Name_____

Subtract the polynomials.

1) $(3x^5 + 19x^3 + 18) - (14x^3 + 6x^5 + 3)$

1) _____

2) $(7x^6 + 15x^3 + 3) - (-20x^3 + 2x^6 - 7)$

2) _____

3) $(-9x^4 + 7x^6 + 1 - 9x^5) - (5 - 5x^5 + 2x^6 - 5x^4)$

3) _____

4) $(-5x^7 + 2x^9 + 2 - 8x^8) - (-3 + 6x^8 + 7x^9 - 9x^7)$

4) _____

Find the product.

5) $\left(-\frac{1}{2}x - 7\right)\left(-\frac{1}{5}x - 2\right)$

5) _____

6) $\left(\frac{1}{3}x + 11\right)\left(-\frac{1}{5}x - 11\right)$

6) _____

7) $(x - 8)(x^2 + 8x - 1)$

7) _____

8) $(9x - 1)(x^2 - 7x + 1)$

8) _____

Factor completely using the grouping method to factor trinomials. If unfactorable, indicate that the polynomial is prime.

9) $11x^2 + 122x + 11$

9) _____

10) $3x^2 + 34x + 11$

10) _____

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

11) _____

12) $3x^2 - 11x + 6$

12) _____

13) $3x^2 + 13x - 10$

13) _____

14) $3x^2 + 13x + 10$

14) _____

15) $3x^2 - 11x - 10$

15) _____

Factor completely.

16) $125p^3 - 1$

16) _____

17) $27p^3 - 1$

17) _____

18) $343p^3 - 1$ 18) _____

19) $x^3 - 343$ 19) _____

20) $x^3 - 64$ 20) _____

21) $x^3 - 729$ 21) _____

22) $t^3 + 216$ 22) _____

23) $t^3 + 64$ 23) _____

24) $t^3 + 729$ 24) _____

25) $a^3b^3 + 729$ 25) _____

26) $a^3b^3 + 64$ 26) _____

Solve. Round to two decimal places unless otherwise noted.

27) If the average cost per unit C(x) to produce x units of plywood is given by $C(x) = \dfrac{1200}{x + 40}$,   27) _____

    what is the unit cost for 40 units?

28) If the average cost per unit C(x) to produce x units of plywood is given by $C(x) = \dfrac{600}{x + 20}$,   28) _____

    what is the unit cost for 50 units?

29) Suppose the cost per ton, C(x), to build an oil platform of x thousand tons is approximated   29) _____

    by $C(x) = \dfrac{262{,}500}{x + 525}$. What is the cost per ton for 20 thousand tons?

30) Suppose the cost per ton, C(x), to build an oil platform of x thousand tons is approximated   30) _____

    by $C(x) = \dfrac{212{,}500}{x + 425}$. What is the cost per ton for 50 thousand tons?

31) In the following formula, S(x) is the minimum number of hours of studying required to atta   31) _____
    test score of x:

    $S(x) = \dfrac{0.55x}{100.5 - x}$.

    How many hours of study are needed to score 89?

32) In the following formula, S(x) is the minimum number of hours of studying required to atta   32) _____
    test score of x:

    $S(x) = \dfrac{0.33x}{100.5 - x}$.

    How many hours of study are needed to score 83?

Simplify by factoring.

33) $\dfrac{3x + 15}{x^2 + 5x}$

33) _____

34) $\dfrac{2x + 4}{x^2 + 2x}$

34) _____

35) $\dfrac{4x + 2}{20x^2 + 26x + 8}$

35) _____

36) $\dfrac{3x + 3}{12x^2 + 21x + 9}$

36) _____

37) $\dfrac{y^2 + 12y + 27}{y^2 + 15y + 54}$

37) _____

38) $\dfrac{y^2 - 3y - 18}{y^2 - 2y - 24}$

38) _____

39) $\dfrac{m^2 - 36}{m^2 - 12m + 36}$

39) _____

40) $\dfrac{m^2 - 1}{m^2 - 2m + 1}$

40) _____

List all numbers for which the rational expression is undefined.

