Math 0308 Final Exam Review-Revised Spring 2018

Solve the given equations.

1. $3x+14=8x-1$

$-3x \quad -3x$

$14=5x-1$

$+1 \quad +1$

$\frac{15}{5}=\frac{5x}{5}$

$3=x$

2. $3(4x-1)=5x+6$

$12x-3=5x+6$

$-5x \quad -5x$

$7x-3=6$

$+3 \quad +3$

$7x=9$

$x=\frac{9}{7}$

3. $8-(3x+4)=6x$

$8-3x-4=6x$

$-3x+4=6x$

$+3x \quad +3x$

$4=9x$

$\frac{4}{9}=x$

4. $\frac{3}{2}x-1=\frac{1}{8}(12x-8)$

LCD = 8

$8\left(\frac{3}{2}x\right)-8(1)=8\cdot\left(\frac{1}{8}\right)(12x-8)$

$12x-8=12x-8$

True Statement

all real numbers

5. $\frac{1}{12}(4x-3)=\frac{1}{4}(2x+1)$

LCD = 12

$12\left(\frac{1}{12}\right)(4x-3)=12\left(\frac{1}{4}\right)(2x+1)$

$4x-3=6x+3$

$-4x \quad -4x$

$-3=2x+3$

$-3 \quad -3$

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

$-3=x$

6. $2(3x+1)-4(2x-2)=2(7x-3)$

$6x+2-8x+8=14x-6$

$-2x+10=14x-6$

$+2x \quad +2x$

$10=16x-6$

$+6 \quad +6$

$\frac{16}{16}=\frac{16x}{16}$

$1=x$

7. $3x+14=5(x-2)-2(x+7)$

$3x+14=5x-10-2x-14$

$3x+14=3x-24$

$-3x \quad -3x$

$14=-24$

False

$\emptyset$ no solution

Solve the following inequalities. Graph your solution on a number line.

8. $x - 7 \le -4$

$+7 \quad +7$

$x \le 3$

9. $4x + 9 > 3$

$-9 \quad -9$

$4x > -6$

$x > -\frac{6}{4}$

$x > -\frac{3}{2}$

10. $1 - 9x \ge 4$

$-1 \quad -1$

$-9x \ge 3$

$\frac{-9x}{-9} \le \frac{3}{-9}$

$x \le -\frac{1}{3}$

11. $2x + 15 > 7x - 1$

$-2x \quad -2x$

$15 > 5x - 1$

$+1 \quad +1$

$16 > 5x$

$\frac{16}{5} > x$

12. $3x + 8 \le 7x - 4$

$-3x \quad -3x$

$8 \le 4x - 4$

$+4 \quad +4$

$12 \le 4x$

$3 \le x$

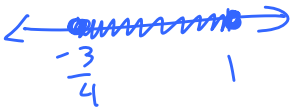
13. $-2 \le 4x + 1 \le 5$

$-1 \quad -1 \quad -1$

$-3 \le 4x \le 4$

$\frac{-3}{4} \le \frac{4x}{4} \le \frac{4}{4}$

$-\frac{3}{4} \le x \le 1$



14. $-1 < 3x + 8 \le 5$

$-8 \quad -8 \quad -8$

$-9 < 3x \le -3$

$\frac{-9}{3} < \frac{3x}{3} \le \frac{-3}{3}$

$-3 < x \le -1$

15. $-7x - 8 < 6$

$+8 \quad 8$

$-7x < 14$

$\frac{-7x}{-7} < \frac{14}{-7}$

$x > -2$

★ divide by neg. reverse inequality

16. $-4x + 5 > -19$

$-5 \quad -5$

$-4x > -24$

$\frac{-4x}{-4} < \frac{-24}{-4}$

$x < 6$

★

Write an algebraic equation to represent each sentence. Then solve the equation by showing all steps.

17. Find two consecutive odd integers whose sum is -24.

1st = x

2nd = $x + 2$

$x + x + 2 = -24$

$2x + 2 = -24$

$-2 \quad -2$

$\frac{2x}{2} = \frac{-26}{2}$

$x = -13$

1st = -13

2nd = $x + 2$

$= -13 + 2$

$= -11$

answer: -11 and -13

18. Find three consecutive integers whose sum is 39.

1st = x
2nd = $x+1$
3rd = $x+2$

$x + x + 1 + x + 2 = 39$
$3x + 3 = 39$
$3x = 36$
$x = 12$

12, 13, 14

19. Twice the sum of a number and negative two is sixteen. Find the number.

x = the number

$2(x + (-2)) = 16$
$2(x-2) = 16$
$2x - 4 = 16$
$+4 \quad +4$
$\frac{2x}{2} = \frac{20}{2}$

$x = 10$

20. The perimeter of a rectangle is 36 feet. The length is 2 feet more than 3 times the width. What are the dimensions of the rectangle?

