

Name: _____

Date: _____

Greeting Students,

Congratulations on enrolling in Honors Algebra II! This course will challenge you to think critically and deepen your understanding of mathematical concepts that are foundational for advanced studies in math and science. To set yourself up for success, it's important to maintain your math skills over the summer.

This packet includes prerequisite skills that will help you be well-prepared for the rigor of this course. Please show your work for every problem. You may either print the packet or complete your work on notebook paper. Be sure to note any problems you don't understand — I'll go over questions during the first few days of school.

This assignment will count as one homework grade, and there will be a test based on the summer work. Have a great summer!

Mrs. Diaz

Prerequisite Skills for Algebra II

- 1) Simplify and evaluate expressions
- 2) Solve basic equations (linear and quadratic)
- 3) Solve absolute value equations
- 4) Determine if relations are functions or not
- 5) Function notation
- 6) Domain and range of a function
- 7) Calculate/Interpret the equation of a line
- 8) Graph linear functions
- 9) Solve systems of 2 equations
- 10) Solve and graph inequalities
- 11) Simplify and factor polynomial expressions
- 12) Simplify radical expressions
- 13) Solve and write explanations for word problems

Skill #1: Simplify and Evaluate Algebraic Expressions

Simplify the expressions by combining like terms.

1. $5a - a$

2. $-(3x - 4y) + 2(2y - 6x)$

3. $7b - (3a - 8b)$

4. $-a^2 + b^2 - \frac{a^2}{2}$

5. $0.5x - 1.5x$

6. $\left(\frac{r}{2}\right)^2 + 3r^2 + r$

Evaluate the expressions for the given value of the variable.

7. $x + 2x - x - 1; x = 2$

8. $5c^3 - 6c^2; c = -5$

9. $y^2 + 4; y = \sqrt{7}$

10. $4a + 7b - 3 + 6b;$
 $a = 2, b = -5$

11. $12(1.1)^t; t = 8$

12. $\frac{3k+2(k-4)}{k+8}; k = -3$

12. Write an expression to model the situation:

You have a summer job at a car wash. You earn \$8.50 per hour and are expected to pay a one-time fee of \$15 for the uniform. If you work x hours in your first week, how much money will you make in that week?

Skill #2: Solve Basic Equations

Solve each equation.

13. $5c - 9 = 8 - 2c$

14. $5(2 - g) = 0$

15. $6(n - 4) = 3n$

16. $x^2 = 16$

17. $3x^2 - 5 = 22$

18. $\sqrt{x} + 3 = 8$

19. The first stage of a rocket burns for 28 seconds longer than the second stage. If the rocket's total burning time is 158 seconds, for how long does each stage burn?

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20. The length of a rectangle is 3 cm greater than the width. The perimeter is 24 cm. What are the dimensions of the rectangle?

Solve each formula for the indicated variable.

21. $v = s^2 + \frac{1}{2}sh$; for h

22. $C = \frac{5}{9}(F - 32)$; for F .

Skill #3: Solve Absolute Value Equations

Solve each equation. Check for extraneous solutions.

23. $|2x + 8| - 4 = 12$

24. $|3x - 2| = 7$

25. $|x - 1| = 5x + 10$

26. $|2x + 5| = 3x + 4$

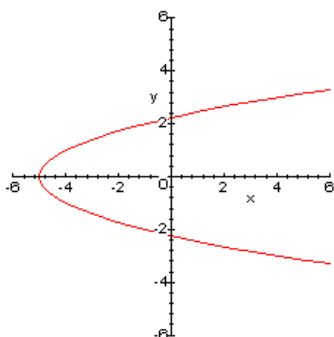
Skill #4: Relations and Functions

Determine if each relation is a function.

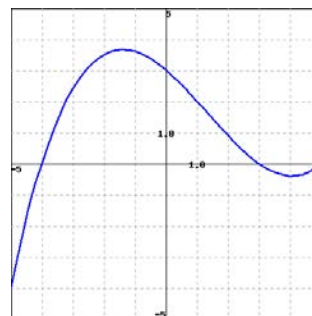
27. $\{(2, 4), (3, 5), (2, 7), (1, 8)\}$

28. $\{(1, 3), (2, 3), (3, 3)\}$

29.