41) $\dfrac{b-6}{6b-18}$

41) _____

42) $\dfrac{b-5}{5b-10}$

42) _____

43) $\dfrac{x^2-36}{x^2+13x+36}$

43) _____

44) $\dfrac{x^2-25}{x^2+14x+48}$

44) _____

45) $\dfrac{x^2-36}{x^2-11x+24}$

45) _____

46) $\dfrac{x^2-9}{x^2+2x-35}$

46) _____

47) $\dfrac{x^2-64}{x^2+5x-36}$

47) _____

MULTIPLE CHOICE.
Choose the one alternative that best completes the statement or answers the question.
Show all work in the space provided.

Choose the correct equation of the given graph.

48) _____
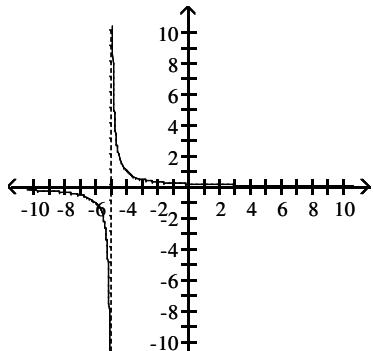
A) $f(x) = \dfrac{x + 5}{x}$ B) $f(x) = \dfrac{x}{x + 5}$ C) $f(x) = \dfrac{1}{x - 5}$ D) $f(x) = \dfrac{1}{x + 5}$

49)

49) _____
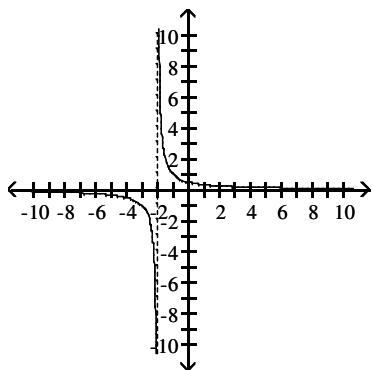
A) $f(x) = \dfrac{x + 2}{x}$ B) $f(x) = \dfrac{1}{x + 2}$ C) $f(x) = \dfrac{x}{x + 2}$ D) $f(x) = \dfrac{1}{x - 2}$

50)
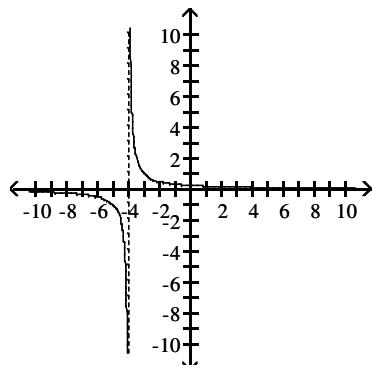
A) $f(x) = \dfrac{1}{x + 4}$

B) $f(x) = \dfrac{x + 4}{x}$

C) $f(x) = \dfrac{x}{x + 4}$

D) $f(x) = \dfrac{1}{x - 4}$

51)
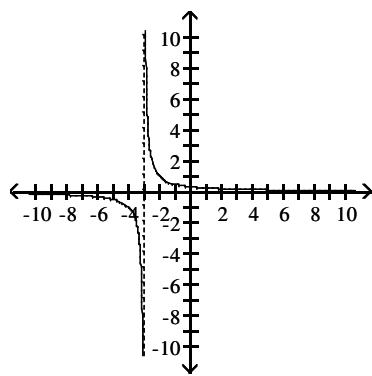
A) $f(x) = \dfrac{x + 3}{x}$

B) $f(x) = \dfrac{1}{x - 3}$

C) $f(x) = \dfrac{1}{x + 3}$

D) $f(x) = \dfrac{x}{x + 3}$

Solve the rational equation.

52) $\dfrac{9}{x} + x = \dfrac{45}{x}$

53) $\dfrac{8}{x} + x = \dfrac{12}{x}$

54) $\dfrac{x^2 + 3}{x} = \dfrac{28}{x}$

54) _____

55) $\dfrac{x^2 + 1}{x} = \dfrac{5}{x}$

55) _____

56) $\dfrac{x^2 - 9}{7x} = -\dfrac{5}{7x}$

56) _____

57) $\dfrac{x^2 - 13}{7x} = -\dfrac{9}{7x}$

57) _____

58) $\dfrac{x^2 - 11}{6x} = -\dfrac{7}{6x}$

58) _____

59) $\dfrac{1}{x - 6} = \dfrac{12}{x^2 - 36}$

59) _____

60) $\dfrac{1}{x - 4} = \dfrac{8}{x^2 - 16}$

60) _____

61) $\dfrac{1}{x - 3} = \dfrac{6}{x^2 - 9}$

61) _____

Solve. Section 5.6A NUMBER PROBLEMS.

