

Summer Math Packet

2022

Name _____

SOLVING LINEAR EQUATIONS

Goal: The goal of solving a linear equation is to find the value of the variable that will make the statement (equation) true.

Method: Perform operations to both sides of the equation in order to isolate the variable.

Addition and Subtraction Properties of Equality:

Let a , b , and c represent algebraic expressions.

1. Addition property of equality:

$$\begin{aligned} \text{If } & a = b, \\ \text{then } & a + c = b + c \end{aligned}$$

2. Subtraction property of equality:

$$\begin{aligned} \text{If } & a = b, \\ \text{then } & a - c = b - c \end{aligned}$$

Multiplication and Division Properties of Equality:

Let a , b , and c represent algebraic expressions.

1. Multiplication property of equality:

$$\begin{aligned} \text{If } & a = b, \\ \text{then } & ac = bc \end{aligned}$$

2. Division property of equality:

$$\begin{aligned} \text{If } & a = b, \\ \text{then } & \frac{a}{c} = \frac{b}{c} \text{ (provided } c \neq 0) \end{aligned}$$

Clearing Fractions or Decimals in an Equation:

When solving an equation with fractions or decimals, there is an option of clearing the fractions or decimals in order to create a simpler equation involving whole numbers.

1. To clear fractions, multiply both sides of the equation (distributing to all terms) by the LCD of all the fractions.
2. To clear decimals, multiply both sides of the equation (distributing to all terms) by the lowest power of 10 that will make *all* decimals whole numbers.

Steps for Solving a Linear Equation in One Variable:

1. Simplify both sides of the equation.
2. Use the addition or subtraction properties of equality to collect the variable terms on one side of the equation and the constant terms on the other.
3. Use the multiplication or division properties of equality to make the coefficient of the variable term equal to 1.
4. Check your answer by substituting your solution into the original equation.

Note: If when solving an equation, the variables are eliminated to reveal a *true* statement such as, $-13 = -13$, then the solution is **all real numbers**. This type of equation is called an **identity**. On the other hand, if the variables are eliminated to reveal a *false* statement such as, $-7 = 3$, then there is **no solution**. This type of equation is called a **contradiction**. All other linear equations which have only one solution are called **conditional**.

Examples:

$$\begin{array}{r} \text{A. } x + 5 = -2 \\ \quad \underline{-5 \quad -5} \\ \quad \quad x = -7 \end{array}$$

$$\begin{array}{r} \text{B. } x - 3 = 7 \\ \quad \underline{+3 \quad +3} \\ \quad \quad x = 10 \end{array}$$

Check:

$$\begin{aligned} (-7) + 5 &= -2 \\ -2 &= -2 \text{ (Solution Checks)} \end{aligned}$$

Check:

$$\begin{aligned} 10 - 3 &= 7 \\ 7 &= 7 \text{ (Solution Checks)} \end{aligned}$$

C. $3x = 24$

$$\frac{3x}{3} = \frac{24}{3}$$

$$x = 8$$

D. $-7x = 28$

$$\frac{-7x}{-7} = \frac{28}{-7}$$

$$x = -4$$

E. $\frac{2}{3}x = -4$

$$\frac{3}{2} \cdot \frac{2}{3}x = \frac{-4}{1} \cdot \frac{3}{2} \text{ (Multiply by the reciprocal)}$$

$$x = -6$$

F. $\frac{y}{-5} = 2$

$$\frac{-5}{1} \cdot \frac{y}{-5} = 2(-5)$$

$$y = -10$$

Identity Example:

G. $2x + 6 = 3(x + 2) - x$

$$2x + 6 = 3x + 6 - x$$

$$2x + 6 = 2x + 6$$

$$\frac{-2x}{-2x} \quad \frac{-2x}{-2x}$$

$$6 = 6 \text{ True Statement}$$

Solution: all real numbers

I. $10 - 5x = 3(x - 4) - 2(x + 7)$

$$10 - 5x = 3x - 12 - 2x - 14$$

$$10 - 5x = x - 26$$

$$\frac{-x}{-x} \quad \frac{-x}{-x}$$

$$10 - 6x = -26$$

$$\frac{-10}{-10} \quad \frac{-10}{-10}$$

$$-6x = -36$$

$$\frac{-6x}{-6} = \frac{-36}{-6}$$

$$x = 6$$

J. $\frac{x-2}{5} - \frac{x-4}{2} = 2$ (LCD is 10)

$$10 \left(\frac{x-2}{5} - \frac{x-4}{2} \right) = 2(10)$$

$$\frac{10}{1} \cdot \frac{(x-2)}{5} - \frac{10}{1} \cdot \frac{(x-4)}{2} = 20$$

$$2(x-2) - 5(x-4) = 20$$

$$2x - 4 - 5x + 20 = 20$$

$$-3x + 16 = 20$$

$$\frac{-16}{-3} \quad \frac{-16}{-3}$$

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

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

Check:

$$3(8) = 24$$

$$24 = 24 \text{ (Solution Checks)}$$

Check:

$$-7(-4) = 28$$

$$28 = 28 \text{ (Solution Checks)}$$

Check:

$$\frac{2}{3} \left(\frac{-6}{1} \right) = -4$$

$$-4 = -4 \text{ (Solution Checks)}$$

Check:

$$\frac{-10}{-5} = 2$$

$$2 = 2 \text{ (Solution Checks)}$$

Contradiction Example:

