

Decatur City Schools

Decatur, Alabama

Mathematics Department

Summer Course Work

In preparation for

Adv. Algebra II with Trig

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
Adv. Algebra II
with Trig
Topics

1. Algebraic Expressions
2. Linear Equations
3. Solving Systems (substitution, elimination)
4. Roots and Simplifying Radicals
5. Laws of Exponents
6. Multiplying Polynomials
7. Factoring 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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Mathematics Department
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Dear Parents and Guardians:

Attached are the summer curriculum review materials for *Advanced Algebra II with Trig*. 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

Simplifying Radicals

An expression under a radical sign is in simplest radical form when:

- 1) there is no integer under the radical sign with a perfect square factor,
- 2) there are no fractions under the radical sign,
- 3) there are no radicals in the denominator

Express the following in simplest radical form.

1) $\sqrt{50}$ _____ 2) $\sqrt{72}$ _____ 3) $\sqrt{192}$ _____ 4) $\sqrt{169}$ _____ 5) $\sqrt{147}$ _____

Properties of Exponents – MEMORIZE!!!!

PROPERTY		EXAMPLE
Product of Powers	$a^m \cdot a^n = a^{m+n}$	$x^4 \cdot x^2 = x^6$
Power of a Power	$(a^m)^n = a^{m \cdot n}$	$(x^4)^2 = x^8$
Power of a Product	$(ab)^m = a^m b^m$	$(2x)^3 = 8x^3$
Negative Power	$a^{-n} = \frac{1}{a^n} \quad (a \neq 0)$	$x^{-3} = \frac{1}{x^3}$
Zero Power	$a^0 = 1 \quad (a \neq 0)$	$4^0 = 1$
Quotient of Powers	$\frac{a^m}{a^n} = a^{m-n} \quad (a \neq 0)$	$\frac{x^3}{x^2} = x^1 = x$
Power of Quotient	$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m} \quad (b \neq 0)$	$\left(\frac{x}{y}\right)^3 = \frac{x^3}{y^3}$

Simplify each expression. Answers should be written using positive exponents.

1) $g^5 \cdot g^{11}$ _____

2) $(b^6)^3$ _____

3) w^{-17} _____

4) $\frac{y^{12}}{y^8}$ _____

5) $(3x^7)(-5x^{-3})$ _____

6) $(-9z^3bcd^0)^5$ _____

7) $\frac{-15x^7y^{-2}}{25x^{-9}y^5}$ _____

8) $\left(\frac{4x^9}{12x^4}\right)^3$ _____

Solving Linear Equations

To solve linear equations, first simplify both sides of the equation. If the equation contains fractions, multiply the equation by the LCD to clear the equation of fractions. Use the addition and subtraction properties of equality to place variables on one side and constants on the other side of the equal sign. Use the multiplication and division properties of equality to solve for the variable. Express all answers as fractions in lowest terms or round decimals to the tenths place where appropriate.

Completed examples:

$$\begin{aligned} \text{a) } 3(x + 5) + 4(x + 2) &= 21 \\ 3x + 15 + 4x + 8 &= 21 \\ 7x + 23 &= 21 \\ 7x &= -2 \\ x &= -\frac{2}{7} \end{aligned}$$

$$\begin{aligned} \text{b) } 2(5x - 4) - 10x &= 6x + 3(2x - 5) \\ 10x - 8 - 10x &= 6x + 6x - 15 \\ -8 &= 12x - 15 \\ 7 &= 12x \\ \frac{7}{12} &= x \end{aligned}$$

$$\begin{aligned} \text{c) } \frac{2}{3}x + 5 &= 6x - \frac{3}{4} \\ 12\left(\frac{2}{3}x + 5\right) &= 12\left(6x - \frac{3}{4}\right) \\ 8x + 60 &= 72x - 9 \\ 69 &= 64x \\ \frac{69}{64} &= x \end{aligned}$$

Solve for the indicated variable. Circle your answers.