62) The sum of a number and 64 times its reciprocal is 16. Find the number.

62) _____

63) The sum of a number and 49 times its reciprocal is 14. Find the number.

63) _____

64) The sum of a number and 6 times its reciprocal is 5. Find the number(s).

64) _____

65) The sum of a number and 4 times its reciprocal is 5. Find the number(s).

65) _____

66) The sum of a number and 3 times its reciprocal is 4. Find the number(s).

66) _____

Solve. Section 5.6A. The time is equal for these and the distance is given. Wind speed is unkown.

67) A plane flies 480 miles with the wind and 300 miles against the wind in the same length of time. If the speed of the wind is 21 mph, what is the speed of the plane in still air?

67) _____

68) A plane flies 490 miles with the wind and 350 miles against the wind in the same length of time. If the speed of the wind is 22 mph, what is the speed of the plane in still air?

68) _____

69) A plane flies 430 miles with the wind and 350 miles against the wind in the same length of time. If the speed of the wind is 28 mph, what is the speed of the plane in still air?

69) _____

70) A plane flies 410 miles with the wind and 350 miles against the wind in the same length of time. If the speed of the wind is 21 mph, what is the speed of the plane in still air?

70) _____

Solve the problem.

71) Given $f(x) = \dfrac{x - 6}{x - 7}$ and $g(x) = \dfrac{x - 6}{x - 3}$, find $f(x) - g(x)$.

71) _____

72) Given $f(x) = \dfrac{x + 1}{x - 3}$ and $g(x) = \dfrac{x + 1}{x - 8}$, find $f(x) - g(x)$.

72) _____

73) Given $f(x) = \dfrac{x + 6}{x + 1}$ and $g(x) = \dfrac{x + 6}{x + 8}$, find $f(x) - g(x)$.

73) _____

74) Given $f(x) = \dfrac{x + 3}{x - 9}$ and $g(x) = \dfrac{x + 3}{x + 2}$, find $f(x) - g(x)$.

74) _____

75) Given $f(x) = \dfrac{9}{4x - 24}$ and $g(x) = \dfrac{x}{x^2 - 36}$, find $f(x) + g(x)$.

75) _____

76) Given $f(x) = \dfrac{8}{5x - 25}$ and $g(x) = \dfrac{x}{x^2 - 25}$, find $f(x) + g(x)$.

76) _____

77) Given $f(x) = \dfrac{4}{5x - 10}$ and $g(x) = \dfrac{x}{x^2 - 4}$, find $f(x) + g(x)$.

77) _____

78) Given $f(x) = \dfrac{2}{3x - 21}$ and $g(x) = \dfrac{x}{x^2 - 49}$, find $f(x) + g(x)$.

78) _____

Find the specified quotient function.

79) Given the functions $f(x) = x^2 - 2x - 8$ and $g(x) = x^2 - 3x - 10$, find an equation of the quotient function $\frac{f}{g}$.

79) _____

80) Given the functions $f(x) = x^2 - 3x - 40$ and $g(x) = x^2 - 4x - 45$, find an equation of the quotient function $\frac{f}{g}$.

80) _____

81) Given the functions $f(x) = x^2 - 4x - 12$ and $g(x) = x^2 - 5x - 14$, find an equation of the quotient function $\frac{f}{g}$.

81) _____

82) Given the functions $f(x) = x^2 - 49$ and $g(x) = x^2 - 10x + 21$, find an equation of the quotient function $\frac{f}{g}$.

82) _____

83) Given the functions $f(x) = x^2 - 36$ and $g(x) = x^2 - 9x + 18$, find an equation of the quotient function $\frac{f}{g}$.

