Entering Algebra 2/Advanced Algebra 2 Summer Packet

Name: _____

Please complete every problem and SHOW ALL WORK. No Work = No Credit. Write your final answers on the answer sheet at the end of the packet. This assignment will be graded both for accuracy on the answer sheet and for showing work throughout the packet. *It is due on the first day you return to school.* This packet will count as a test grade in the first marking period of the new school year.

A test on similar problems and concepts in summer assignment will be administered during the first two weeks of class. Students who do not demonstrate an 80% proficiency score on the test will be placed in Algebra 2 rather than in Advanced Algebra 2. Those who score below a 73 will be required to attend weekly math skill strengthening sessions during lunch until an adequate level of proficiency is reached. Those who do not complete the summer packet with work shown will be placed in the weekly extra math strengthening sessions automatically.

Simplifying Expressions/ Combining Like Terms

- *Remember to distribute the negative sign if it is on the left (outside) of the parentheses.*
- *Terms with variables with exponents can only be added and subtracted with terms that have the same variable and degree.*
- *Integers (numbers) cannot be added/subtracted with other terms that have a variable.*
- *You can multiply any terms together. Numbers with terms that have a variable, terms with variables and terms with variables, they are allowed to be multiplied together.*

1) $4n - n$

2) $-6k + 7k$

3) $12r - 8 - 12$

4) $n + 4 - 9 - 5n$

5) $8x - 9y + 16x + 12y$

6) $5n - (3 - 4n)$

7) $14y + 22 - 15y^2 + 23y$

8) $-2(11b - 3)$

9) $(8c + 3) + 12(4c - 10)$

10) $9(6x - 2) - 3x(9x - 3)$

Solving Equations

Solve each equation. You must show all work.

11) $26 = 8 + v$

12) $m + 4 = -12$

13) $v - 15 = -27$

14) $\frac{m}{4} = -13$

15) $21 = -7n$

16) $-17x = -204$

17) $-6 = \frac{b}{18}$

18) $8(3x - 4) = 196$

19) $45 - 720 + 15x = 60$

20) $-131 = -5(3x - 8) + 6x$

21) $-6 + \frac{x}{4} = -5$

22) $\frac{v+9}{3} = 8$

SOLVING EQUATIONS WITH VARIABLES ON BOTH SIDES

Example

Solve.

$6a - 12 = 5a + 9$

Subtract 5a from both sides

$a-12=9$

Add 12 to each side
$\alpha = 21$

Exercises: Solve the equation.

23) $3x + 5 = 2x + 11$

24) $8m + 1 = 7m - 9$

25) $11q-6=3q + 8q$

26) $-14 + 3a = 10 - a$

Solving Literal Equations

- *A literal equation is an equation that contains more than one variable.*
- *You can solve a literal equation for one of the variables by getting that variable by itself (isolating the specified variable).*

Ex 26

Given the formula for the surface area of a right cylinder, solve for h. $S = 2\pi r^2 + 2\pi rh$

$S = 2\pi r(r + h)$

$\frac{S}{2\pi r} = r + h$

$\frac{S}{2\pi r} - r = h$

or

$S - 2\pi r^2 = 2\pi rh$

$\frac{(S - 2\pi r^2)}{2\pi r} = h$

27) $\mathrm{Y} + \mathrm{V} = \mathrm{W}$, for V

28) $g = x - c + y$, $for\ x$

29) $9wr = 81$, $for\ w$

30) $dx + t = 10$, $for\ x$

31) $g = ca - b$, $for\ a$

32) $am = n + p$, $for\ a$

33) $u = \frac{ak}{b}$, $for\ a$

34) $z = b + \frac{m}{a}$, $for\ a$

Rules of Exponents

Simplify each expression.

35) $(c^5)(c)(c^2)$

36) $\frac{m^{15}}{m^3}$

37) d^0

38) $\frac{(45y^3z^{10})}{5y^3z}$

39) $(3m^2n)^4$

40) $4x(2x^2y)^0$

41) $(3x^4y)(2y^2)^3$

42) $\frac{m^4}{2m^4}$

Binomial Multiplication

43) $(x+7)(x-12)$

44) $(x-10)(x-2)$

45) $(x+10)^2$

46) $(-3x-4)(2x+4)$

47) $(2x-3)^2$

48) $(-x+5)^2$

49) $(2x-1)(4x+3)$

50) $(-2x+10)(-9x+5)$

Factoring

Factor each expression.

