Factor completely. (Factoring Review)

1) \(6x^2 - 26x - 20\)
2) \(512y^3 - 343\)
3) \(3xy - 15x + 8y - 40\)
4) \(25x^2 - 36y^2\)
5) \(343y^3 + 1000\)
6) \(12x^2 - 17xy + 6y^2\)
7) \(-50x^3 + 115x^2 - 60x\)
8) \(9x^2 - 48x + 64\)
9) \(81x^2 + 25\)
10) \(x^4 - 1\)

Add or divide as indicated. Simplify completely. (Section 10.2)

17) \(\frac{x^2 + 5x - 6}{x^2 + 9x + 18} + \frac{x^2 - 1}{x^2 + 7x + 12}\)
18) \(\frac{3x + 10}{x^2 - 4x - 12} - \frac{x + 6}{x^2 - 4x - 12}\)
19) \(\frac{m - 6}{m^2 + 14m + 48} + \frac{4m - 5}{m^2 + 7m - 8}\)
20) \(\frac{4}{5x + 20} + \frac{1}{15x - 45}\)

Simplify. (Section 10.3)

21) \(\frac{5}{x} + \frac{3}{x^2}\)
22) \(\frac{x - 1}{9x}, \frac{25}{x^2}, \frac{9}{x}\)

Multiply or divide as indicated. Simplify completely. (Section 10.1)

11) \(\frac{2x + 3}{10x^2 + 19x + 6}\)
12) \(\frac{2x - 8}{12 - 3x}\)
13) \(\frac{55xy^2}{x^2 - 4} \cdot \frac{5x - 10}{11x^2y^2}\)
14) \(\frac{x^2 + 8x + 15}{x^2 + 11x + 24} \cdot \frac{x^2 + 8x}{x^2 + 10x + 25}\)
15) \(\frac{2x^2 + 42x^5}{x^5} \cdot \frac{7}{\text{No further simplification possible}}\)
16) \(\frac{x^2 - 6x + xy - 6y}{9x^2 - 9y^2} + \frac{x - 6}{3x - 3y}\)

Solve the equation. (Section 10.5)

23) \(\frac{4}{x + 5} - \frac{9}{x - 5} = \frac{5}{x^2 - 25}\)
24) \(\frac{1}{x + 6} + \frac{2}{x + 3} = \frac{-3}{x^2 + 9x + 18}\)
25) \(\frac{x + 4}{x^2 - 3x + 2} \cdot \frac{4}{x^2 - 4x + 4} = \frac{x - 4}{x^2 - 3x + 2}\)
26) \(2 + \frac{5}{3x - 1} = \frac{2}{(3x - 1)^2}\)
Solve. (Section 10.6)

27) A recent advertisement claimed that 2 out of every 3 doctors recommend a certain herbal supplement to increase energy levels. If a local hospital employs 290 doctors, how many doctors would you expect to recommend the supplement? (Round to the nearest whole number, if necessary.)

28) A painter can finish painting a house in 6 hours. Her assistant takes 8 hours to finish the same job. How long would it take for them to complete the job if they were working together?

29) One pump can drain a pool in 8 minutes. When a second pump is also used, the pool only takes 5 minutes to drain. How long would it take the second pump to drain the pool if it were the only pump in use?

Use radical notation to write the expression. Simplify if possible. (Section 11.2)

30) $27^{4/3}$

Write with positive exponents. Simplify if possible. (Section 11.2)

31) $36^{-3/2}$

Use the properties of exponents to simplify the expression. Write with positive exponents. (Section 11.2)

32) $\frac{x^{6/5} \cdot x^{5/6}}{x^{3/7}}$

Simplify the radical expression. Assume that all variables represent positive real numbers. (Section 11.3)

33) $\sqrt[3]{32}$

34) $\frac{3}{\sqrt[10]{8}}$

35) $\frac{\sqrt[48]{48}}{\sqrt{2}}$

Add or subtract. Assume all variables represent positive real numbers. (Section 11.4)

36) $\sqrt[63]{63} - \sqrt[343]{343}$

37) $\sqrt{27} + 9\sqrt{243} - 7\sqrt{48}$

38) $\sqrt[4]{\frac{3}{4}} + \sqrt[25]{\frac{108}{25}}$

Multiply, and then simplify if possible. Assume all variables represent positive real numbers. (Section 11.4)

39) $(4\sqrt{11} - 4)^2$

40) $(2\sqrt{2} + 5)(5\sqrt{2} + 9)$

41) $(\sqrt{2x} - 3 - 4)^2$

Rationalize the denominator and simplify. Assume that all variables represent positive real numbers. (Section 11.5)

42) $\frac{\sqrt{2}}{\sqrt{11}}$

43) $\frac{5}{\sqrt{10} - 8}$

Solve. (Section 11.6)

44) $\sqrt{73} - x = x - 1$

45) $\sqrt{x + 53} - \sqrt{x + 13} = 4$

46) $\sqrt{4x + 1} = 3 + \sqrt{x - 2}$

Write in terms of $i$. (Section 11.7)

