SOUTHINGTON HIGH SCHOOL

Richard Aroian, Principal
Assistant Principals: Leah Clark, Simone Crouch, Thomas Hinman, Kathleen Reynolds

Dear Students,

Attached to this letter you will find a comprehensive set of problems that reflect critical math skills that should be mastered prior to entering your Algebra 2 class at Southington High School. You are encouraged to utilize a wide range of methods for finding the correct answer, including techniques both with and without the aid of a calculator*. Working with a friend, sibling, or parent might be a helpful way to complete this assignment! Also watching videos on Khan Academy is encouraged. You can access Khan Academy by going to https://www.khanacademy.org/

On the first or second day of the course your teachers will check your packets for completion and review how to solve some of the problems that are most important to beginning your first unit of the year. To receive full credit for completing the assignment you must attempt each problem and show all work used to complete it. Soon thereafter, you will be given a brief assessment on these skills to measure your progress and readiness for the course. Please note: the work and answers to the odd questions are in this packet. They are provided as a means to assess your work as you go.

Our goal is for you to have a successful and enjoyable transition into your Algebra 2 class at Southington High School and this packet is meant to help facilitate this process. Our absolute hope is that you try your best and remember that your teachers are prepared to help you with any challenges you faced when you return in late August.

Sincerely,

Marisa Kudla
Mathematics Department Leader
Southington High School
860-628-3229, ext. 11243
mkudla@southingtonschools.org

Rich Aroian
Principal
Southington High School
860-628-3229, ext. 11232
raroian@southingtonschools.org

*Reminder: A calculator is an important tool used within this course. Students are strongly encouraged to obtain one for their personal use. Copies of this packet may be found on the Southington High SchoolWebsite. Go to www.southingtonschools.org and click on the link to Parent Resources

Name: _____ **Date:** _____

ALGEBRA 2 SUMMER PACKET 2026

Factor the following expressions, completely:

1) $5x^2 + 15x$

2) $x^2 - 4$

3) $x^2 + 7x + 10$

4) $x^2 - 36$

5) $x^2 + 8x + 15$

6) $x^2 - 3x - 18$

7) $2x^2 + 4x - 48$

8) $x^2 - 13x + 36$

9) $x^2 - 2x - 35$

10) $x^2 + 5x + 6$

11) $3x^2 - 3x - 60$

12) $4x^2 + 28x + 40$

13) $3x^2 - 11x - 20$

14) $16x^2 - 25$

15) $3x^2 - 9x - 30$

16) $42x^2 + 6x$

17) $6x^2 - 7x - 5$

18) $2x^2 - 8$

19) $12x^2 - 27$

20) $5x^3 - 5x$

Simplify the Radical:

21) $\sqrt{25}$ 22) $\sqrt{12}$ 23) $\sqrt{27}$ 24) $\sqrt{200}$

25) $\sqrt{48}$ 26) $\sqrt{125}$ 27) $\sqrt{98}$ 28) $\sqrt{8}$

Perform the indicated operation:

29) $\frac{1}{4} + \frac{5}{4} =$ 30) $\frac{1}{6} - \frac{5}{6} =$ 31) $\frac{1}{4} + \frac{1}{2} =$

32) $\frac{1}{3} - \frac{5}{9} =$ 33) $\frac{1}{6} + \frac{5}{15} =$ 34) $\frac{3}{4} - \frac{1}{6} =$

35) $\frac{2}{3} \bullet \frac{4}{3} =$ 36) $\frac{1}{6} \div \frac{2}{15} =$ 37) $\frac{3}{4} \div 6 =$

Divide using Long Division:

38) $369 \div 3$ 39) $4113 \div 9$ 40) $308 \div 14$

41) $2760 \div 20$ 42) $1369 \div 14$ 43) $2544 \div 11$

Solve the following equations:

44) $8(2x - 5) = -6(3x - 4)$

45) $-x - 2 = 9(x - 8)$

46) $\frac{5}{4}x + 25 = -20$

Write in standard form (exponents should go in decreasing order):