$2(x) + 2(3x+2) = 36$
$2x + 6x + 4 = 36$
$8x + 4 = 36$
$8x = 32$
$x = 4$

width = 4 ft
length = 14 ft

21. The sum of six times a number and ten is equal to the difference of the number and fifteen. Find the number.

x = the number

$6x + 10 = x - 15$
$-x \qquad -x$
$5x + 10 = -15$
$-10 \quad -10$
$\frac{5x}{5} = \frac{-25}{5}$

$x = -5$

22. The perimeter of a rectangle is 64 feet. The length is 7 feet less than two times the width. What are the dimensions of the rectangle?

$2x-7$

$2(13)-7$

$26-7$

$2x + 2(2x-7) = 64$

$2x + 4x - 14 = 64$

$6x - 14 = 64$

$\frac{6x}{6} = \frac{78}{6}$

$x = 13$

width = 13 ft

length = 19 ft

Using the laws of exponents, simplify the following expressions. Write your answers with positive exponents. Assume that all variables represent non-zero numbers.

23. $(x^4)^6$ multiply

x^{24}

24. $\left(\frac{3x^4}{y^8}\right)^3$ multiply all exponents

$\frac{3^3 x^{12}}{y^{24}} = \frac{27x^{12}}{y^{24}}$

25. $\frac{39x^5y^{12}}{3x^4y^6}$

$13xy^6$

26. $(2x^0y^3)^3$ $x^0 = 1$

$(2y^3)^3$

$2^3 y^9$

$8y^9$

27. $(x^2y^5)^{-3}$

$x^{-6}y^{-15}$

$\frac{1}{x^6y^{15}}$

28. $(x^{-4}y^3)^{-4}$

$x^{16}y^{-12} = \frac{x^{16}}{y^{12}}$

29. $\frac{14x^{-2}y^6}{21x^{-10}y^{-3}}$

$\frac{14x^{10}y^6 \cdot y^3}{21x^2} = \frac{2x^8y^9}{3}$

30. $\frac{-9x^2y^{-8}}{12x^4y^{-4}} = \frac{-9x^2y^4}{12x^4y^8}$

$= \frac{-3}{4x^2y^4}$

Add

Mult

Subtract

$x^0 = 1$

Perform the indicated operations, and simplify all answers.

31. $(x^2-5x-12)+(7x^2-3x+4)$

$8x^2-8x-8$

32. $(5x^2-x+6)-(x^2-8x-2)$ ★ distribute

$5x^2-x+6-x^2+8x+2$

$4x^2+7x+8$

33. $(3x+8)(6x-5)$

$18x^2-15x+48x-40$

$18x^2+33x-40$

34. $(x-11y)(x+11y)$

$x^2+11xy-11xy-121y^2$

x^2-121y^2

35. $\dfrac{24x^5yz+6x^4y^2z^3-4x^3y^3z^5}{3x^4yz^2}$

$\dfrac{24x^5yz}{3x^4yz^2}+\dfrac{6x^4y^2z^3}{3x^4yz^2}-\dfrac{4x^3y^3z^5}{3x^4yz^2}$

$\dfrac{8x}{z}+2yz-\dfrac{4y^2z^3}{3x}$

36. $\dfrac{12xz^3-40x^5z+8x^2z}{8x^2z}$

$=\dfrac{12xz^3}{8x^2z}-\dfrac{40x^5z}{8x^2z}+\dfrac{8x^2z}{8x^2z}$

$=\dfrac{3z^2}{2x}-5x^3+1$

37. $\dfrac{2x^3+13x^2+21x+7}{x+4}$

$2x^2+5x+1+\dfrac{3}{x+4}$

$x+4\overline{)\,2x^3+13x^2+21x+7}$

$-2x^3+8x^2$

$5x^2+21x$

$-5x^2+20x$

$x+7$

$-x+4$

3

38. $\dfrac{12x^3+5x^2-34x+10}{4x-1}$

$3x^2+2x-8+\dfrac{2}{4x-1}$

$4x-1\overline{)\,12x^3+5x^2-34x+10}$

$-12x^3+3x^2$

$8x^2-34x$

$-8x^2+2x$

$-32x+10$

$+32x-8$

2

Completely factor the following polynomials.