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

$$5x - 3 = 4x + 8 + x$$

$$5x - 3 = 5x + 8$$

$$\frac{-5x}{-5x} \quad \frac{-5x}{-5x}$$

$$-3 = 8 \text{ False Statement}$$

No Solution

Check:

$$10 - 5(6) = 3(6 - 4) - 2(6 + 7)$$

$$10 - 30 = 3(2) - 2(13)$$

$$-20 = 6 - 26$$

$$-20 = -20 \text{ (Solution Checks)}$$

K. $0.05x + 0.25 = 0.2$

$$100(0.05x + 0.25) = 0.2(100)$$

$$5x + 25 = 20$$

$$\frac{-25}{-25} \quad \frac{-25}{-25}$$

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

$$x = -1$$

Check:

$$0.05(-1) + 0.25 = 0.2$$

$$-0.05 + 0.25 = 0.2$$

$$0.2 = 0.2 \text{ (Solution Checks)}$$

LINEAR EQUATIONS PRACTICE

1. $4x = 4$
2. $x + 6 = -7$
3. $x - 4 = 7$
4. $\frac{x}{3} = -9$
5. $2x + 4 = 8$
6. $14 = 3 + 2x$
7. $8x - 3 = -19$
8. $6 - x = 9$
9. $-x = -12$
10. $3(x - 2) = 6$
11. $-3(2x - 8) = -12$
12. $4(6 + 2x) = 0$
13. $3x + 2x + 6 = -15$
14. $4 = -2(x + 3)$
15. $27 = 46 + 2x - x$
16. $4x + 6 - 7x + 9 = 18$
17. $4 + 3(x + 2) = 10$
18. $-3 + 3x = -2(x + 1)$
19. $9x - 6 = -3x + 30$
20. $-(x + 2) = 2(3x - 6)$
21. $2x + 6 = 3x + 9 - 3$
22. $-5x + 3 = 2x + 10$
23. $3x - 12x = 24 - 9x$
24. $2(x + 4) = -3(x + 5)$
25. $4(2x - 3) + 4 = 8x - 8$
26. $6x + 11 = -(6x + 5)$
27. $2(x + 7) = 6x + 9 - 4x$
28. $-5(3 - 4x) = -6 + 20x - 9$
29. $4(x - 3) - (x - 5) = 0$
30. $-2(4 - x) = 6(x + 2) + 3x$
31. $\frac{4}{7} = \frac{x}{21}$
32. $\frac{x}{4} = \frac{-20}{16}$
33. $\frac{9c}{10} = \frac{9}{5}$
34. $\frac{1}{4} = \frac{z+1}{4}$
35. $\frac{a}{5} = \frac{a-3}{2}$
36. $\frac{n}{10} = 9 - \frac{n}{5}$
37. $\frac{2}{8} + \frac{3}{4} = \frac{w}{5}$
38. $x - \frac{3}{4} = -2x$
39. $\frac{x}{4} - \frac{x}{6} = \frac{1}{4}$
40. $a - \frac{a}{3} + \frac{a}{5} = 26$
41. $\frac{12}{10} = \frac{z}{25}$
42. $\frac{-2}{6} = \frac{3c}{9}$
43. $\frac{x+4}{7} = \frac{3}{7}$
44. $\frac{4x+5}{6} = \frac{7}{2}$
45. $6 - \frac{x}{4} = \frac{x}{8}$
46. $\frac{x}{3} - \frac{3x}{4} = \frac{1}{12}$
47. $\frac{5}{2} - x = 3x$
48. $\frac{3-5y}{4} = \frac{2-4y}{3}$
49. $\frac{2x-1}{3} - \frac{3x}{4} = \frac{5}{6}$
50. $-\frac{x}{4} = 12$
51. $-x = -12$
52. $-2x = -16$
53. $2x = -14$
54. $\frac{1}{7}x = -8$
55. $\frac{1}{7}x = 2$
56. $-\frac{x}{2} = 4$
57. $-x = 26$
58. $3x = 15$
59. $4x = -32$
60. $\frac{1}{3}x = 5$
61. $\frac{1}{9}x = 5$
62. $-\frac{5}{3}x = -15$
63. $-\frac{6}{5}x = -30$
64. $\frac{6}{5}x = 90$
65. $\frac{1}{3}x = 4$
66. $\frac{7}{6}x = 168$
67. $\frac{1}{6}x = 2$
68. $-\frac{9}{5}x = -45$
69. $-\frac{4}{9}x = -36$
70. $4x - 4 = -40$
71. $9x - 7 = -34$
72. $\frac{7}{8}y - 6 = 8$
73. $10 - x = 6$
74. $-2x - 4x = 1$
75. $-9x - 9x = -9$
76. $\frac{x}{3} - \frac{x}{5} = 2$
77. $\frac{x}{7} - \frac{x}{9} = 2$
78. $\frac{x}{3} - \frac{x}{9} = 6$
79. $\frac{x}{8} - \frac{x}{9} = 1$
80. $\frac{5}{9}y - 4 = 6$
81. $x + 0.4x = 3.5$
82. $5(x - 3) = 45$
83. $-3(x + 7) = 9$
84. $-4(x - 6) = 12$
85. $8 = 2(x - 5) + 6x$
86. $2 = 7(x + 4) + 9x$
87. $1 = 3(x - 2) + 3 - 2x$
88. $3 = 4(x - 2) + 5 - 3x$
89. $3.65 - 7.4x + 1.12 = 21.76$
90. $-8x + 3 - 2x = -6x + 3 - 4x$
91. $10x + 3 + 10x = 13x - 3 + 7x$
92. $6 + 3x = 5(x - 1) - 3(x - 2)$
93. $10 - 5x = 3(x - 4) - 2(x + 7)$
94. $9.2y - 4.3 = 50.9$
95. $0.05z + 0.2 = 0.15z - 10.5$
96. $0.25(60) + 0.10x = 0.15(60 + x)$
97. $0.5(3q + 87) = 1.5q + 43.5$
98. $0.4(y + 10) + 0.6y = 2$
99. $21.1w + 4.6 = 10.9w + 35.2$
100. $0.125x = 0.025(5x + 1)$

