific notation, so the exponents are alike.

ADD: $(n\times10^a)+(m\times10^a)=(n+m)\times10^a$

SUBTRACT: $(n\times10^a)-(m\times10^a)=(n-m)\times10^a$

Directions: Perform the indicated operations.

1. $(1.2\times10^5)+(5.35\times10^6)$	2. $(6.91\times10^{-2})+(2.4\times10^{-3})$
3. $(3.67\times10^2)-(1.6\times10^1)$	4. $(8.41\times10^{-5})-(7.9\times10^{-6})$

5. $(4.3 \times 10^{8}) \times (2.0 \times 10^{6})$	6. $(1.5 \times 10^{-2}) \times (8.0 \times 10^{-1})$
7. $\frac{7.8\times10^{3}}{1.2\times10^{4}}$	8. $\frac{8.1\times10^{-3}}{9.0\times10^{2}}$