39. $x^2+11x+24$

$(x+3)(x+8)$

40. x^2-81

$(x+9)(x-9)$

41. $x^2-9x+14$

$(x-7)(x-2)$

42. $25u^3v^2-15uv^7$

$5uv^2(5u^2-3v^5)$

43. x^2+6x+8

$(x+2)(x+4)$

44. $x^2+11x+28$

$(x+4)(x+7)$

45. $x^2-6x-27$

$(x-9)(x+3)$

46. $6x^2-11x-2$

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

47. $5x^2+7x-6$

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

48. $2xy+4x^3y$

$2xy(1+2x^2)$

49. $6xy+21x+10y+35$

$3x(2y+7)+5(2y+7)$

$(2y+7)(3x+5)$

50. $6xy+x-30y-5$

$x(6y+1)-5(6y+1)$

$(6y+1)(x-5)$

51. $12x^3-28x^2-3x+7$

$4x^2(3x-7)-1(3x-7)$

$(3x-7)(4x^2-1)$

$(3x-7)(2x+1)(2x-1)$

Solve the given equations.

52. $10x^2 - 8x = 0$

$2x(5x-4)=0$

$2x=0 \quad 5x-4=0$

$x=0 \quad 5x=4$

$x=\frac{4}{5}$

53. $x^2 + 5x = 24$

$x^2+5x-24=0$

$(x+8)(x-3)=0$

$x+8=0 \quad x-3=0$

$x=-8 \quad x=3$

54. $3x^2 + 19x + 6 = 0$

$(3x+1)(x+6)=0$

$3x+1=0 \quad x+6=0$

$3x=-1$

$x=-\frac{1}{3} \quad x=-6$

55. $9x^2 - 5x = 0$

$x(9x-5)=0$

$x=0 \quad 9x-5=0$

$9x=5$

$x=\frac{5}{9}$

56. $x^2 + 6x - 15 = 2(x+3)$

$x^2+6x-15=2x+6$

$x^2+4x-21=0$

$(x+7)(x-3)=0$

$x+7=0 \quad x-3=0$

$x=-7 \quad x=3$

57. $x^2 + 5x - 18 = 3(x-1)$

$x^2+5x-18=3x-3$

$x^2+2x-15=0$

$(x+5)(x-3)=0$

$x+5=0 \quad x-3=0$

$x=-5 \quad x=3$

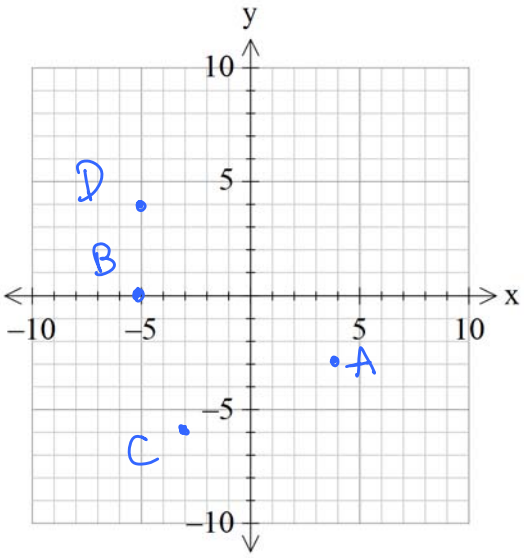
58. Plot the points on the given rectangular coordinate system: Label the points on the grid as A, B, C, and D

$A(4,-3)$

$B(-5,0)$

$C(-3,-6)$

$D(-5,4)$



Given the following linear equations, complete the table of solution pairs.

59. $6x-5y=10$

Complete the table.

x	y
0	-2
$\frac{5}{3}$	0
$\frac{10}{3}$	2

$6(0)-5y=10$
$-5y=10$
$y=-2$

$6x-5(0)=10$
$6x=10$
$x=\frac{10}{6}=\frac{5}{3}$

$6x-5(2)=10$
$6x-10=10$
$6x=20$
$x=\frac{20}{6}=\frac{10}{3}$

60. $3x-4y+9=0$

x	y
-3	0
$-\frac{5}{3}$	1
5	6

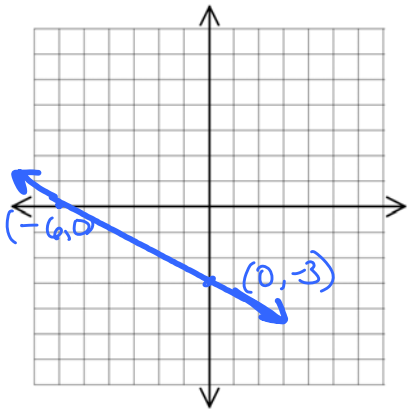
$3(-3)-4y+9=0$
$-9-4y+9=0$
$-4y=0$
$y=0$

$3x-4(1)+9=0$
$3x-4+9=0$
$3x+5=0$
$3x=-5$
$x=-5/3$

$3(5)-4y+9=0$
$15-4y+9=0$
$-4y+24=0$
$-4y=-24$
$y=6$

Find the x- and y- intercepts and then graph the following lines.