LINEAR EQUATIONS PRACTICE ANSWERS

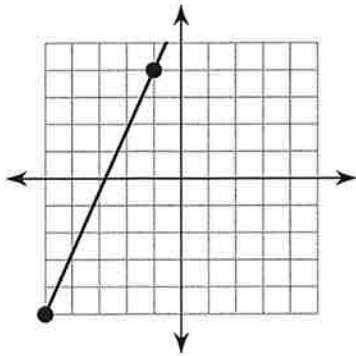
1. $x = 1$
2. $x = -13$
3. $x = 11$
4. $x = -27$
5. $x = 2$
6. $x = \frac{11}{2}$
7. $x = -2$
8. $x = -3$
9. $x = 12$
10. $x = 4$
11. $x = 6$
12. $x = -3$
13. $x = -\frac{21}{5}$
14. $x = -5$
15. $x = -19$
16. $x = -1$
17. $x = 0$
18. $x = \frac{1}{5}$
19. $x = 3$
20. $x = \frac{10}{7}$
21. $x = 0$
22. $x = -1$
23. No Solution
24. $x = -\frac{23}{5}$
25. All real numbers
26. $x = -\frac{4}{3}$
27. No Solution
28. All real numbers
29. $x = \frac{7}{3}$
30. $x = -\frac{20}{7}$
31. $x = 12$
32. $x = -5$
33. $c = 2$
34. $z = 0$
35. $a = 5$
36. $n = 30$
37. $w = 5$
38. $x = \frac{1}{4}$
39. $x = 3$
40. $a = 30$
41. $z = 30$
42. $c = -1$
43. $x = -1$
44. $x = 4$
45. $x = 16$
46. $x = -\frac{1}{5}$
47. $x = \frac{5}{8}$
48. $y = -1$
49. $x = -14$
50. $x = -48$
51. $x = 12$
52. $x = 8$
53. $x = -7$
54. $x = -56$
55. $x = 14$
56. $x = -8$
57. $x = -26$
58. $x = 5$
59. $x = -8$
60. $x = 15$
61. $x = 45$
62. $x = 9$
63. $x = 25$
64. $x = 75$
65. $x = 12$
66. $x = 144$
67. $x = 12$
68. $x = 25$
69. $x = 81$
70. $x = -9$
71. $x = -3$
72. $y = 16$
73. $x = 4$
74. $x = -\frac{1}{6}$
75. $x = \frac{1}{2}$
76. $x = 15$
77. $x = 63$
78. $x = 27$
79. $x = 72$
80. $y = 18$
81. $x = 2.5$
82. $x = 12$
83. $x = -10$
84. $x = 3$
85. $x = \frac{9}{4}$
86. $x = -\frac{13}{8}$
87. $x = 4$
88. $x = 6$
89. $x \approx -2.3$
90. All real numbers
91. No Solution
92. $x = -5$
93. $x = 6$
94. $y = 6$
95. $z = 107$
96. $x = 120$
97. All real numbers
98. $y = -2$
99. $w = 3$
100. No Solution

Review of Linear Functions (Lines)

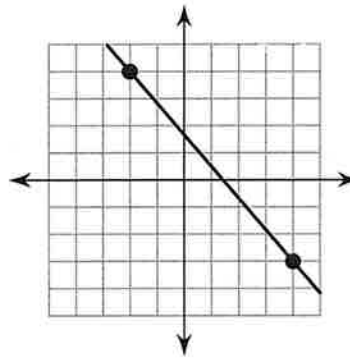
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Find the slope of each line.

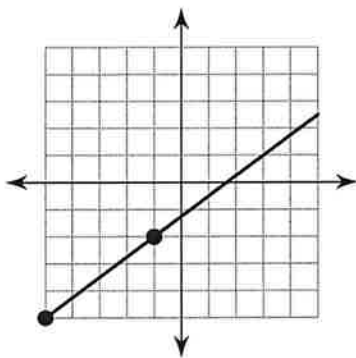
1)



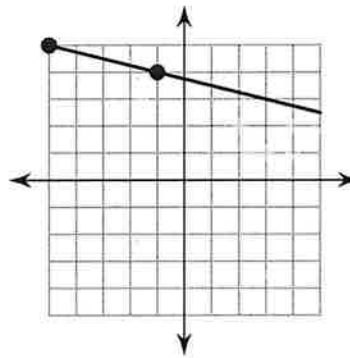
2)



3)



4)



5) $y = -\frac{5}{4}x + 3$

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

7) $y = -\frac{3}{4}x$

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

Find the slope of the line through each pair of points.

9) $(17, -6), (-11, 7)$

10) $(3, 4), (-4, -5)$

11) $(-20, 14), (17, 15)$

12) $(11, -18), (-1, -7)$

Find the slope of a line parallel to each given line.

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

14) $y = \frac{9}{5}x - 5$

Find the slope of a line perpendicular to each given line.

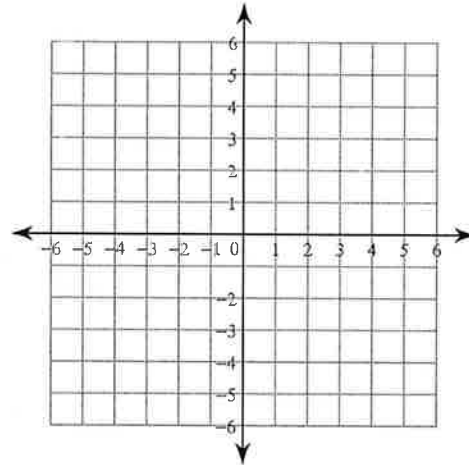
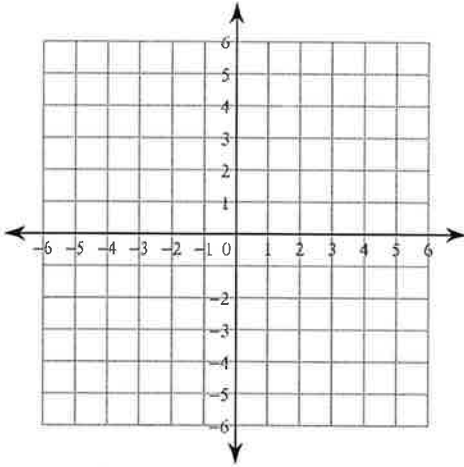
15) $y = -\frac{1}{2}x - 2$

16) $y = -x - 1$

Sketch the graph of each line.