51) $3x^2 + 6x$

52) $4ab - 16ab^2 + 8ab^2c$

53) $x^2 - 25$

54) $n^2 + 8n + 15$

55) $g^2 - 9g + 20$

56) $z^2 - 7z - 30$

57) $4y^3 - 36y$

58) $5k^2 + 30k - 135$

59) $d^2 + 3d - 28$

60) $m^2 + 18m + 81$

SOLVING INEQUALITIES
Example:

When you multiply or divide each side of an Inequality by a negative number, you must reverse the inequality symbol to maintain a true statement.

a. $5x - 4 \geq 4x + 6$

Solve for x as if you would for a normal equation. The only difference is the inequality symbol (< or >)

$x - 4 \geq 6$

$x \geq 10$

b. $10 - 7x < 24$

Solve for x per usual.

$-7x < 14$

Here, you must divide both sides by NEGATIVE 7. When you divide by a negative number, you must flip the inequality symbol (from < to > in this case)

$x > -2$

61) $-x + 2 > 7$

62) $-5 + m < 21$

63) $z + 6 > -2$

64) $c - 18 < 10$

65) $x - 5 < 4$

66) $-3x + 4 \leq -5$

SOLVING PROPORTIONS

Examples:

a. $\frac{x}{8} = \frac{3}{4}$

Cross multiply.

$4x = 8 \times 3$

Once you cross multiply, you solve as usual.

$4x = 24$

$x = 6$

b. $\frac{6}{x+4} = \frac{2}{9}$

$6 \times 9 = 2(x + 4)$
$54 = 2x + 8$
$46 = 2x$
$23 = x$

Solve.

67) $\frac{y}{50} = \frac{3}{100}$

68) $\frac{6}{45} = \frac{2z+10}{15}$

69) $\frac{3}{p-6} = \frac{1}{p}$

70) $\frac{3}{8} = \frac{3}{2d}$

71) $\frac{1}{18} = \frac{5}{-4(x-1)}$

72) $\frac{r}{3r} + 1 = \frac{2}{3}$

73) $\frac{3w+6}{28} = \frac{3}{4}$

74) $\frac{3}{m+4} = \frac{9}{14}$

75) $\frac{w}{4} = \frac{9}{w}$

Function Notation

In the first example, you would replace 6 *wherever* n *is.* $3 * 6 = 18$

76) $h(n) = 3n;$ *Find* $h(6)$

77) $w(x) = -3x - 4;$ *Find* $w(7)$

78) $g(t) = 3t + 4;$ *Find* $g(-3)$

80) $g(n) = n^2 + 2;$ *Find* $g(3)$

79) $w(n) = -2n - 2;$ *Find* $w(9)$

81) $w(x) = -3x^2 - x;$ *Find* $w(-4)$

Substitution

Substitute the value of the given variable in the second equation.

In the first example, you would plug in -2 *for* y *in the second equation.*

$$4x - 3(-2) = 18$$

$$4x + 6 = 18 \quad ; solve\ for\ x$$

$$4x = 12$$

$$x = 3$$

82) $y = -2$
$4x - 3y = 18$

83) $x = 5$
$x + y = 12$

84) $x = -2$
$x + 3y = 4$

85) $y = 2x$
$x + y = 9$

Evaluate the expression if $a = 2, b = -3, c = -1, and\ d = 4.$

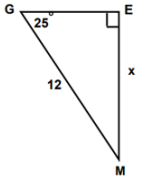
86) $2a + c$	87) $\frac{bd}{2c}$	88) $5bc$

Trigonometry

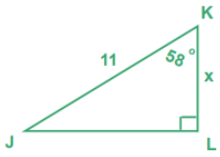
$$sin\theta = \frac{opposite}{adjacent} \qquad cos\theta = \frac{adjacent}{hypotenus} \qquad tan\theta = \frac{opposite}{adjacent}$$

SOH − CAH − TOA Make sure your calculator is set to degrees

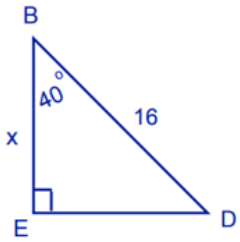
89)



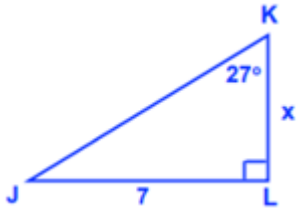
92)



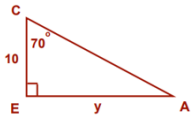
90)



