Factor the polynomial completely.

1) $42x^5y + 48xy^3$

2) $2(y + 4) - x(y + 4)$

3) $4xy + 16x + 7y + 28$

4) $x^2 - 2x - 24$

5) $16y^3 - 40y^2 + 25y$

6) $9x^4 - 9x^2 - 10$

7) $10(a + 6)^2 + 34(a + 6) + 12$

8) $(5x + y)^2 - 36$

9) $25x^2 + 16$

10) $x^3 + 1000$

11) $343x^3 - 1000$

Solve the equation.

12) $x^2 + 7x - 60 = 0$

13) $\dfrac{x^2}{162} + \dfrac{1}{9} = \dfrac{x}{18}$

Solve.

14) A certain rectangle's length is 8 feet longer than its width. If the area of the rectangle is 84 square feet, find its dimensions.

15) Find the length of the shorter leg of a right triangle if the longer leg is 24 meters and the hypotenuse is 6 more than twice the shorter leg.

Find the domain of the rational function.

16) $f(x) = \dfrac{1 - 5x}{x^2 - 6x - 16}$

21) $\dfrac{m + 4}{m^2 + 6m - 7} + \dfrac{5m - 3}{m^2 + 15m + 56}$

Simplify the rational expression.

17) $\dfrac{4x - 8}{2 - x}$

22) $\left(\dfrac{2}{3} - \dfrac{7}{x}\right) \div \left(\dfrac{3}{x} + \dfrac{7}{2}\right)$

Multiply or divide as indicated. Simplify completely.

18) $\dfrac{36xy^2}{x^2 - 49} \cdot \dfrac{12x - 84}{3x^2 y^2}$

Simplify.

23)
$$\dfrac{\dfrac{4}{x} + 7}{\dfrac{16}{x^2} - 49}$$

19) $\dfrac{x^2 + 11x + 18}{x^2 + 12x + 27} \div \dfrac{x^2 + 2x}{x^2 + 13x + 30}$

24) $\dfrac{9x^{-1} + (8y)^{-1}}{x^{-2}}$

Perform the indicated operation. Simplify if possible.

20) $\dfrac{3}{7x} + \dfrac{6}{11x}$

Divide.

25) $\dfrac{-12x^6 - 10x^4 - 4x^2}{-2x^4}$

26) $(12x^3 + x^2 - 84x - 7) \div (6x^2 - 42)$

Solve the equation.

27) $1 + \dfrac{1}{x} = \dfrac{6}{x^2}$

28) $\dfrac{1}{x} + \dfrac{1}{x-3} = \dfrac{x-2}{x-3}$

29) $x^{-2} - 23x^{-1} + 132 = 0$

Solve the equation for the specified variable.

30) $\dfrac{PV}{T} = \dfrac{pv}{t}$ for V

Solve.

31) Two times the reciprocal of a number equals 24 times the reciprocal of 30. Find the number.

32) 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?

33) A cyclist bikes at a constant speed for 17 miles. He then returns home at the same speed but takes a different route. His return trip takes one hour longer and is 22 miles. Find his speed.

3

1) $6xy(7x^4 + 8y^2)$

2) $(y + 4)(2 - x)$

3) $(4x + 7)(y + 4)$

4) $(x - 6)(x + 4)$

5) $y(4y - 5)^2$

6) $(3x^2 - 5)(3x^2 + 2)$

7) $(2a + 18)(5a + 32)$

8) $(5x + y + 6)(5x + y - 6)$

9) prime polynomial

10) $(x + 10)(x^2 - 10x + 100)$

11) $(7x - 10)(49x^2 + 70x + 100)$

12) $-12, 5$

13) $3, 6$

14) 6 ft by 14 ft

15) 10 m

16) {x | x is a real number and x ≠ 8, x ≠ -2}

17) -4

18) $\dfrac{144}{x(x + 7)}$

19) $\dfrac{x + 10}{x}$

20) $\dfrac{75}{77x}$

21) $\dfrac{6m^2 + 4m + 35}{(m + 7)(m - 1)(m + 8)}$

22) $\dfrac{2(2x - 21)}{3(7x + 6)}$

23) $\dfrac{x}{4 - 7x}$

24) $\dfrac{72xy + x^2}{8y}$

25) $6x^2 + 5 + \dfrac{2}{x^2}$

26) $2x + \dfrac{1}{6}$

27) $-3, 2$

28) 1

29) $\dfrac{1}{11}, \dfrac{1}{12}$

30) $V = \dfrac{pvT}{tP}$

31) $\dfrac{5}{2}$

32) $3\dfrac{3}{7}$ hours

33) 5 mph