

Decatur City Schools

Decatur, Alabama

Mathematics Department

Summer Course Work

In preparation for

Algebra II

Completion of this summer work
is required on the first class day
of the 2019-2020 school year.

Student Name: _____

Decatur City Schools
Mathematics Department

Summer Workbook
Algebra II

Topics

1. Algebraic Expressions
2. Linear Equations
3. Roots and Simplifying Radicals
4. Laws of Exponents
5. Multiplying Polynomials

All pages MUST show the work in order for the work to be accepted. If more paper is needed, the work may go on the back of each page or neatly on a separate page.

Completion of this booklet is required by the first class day of the school year.

*****If you do not remember something, look it up. Use resources such as, Khan Academy, Google, YouTube, etc.**

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Dear Parents and Guardians:

Attached are the summer curriculum review materials for *Algebra II*. This booklet was prepared by the Decatur City Schools Math Department and contains topics that reflect content learned in prerequisite courses. These materials must be completed and brought to class on the first class day of school.

Your child is required to complete this booklet over the summer. A test based on the material in the packet will be given to your child during the second week of school. It will count as the first test of the year and the grade will be determined as follows:

Completion of the packet on time will count 20% of the grade
Performance on the test will count 80% of the grade.

Thank you for your cooperation.

Sincerely,

Decatur City School Mathematics Department

Equations

A linear function is a function where the highest power of x is 1. You have seen these functions in many forms. Some of the common forms are $y = mx + b$ (slope-intercept form) and $Ax + By = C$ (standard form). Notice in both forms the exponent on x is 1.

Every linear function has an x and y intercept.

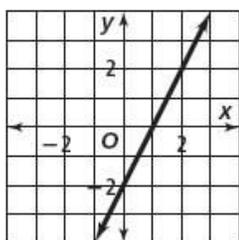
x – Intercept: Where a function crosses the x – axis.

y – Intercept: Where a function crosses the y – axis.

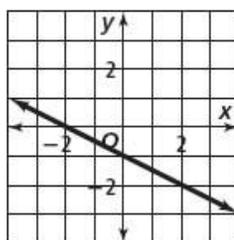
Slope is a key concept to consider when thinking of linear functions. Slope is the “ m ” in the $y = mx + b$ and is defined to be $-A/B$ for standard form of a line. Here are some definitions of slope.

$$\text{slope} = m = \frac{\text{vertical change}}{\text{horizontal change}} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

Positive slopes increase from left to right. Negative slopes decrease from left to right.



Positive slope

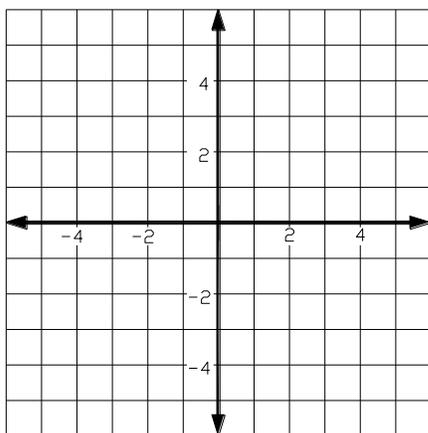


Negative slope

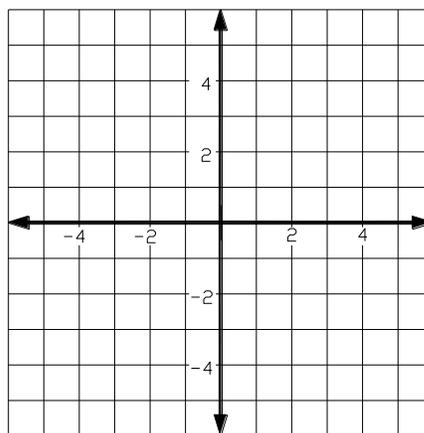
Slope

Graph each equation.

1) $y = 3x - 2$



2) $y - 5 = 4x$



Find the slope of the line through the following points.

3) $(-2, 5)$ and $(8, -3)$

4) $(2, 5)$ and $(2, -7)$

5) $(4, -3)$ and $(-2, -3)$

Simplifying Algebraic Expressions

The difference between an expression and an equation is that an expression doesn't have an equal sign. Expressions can only be simplified, not solved. Simplifying an expression often involves **combining like terms**. Terms are like if and only if they have the **same variable and power or if they are constants**. Simplifying expressions also refers to substituting values to get a resultant value of the expression.

Simplify the following expressions by combining like terms.