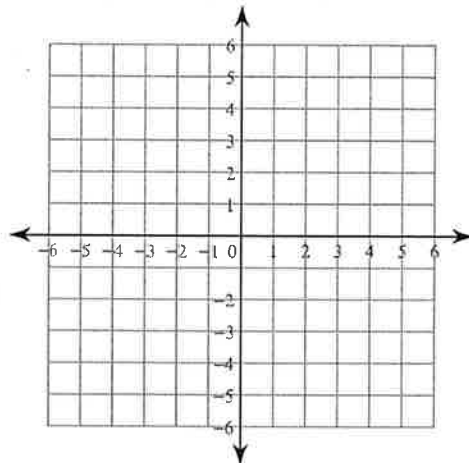
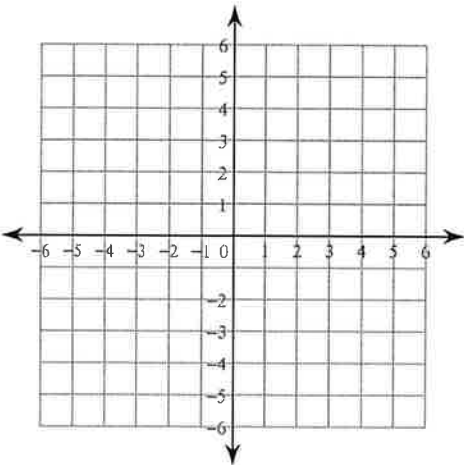
17) $y = \frac{4}{5}x + 2$