30.



Skill #5: Function Notation

Find $f(-4)$ for each function.

31. $f(x) = 2x^2 + 3x - 7$

32. $f(x) = \frac{2}{x}$

33. $f(t) = t^3 - \frac{t}{2}$

Solve for the missing variable.

34. What value of x makes $f(x) = 8$ if $f(x) = 3x + 12$?

35. What value(s) of t make $f(t) = 2$, if $f(t) = t^2 - 7$.

Evaluate the function.

36. If $f(x) = 2x + 3$, what is the function for $f(x + 2)$?

37. If $f(x) = 2x + 3$, what is the function for $f(2x)$?

Skill #6: Domain and Range

Identify the domain and range of each relation.

38. $\{(2, 4), (3, 5), (2, 7), (1, 8)\}$

Domain: _____

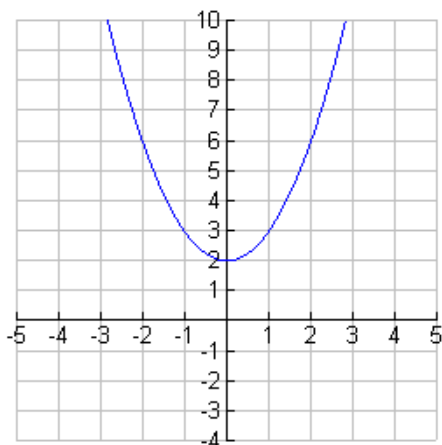
Range: _____

39. $\{(1, 3), (2, 3), (3, 3)\}$

Domain: _____

Range: _____

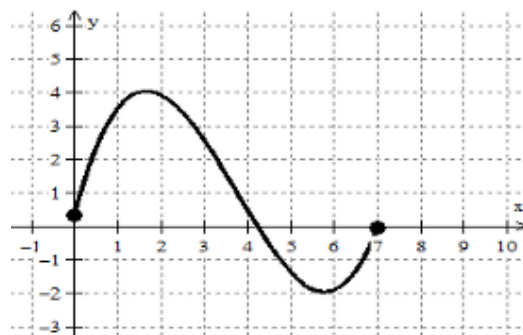
40.



Domain: _____

Range: _____

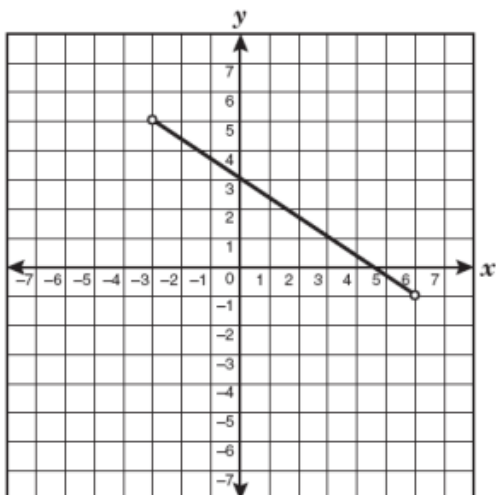
41.



Domain: _____

Range: _____

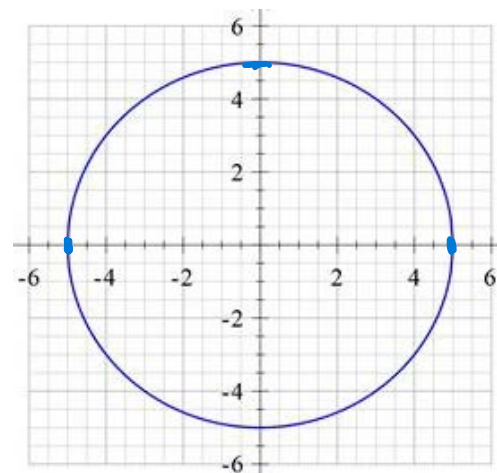
42.



Domain: _____

Range: _____

43.