1) $2x^2 = 50$

2) $5 + 2(k + 4) = 5(k - 3) + 10$

3) $-5 + \frac{b}{4} = 7$

4) $\frac{1}{3} + \frac{4}{6}y = \frac{2}{3}$

Graphing Linear Equations

Formulas: Slope formula

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

Slope – Intercept form

$$y = mx + b$$

Point-Slope form

$$y - y_1 = m(x - x_1)$$

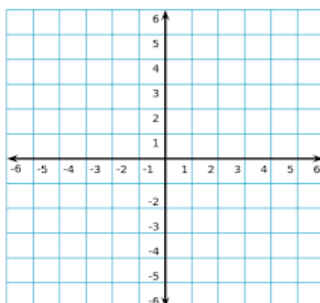
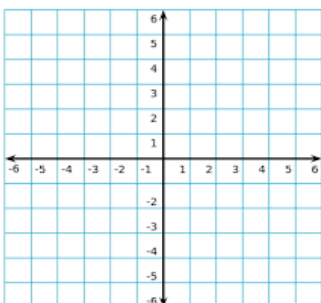
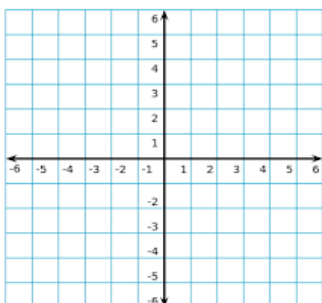
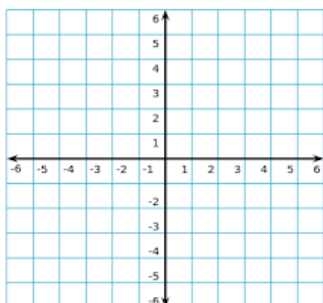
Graph the following equations:

1. $y = 3x - 5$

2. $2x + 3y = 6$

3. $y = 3$

4. $x = 2$



Write the equation of the lines described below. Give each answer in slope-intercept form.

1. slope = 4 and y-intercept = -2

2. slope = 5 and the line passes through (-2, 3)

3. the line passes through (2, 5) and (-3, 15)

Operations With Polynomials

To add or subtract polynomials, just combine like terms.

To multiply polynomials, multiply the numerical coefficients and apply the rules for exponents for variables.

Perform the indicated operations and simplify. Circle your answers.

1) $(7x - 3)(3x + 7)$

2) $(5x^2 - 4) - 2(3x^2 + 8x + 4)$

3) $-2x(5x + 11)$

4) $(5x - 6)^2$

5) $3x - 4 + 7x - 8 - 10x - 2$

6) $3x^3(4x + 5x^2 - 11x^4)$

7) $5x^3 + 2x^2 - 7x - x^3 + 5x^2 - 18$

8) $(5x^2 + x - 4) - (9x^2 - 4x - 11)$

Do you remember how to write an equation using function notation?

In general, the symbol **f(x)** replaces **y**. It is read as “**f of x.**” It is the value of function “f” at x.

f(x) can be used instead of y. We will use both.

$$f(x) = y$$

Whatever number is inside the parentheses, **SUBSTITUTE** the number in for the letter _____, then **evaluate** to find the value for y.

Ex) Given $f(x) = 2x + 4$, find **f(2) = 2(2) + 4 = 4 + 4 = 8**, so $f(2) = 8$

$$f(3) = \mathbf{2(3) + 4 = 6 + 4 = 10}$$
, so $f(3) = 10$

Problems: Evaluate each function at the given value.