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

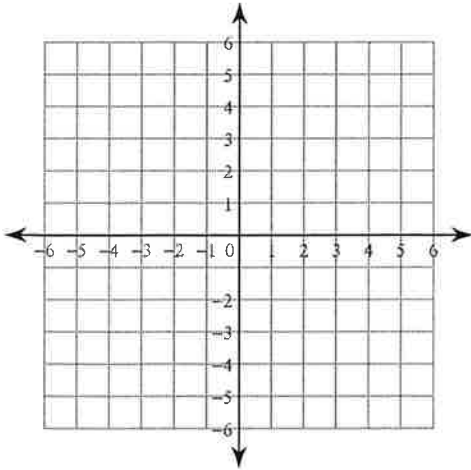


19) $y = \frac{7}{4}x - 4$

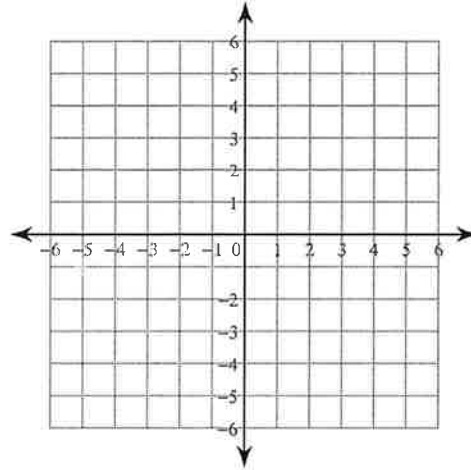
20) $y = \frac{5}{2}x - 5$



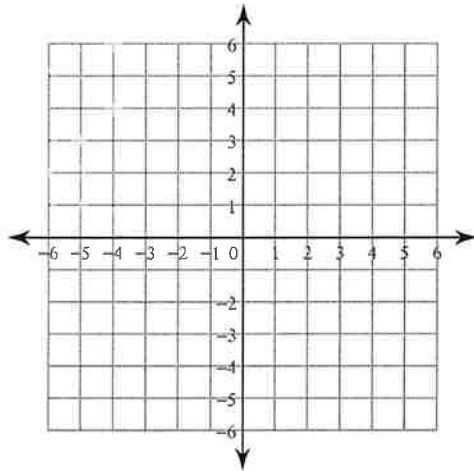
21) $y = \frac{1}{4}x - 4$



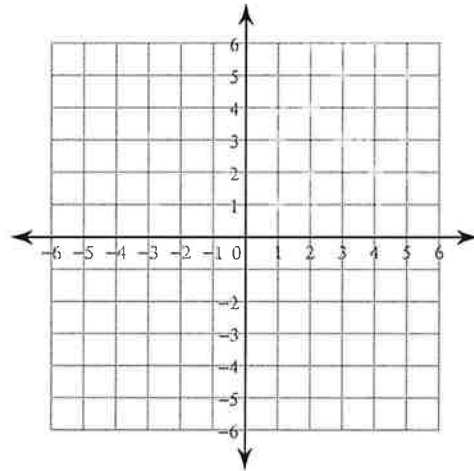
22) $y = -x + 4$



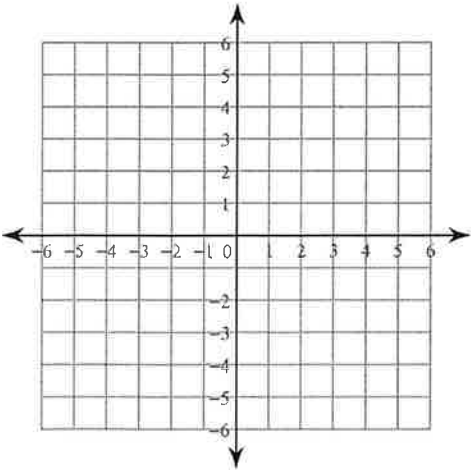
23) x-intercept = -2 , y-intercept = -2



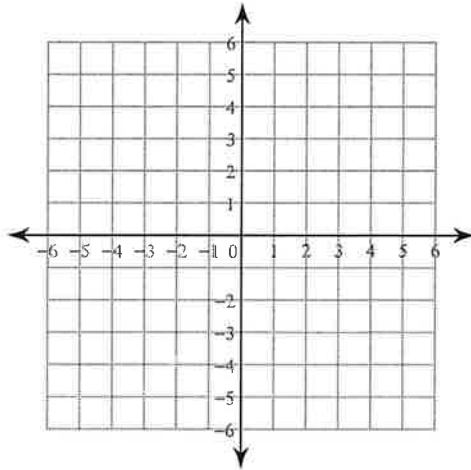
24) x-intercept = 5 , y-intercept = 4



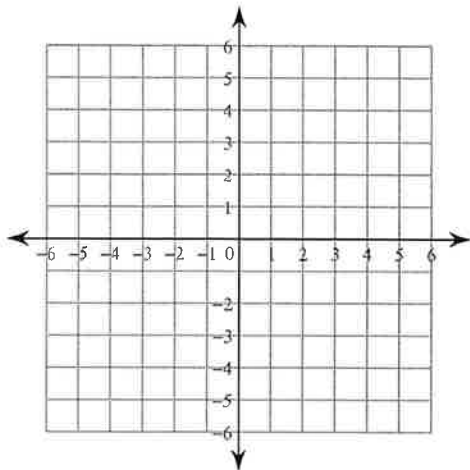
25) $3x + 4y = -12$



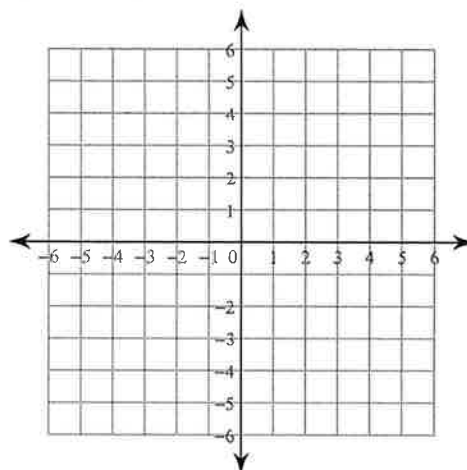
26) $5x + 3y = -6$



27) $x + y = -2$

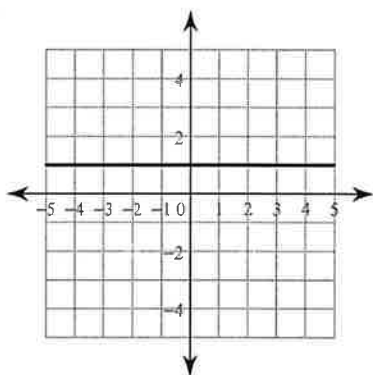


28) $2x + 5y = -10$

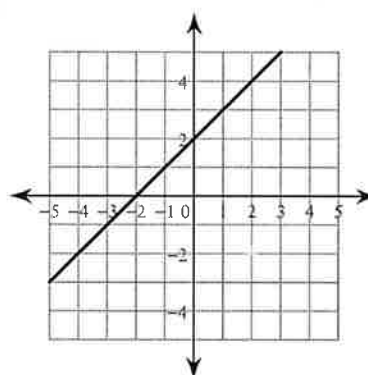


Write the slope-intercept form of the equation of each line.

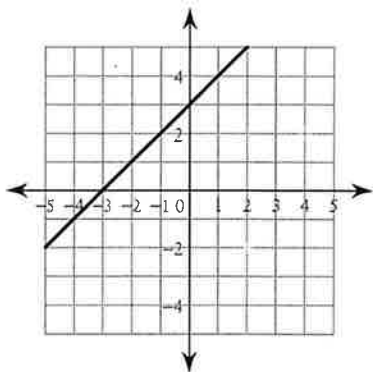
29)



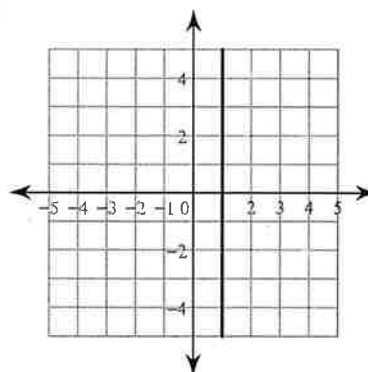
30)



31)



32)



$$33) x - 2y = 7$$

$$34) 7x + 2y = -28$$

$$35) 2x + 3y = -6$$

$$36) 2x + 3y = -7$$

$$37) 4x + y = 5$$

$$38) 4x - 3y = 6$$

Write the slope-intercept form of the equation of each line given the slope and y-intercept.

$$39) \text{ Slope} = -10, \text{ y-intercept} = -5$$

$$40) \text{ Slope} = -\frac{9}{5}, \text{ y-intercept} = -4$$

$$41) \text{ Slope} = -\frac{5}{4}, \text{ y-intercept} = 5$$

$$42) \text{ Slope} = 7, \text{ y-intercept} = 5$$

Write the standard form of the equation of each line given the slope and y-intercept.

43) Slope = -4 , y-intercept = 3

44) Slope = $\frac{1}{2}$, y-intercept = -1

45) Slope = $-\frac{9}{2}$, y-intercept = 4

46) Slope = $\frac{1}{5}$, y-intercept = -4

47) Slope = $\frac{5}{4}$, y-intercept = 1

48) Slope = -5 , y-intercept = 3

Write the slope-intercept form of the equation of the line through the given point with the given slope.