47) $\sqrt{-900}$

48) $\sqrt{-112}$

Perform the indicated operation. Write the result in the form $a + bi$. (Section 11.7)

49) $(9 - 7i)^2$

50) $\frac{7 + 9i}{7 + 2i}$

Find the domain and the range of the relation. Then determine whether the relation is a function. (Section 8.2)

51) $\{(-3, -6), (0, 4), (4, 2), (6, -2)\}$
52) \{ (41, -3), (5, -2), (5, 0), (9, 2), (21, 4) \}

Determine whether the graph is that of a function. (Section 8.2)
53)

\[ \begin{array}{c}
\text{Graph of a function:}
\end{array} \]

54)

\[ \begin{array}{c}
\text{Graph of a non-function:}
\end{array} \]

Decide whether the relation defines a function. (Section 8.2)
55) \[ 7x = 5 - 3y \]
56) \[ y = |x| - 7 \]
57) \[ y = 5x^2 \]

Find the indicated value. (Section 8.2)
58) Use the graph to find \( f(-4) \).

\[ \begin{array}{c}
\text{Graph to find } f(-4):
\end{array} \]

Solve the problem. (Section 8.2)
59) Find \( f(4) \) when \( f(x) = 2x^2 + 5x + 7 \).

Find an equation of the line through the pair of points. Write the equation in the form \( Ax + By = C \). (Section 8.5)
60) \((-2, 6) \) and \((0, -9)\)

Write an equation of the line with the given slope and containing the given point. Write the equation using function notation. (Section 8.5)
61) Slope \(-\frac{4}{7}\); through \((2, 2)\)

Find an equation of the line passing through the given points. Use function notation to write the equation. (Section 8.5)
62) \((-2, -22), (7, 50)\)

Write an equation in standard form for the line graphed. (Section 8.5)
63)
Solve. Assume the exercise describes a linear relationship. (Section 8.5)

64) The average value of a certain type of automobile was $13,260 in 1991 and depreciated to $6840 in 1995. Let \( y \) be the average value of the automobile in the year \( x \), where \( x = 0 \) represents 1991. Write a linear equation that models the value of the automobile in terms of the year \( x \).

65) When making a telephone call using a calling card, a call lasting 5 minutes costs $1.50. A call lasting 14 minutes costs $3.30. Let \( y \) be the cost of making a call lasting \( x \) minutes using a calling card. Write a linear equation that models the cost of making a call lasting \( x \) minutes.

Find an equation of the line. Write the equation using function notation. (Section 8.5)

66) Through (2, 9); parallel to \( f(x) = 5x - 6 \)

67) Through (-3, -2); perpendicular to \( f(x) = 3x + 2 \)

68) Through (2, 3); parallel to \( 5x + 2y = -2 \)

69) Through (-6, 15); perpendicular to \( 5x + 8y = 83 \)

Graph the function. (Section 8.3)

70) \( f(x) = \frac{1}{2}x + 4 \)

Graph the linear equation by finding and plotting its intercepts. (Section 8.3)

71) \(-x + 2y = 6\)

Graph the quadratic equation by finding and plotting ordered pair solutions. (Section 8.3)

72) \( y = 3x^2 \)

Solve the inequality. (Section 2.9 & 2.10)

73) \( 20x + 35 > 5(3x + 8) \)

74) \(-6x + 16 \leq -2(2x - 12) \)

75) \( 8 \leq 2(x - 1) \leq 12 \)

76) \( x \leq -1 \) and \( x \leq -2 \)

77) \( 8 \leq 3t - 1 \leq 14 \)

78) \( x + 4 < 1 \) and \(-4x < -12 \)

79) \( x \leq 2 \) or \( x \geq 8 \)

80) \( x < 4 \) or \( x < 7 \)

81) \( 9x - 6 < 3x \) or \(-2x \leq -6 \)

Graph the inequality. (Section 8.7)

82) \( 5x + y > 3 \)

83) \( 6x - 5y \geq 30 \)

Solve the equation by factoring. (Review)

84) \( (x + 7)(x + 1) = 40 \)

Use the square root property to solve the equation. (Section 12.1)

85) \( 2x^2 = 14 \)

86) \( (x + 8)^2 = 40 \)

87) \( (2x - 5)^2 = 25 \)

Solve the equation by completing the square. (Section 12.1)

88) \( x^2 + 18x + 67 = 0 \)

89) \( 49x^2 + 84x + 32 = 0 \)

Use the quadratic formula to solve the equation. (Section 12.2)

90) \( x^2 + 10x + 3 = 0 \)

91) \( 5x^2 - 4x - 9 = 0 \)

92) \( 2x^2 + 8x = -5 \)
Solve. (Section 12.3)

93) A ball is thrown upward with an initial velocity of 21 meters per second from a cliff that is 50 meters high. The height of the ball is given by the quadratic equation \( h = -4.9t^2 + 21t + 50 \) where \( h \) is in meters and \( t \) is the time in seconds since the ball was thrown. Find the time it takes the ball to hit the ground. Round your answer to the nearest tenth of a second.