Domain: _____

Range: _____

Skill #7: Linear Equations

44. Identify the slope and the y-intercept of the following linear equations.

a. $y = \frac{1}{3}x + 9$

b. $y = -2x$

c. $2x - 4y = 12$

d. $3x + 4y = 18$

45. Find the equation in slope-intercept form of a line with a slope of -2 and a y-intercept of -9.

46. Find the equation of a line in slope-intercept form that has a slope of 4 and passes through (3, 8).

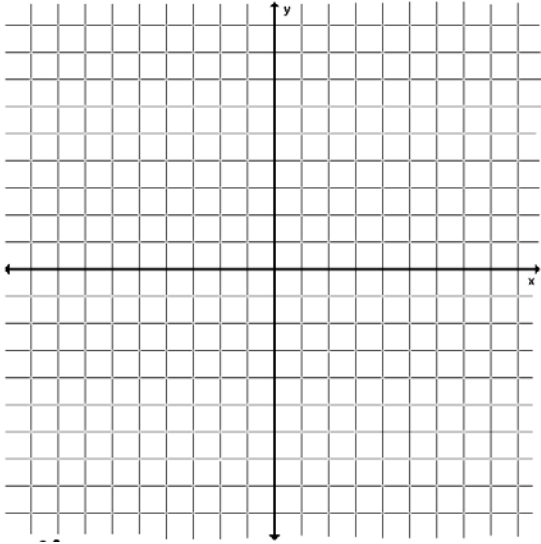
47. Find the equation of a line in slope-intercept form that passes through (2, 5) and (-2, 3).

48. Convert the equation into standard form: $y = \frac{1}{3}x + 7$

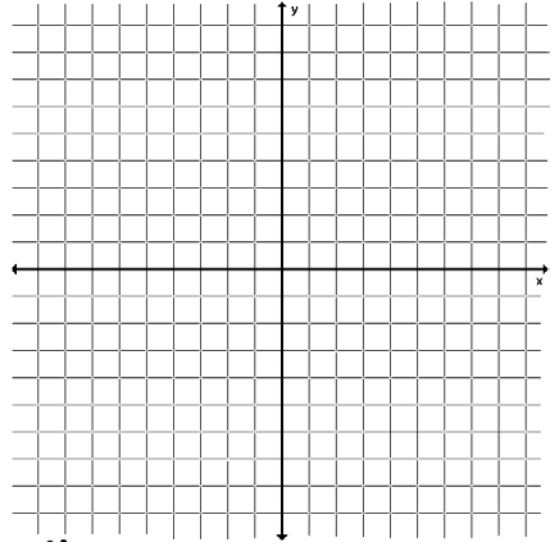
Skill #8: Graphing Linear Functions

Graph the following linear functions on the coordinate plane.