49) through: $(-1, 1)$, slope = 1

50) through: $(2, 5)$, slope = 2

51) through: $(1, -1)$, slope = $-\frac{3}{5}$

52) through: $(5, 1)$, slope = -1

53) through: $(-4, 3)$, slope = $\frac{1}{4}$

54) through: $(4, 3)$, slope = $\frac{3}{2}$

Write the slope-intercept form of the equation of the line through the given points.

55) through: $(5, 2)$ and $(0, -5)$

56) through: $(5, 5)$ and $(-1, -1)$

57) through: $(2, 1)$ and $(4, 3)$

58) through: $(0, 2)$ and $(3, 5)$

59) through: $(1, 0)$ and $(0, -5)$

60) through: $(0, 3)$ and $(-4, 5)$

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

61) through: $(-5, -3)$, parallel to $y = \frac{2}{5}x - 2$

62) through: $(-1, 2)$, parallel to $y = -\frac{3}{2}x - 2$

63) through: $(-3, -5)$, parallel to $y = 2x + 2$

64) through: $(5, -1)$, parallel to $y = -x - 5$

65) through: $(-2, -1)$, parallel to $y = -3x + 3$

66) through: $(2, 3)$, parallel to $y = \frac{8}{3}x - 4$

67) through: $(-2, -4)$, perp. to $y = -\frac{2}{9}x + 4$

68) through: $(3, -4)$, perp. to $y = -7x$

69) through: $(-2, -4)$, perp. to $y = -\frac{1}{2}x$

70) through: $(4, 5)$, perp. to $y = -x + 2$

71) through: $(-5, 3)$, perp. to $y = -5x + 1$

72) through: $(-1, 1)$, perp. to $y = -x - 1$

Solve each equation.

73) $-8x + 4x = -16$

74) $20 = 4b + 7 + 5$

75) $18 = 6p + 3p$

76) $7 = 6k - 7k$

77) $2v + 7v + 14 = 6v + 2$

78) $23 - 2m = 3 - 2(5m - 2)$

79) $-3(5p - 1) - 2(1 + 3p) = 1 - 6p - 4p$

80) $-\frac{88}{45} = \frac{1}{3}r + \frac{2}{5}r$

81) $\frac{5}{4} = r + \frac{3}{2} - \frac{1}{2}r$

82) $9.89 - 2.8x = 4.5x + 0.4$

83) $-1.476 - 1.6a = 3.6a - 0.28a$

84) $21.882 + 4.9n = 4.2(1.8n + 3.69)$

85) $-24.26674 + 0.1x = -1.93(1 - 4.2x)$

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

86) $x - 6y = -30$

87) $2x - y = 2$

Find the slope of each line.

88) $4x + 3y = -9$

89) $3x + y = -1$

90) $2x + 3y = 15$

91) $2x + y = 0$

Why Did King Kong Eat a Truck?

Circle the appropriate number-letter pairs in each column. Write the letter in the matching numbered box at the bottom of the page. (Hint: You should circle 11 number-letter pairs in each column.)

Circle the number-letter of each TRUE STATEMENT:

- 8-S $(x + 2)^2 = x^2 + 4x + 4$
- 13-E $(a - 5)^2 = a^2 - 10a + 25$
- 10-A $(u + 8)^2 = u^2 + 16u + 64$
- 2-H $(m - 4)^2 = m^2 - 16m + 16$
- 18-G $(3x + 1)^2 = 9x^2 + 6x + 1$
- 14-D $(5t - 2)^2 = 25t^2 - 20t + 4$
- 4-P $(2b + 3)^2 = 4b^2 + 12b + 6$
- 20-A $(2n + 7)^2 = 4n^2 + 28n + 49$
- 2-E $(10d - 4)^2 = 100d^2 - 80d + 16$
- 5-K $(8x - 1)^2 = 16x^2 - 16x + 1$
- 7-R $(4w + 5)^2 = 16w^2 + 20w + 25$
- 4-L $(x^2 - 3)^2 = x^4 - 6x^2 + 9$
- 11-T $(k^2 + 9)^2 = k^4 - 18k^2 + 81$
- 5-W $(2a + b)^2 = 4a^2 + 4ab + b^2$
- 15-A $(3u - 2v)^2 = 9u^2 - 12uv + 4v^2$
- 6-E $(8a + b)^2 = 64a^2 + 8ab + b^2$
- 1-H $(c^2 - 6d^2)^2 = c^4 - 12c^2d^2 + 36d^4$
- 21-I $(2xy - 5)^2 = 4x^2y^2 - 20xy + 10$

Circle the number-letter of each TRINOMIAL SQUARE:

- 6-A $n^2 + 6n + 9$
- 11-N $x^2 - 14x + 49$
- 3-R $a^2 + 2a + 4$
- 7-Y $c^2 + 2c + 1$
- 12-B $k^2 - 5k + 25$
- 21-C $x^2 - 12x + 36$
- 3-A $4t^2 + 12t + 9$
- 12-T $81x^2 - 18x + 1$
- 17-L $4m^2 + 8m + 16$
- 16-B $9w^2 - 24w + 16$
- 9-F $25t^2 - 45t + 9$
- 22-D $4x^4 + 8x^2 + 1$
- 9-W $a^2 + 2ab + b^2$
- 22-K $4m^2 + 20mn + 25n^2$
- 19-L $9a^2 - 27ab + 9b^2$
- 17-I $100u^2 - 60uv + 9v^2$
- 8-E $100a^2 + 20ab + 4b^2$
- 19-M $9x^4 + 6x^2y^2 + y^4$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
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Why Didn't Klutz Do Any Homework on Saturday?



Either multiply or factor, as directed, and find your answer in the adjacent answer column. Write the letter of that exercise in the box that contains the number of the answer.