83) _____

**Identify any vertical or horizontal asymptotes in the graph of y = f(x). State the domain of f.**

84)

85)
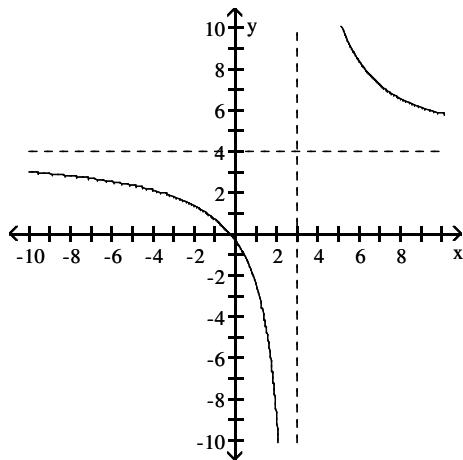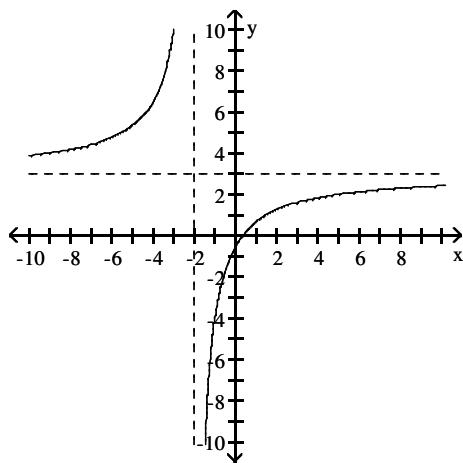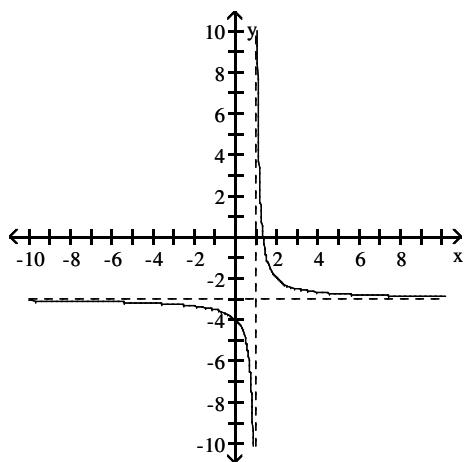
86)

87)

88)

89)
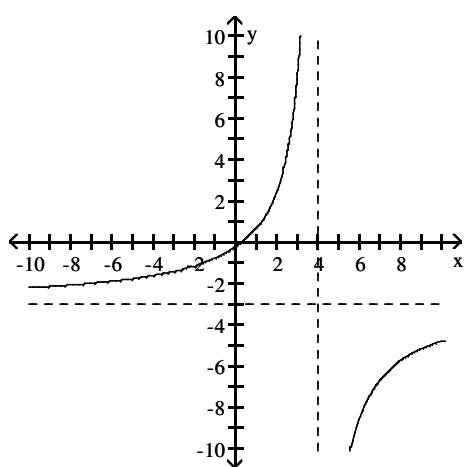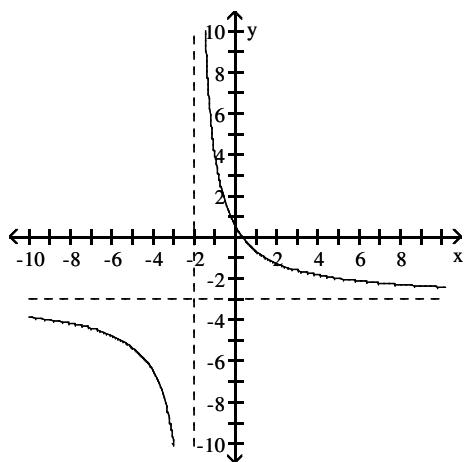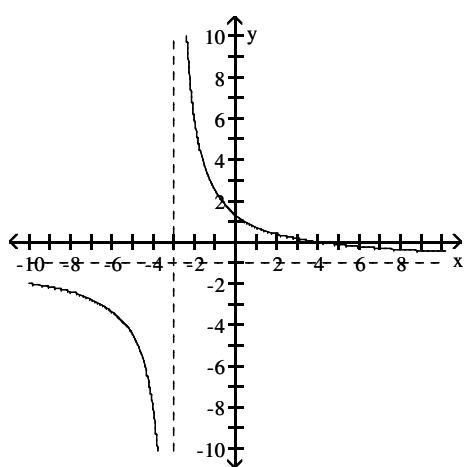
1) $-3x^5 + 5x^3 + 15$