47) $5(x + 12)$

48) $x(3x^2 - 4x - 2)$

49) $3x(x - 11)$

50) $(2x - 3) - (x - 5)$

51) $2(x + 5) + (x - 9)$

52) $4 - 2(x^2 - 1)$

53) $-\frac{2}{3}(3x - 6)$

54) $(x - 7)(x + 7)$

55) $-(x + 6)(x + 1)$

56) $(3x + 1)^2$

57) $2(x - 4)^2$

58) $-\frac{1}{2}(x + 1)^2$

Evaluate for the given value:

59) $f(x) = 2x - 1,\ f(2) =$ _____

60) $g(x) = x^2 - 5,\ g(4) =$ _____

61) $f(x) = 2x^2 + 4,\ f(-1) =$ _____

62) $g(x) = x^2 + 5x,\ g(-4) =$ _____

Find the slope and y-intercept for each equation:

63) y = 3x + 4

64) 2y = 2x + 10

Find the x-intercept and y-intercept for each equation:

65) y = 6x –12

66) 4y = 12x

67) 5x – 4y = 20

x-int:_____y-int:_____

x-int:_____y-int:_____

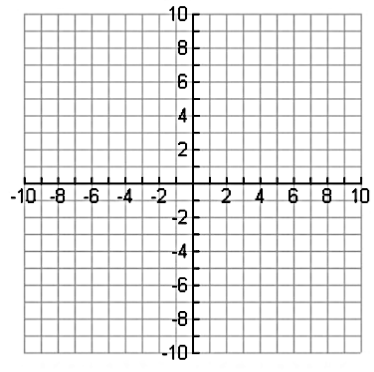
x-int:_____y-int:_____

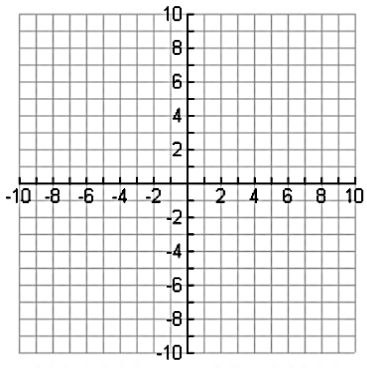
Graph the following:

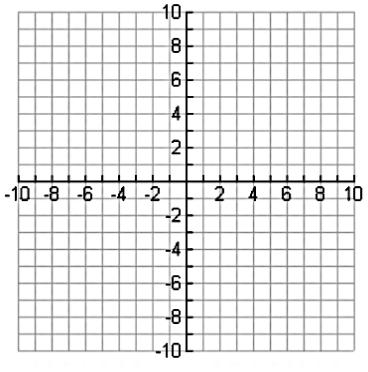
68) $y = 4$

69) $y = 2x - 3$

70) $y = -4x$

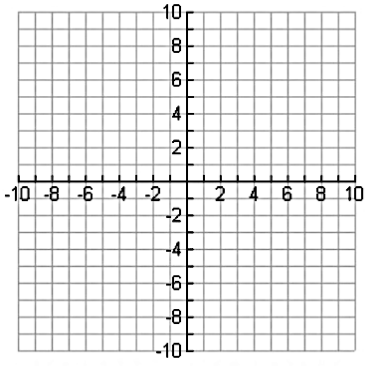




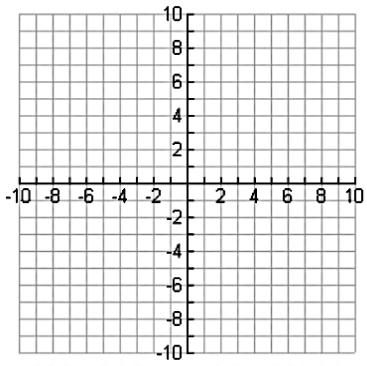


Graph the following:

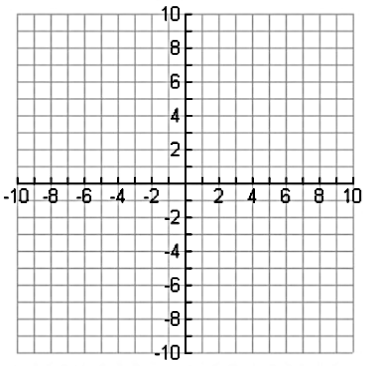
71) $x = -1$



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



73) $4y = -2x + 8$



Use Substitution to solve each system of equations:

74) y = 2
-2x + 3y = -8

Solution:_____

75) y = 3x – 9
y = -x – 1

Solution:_____

76) $4 = 8x$
$y = 8x - 1$

Solution:_____

77) x = 2y + 2
x – y = -3

78) 2x + 5y =10
$y = -\frac{2}{5}x + 2$

79) x + 3y = 7
$3y = -1x + 21$

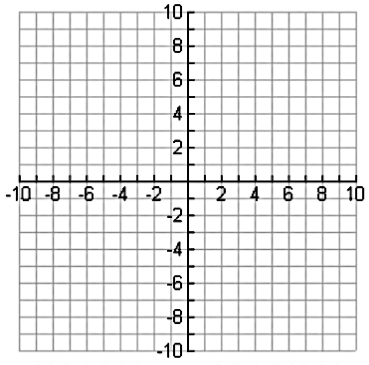
Solution:_____ Solution:_____ Solution:_____

Graph the system to find the solution:

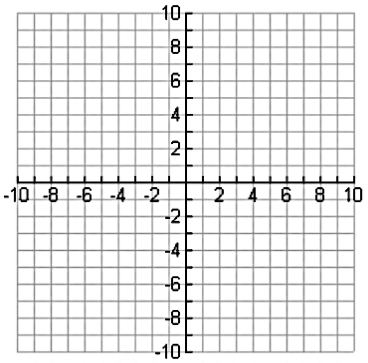
80) y = 2
-2x + 3y = -6

81) y = 3x – 9
y = -x – 1

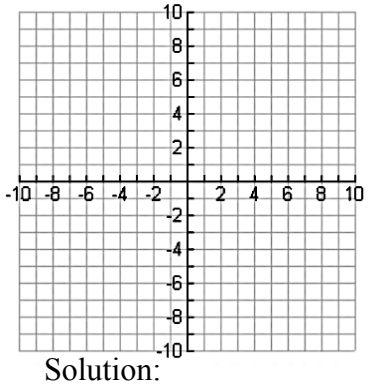
82) 2x + 5y =10
$y = \frac{2}{5}x + 2$



Solution:_____



Solution:_____



Solution:_____

Simplify each expression using the properties of exponents (no negative exponents):

83) $x^4 \cdot x^5$

84) $(x^2)^4$

85) $\frac{x^5}{x^2}$

86) x^0

87) $\left(\frac{x}{2}\right)^3$

88) x^{-4}

89) $(3x)^0$

90) $3x^0$

91) $(3xy^2)^2$

92) $2x^{-3}$

93) $(2x)^{-3}$

94) $(-3x)^3$

95) $3(6x^3)^2$

96) $\left(\frac{2x}{3}\right)^2$

97) $\frac{15x^4}{3x^7}$

98) $\left(\frac{2x}{6x^2}\right)^2$

Name: Odd Key Date: _____

ALGEBRA 2 SUMMER PACKET 2025



Factor the following expressions, completely:

1) $5x^2 + 15x$

gcf
$5x(x+3)$

2) $x^2 - 4$

3) $x^2 + 7x + 10$

$(x+5)(x+2)$

4) $x^2 - 36$

5) $x^2 + 8x + 15$

$(x+5)(x+3)$

6) $x^2 - 3x - 18$

7) $2x^2 + 4x - 48$

$2(x^2+2x-24)$
$2(x+6)(x-4)$

8) $x^2 - 13x + 36$

9) $x^2 - 2x - 35$

$(x-7)(x+5)$

10) $x^2 + 5x + 6$

11) $3x^2 - 3x - 60$

$3(x^2-x-20)$
$3(x+4)(x-5)$

12) $4x^2 + 28x + 40$

13) $3x^2 - 11x - 20$

$-15 \times 4 = -60$
$-15 + 4 = -11$
$3x^2 - 15x + 4x - 20$
$3x(x-5) + 4(x-5)$
$(3x+4)(x-5)$

