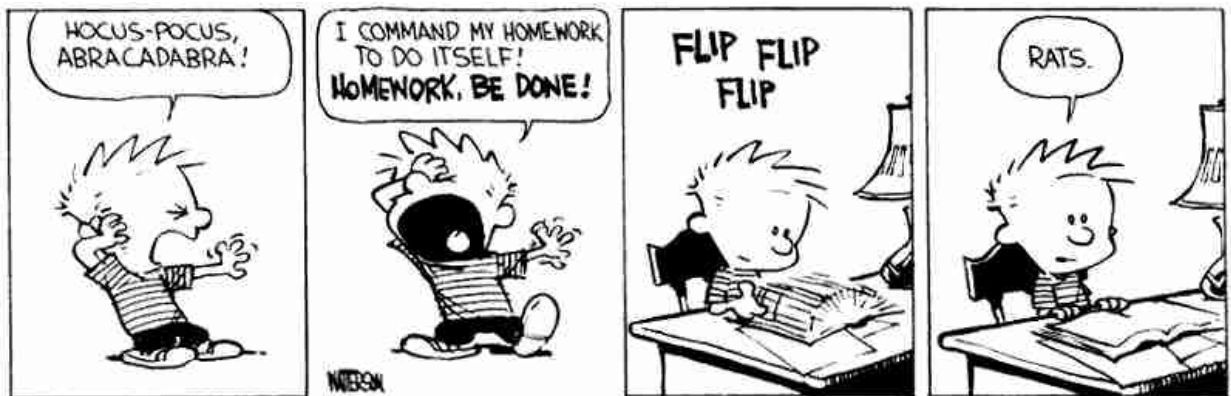# FOR ALL STUDENTS TAKING ALGEBRA II

2013-2014
SUMMER REVIEW PACKET

Dear Student and Parent/Guardian,

The math department at Central Dauphin School District wants you to be successful in Algebra II. We also want you to be prepared for PSSA and Keystone Exams. This summer packet is designed to help you reach these goals by reviewing necessary skills.

Be sure to follow the key information below when completing this packet:

- The packet is due when you return to school in August.

- **Every problem must be completed. None left blank.**

- The packet is worth 10 times a regular homework grade.

- Work must be shown to receive credit – no work, no points.

- Final answers must be shown on the answer pages at the back of the packet.

- A possible Quiz covering the material from the packet may be given at the end of the first week of school. These topics also tie in with the first few units of Algebra II.

- When you return in August, you will have the opportunity to ask questions. Math Help will also be available during the first week.

We hope that you have an enjoyable summer and return to school ready to be successful in Algebra II!

Helpful Websites
www.glencoe.com
www.wolframalpha.com
www.regentsprep.org
www.purplemath.com/modules
www.Aleks.com (a website where you can subscribe for individual math lessons)
www.khanacademy.org

Chapter 1 Equations and Inequalities

Example:

Evaluate $x^2 - (y+2)$ if $x = 4$ and $y = 3$

$$x^2 - (y+2) = 4^2 - (3+2) \qquad \text{Replace x with 4 and y with 3}$$
$$= 4^2 - 5 \qquad \text{Add 3 and 2}$$
$$= 16 - 5 \qquad \text{Evaluate } 4^2$$
$$= 11 \qquad \text{Subtract 5 from 16}$$

Evaluate each expression if $x = 3$, $y = 4$, and $z = 2$

1. $y^2 + 3z$

2. $8(x-z)^2 + 3y$

3. $5|x+6| - |6y|$

4. $|y-z| + 2|xz|$

Example:

Solve $7x + 56 = 5x - 11$

$$\underline{-5x \qquad -5x} \qquad \text{Subtract 5x from each side}$$

$$2x + 56 = -11 \qquad \text{Simplify}$$
$$\underline{-56 \quad -56} \qquad \text{Subtract 56 from each side}$$

$$2x = -67 \qquad \text{Simplify}$$

$$\frac{2x}{2} = \frac{-67}{2} \qquad \text{Divide each side by 2}$$

$$x = -33.5 \qquad \text{Simplify and check the result}$$

Solve:

5. $7 + 5n = -58$

6. $3w + 14 = 7w + 2$

7. $-\dfrac{2}{3}a + 5 = 19$

8. $5y + 4 = 2(y - 4)$

Example:

Solve $3|2x + 9| = 33$

$$\frac{3|2x+9|}{3} = \frac{33}{3} \qquad \text{Divide each side by 3 to isolate the absolute value}$$
$$|2x + 9| = 11 \qquad \text{Simplify}$$

$$2x + 9 = 11 \text{ or } 2x + 9 = -11 \qquad \text{Split using definition of absolute value and solve each equation.}$$
$$2x = 2 \text{ or } \qquad 2x = -20 \qquad \text{Subtract 9 from each side}$$
$$x = 1 \text{ or } \qquad x = -10 \qquad \text{Divide each side by 2. Check your solutions}$$