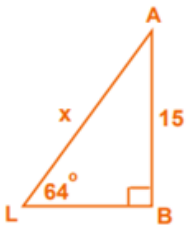
93)



91)



94)



Make sure your calculator is set to degrees

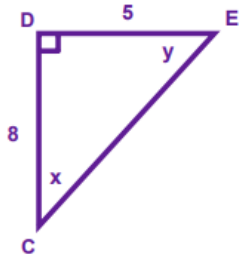
Trig ratios have inverses. These inverses are necessary to use when solving for a missing angle.

$$sin\theta \ -inverse- \sin^{-1}\theta$$

$$cos\theta \ -inverse- \cos^{-1}\theta$$

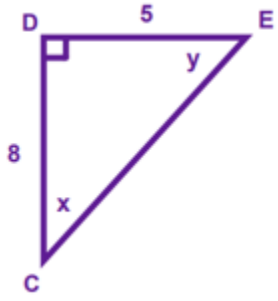
$$tan\theta \ -inverse- \tan^{-1}\theta$$

Example: Solve for x

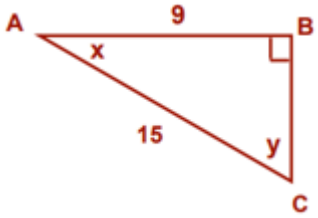


- $tanx = \frac{5}{8}$
- *Solve for x by using the inverse operation of* tan *which is* $\tan^{-1}$
- $x = \tan^{-1}\frac{5}{8}$
- $x = 32\ degrees$

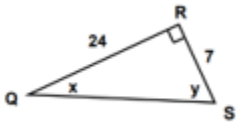
95)



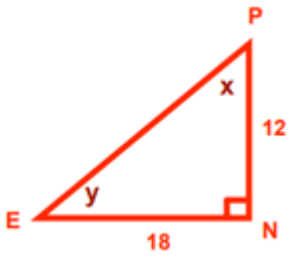
97)



96)



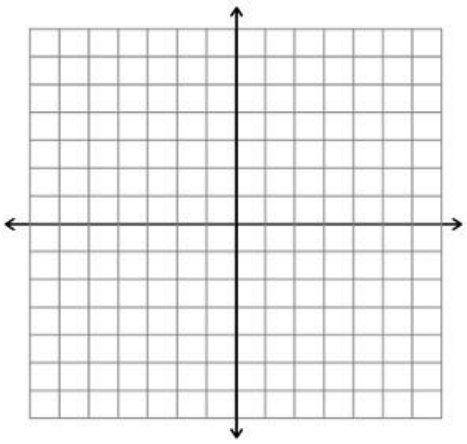
98)



Slope − Intercept Form of the Equation of a Line

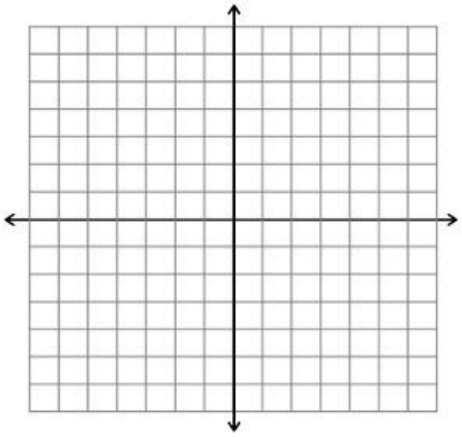
The slope-intercept form for the equation of a line with slope m and y-intercept b is $y=mx+b$

Example: $y = 3x - 1$
The slope is 3. This number is next to the x variable thus representing the slope
The y-intercept is -1. This number represents the b in the y=mx+b equation.



Place a point on the y-axis at -1 (this is the y-intercept (0,-1)). Slope is 3 or 3/1, so you place another point 3 units up, 1 unit to the right (rise over run). This would place your next point at (1,2). Don't forget that the x coordinates are left and right while the y coordinates are up and down. Once you have both points labeled, you can draw a line through both to represent the line of the equation $y = 3x - 1$

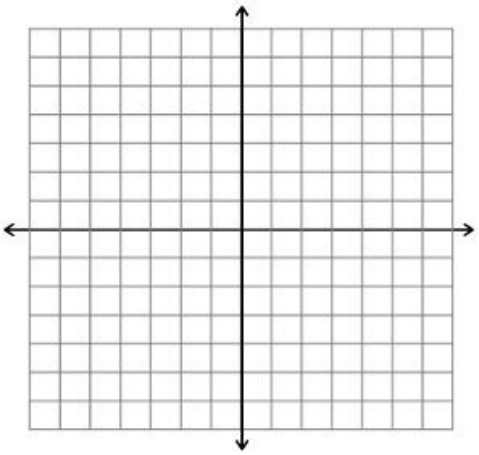
Example: $y = -\frac{3}{4}x + 2$
The slope is $-\frac{3}{4}$. This is the number next to the x variable.
The y-intercept is 2.