1) $f(x) = \frac{2x^2}{x-2}$ $f(3) = \underline{\hspace{2cm}}$ $f(0) = \underline{\hspace{2cm}}$ $f(-3) = \underline{\hspace{2cm}}$

2) $f(x) = |5x + 6|$ $f(-2) = \underline{\hspace{2cm}}$ $f(0) = \underline{\hspace{2cm}}$ $f(-3) = \underline{\hspace{2cm}}$

3) $g(x) = 3x + 6$ $g(3) = \underline{\hspace{2cm}}$ $g(0) = \underline{\hspace{2cm}}$ $g(-1) = \underline{\hspace{2cm}}$

Solving Systems of Equations

Solve for x and y:
 $x = 2y + 5$ $3x + 7y = 2$

Using **substitution** method:

$$\begin{aligned}3(2y + 5) + 7y &= 2 \\6y + 15 + 7y &= 2 \\13y &= -13 \\y &= -1\end{aligned}$$

$$\begin{aligned}x &= 2(-1) + 5 \\x &= 3\end{aligned}$$

Solution: (3, -1)

Solve for x and y:
 $3x + 5y = 1$ $2x + 3y = 0$

Using **elimination** method:

$$\begin{aligned}3(3x + 5y = 1) \\-5(2x + 3y = 0)\end{aligned}$$

$$\begin{aligned}9x + 15y &= 3 \\-10x - 15y &= 0\end{aligned}$$

$$\begin{aligned}-1x &= 3 \\x &= -3\end{aligned}$$

$$\begin{aligned}2(-3) + 3y &= 0 \\y &= 2\end{aligned}$$

Solution: (-3, 2)

Solve each system of equations by either the substitution method or the linear combination (addition/subtraction) method. Write your answer as an ordered pair.

1) $y = 2x + 4$
 $-3x + y = -9$

2) $2x + 3y = 6$
 $-3x + 2y = 17$

3) $x - 2y = 5$
 $3x - 5y = 8$

4) $3x + 7y = -1$
 $6x + 7y = 0$

Solving absolute value equations and inequalities

Solve each equation. Check your solutions.

-Isolate the absolute value expression.

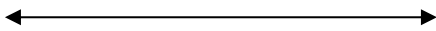
Ex) $|2x+3|=5$

-When $|a|=b$, then $a=b$ or $a=-b$, so set up both equations and solve each.

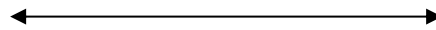
$$\begin{array}{l} 2x + 3 = 5 \quad \mathbf{OR} \quad 2x + 3 = -5 \\ x = 1 \quad \quad \quad \text{or} \quad \quad x = -4 \end{array}$$

Solve and graph the solution.

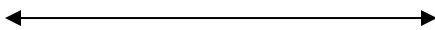
1. $|-6+3m|=6$



2. $|4x+6|\geq 2$



3. $|2x+4|\leq 20$



Factoring.

Examples:

Factoring out the GCF

a) $6x^2 + 21x$

$$3x(2x + 7)$$

Difference of Squares

b) $x^2 - 64$

$$(x - 8)(x + 8)$$

Perfect Square Trinomial

c) $x^2 - 10x + 25$

$$(x - 5)^2$$

Trinomial

d) $3x^2 + 7x + 2$

$$(3x + 1)(x + 2)$$

Trinomial

e) $2x^2 - 13x + 15$

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

Trinomial

f) $6x^2 + x - 1$

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

Tutorials:

Factoring Trinomials (skip substitution method):

http://www.wtamu.edu/academic/anns/mps/math/mathlab/int_algebra/int_alg_tut28_facttri.htm

Factoring Polynomials (video): <http://www.youtube.com/watch?v=uoEoWzHXaJ8>

Factoring a Trinomial: <http://www.algebrahelp.com/lessons/factoring/trinomial/>

Factoring: <http://www.regentsprep.org/Regents/Math/math-topic.cfm?TopicCode=factor>

Factor Completely.

1) $16y^2 + 8y$

2) $18x^2 - 12x$

3) $6m^2 - 60m + 10$

4) $6y^2 - 13y - 5$

5) $20x^2 + 31x - 7$

6) $12x^2 + 23x + 10$