

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

Find all numbers for which the rational expression is not defined.

1)  $\frac{2}{a-7}$  1) \_\_\_\_\_

A)  $a = 0$

B)  $a = 7$

C) None

D)  $a = -7$

2)  $\frac{7}{b+8}$  2) \_\_\_\_\_

A)  $b = 0$

B)  $b = -8$

C)  $b = 8$

D) None

3)  $\frac{c-9}{5}$  3) \_\_\_\_\_

A)  $c = 0$

B)  $c = -9$

C) None

D)  $c = 9$

4)  $\frac{d-6}{2-d}$  4) \_\_\_\_\_

A)  $d = 2, 6$

B)  $d = -2$

C)  $d = 2$

D) None

5)  $\frac{x^2 - 36}{x^2 - 13x + 42}$  5) \_\_\_\_\_

A)  $x = -7$  and  $x = -6$

B)  $x = 0$

C)  $x = 6$  and  $x = -6$

D)  $x = 7$  and  $x = 6$

6)  $\frac{x^2 - 81}{x^2 + 5x - 14}$  6) \_\_\_\_\_

A)  $x = 7$  and  $x = -2$

B)  $x = 0$

C)  $x = 9$  and  $x = -9$

D)  $x = -7$  and  $x = 2$

7)  $\frac{x^2 - 81}{x^2 - 2x - 15}$  7) \_\_\_\_\_

A)  $x = 9$  and  $x = -9$

B)  $x = 0$

C)  $x = 5$  and  $x = -3$

D)  $x = -5$  and  $x = 3$

8)  $\frac{2y-6}{y^2-49}$  8) \_\_\_\_\_

A)  $y = 49$

B)  $y = 7$

C)  $y = 7$  and  $y = -7$

D)  $y = 3$

$$9) \frac{b-7}{7b-28}$$

$$A) b = 4$$

$$B) b = 28$$

$$C) b = 0$$

$$D) b = -7$$

9) \_\_\_\_\_

Multiply. Do not simplify.

$$10) \frac{7y^4}{7y^4} \cdot \frac{2z}{7x}$$

$$A) \frac{2z}{(7y^4)(7x)}$$

$$B) \frac{(7y^4)(7x)}{(7y^4)(2z)}$$

$$C) \frac{(7y^4)(2z)}{7x}$$

$$D) \frac{(7y^4)(2z)}{(7y^4)(7x)}$$

10) \_\_\_\_\_

$$11) \frac{3x}{3x} \cdot \frac{x-3}{x+10}$$

$$A) \frac{3x(x-3)}{x+10}$$

$$B) \frac{3x(x+10)}{3x(x-3)}$$

$$C) \frac{x-3}{3x(x+10)}$$

$$D) \frac{3x(x-3)}{3x(x+10)}$$

11) \_\_\_\_\_

$$12) \frac{7a+1}{5a-1} \cdot \frac{a}{a}$$

$$A) \frac{(7a+1)a}{5a-1}$$

$$B) \frac{(7a+1)a}{(5a-1)a}$$

$$C) \frac{7a+1}{(5a-1)a}$$

$$D) \frac{(5a-1)a}{(7a+1)a}$$

12) \_\_\_\_\_

$$13) \frac{x-9}{7-x} \cdot \frac{-1}{-1}$$

$$A) \frac{(7-x)(-1)}{(x-9)(-1)}$$

$$B) \frac{(x-9)(-1)}{(7-x)(-1)}$$

$$C) \frac{x-9}{(7-x)(-1)}$$

$$D) \frac{(x-9)(-1)}{7-x}$$

13) \_\_\_\_\_

$$14) \frac{x+4}{x+9} \cdot \frac{x-4}{x-4}$$

$$A) \frac{(x+9)(x-4)}{(x+4)(x-4)}$$

$$B) \frac{(x+4)(x-4)}{(x+9)(x-4)}$$

$$C) \frac{x+4}{(x+9)(x-4)}$$

$$D) \frac{(x+4)(x-4)}{x+9}$$

14) \_\_\_\_\_

Simplify.

$$15) \frac{24k^3}{6k}$$

$$A) 18$$

$$B) 4k^2$$

$$C) 18k^2$$

$$D) 4k$$

15) \_\_\_\_\_

$$16) \frac{16m^2p^2}{8m^9p}$$

$$A) \frac{2m^7}{p}$$

$$B) 2mp$$

$$C) \frac{2p}{m^7}$$

$$D) 2m^7p^2$$

16) \_\_\_\_\_

$$17) \frac{16x - 4}{20} \qquad \qquad \qquad 17) \underline{\hspace{2cm}}$$

A)  $\frac{4x - 1}{5}$       B)  $\frac{4x}{5}$       C)  $\frac{4x - 1}{20}$       D)  $4x - 1$

$$18) \frac{3m^2 + 3m}{15m^2 + 21m} \qquad \qquad \qquad 18) \underline{\hspace{2cm}}$$

A)  $\frac{m^2 + 1}{5m^2 + 7}$       B)  $\frac{m + 1}{5m + 7}$       C)  $\frac{m + 1}{m + 7}$       D)  $\frac{m + 3}{5m + 7}$

$$19) \frac{4x^2 - 20x}{12x^2 - 60x} \qquad \qquad \qquad 19) \underline{\hspace{2cm}}$$