Solve the absolute value equation. (Section 2.11)

94) \( |2x + 8| = 4 \)

95) \( |3x + 5| + 10 = 3 \)

96) \( |5x + 9| + 6 = 14 \)

97) \( |5x + 9| = |x - 3| \)

Solve the inequality. (Section 2.12)

98) \( |5k + 2| \leq 6 \)

99) \( |x - 9| > 11 \)

100) \( |x + 5| > 16 \)
1) $2(3x + 2)(x - 5)$  
2) $(8y - 7)(64y^2 + 56y + 49)$  
3) $(3x + 8)(y - 5)$  
4) $(5x + 6y)(5x - 6y)$  
5) $(7y + 10)(49y^2 - 70y + 100)$  
6) $(3x - 2y)(4x - 3y)$  
7) $-5(x-5)(2x - 3)$  
8) $(3x - 8)^2$  
9) Prime

10) $(x^2 + 1)(x + 1)(x - 1)$  
11) $\frac{1}{5x + 2}$  
12) $-\frac{2}{3}$  
13) $-\frac{25}{x(x + 2)}$  
14) $\frac{x}{x + 5}$  
15) $\frac{7}{2x10}$  
16) $\frac{1}{3}$  
17) $\frac{x + 4}{x + 1}$  
18) $\frac{2}{x - 6}$  
19) $\frac{5m^2 + 12m - 24}{(m + 8)(m + 6)(m - 1)}$  
20) $\frac{13x - 32}{15(x + 4)(x - 3)}$  
21) $\frac{5x + 3}{25 - 9x}$  
22) $\frac{x - 3}{9}$  
23) -14  
24) $\emptyset$  
25) 3  
26) $-\frac{1}{3}, \frac{1}{6}$  
27) 193 doctors  
28) $3\frac{3}{7}$ hr  
29) $13\frac{1}{3}$ min  
30) 81  
31) $\frac{1}{216}$  
32) $x^337/210$  

33) $4\sqrt{2}$  
34) $3\sqrt{4}$  
35) $2\sqrt{6}$  
36) $-4\sqrt{7}$  
37) $56\sqrt{3}$  
38) $\frac{17\sqrt{3}}{10}$  
39) $192 - 32\sqrt{11}$  
40) $65 + 43\sqrt{2}$  
41) $2x - 8\sqrt{2x - 3} + 13$  
42) $\frac{\sqrt{22}}{11}$  
43) $-\frac{5\sqrt{10} + 40}{54}$  
44) $9$  
45) $-4$  
46) $2, 6$  
47) $30i$  
48) $4i\sqrt{7}$  
49) $32 - 126i$  
50) $\frac{67 + 49i}{53 - 53i}$  
51) Domain: $\{-3, 0, 4, 6\}$  
      Range: $\{-6, 4, 2, -2\}$  
      Function  
52) Domain: $\{41, 9, 5, 21\}$  
      Range: $\{-3, -2, 0, 2, 4\}$  
      Not a function  
53) Function  
54) Not a function  
55) Function  
56) Function  
57) Function  
58) 8  
59) 59  
60) $-15x - 2y = 18$  
61) $f(x) = -\frac{4}{7}x + \frac{22}{7}$  
62) $f(x) = 8x - 6$  
63) $2x - 3y = 15$  
64) $y = -1605x + 13,260$  
65) $y = 0.2x + 0.5$  
66) $f(x) = 5x - 1$  
67) $f(x) = -\frac{1}{3}x - 3$  
68) $f(x) = -\frac{5}{2}x + 8$
69) \( f(x) = \frac{8}{5}x + \frac{123}{5} \)

70)

71)

72)

73) \((1, \infty)\)

74) \([-4, \infty)\)

75) \([5, 7]\)

76) \((-\infty, -2]\)

77) \([3, 5]\)

78) \(\emptyset\)

79) \((-\infty, 2] \cup [8, \infty)\)

80) \((-\infty, 7)\)

81) \((-\infty, 1) \cup [3, \infty)\)

82) \(-11, 3\)

83) \(-\sqrt{7}, \sqrt{7}\)

84) \(-8 - 2\sqrt{10}, -8 + 2\sqrt{10}\)

85) \(5, 0\)

86) \(-9 - \sqrt{14}, -9 + \sqrt{14}\)

87) \(\frac{4}{7}, \frac{8}{7}\)

88) \(-5 - \sqrt{22}, -5 + \sqrt{22}\)

89) \(\frac{9}{5}, -1\)

90) \(-\frac{4 - \sqrt{6}}{2}, -\frac{4 + \sqrt{6}}{2}\)

91) \(6.0\) sec

92) \(-2, -6\)

93) \(\emptyset\)

94) \(-\frac{1}{5}, -\frac{17}{5}\)

95) \(-3, -1\)

96) \(-\frac{8}{5}, \frac{4}{5}\)

97) \(-\infty, -2) \cup (20, \infty)\)

98) \(\emptyset\)

99) \((-\infty, -21) \cup (11, \infty)\)

100) \(\emptyset\)