Solve:

9. $|x - 18| = 5$

10. $|2w + 3| + 6 = 12$

11. $68 = 2|y - 2|$

12. $|3n + 2| + 4 = 2$

Example:

Solve $7x - 5 > 6x + 4$ and graph

$\underline{-6x \quad\quad -6x}$ Subtract 6x from each side

$x - 5 > 4$ Simplify

$\underline{+5 \ +5}$ Add 5 to each side

$x > 9$ Simplify

* Recall when you divide or multiply by a negative number you switch the inequality symbol

Solve and graph:

13. $4x + 7 \le 3x + 9$

14. $-m > \dfrac{m + 4}{9}$

15. $13 \le 2x + 7 \le 17$

16. $y - 2 > -3$ or $y + 4 \le -3$

Example:

Solve $|3x - 12| \ge 6$

$3x - 12 \ge 6$ or $3x - 12 \le -6$ Split

$3x \ge 18$ or $3x \le 6$ Solve

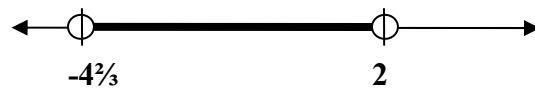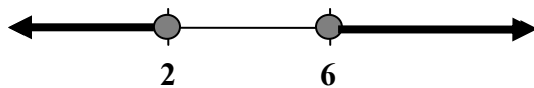$x \ge 6$ or $x \le 2$

Solve $|3x + 4| < 10$

$-10 < 3x + 4 < 10$

$-14 < 3x < 6$

$-\dfrac{14}{3} < x < 2$

Solve and graph:

17. $|4k - 8| < 20$

18. $|3y + 7| \ge 2$

19. $|5n - 8| > -4$

20. $|2y - 9| \le 27$

Chapter 2 Linear Relations and Functions

Forms of Linear Equations

Standard	**Point-Slope**	**Slope-intercept**
$Ax + By = C$	$(y - y_1) = m(x - x_1)$	$y = mx + b$

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

Example:

Graph $2x - 3y = -18$

Method A: using a table
Find the x-intercept
$2x - 3(0) = -18$
$2x = -18$

$x = -9$

Find the y-intercept
$2(0) - 3y = -18$
$-3y = -18$
$y = 6$
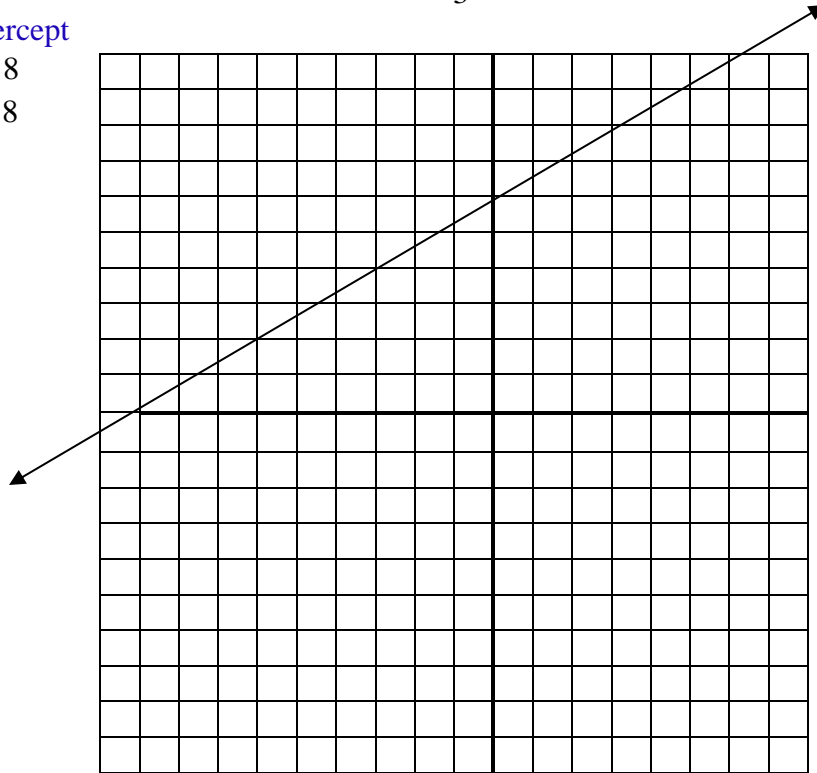
Method B: using slope-intercept form
Solve for y
$2x - 3y = -18$
$-3y = -2x - 18$
$y = \dfrac{2}{3}x + 6$

Graph:

1. $5x + 2y = 20$

2. $3y - x = -6$

Example:

Write equations of lines given slope and a point.