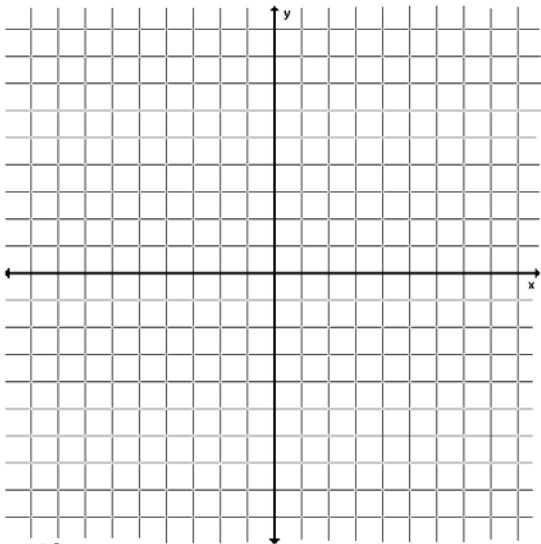
49. $f(x) = 3x + 2$



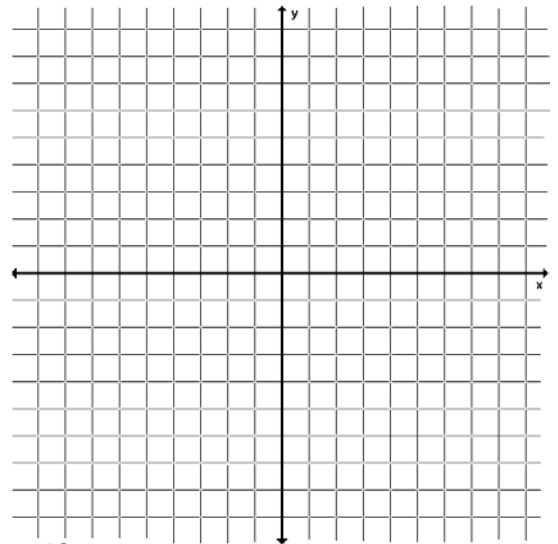
50. $f(x) = -\frac{2}{5}x - 1$



51. $3x + 4y = 12$



52. $2x - 5y = 15$



Skill #9: Solving Systems of 2 Equations

Solve the systems by substitution. Write your answer as a coordinate pair(s), if it exists.

53. $\begin{cases} y = 6x - 11 \\ -2x - 3y = -7 \end{cases}$

54. $\begin{cases} y = 4x - 9 \\ y = x - 3 \end{cases}$

55. $\begin{cases} y = -2x + 6 \\ 2x + y = -7 \end{cases}$

Solve the systems by elimination. Write your answer as a coordinate pair, if it exists.

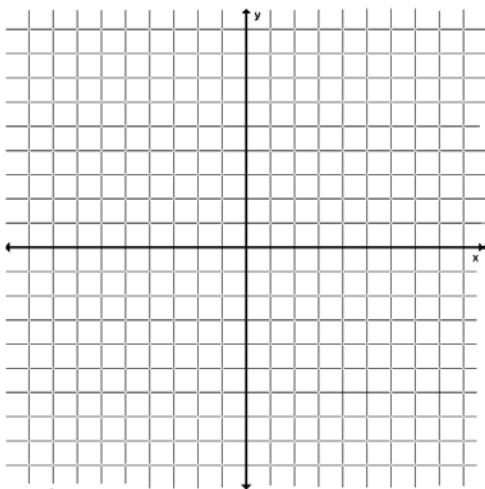
56. $\begin{cases} 6x - 12y = 24 \\ -x - 6y = 4 \end{cases}$

57. $\begin{cases} 3x - 4y = 2 \\ -6x + 8y = -4 \end{cases}$

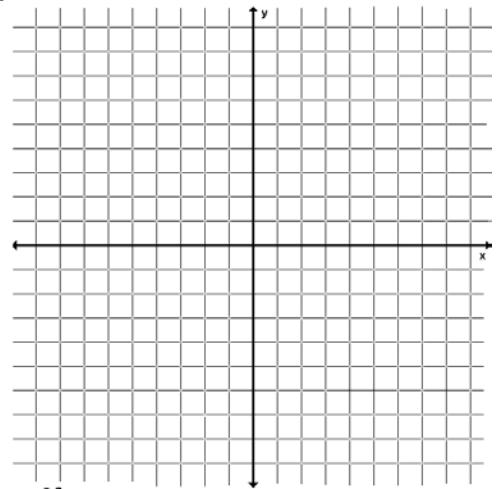
58. $\begin{cases} -11x - 4y = 36 \\ -10x - 10y = 20 \end{cases}$

Solve the systems by graphing. Write your answer as a coordinate pair, if it exists.

59. $\begin{cases} y = x + 2 \\ x = -3 \end{cases}$



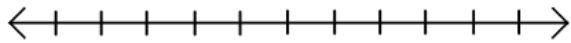
60. $\begin{cases} y = -3x + 4 \\ 3x - y = 2 \end{cases}$



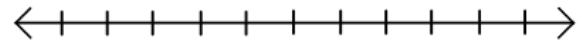
Skill #10: Solve and Graph Inequalities

Solve each inequality. Then, graph it on the number line. Label the number line for each problem.