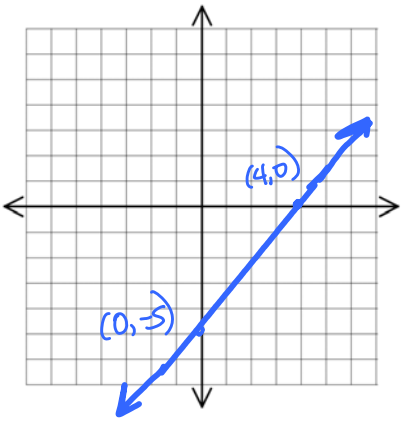
61. $-x-2y=4$



Let $x=0$
$-0-2y=6$
$\frac{-2y}{-2}=\frac{6}{-2}$
$y=-3$

Let $y=0$
$-x-2(0)=6$
$\frac{-x}{-1}=\frac{6}{-1}$
$x=-6$

62. $5x-4y=-20$

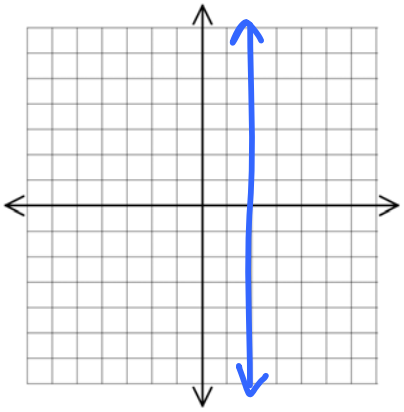


Let $x=0$
$5(0)-4y=20$
$\frac{-4y}{-4}=\frac{20}{-4}$
$y=-5$

Let $y=0$
$5x-4(0)=20$
$\frac{5x}{5}=\frac{20}{5}$
$x=4$

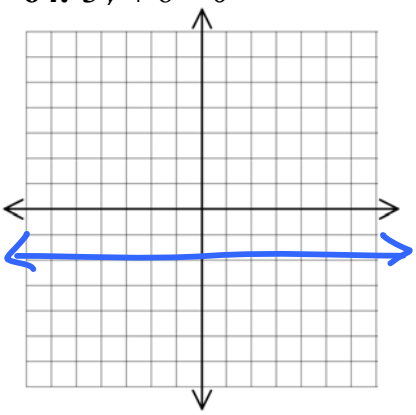
Graph the following lines:

63. $x=2$



vertical – slope is undefined

64. $3y+6=0$



$3y=-6$
$y=-2$

horizontal
slope is zero

Find the slope of the line that passes through the given pair of points.

65. $(-2,4)$ $(1,5)$

$m = \frac{4-5}{-2-1} = \frac{-1}{-3} = \frac{1}{3}$

66. $(1,-3)$ $(4,2)$

$m = \frac{-3-2}{1-4} = \frac{-5}{-3} = \frac{5}{3}$

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

67. $(2,4)$ $(2,-3)$

$m = \frac{4+(-3)}{2-2} = \frac{7}{0}$ UNDEFINED

vertical line

68. $(1,-3)$ $(4,-3)$

$m = \frac{-3-(-3)}{1-4} = \frac{0}{-3} = 0$

horizontal line

Find the slope and *y*-intercept for the following linear equation.

69. $7x - 9y = 18$

$-9y = 18 - 7x$

$y = -2 + \frac{7}{9}x$

$y = \frac{7}{9}x - 2$

$m = \frac{7}{9}$ $y\text{-int} = -2$

70. $2x + 5y = 15$

$5y = 15 - 2x$

$y = 3 - \frac{2}{5}x$

$y = -\frac{2}{5}x + 3$

$m = -\frac{2}{5}$ $y\text{int} = 3$

Solve for y

$y = mx + b$

m slope

b y-int

Find an equation for the line described. Write your answer in slope-intercept form.

71. $m = \frac{3}{5}$; y-intercept $= -2$

$y = mx + b$

$y = \frac{3}{5}x - 2$

easy!