1.) $3 + 2y^2 - 7 - 5x - 4y^3 + 6x$	2.) $x^2 + x^2 + x + x$
3.) $4(3x - 2x^3 + 5) - 6x$	4.) $x(2x - 3x^4 + 2y - 5xy)$

Evaluate the following expressions by substituting the given values for the variables.

5.) $3a + 2b - 6a + 5b - 8b$; $a = -2$ and $b = 6$	6.) $3(4c - 2d) + d(dc^2 + 7)$; $c = -2$ and $d = 3$
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Solving Equations

Solve each equation and check your answer.

1.) $3x + 4 = -2$

2.) $3a - 2 = 5a + 7$

3.) $4(3h - 5) = -15$

4.) $3(4 - 3t) = -2$

5.) $5 - 2(3t + 4) = -1$

6.) $2(3x - 4) = -3(x - 8)$

Multiplying Binomials

$$(a + b)(c + d) = \underbrace{ac}_{\text{first}} + \underbrace{ad}_{\text{outside}} + \underbrace{bc}_{\text{inside}} + \underbrace{bd}_{\text{last}}$$

$$\begin{aligned}(x + 3)(x + 5) &= x * x + x * 5 + 3 * x + 3 * 5 \\ &= x^2 + 5x + 3x + 15 \\ &= x^2 + 8x + 15\end{aligned}$$

1.) $(x + 3)(2x - 5)$

2.) $(x + 5)(x + 4)$

3.) $(3w + 4)(2w - 1)$

Laws of Exponents

The following laws of exponents are for multiplying and dividing monomials.

PRODUCT RULE: $a^m \cdot a^n = a^{m+n}$ (when multiplying like bases, add the powers)

Examples: 1) $x^4 \cdot x^5 = x^{4+5} = x^9$ 2) $5^5 \cdot 5^8 = 5^{5+8} = 5^{13}$

POWER RULE: $(a^m b^n)^p = a^{mp} b^{np}$ (when taking a monomial to a power, multiply the powers including the coefficient)

Examples: 1) $(a^4 b^3)^2 = a^8 b^6$ 2) $(3m^2 n^5)^4 = 3^4 m^8 n^{20} = 81m^8 n^{20}$

QUOTIENT RULE: $\frac{a^m}{a^n} = a^{m-n}$ (when dividing with like bases, subtract the powers)

(Note: it is always the numerator's power minus the denominator's power)

Examples: 1) $\frac{x^6}{x^4} = x^{6-4} = x^2$ 2) $\frac{m^5 n^7}{m^4 n^{10}} = m^{5-4} n^{7-10} = mn^{-3}$

ZERO POWER RULE: $a^0 = 1$ (any term to the zero power is one)

Examples:

1) $(m^5 n^7)^0 = 1$ 2) $(4m^8 n^2)(-2mn^4)^0 = (4m^8 n^2)(1) = 4m^8 n^2$

NEGATIVE POWER RULE: $a^{-n} = \frac{1}{a^n}$ and $\frac{1}{a^{-n}} = a^n$ (take the reciprocal of the variable to the negative power)

Examples: $3x^{-4} = \frac{3}{x^4}$

It is improper to leave negative powers in your final answer. All final answers should be written with positive powers. Therefore, you will need the following property. ****

Simplify. Write answers with positive exponents.

1.) $15^{-4}(15^8)$

2.) $a^7(a^8)(a)$

3.) $(3m^4 n^6)(2mn)^0(2m^2 n)$

4.) $\frac{-28a^6 b^{-3} c^5}{7a^{11} b^{-5} c^5}$

5.) $(-1x^5 y^6)^{10}$

6.) $(5m^3 n)(-2mn^3)$

Simplifying Radicals

Perfect Squares:

X	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
X²	1	4	9	16	25	36	49	64	81	100	121	144	169	196	225

$\sqrt{25}$ is read "the square root of 25"

$\sqrt{25} = 5$ because $5^2 = 25$

Examples:

$$\sqrt{36}$$

$$6$$

$$\begin{array}{c} \sqrt{27} \\ \swarrow \quad \searrow \\ \sqrt{9} * \sqrt{3} \\ 3\sqrt{3} \end{array}$$

$$\begin{array}{c} \sqrt{50} \\ \swarrow \quad \searrow \\ \sqrt{25} * \sqrt{2} \\ 5\sqrt{2} \end{array}$$

Simplify (Simplifying Perfect Squares):

1.) $\sqrt{4}$

2.) $\sqrt{16}$

3.) $\sqrt{100}$

4.) $\sqrt{18}$

5.) $\sqrt{125}$