2) $5x^6 + 35x^3 + 10$

3) $5x^6 - 4x^5 - 4x^4 - 4$

4) $-5x^9 - 14x^8 + 4x^7 + 5$

5) $\frac{1}{10}x^2 + \frac{12}{5}x + 14$

6) $-\frac{1}{15}x^2 - \frac{88}{15}x - 121$

7) $x^3 - 65x + 8$

8) $9x^3 - 64x^2 + 16x - 1$

9) $(11x + 1)(x + 11)$

10) $(3x + 1)(x + 11)$

11) prime

12) $(3x - 2)(x - 3)$

13) $(3x - 2)(x + 5)$

14) prime

15) prime

16) $(5p - 1)(25p^2 + 5p + 1)$

17) $(3p - 1)(9p^2 + 3p + 1)$

18) $(7p - 1)(49p^2 + 7p + 1)$

19) $(x - 7)(x^2 + 7x + 49)$

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

21) $(x - 9)(x^2 + 9x + 81)$

22) $(t + 6)(t^2 - 6t + 36)$

23) $(t + 4)(t^2 - 4t + 16)$

24) $(t + 9)(t^2 - 9t + 81)$

25) $(ab + 9)(a^2b^2 - 9ab + 81)$

26) $(ab + 4)(a^2b^2 - 4ab + 16)$

27) $15.00

28) $8.57

29) $481.65

30) $447.37

31) 4.26 hr

32) 1.57 hr

33) $\frac{3}{x}$

34) $\frac{2}{x}$

35) $\frac{1}{5x + 4}$

36) $\frac{1}{4x + 3}$

37) $\frac{y + 3}{y + 6}$

38) $\dfrac{y + 3}{y + 4}$

39) $\dfrac{m + 6}{m - 6}$

40) $\dfrac{m + 1}{m - 1}$

41) 3
42) 2
43) –4, –9
44) –6, –8
45) 3, 8
46) –7, 5
47) –9, 4
48) D
49) B
50) A
51) C
52) {–6, 6}
53) {–2, 2}
54) {–5, 5}
55) {–2, 2}
56) {–2, 2}
57) {–2, 2}
58) {–2, 2}
59) ∅
60) ∅
61) ∅
62) 8
63) 7
64) 2 or 3
65) 1 or 4
66) 1 or 3
67) 91 mph
68) 132 mph
69) 273 mph
70) 266 mph

71) $\dfrac{4(x - 6)}{(x - 7)(x - 3)}$

72) $\dfrac{-5(x + 1)}{(x - 3)(x - 8)}$

73) $\dfrac{7(x + 6)}{(x + 1)(x + 8)}$

74) $\dfrac{11(x + 3)}{(x - 9)(x + 2)}$

75) $\dfrac{13x + 54}{4(x + 6)(x - 6)}$

76) $\dfrac{13x + 40}{5(x + 5)(x - 5)}$

77) $\dfrac{9x + 8}{5(x + 2)(x - 2)}$

78) $\dfrac{5x + 14}{3(x + 7)(x - 7)}$

79) $\dfrac{f}{g}(x) = \dfrac{x - 4}{x - 5}$

80) $\dfrac{f}{g}(x) = \dfrac{x - 8}{x - 9}$

81) $\dfrac{f}{g}(x) = \dfrac{x - 6}{x - 7}$

82) $\dfrac{f}{g}(x) = \dfrac{x + 7}{x - 3}$

83) $\dfrac{f}{g}(x) = \dfrac{x + 6}{x - 3}$

84) Vertical: $x = 3$; horizontal: $y = 4$; $(-\infty, 3) \cup (3, \infty)$
85) Vertical: $x = -2$; horizontal: $y = 3$; $(-\infty, -2) \cup (-2, \infty)$
86) Vertical: $x = 1$; horizontal: $y = -3$; $(-\infty, 1) \cup (1, \infty)$
87) Vertical: $x = 4$; horizontal: $y = -3$; $(-\infty, 4) \cup (4, \infty)$
88) Vertical: $x = -2$; horizontal: $y = -3$; $(-\infty, -2) \cup (-2, \infty)$
89) Vertical: $x = -3$; horizontal: $y = -1$; $(-\infty, -3) \cup (-3, \infty)$