$m = -\dfrac{3}{2}$, passes through $(-4,1)$

$y = mx + b$

$1 = -\dfrac{3}{2}(-4) + b$ Substitute the point for x and y and the slope for m

$1 = 6 + b$ Simplify

$-5 = b$ Simplify

$y = -\dfrac{3}{2}x - 5$ Write the equation in slope-intercept form

Write the equation of the line with the given slope passing through the given point

3. $m = 3$; $(5,7)$ 4. $m = \dfrac{2}{3}$; $(-12,2)$

Example:

Write equations of lines given two points.

$(6,1);(8,-4)$

$m = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{-4-1}{8-6} = -\dfrac{5}{2}$ Use the slope formula to find slope

$y = mx + b$

$1 = -\dfrac{5}{2}(6) + b$ Use the slope and one point to find b

$1 = -15 + b$

$16 = b$

$y = -\dfrac{5}{2}x + 16$ Write the equation

Write the equation of the line passing through the two given points.

5. $(2,-3);(-3,7)$ 6. $(-3,5);(2,2)$

Example:

Write equations of parallel and perpendicular lines.

If $m = -\dfrac{5}{2}$, then the parallel slope is the same $m = -\dfrac{5}{2}$

and the perpendicular slope is the opposite reciprocal $m = \dfrac{2}{5}$

Write the equation of the line that passes through $(2,-1)$, perpendicular to the graph of $2x + 3y = 6$.

First find the slope of the line (solve for y)

$$2x + 3y = 6$$

$$\underline{-2x \qquad\qquad -2x} \qquad\qquad\qquad \text{Subtract } 2x$$

$$\dfrac{3y}{3} = \dfrac{-2x}{3} + \dfrac{6}{3} \qquad\qquad\qquad \text{Divide by 3}$$

$$y = -\dfrac{2}{3}x + 2 \qquad\qquad\qquad \text{Simplify}$$

$$\text{Perpendicular slope is } m = \dfrac{3}{2}$$

$$y = mx + b$$

$$-1 = \dfrac{3}{2}(2) + b \qquad\qquad\qquad \text{Use the slope and the point to find b}$$

$$-1 = 3 + b$$

$$-4 = b$$

$$y = \dfrac{3}{2}x - 4 \qquad\qquad\qquad \text{Write the equation}$$

Write the equation of parallel or perpendicular lines

7. $(2,-1)$, parallel to graph of $2x + 3y = 6$

8. $(-4,1)$, perpendicular to line whose slope is $-\dfrac{3}{2}$

Challenge: $(2,-5)$, perpendicular to graph of $x = 4$

Chapter 3 Systems of Equations and inequalities
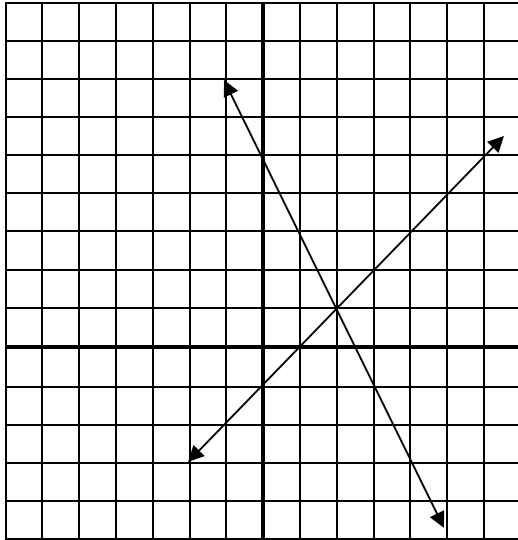**Methods to solve a system of equations**

    1. Graphing

$4x + 2y = 10$

$x - y = 1$

Solve each equation for y

$4x + 2y = 10 \rightarrow y = -2x + 5$

$x - y = 1 \rightarrow y = x - 1$

The solution is $(2,1)$, where the two graphs intersect.

2. Substitution

$4x + 2y = 10$

$x - y = 1$

Solve one equation for one variable

    $x - y = 1 \rightarrow x = y + 1$

Substitute into other equation

    $4(y + 1) + 2y = 10$

Solve the equation

    $4(y + 1) + 2y = 10$

    $4y + 4 + 2y = 10$

    $6y + 4 = 10$

    $6y = 6$

    $y = 1$

Plug the answer into one of the original
equations to find the other variable.

    $x - (1) = 1$

    $x = 2$

Solution is $(2,1)$

3. Elimination

$4x + 2y = 10$

$x - y = 1$

Choose a variable to be opposite coefficients
Let's choose y. Multiply 2nd equation by 2

    $4x + 2y = 10 \rightarrow 4x + 2y = 10$

    $2(x - y = 1) \rightarrow 2x - 2y = 2$

    $6x \quad = 12$ Add

    $x = 2$

Plug the answer into one of the original
equations to find the other variable.