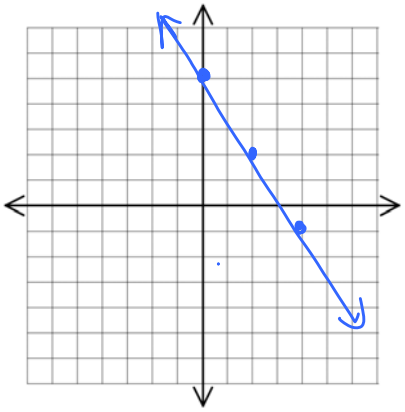
72. $m = \frac{-2}{7}$; y-intercept $= \frac{1}{2}$

$y = mx + b$

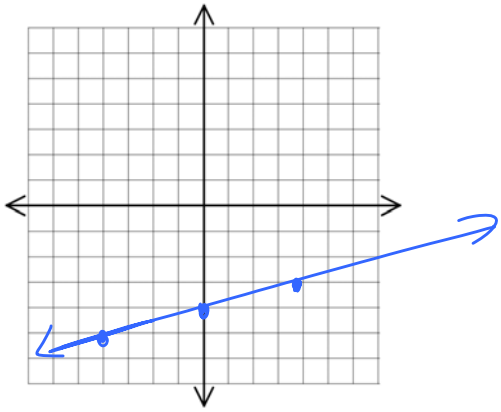
$y = -\frac{2}{7}x + \frac{1}{2}$

$y = mx + b$

73. Through the point $(0,5)$, having slope of $\frac{-3}{2}$



74. Through the point $(0,-4)$, having slope of $\frac{1}{4}$



Determine the solutions of the following linear systems of equations. If there are no solutions, write *inconsistent*. If there are infinitely many solutions, write *dependent*.

75.

$$5x - 4y = 33$$
$$x = 3y$$

$5(3y) - 4y = 33$

$15y - 4y = 33$

$11y = 33$

$y = 3$

$x = 3(3)$

$x = 9$

(x, y) $(9, 3)$

76.

$$y = -3x + 12$$
$$9x + 2y = 15$$

$9x + 2(-3x + 12) = 15$

$9x - 6x + 24 = 15$

$3x + 24 = 15$

$3x = -9$

$x = -3$

$y = -3(-3) + 12$

$y = 9 + 12$

$y = 21$

$(-3, 21)$

77.

$$3x + 2y = -10$$
$$2x + 5y = -14$$

$2(3x + 2y = -10)$

$-3(2x + 5y = -14)$

$6x + 4y = -20$

$-6x - 15y = 42$

$-11y = 22$

$y = -2$

$3x + 2(-2) = -10$

$3x - 4 = -10$

$3x = -6$

$x = -2$

$(-2, -2)$

78.

$$-5x + 2y = -11$$
$$-6x - 5y = -28$$

$5(-5x + 2y = -11)$

$2(-6x - 5y = -28)$

$-25x + 10y = -55$

$-12x - 10y = -56$

$-37x = +111$

$\frac{-37x}{-37} = \frac{+111}{+37}$

$x = 3$

$-5(3) + 2y = -11$

$-15 + 2y = -11$

$2y = 4$

$y = 2$

$(3, 2)$

79. $2x-6y=4$
$(-x+3y=-2)2$

$2x-6y=4$
$-2x+6y=-4$
$0=0$ true
dependent

80. $6x-4y=10$
$2(-3x+2y=-4)$

$6x-4y=10$
$-6x+4y=-8$
$0=2$
False
Inconsistent
No solution

Solve the following proportions.

81. $\frac{x}{3}=\frac{5}{11}$

$11x=15$
$x=\frac{15}{11}$

82. $\frac{x+2}{5x}=\frac{-3}{7}$

$7(x+2)=-3(5x)$
$7x+14=-15x$
$-7x \quad -7x$
$\frac{14}{-22}=\frac{-22x}{-22}$
reduce
$-\frac{7}{11}=x$

Set up a proportion and solve the following:

83. A cookie recipe calls for $\frac{1}{3}$ cup of flour for 12 cookies. How many cups of flour are needed to prepare 30 cookies?

$\frac{\frac{1}{3}}{12}=\frac{x}{30}$
$\frac{1}{3}(30)=x(12)$
$\frac{10}{12}=\frac{12x}{12}$
$\frac{5}{6}=x$

$\frac{5}{6}$ cup of flour

84. A car can drive 132 miles on the highway on 4 gallons of gas. At this rate, how many miles can the car drive on 9 gallons of gas?

$\frac{132}{4}=\frac{x}{9}$
$9(132)=4x$
$\frac{1188}{4}=\frac{4x}{4}$
$297=x$

297 miles