Multiply:

- I $(a + 5)(a - 5)$
 D $(2 + 3a)(2 - 3a)$
 E $(7a - 1)(7a + 1)$
 N $(a^2 - 6)(a^2 + 6)$
 A $(4a + b)(4a - b)$
 O $(2a^2 - 5b)(2a^2 + 5b)$
 4 $16a^2 - b^2$
 13 $49a^2 - 1$
 6 $a^2 - 25$
 17 $4a^4 - 25b^2$
 15 $4 - 9a^2$
 12 $4a^4 - 36$
 24 $a^4 - 36$

Factor:

- S $x^2 - y^2$
 L $4x^2 - 49y^2$
 W $81x^2 - 100y^2$
 E $36x^2 - 121y^2$
 O $9x^2 - 64y^2$
 N $x^4 - 400$
 3 $(9x + 10y)(9x - 10y)$
 5 $(x + y)(x - y)$
 7 $(x^2 + 20)(x^2 - 20)$
 11 $(6x + 11y)(6x - 11y)$
 16 $(3x + 7y)(3x - 7y)$
 22 $(2x + 7y)(2x - 7y)$
 23 $(3x + 8y)(3x - 8y)$

Factor:

- E $n^2 - 49$
 A $n^2 - 1$
 N $81 - n^2$
 H $4n^2 - 9$
 I $49n^2 - 16$
 E $144 - 25n^2$
 1 $(2n + 3)(2n - 3)$
 10 $(12 + 5n)(12 - 5n)$
 8 $(n + 1)(n - 1)$
 5 $(7n + 3)(7n - 3)$
 2 $(n + 7)(n - 7)$
 18 $(9 + n)(9 - n)$
 20 $(7n + 4)(7n - 4)$

Factor:

- T $a^6 - b^4$
 C $25a^9 - 9b^4$
 W $a^2b^2 - 36$
 D $16 - a^4b^6$
 K $a^2b^4 - c^8$
 N $4a^{16} - 225$
 19 $(4 + a^2b^3)(4 - a^2b^3)$
 14 $(2a^8 + 15)(2a^8 - 15)$
 21 $(a^3 + b^2)(a^3 - b^2)$
 12 $(ab^2 + c^4)(ab^2 - c^4)$
 9 $(ab + 6)(ab - 6)$
 16 $(5a^4 + 3b^2)(5a^4 - 3b^2)$
 10 $(4 + ab^4)(4 - ab^4)$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
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OBJECTIVE 3-h: To simplify products of the form $(a + b)(a - b)$, to factor differences of squares.



Why Does Gyo Never, Never, Ever Bet on Even Numbers?



Factor completely each polynomial below. Find your answer and notice the two letters next to it. Write these letters in the two boxes at the bottom of the page that contain the number of that exercise.

① $3x^2 - 75$

LO $5(x - 4)^2$

SF $5(x + 3)^2$

② $5x^2 + 30x + 45$

EL $2(x - 12)^2$

NT $2(x - 6)^2$

③ $x^3 - 49x$

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

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

④ $2x^2 - 24x + 72$

EA $x(x + 8)(x - 8)$

ST $x(x + 7)(x - 7)$

⑤ $2k^3 - 8k$

HI $5k(k + 10)^2$

HE $2k(k + 2)(k - 2)$

⑥ $54k^2 - 24$

EN $3(k - 2)^2$

LS $6(3k + 1)(3k - 1)$

⑦ $5k^3 + 100k^2 + 500k$

SO $2k(k + 4)(k - 4)$

OR $3(2k - 3)^2$

⑧ $12k^2 - 36k + 27$

DS $6(3k + 2)(3k - 2)$

TE $5k(k + 8)^2$

⑨ $7a^3b - 7ab^3$

MI $7ab(a + 2b)^2$

AT $2b^2(2a + 4)^2$

⑩ $32a^2b^2 + 16ab^2 + 2b^2$

LA $4ab(a - 3b)^2$

AV $4ab(a - 5b)^2$

⑪ $4a^3b - 40a^2b^2 + 100ab^3$

OD $a^2b(2ab + 1)(2ab - 1)$

MA $a^2b(ab + 2)(ab - 2)$

⑫ $4a^4b^3 - a^2b$

WA $7ab(a + b)(a - b)$

IN $2b^2(4a + 1)^2$

5	5	9	9	4	4	4	3	3	1	1	12	12	6	6	10	10	7	7	2	2	11	11	8	8
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What Happens If the Jolly Green Giant Steps on Your House?

For exercises in the first column, express each square as a trinomial. For the remaining exercises, factor each trinomial as the square of a binomial, if possible. (If this is not possible, the correct answer is "not possible.") Find your answer below. Write the letter of the exercise in the box containing the number of its answer.

Express as a trinomial:

- (E) $(u + 3)^2$
- (O) $(u - 8)^2$
- (S) $(2u + 5)^2$
- (L) $(1 - 4u)^2$
- (T) $(u + 2v)^2$
- (U) $(7u - 3v)^2$
- (O) $(uv + 6)^2$

Answers:

- (13) $4u^2 + 20u + 25$
- (3) $4u^2 + 16u + 25$
- (9) $u^2 + 6u + 9$
- (10) $u^2 + 4uv + 4v^2$
- (14) $49u^2 - 31uv + 9v^2$
- (6) $1 - 8u + 16u^2$
- (2) $u^2 - 16u + 64$
- (18) $u^2v^2 + 12uv + 36$
- (5) $u^2 + 7uv + 4v^2$
- (12) $49u^2 - 42uv + 9v^2$

Factor:

- (E) $t^2 + 4t + 4$
- (U) $t^2 - 12t + 36$
- (L) $t^2 - 18t + 81$
- (Y) $25 + 10t + t^2$
- (W) $4t^2 + 20t + 25$
- (S) $9t^2 - 12t + 4$
- (I) $t^2 + 10t + 20$