Place a point on the y-axis at 2 (this is the y-intercept (0,2)). Slope is -3/4, so you place another point 3 units down (negative 3), 4 unit to the right (rise over run). This would place your next point at (4,-1). Once you have both points labeled, you can draw a line through both to represent the line of the equation $y = -\frac{3}{4}x + 2$

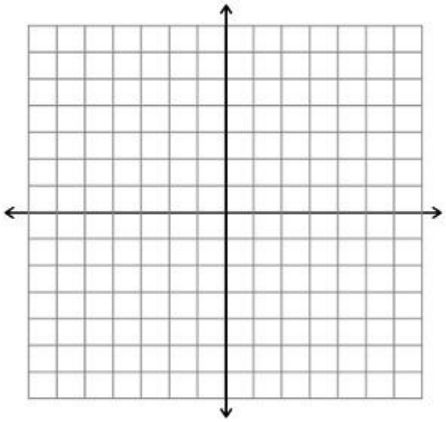
99) $y = 2x + 5$

Slope: ____ y-intercept: ____



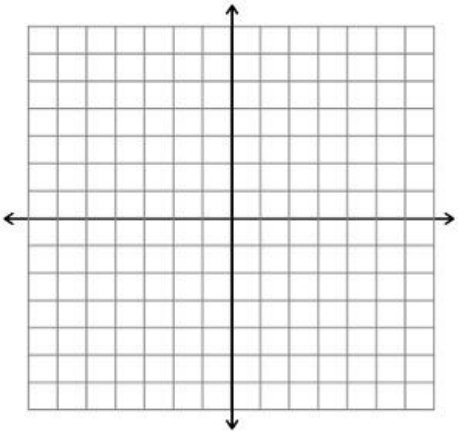
100) $y = \frac{1}{2}x - 3$

Slope: ____ y-intercept: ____



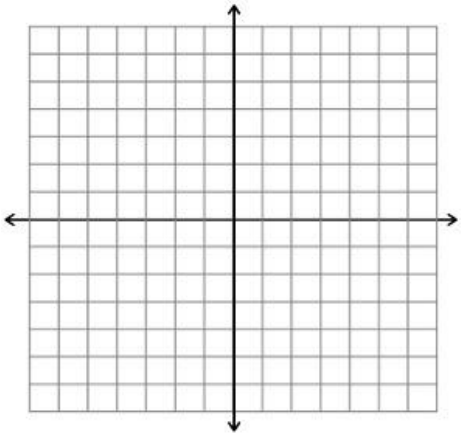
101) $y = -\frac{2}{5}x + 4$

Slope: ____ y-intercept: ____



102) $y = -3x$

Slope: ____ y-intercept: ____



Slope of a line

The slope of a line can be determined a few ways

- *If you have two coordinates, you can use the equation slope* $= \frac{y2-y1}{x2-x1}$
- *If the equation of a line is in* $y = mx + b$ *form, you can identify slope as* m
- *If the equation of a line is not in* $y = mx + b$ *form, solve for* y*. You will have the equation in slope intercept form if it is a linear equation.*
- *If a line has a slope parallel to a different line, they have the same exact slope*
- *If a line has a slope perpendicular to that of a different line, the slope is the opposite reciprocal of the slope it is compared to.*
  - *Example:* $y = 3x + 1$*, the slope of a line perpendicular to it is*
    - $-\frac{1}{3}$

Find the slope of each line:

103) $y = \frac{9}{5}x + 5$

104) $x = -y - 5$

105) $7x - 5y = 20$

106) $5x + y = 3$

Find the slope of the line that passes through the following two points:

107) (-5,10) and (-3,4)

108) (3,1) and (-6,-2)

Write the slope-intercept form of the equation of the line described.

- **Identify the slope of the line, plug that in to $y = mx + b$**
- *To find b, plug in one of the given coordinates as your x and y variables, solve for b*

Example: Equation of a line with a slope of $-\frac{1}{2}$ *passing through* $(-6,-3)$

Slope is given to us as $-\frac{1}{2}$. *I now have the equation* $y = -\frac{1}{2}x + b$

I can solve for b by plugging in the given coordinate $(-6,-3)$.