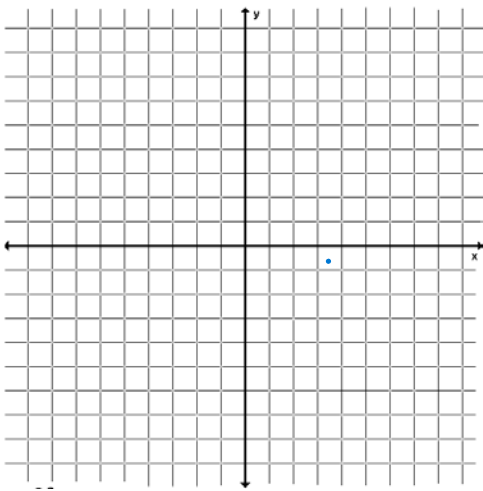
61. $7x + 4 > 18$



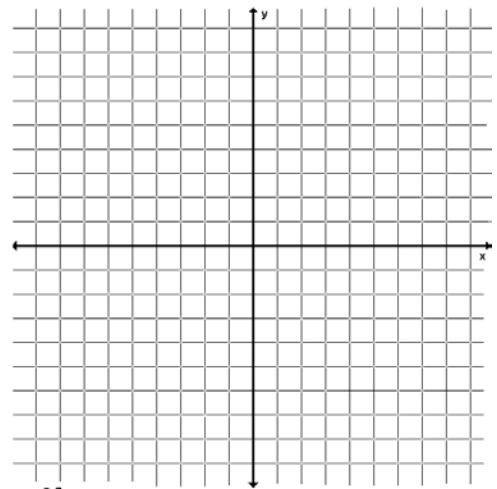
62. $-2(x + 5) \geq -16$



63. $y < -2x + 7$



64. $2x + 6y \geq 18$



Skill #11: Simplify and Factor Polynomial Expressions

Simplify the expressions by multiplying and combining like terms.

65. $(2x + 7)(3x - 5)$

66. $2x^2(x^3 + 5x^2 - 6)$

67. $(3x - 1)(x^2 + 4x - 2)$

68. $(x^2 - 3x + 4)(x^2 + x - 5)$

Factor the given expressions using the method described.

69. Factor out the greatest common factor:

a. $10x^2y^2 + 15xy^3 - 5xy^2$

b. $-6rs - 12r^2s + 9rt$

70. Factor by difference of squares. If the expression is not factorable, write “N.F.”

a. $x^2 - 81$

b. $4t^2 - 25$

c. $z^2 + 36$

d. $x^4 - 49$

71. Factor the trinomial into two binomials. If the expression is not factorable, write “N.F.”

a. $x^2 + x - 12$

b. $x^2 + 13x + 40$

c. $x^2 - 17x + 72$

d. $2x^2 - 6x - 8$

e. $2x^2 - 9x - 18$

f. $12x^2 + 11x - 5$

Skill #12: Simplifying Radical Expressions

Simplify:

72. $2\sqrt{3} + 5\sqrt{3}$

73. $2\sqrt{5} \times 3\sqrt{5}$

74. $3\sqrt{3} \times 4\sqrt{5}$

Simplify the radicals:

75. $\sqrt{25}$

76. $\sqrt{200}$

77. $\sqrt{96}$

78. $\sqrt{216}$

79. $\sqrt{80x^2}$

80. $\sqrt{125x^3}$

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Skill #13: Word Problems

81. Phil and Matt made cookies for a fundraiser at their school. Phil made 25% more cookies than Matt. The cookies sold for \$0.25 each. After the sale, 20% of the combined total cookies remained.

a. Create an equation to represent the total amount of money Matt and Phil will earn at the fundraiser based on the number of cookies Matt baked. Explain how you determined your equation.

b. Phil and Matt made a total of \$72.00 at the fundraiser. How many cookies did Phil make, and how many did Matt make? Show your work.

c. Next month, Matt and Phil plan to bake the same number of cookies again, but want to sell them for \$0.50 each. They estimate they will only sell 70% of the cookies because of the price increase. Based on their prediction, should they increase the price? Justify your answer.

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82. Let $|x| + |y| = c$, where c is a real number.

Determine the number of solutions for x and y for each of the following scenarios. Justify your answer for each case.

Case 1: $c < 0$

Case 2: $c = 0$

Case 3: $c > 0$