Answers:

- (5) not possible
- (7) $(t - 9)^2$
- (19) $(t - 12)^2$
- (4) $(2t + 5)^2$
- (15) $(t + 2)^2$
- (21) $(3t - 2)^2$
- (16) $(2t - 9)^2$
- (3) $(t - 6)^2$
- (1) $(5 + t)^2$
- (8) $(3t - 5)^2$

Factor:

- (D) $49a^2 + 14a + 1$
- (O) $16a^2 - 24a + 9$
- (G) $a^2 - 8a + 64$
- (M) $a^2 + 2ab + b^2$
- (H) $a^2 + 10ab + 25b^2$
- (R) $4a^2 - 12ab + 9b^2$
- (M) $100a^2 - 20ab + b^2$

Answers:

- (8) not possible
- (11) $(10a - 3b)^2$
- (16) $(7a + 1)^2$
- (11) $(10a - b)^2$
- (20) $(a + b)^2$
- (17) $(2a - 3b)^2$
- (19) $(4a - 3)^2$
- (20) $(a + 3b)^2$
- (14) $(a + 5b)^2$
- (19) $(4a - 8)^2$



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
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How Can Fishermen Save Gas ?

Factor each polynomial below. Find one of the factors in **each** column of binomials. Notice the letter next to one factor and the number next to the other. Write the letter in the box at the bottom of the page that contains the matching number.

- | | | |
|--------------------|--------------|--------------|
| ① $4n^2 - 49$ | ③ $(n + 1)$ | ⓐ $(n - 3)$ |
| ② $n^2 + 8n + 12$ | ⑪ $(n + 2)$ | ⓐ $(2n - 7)$ |
| ③ $n^2 - 9n + 20$ | ② $(n + 8)$ | ⓐ $(n - 5)$ |
| ④ $n^2 + 16n + 64$ | ⑨ $(2n + 7)$ | ⓐ $(3n - 5)$ |
| ⑤ $n^2 + 2n - 15$ | ④ $(n + 5)$ | ⓐ $(n + 8)$ |
| ⑥ $3n^2 - 8n + 5$ | ⑱ $(n - 1)$ | ⓐ $(3n - 1)$ |
| | ⑭ $(n - 4)$ | ⓐ $(n + 6)$ |

- | | | |
|---------------------|----------------|----------------|
| ⑦ $a^2 + 4a - 21$ | ① $(a - 5)$ | ⓐ $(2a + 1)$ |
| ⑧ $5a^2 + 9a - 2$ | ⑬ $(a + 7)$ | ⓐ $(a - 6)$ |
| ⑨ $2a^2 + 11a + 15$ | ⑤ $(5a + 1)$ | ⓐ $(a - 3)$ |
| ⑩ $1 - 9a^4$ | ⑦ $(a + 2)$ | ⓐ $(a + 3)$ |
| ⑪ $a^2 - 11a + 30$ | ⑮ $(a - 1)$ | ⓐ $(5a - 1)$ |
| ⑫ $10a^2 - 3a - 1$ | ⑧ $(1 - 3a^2)$ | ⓐ $(2a - 1)$ |
| | ⑯ $(2a + 5)$ | ⓐ $(1 + 3a^2)$ |

- | | | |
|---------------------|---------------|--------------|
| ⑬ $8u^2 + 19u + 6$ | ⑩ $(u + 3)$ | ⓐ $(u + 1)$ |
| ⑭ $25u^2 - 20u + 4$ | ⑫ $(2u + 9)$ | ⓐ $(2u + 1)$ |
| ⑮ $3u^2 - 11u - 14$ | ⑰ $(u - 3)$ | ⓐ $(8u + 3)$ |
| ⑯ $u^2 - 4u - 21$ | ③ $(5u - 2)$ | ⓐ $(2u - 1)$ |
| ⑰ $6u^2 + 17u - 10$ | ⑥ $(3u - 14)$ | ⓐ $(u - 7)$ |
| ⑱ $2u^2 + 5u - 18$ | ⑮ $(u + 2)$ | ⓐ $(u - 2)$ |
| | ⑰ $(3u + 10)$ | ⓐ $(5u - 2)$ |

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
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WHAT DID MRS. ZLING SAY WHEN MR. ZLING SAID HE WAS GOING MOUNTAIN CLIMBING IN THE HIMALAYAS?

Factor each trinomial below. Find both factors in the rectangle below and cross out each box containing a factor. You will cross out **two** boxes for each exercise. When you finish, print the letters from the remaining boxes in the squares at the bottom of the page.

- ① $6x^2 + 19x + 3$
- ② $5x^2 - 9x - 2$
- ③ $9x^2 + 15x + 4$
- ④ $7x^2 + x - 8$
- ⑤ $2x^2 - 21x + 40$
- ⑥ $15m^2 + 19m + 6$
- ⑦ $8m^2 - 5m - 3$
- ⑧ $4m^2 - 17m + 18$
- ⑨ $14m^2 + 17m - 22$
- ⑩ $3m^2 - m - 30$

TH (4m - 9)	AT (3x + 1)	PA (m - 2)	DO (m - 3)	NE (2x - 5)	XT (3m - 10)	CK (14m - 11)	YO (2m - 3)	UR (5x + 1)
UP (6x + 1)	UW (15m + 1)	IN (x + 3)	PL (m + 2)	AN (x + 4)	DA (5m + 3)	RE (x - 2)	MA (3m + 2)	TT (9x + 2)
CO (7x + 8)	LD (3x + 4)	IB (7x + 2)	ER (8m + 3)	AJ (m + 3)	ET (7m + 2)	ON (x - 8)	HI (m - 1)	GH (x - 1)