-6 *is the* $x-$*coordinate*

-3 *is the* $y-$*coordinate*

$-3 = -\frac{1}{2}(-6) + b$ *Simplify.*

$-3 = 3 + b$ *Solve for b*

$-6 = b$ *Now plug b in to your $y = mx + b$ equation*

$y = -\frac{1}{2}x - 6$

Remember that in the equation of the line, y and x will remain as y and x

109) *Passing through* $(-3,3)$ *and* $(1,-1)$

110) *Parallel to* $y = \left(-\frac{1}{5}\right)x - 7$ *and passes through* $(2,3)$

111) *Perpendicular to* $y = 3x$ *and passes through* $(0,3)$

Algebra 2/ Adv Algebra 2 Answer Key

Simplifying Expressions

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Solving Equations

11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____

Solving Equations with variables on both sides

23. _____
24. _____
25. _____
26. _____

Solving Literal Equations

27. _____
28. _____
29. _____
30. _____
31. _____
32. _____
33. _____
34. _____

Rules of Exponents

35. _____
36. _____
37. _____
38. _____
39. _____
40. _____
41. _____
42. _____

Binomial Multiplication

43. _____
44. _____
45. _____
46. _____
47. _____
48. _____
49. _____
50. _____

Factoring

51. _____
52. _____
53. _____
54. _____
55. _____
56. _____
57. _____
58. _____
59. _____
60. _____

Solving Inequalities

61. _____
62. _____
63. _____
64. _____
65. _____
66. _____

Solving Proportions

67. _____
68. _____
69. _____
70. _____
71. _____
72. _____
73. _____
74. _____
75. _____

Function Notation

76. _____
77. _____
78. _____
79. _____
80. _____
81. _____

Substitution

82. _____
83. _____
84. _____
85. _____

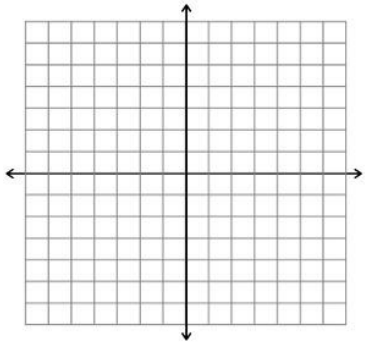
Evaluate

86. _____
87. _____
88. _____

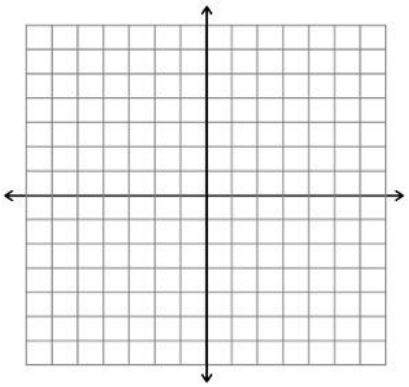
Trigonometry

89. _____
90. _____
91. _____
92. _____
93. _____
94. _____
95. _____
96. _____
97. _____
98. _____

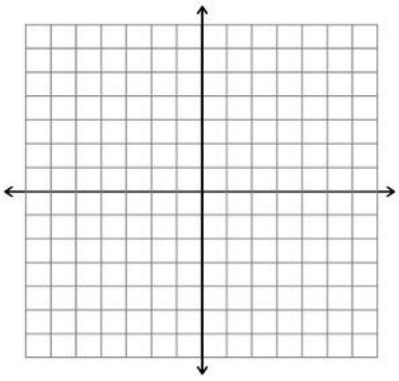
99. Slope: ____ y-intercept: ____



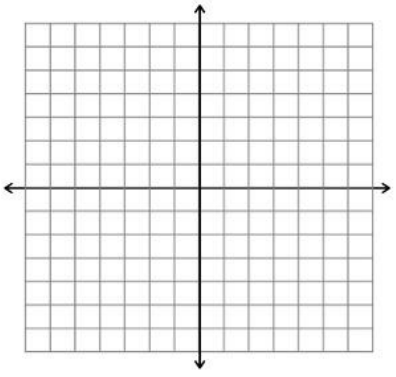
100. Slope: ____ y-intercept: ____



101. Slope: ____ y-intercept: ____



102. Slope: ____ y-intercept: ____



Slope of a Line

103. _____
104. _____
105. _____
106. _____
107. _____
108. _____
109. _____
110. _____
111. _____