    $(2) - y = 1$

    $-y = -1$

    $y = 1$

Solution is $(2,1)$

Solve the following system using all 3 methods. (Do all work on answer key)

$$x + 2y = 6$$
$$2x + y = 9$$

1. Graphing
2. Substitution
3. Elimination

Solving systems of inequalities

The solution is the intersection of the shaded areas of the graphs.
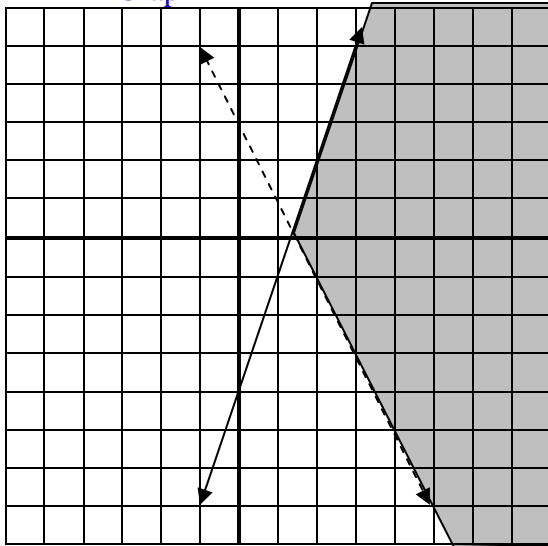
$$3x - y \geq 4$$
$$2x + y > 3$$

Solve for y

$$3x - y \geq 4 \rightarrow y \leq 3x - 4$$
$$2x + y > 3 \rightarrow y > -2x + 3$$

Graph

Solve the system of inequalities

4. $3x + 2y \geq 6$
        $4x - y > 2$

Name _____   Summer Packet – Answer Sheet

You **MUST** show your work and circle your answers.

Chapter 1

1.   2.

3.   4.

5.   6.

7.   8.

9.   10.

11.   12.

13.

14.

15.

16.

17.

18.

19.

20.

Name _____ Summer Packet – Answer Sheet

You **MUST** show your work and circle your answers.

Chapter 2

1.   2.

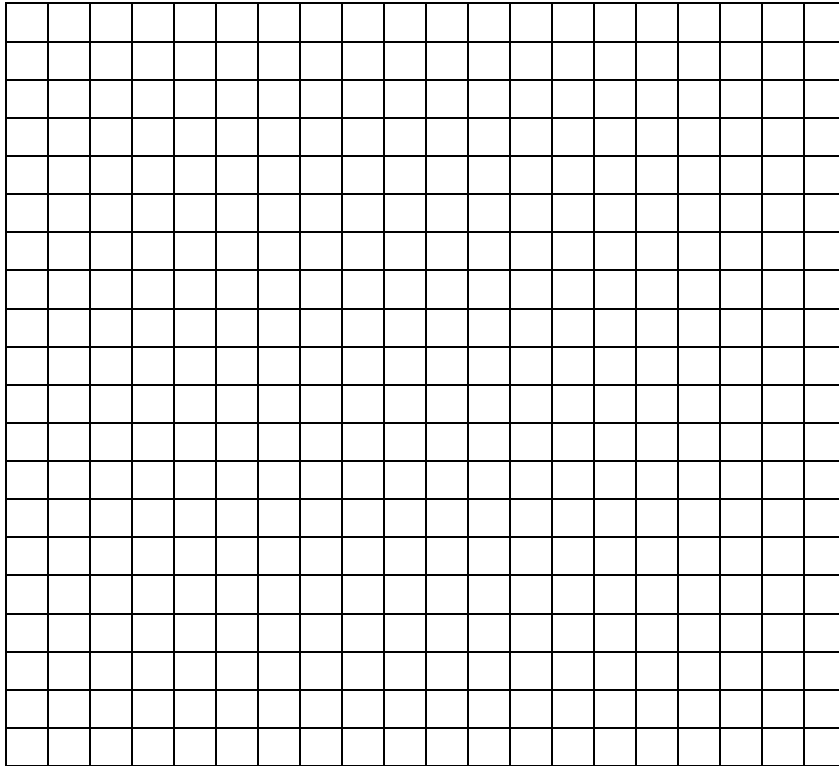3.   4.

5.   6.

7.   Parallel   8.   Perpendicular

9. CHALLENGE:

Name _____   Summer Packet – Answer Sheet
You **MUST** show your work and circle your answers.
Chapter 3

    1.   Graph

    2.   Substitution

    3. Elimination

4. Graphing Inequalities