14) $16x^2 - 25$

15) $3x^2 - 9x - 30$

$3(x^2-3x-10)$
$3(x-5)(x+2)$

16) $42x^2 + 6x$

17) $6x^2 - 7x - 5$

$-10 \times 3 = -30$
$-10 + 3 = -7$
$6x^2 - 10x + 3x - 5$
$2x(3x-5) + 1(3x-5)$
$(2x+1)(3x-5)$

18) $2x^2 - 8$

19) $12x^2 - 27$

$3(4x^2-9)$
$3(2x+3)(2x-3)$

20) $5x^3 - 5x$

Simplify the Radical: NO CALCULATOR!

21) $\sqrt{25} = 5$

22) $\sqrt{12}$

23) $\sqrt{27} = \sqrt{9}\cdot\sqrt{3}$ $3\sqrt{3}$

24) $\sqrt{200}$

25) $\sqrt{48}$ $\sqrt{16}\cdot\sqrt{3}$ $4\sqrt{3}$

26) $\sqrt{125}$

27) $\sqrt{98}$ $\sqrt{49}\cdot\sqrt{2}$ $7\sqrt{2}$

28) $\sqrt{8}$

Perform the indicated operation: NO CALCULATOR...SHOW ALL WORK,

29) $\frac{1}{4}+\frac{5}{4} = \frac{6}{4} = \frac{3}{2}$ need common denominators

30) $\frac{1}{6}-\frac{5}{6} =$

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

32) $\frac{1}{3}-\frac{5}{9} =$

33) $\frac{1}{6}+\frac{5}{15} =$ $\frac{5}{30}+\frac{10}{30} = \frac{15}{30} = \frac{1}{2}$

34) $\frac{3}{4}-\frac{1}{6} =$

35) $\frac{2}{3}\cdot\frac{4}{3} = \frac{8}{9}$ multiply across

36) $\frac{1}{6}\div\frac{2}{15} =$

37) $\frac{3}{4}\div\frac{6}{1} =$ keep change flip $\frac{3}{4}\cdot\frac{1}{6} = \frac{3}{24} = \frac{1}{8}$

Divide using Long Division: WRITE AS A MIXED FRACTION

38) $369 \div 3$

39) $4113 \div 9$

$$\begin{array}{r} 457 \\ 9\overline{)4113} \\ -36 \\ \hline 51 \\ 45 \\ \hline 63 \\ -63 \\ \hline \end{array}$$

457

40) $308 \div 14$

41) $2760 \div 20$

$$\begin{array}{r} 138 \\ 20\overline{)2760} \\ -20 \\ \hline 76 \\ -60 \\ \hline 160 \\ -160 \\ \hline \end{array}$$

138

42) $1369 \div 14$

43) $2544 \div 11$

$$\begin{array}{r} 231 \\ 11\overline{)2544} \\ -22 \\ \hline 34 \\ -33 \\ \hline 14 \\ -11 \\ \hline 3 \end{array}$$

$231\frac{3}{11}$

Solve the following equations:

44) $8(2x - 5) = -6(3x - 4)$

45) $-x - 2 = 9(x - 8)$

$-x - 2 = 9x - 72$

$+x \quad +x$

$-2 = 10x - 72$

$+72 \quad +72$

$\frac{70}{10} = \frac{10x}{10}$ $x = 7$

46) $\frac{5}{4}x + 25 = -20$

Write in standard form (exponents should go in decreasing order):

47) $5(x + 12)$

$5x + 60$

48) $x(3x^2 - 4x - 2)$

49) $3x(x - 11)$

$3x^2 - 33x$

50) $(2x - 3) - (x - 5)$

51) $2(x + 5) + (x - 9)$

52) $4 - 2(x^2 - 1)$

$2x + 10 + x - 9$

$3x + 1$

53) $-\frac{2}{3}(3x - 6)$

$-2x + 4$

54) $(x - 7)(x + 7)$

55) $-(x + 6)(x + 1)$ FOIL

$-1(x^2 + 7x + 6)$

$-x^2 - 7x - 6$

56) $(3x + 1)^2$

57) $2(x - 4)^2$

$2(x-4)(x-4)$

$2(x^2 - 4x - 4x + 16)$

$2(x^2 - 8x + 16)$

$2x^2 - 16x + 32$

58) $-\frac{1}{2}(x + 1)^2$

Evaluate for the given value:

59) $f(x) = 2x - 1,\ f(2) =$ 3

$f(2) = 2(2) - 1$

$f(2) = 4 - 1$

60) $g(x) = x^2 - 5,\ g(4) =$ ____

61) $f(x) = 2x^2 + 4,\ f(-1) =$ 6

$f(-1) = 2(-1)^2 + 4$

$f(-1) = 2(1) + 4$

62) $g(x) = x^2 + 5x,\ g(-4) =$ ____

Find the slope and y-intercept for each equation:

63) $y = 3x + 4$ $y = mx + b$

slope $m = 3$

$b = 4 \rightarrow$ y-int $(0, 4)$

64) $2y = 2x + 10$

Find the x-intercept and y-intercept for each equation:

65) $y = 6x - 12$

x-int let $y = 0$

$0 = 6x - 12$

$12 = 6x$

$x = 2$

y-int let $x = 0$

$y = 6(0) - 12$

$y = -12$

x-int: $(2, 0)$ y-int: $(0, -12)$

66) $4y = 12x$

x-int: ____ y-int: ____

67) $5x - 4y = 20$

$5x - 4(0) = 20$

$5x = 20$

$x = 4$

$5(0) - 4y = 20$

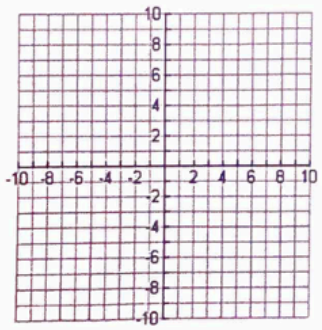
$-4y = 20$

$\frac{-4y}{-4} = \frac{20}{-4}$

x-int: $(4, 0)$ y-int: $(0, -5)$

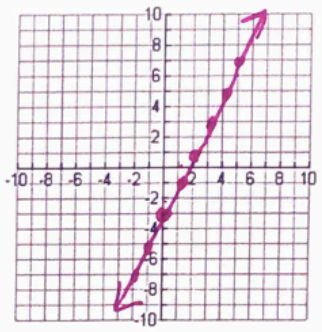
Graph the following:

68) $y = 4$

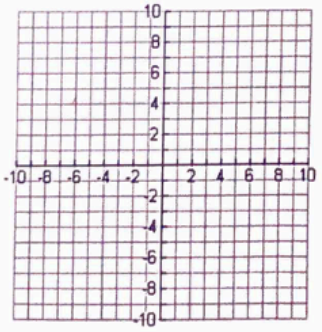


69) $y = 2x - 3$

$m = \frac{2}{1}$ $b = -3$

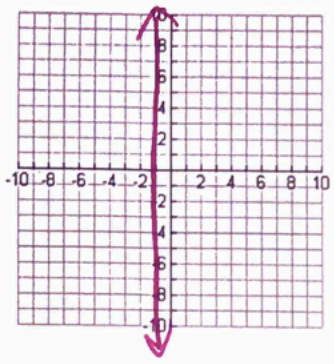


70) $y = -4x$

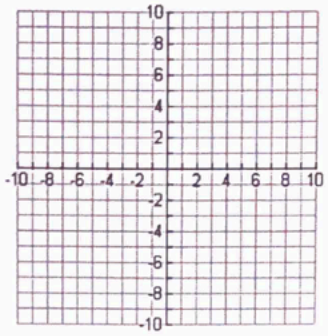


Graph the following:

71) $x = -1$

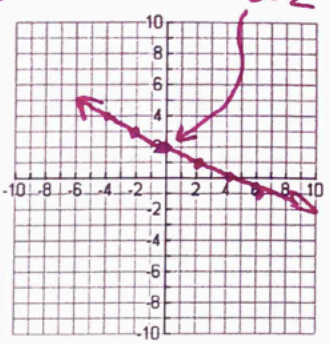


72) $y = \frac{2}{3}x - 3$



73) $\frac{4y}{4} = \frac{-2x}{4} + \frac{8}{4}$

$y = -\frac{1}{2}x + 2$ $m = \frac{-1}{2}$ $b = 2$



Use Substitution to solve each system of equations:

74) $y = 2$
$-2x + 3y = -8$

Solution:_____

75) $y = 3x - 9$
$y = -x - 1$

$3x - 9 = -x - 1$
$+x \quad +x$
$4x - 9 = -1$
$+9 \quad +9$
$4x = 8$
$x = 2$

$y = 3(2) - 9$
$y = 6 - 9$
$y = -3$

Solution: (2, -3)

76) $4 = 8x$
$y = 8x - 1$

Solution:_____

77) $x = 2y + 2$
$x - y = -3$

$(2y + 2) - y = -3$
$2y + 2 - y = -3$
$y + 2 = -3$
$y = -5$

$x = 2(-5) + 2$
$x = -10 + 2$
$x = -8$

Solution: (-8, -5)

78) $2x + 5y = 10$
$y = -\frac{2}{5}x + 2$

Solution:_____

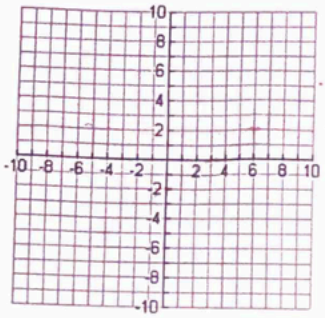
79) $x + 3y = 7$ → $x = 7 - 3y$
$3y = -1x + 21$

$3y = -1(7 - 3y) + 21$
$3y = -7 + 3y + 21$
$-3y \quad -3y$
$0 \neq 14$

Solution: NO R. Solutions

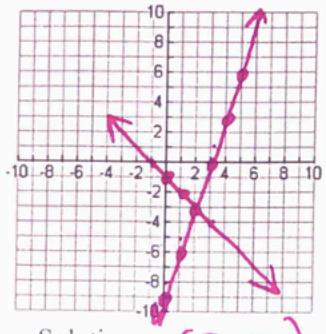
Graph the system to find the solution:

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



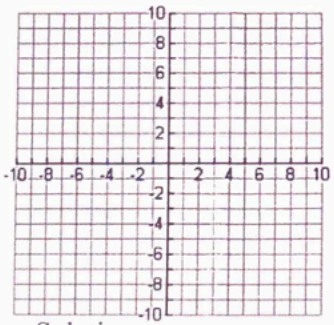
Solution: _____

81) $y = 3x - 9$
$y = -x - 1$



Solution: (2, -3)

82) $2x + 5y = 10$
$y = \frac{2}{5}x + 2$



Solution: _____

Simplify each expression using the properties of exponents (no negative exponents):

83) $x^4 \cdot x^5$ = x^9

84) $(x^2)^4$

85) $\frac{x^5}{x^2}$ = x^3

86) x^0

87) $\left(\frac{x}{2}\right)^3$ = $\frac{x^3}{2^3}$ = $\frac{x^3}{8}$

88) x^{-4}

89) $(3x)^0$
$3^0 x^0$
$(1)(1) = 1$

90) $3x^0$

91) $(3x^1y^2)^2$
$3^2x^2y^4 = 9x^2y^4$

92) $2x^{-3}$

93) $(2x)^{-3}$
$\frac{1}{(2x)^3} = \frac{1}{2^3x^3} = \frac{1}{8x^3}$

94) $(-3x)^3$

95) $3(6x^3)^2$
$3(6^2x^6)$
$3(36x^6)$
$108x^6$

96) $\left(\frac{2x}{3}\right)^2$

97) $\frac{15x^4}{3x^7}$
$5x^{-3} = \frac{5}{x^3}$

98) $\left(\frac{2x}{6x^2}\right)^2$