A) 2      B)  $\frac{x - 5}{6x - 30}$       C) 3      D)  $\frac{1}{3}$

$$20) \frac{8 - 2x}{x - 4} \qquad \qquad \qquad 20) \underline{\hspace{2cm}}$$

A)  $x - 4$       B)  $2x - 8$       C) -2      D) 2

$$21) \frac{y^2 + 3y}{y^2 + 5y} \qquad \qquad \qquad 21) \underline{\hspace{2cm}}$$

A)  $\frac{12y + 27}{14y + 45}$       B)  $\frac{y^2 + 3y}{y + 5}$       C)  $\frac{y + 3}{y + 5}$       D)  $\frac{y + 3}{y^2 + 5y}$

$$22) \frac{4x + 2}{20x^2 + 26x + 8} \qquad \qquad \qquad 22) \underline{\hspace{2cm}}$$

A)  $\frac{4x + 5}{5x + 26}$       B)  $\frac{4x + 2}{20x^2 + 26x + 8}$   
C)  $\frac{4x}{5x + 4}$       D)  $\frac{1}{5x + 4}$

$$23) \frac{y^2 - 2y - 8}{y^2 + 3y - 28} \qquad \qquad \qquad 23) \underline{\hspace{2cm}}$$

A)  $\frac{-2y - 8}{3y - 28}$       B)  $\frac{-2y - 2}{3y - 7}$       C)  $\frac{y + 2}{y + 7}$       D)  $-\frac{y^2 - 2y - 8}{y^2 + 3y - 28}$

$$24) \frac{y^2 + 3y - 18}{y^2 + 12y + 36}$$

24) \_\_\_\_\_

A)  $\frac{3y - 18}{12y + 36}$

B)  $-\frac{y^2 + 3y - 18}{y^2 + 12y + 36}$

C)  $\frac{y - 3}{y + 6}$

D)  $\frac{3y + 18}{12y - 12}$

$$25) \frac{y^2 + 3y - 18}{y^2 + 2y - 24}$$

25) \_\_\_\_\_

A)  $-\frac{y^2 + 3y - 18}{y^2 + 2y - 24}$

B)  $\frac{3y - 3}{2y - 4}$

C)  $\frac{y - 3}{y - 4}$

D)  $\frac{3y - 18}{2y - 24}$

Multiply and, if possible, simplify.

$$26) \frac{2z^3}{3} \cdot \frac{9}{z^2}$$

26) \_\_\_\_\_

A)  $\frac{6}{z}$

B)  $6z$

C)  $\frac{6z^2}{z^3}$

D)  $\frac{z}{6}$

$$27) \frac{3x^2}{5} \cdot \frac{10}{x^3}$$

27) \_\_\_\_\_

A)  $\frac{x}{16}$

B)  $\frac{6x^2}{x^3}$

C)  $\frac{x^5}{16}$

D)  $\frac{6}{x}$

$$28) \frac{5p - 5}{p} \cdot \frac{5p^2}{6p - 6}$$

28) \_\_\_\_\_

A)  $\frac{6}{25p}$

B)  $\frac{25p^3 - 25p^2}{6p^2 - 6p}$

C)  $\frac{25p}{6}$

D)  $\frac{30p^2 + 60p + 30}{5p^3}$

$$29) \frac{k^2 + 5k + 6}{k^2 + 11k + 18} \cdot \frac{k^2 + 9k}{k^2 + 12k + 27}$$

29) \_\_\_\_\_

A)  $\frac{k}{k + 9}$

B)  $\frac{1}{k + 9}$

C)  $\frac{k^2 + 9k}{k + 9}$

D)  $\frac{k}{k^2 + 11k + 18}$

$$30) \frac{k^2 + 14k + 48}{k^2 + 16k + 64} \cdot \frac{k^2 + 8k}{k^2 + 3k - 18}$$

30) \_\_\_\_\_

A)  $\frac{k}{k^2 + 16k + 64}$

B)  $\frac{k^2 + 8k}{k - 3}$

C)  $\frac{k}{k - 3}$

D)  $\frac{1}{k - 3}$

$$31) \frac{x^2}{x^2 - 4} \cdot \frac{x^2 - 11x + 18}{x^2 - 9x} \quad 31) \underline{\hspace{2cm}}$$

A)  $\frac{x}{x+2}$       B)  $\frac{x^2}{x+2}$       C)  $\frac{x}{x-2}$       D)  $\frac{x}{(x+2)(x+9)}$

$$32) \frac{x^4 - 81}{x^4 - 1} \cdot \frac{x^2 + 1}{x^2 + 9} \quad 32) \underline{\hspace{2cm}}$$

A)  $\frac{(x+3)(x-3)}{(x+1)(x-1)}$       B)  $\frac{x+3}{x-1}$       C)  $\frac{x-3}{x+1}$       D)  $\frac{x-3}{x-1}$

Find the reciprocal.

$$33) \frac{10}{y} \quad 33) \underline{\hspace{2cm}}$$

A)  $-\frac{10}{y}$       B)  $1 - \frac{10}{y}$       C)  $\frac{y}{10}$       D)  $\frac{1}{10y}$

$$34) \frac{x}{7} \quad 34) \underline{\hspace{2cm}}$$

A)  $\frac{7}{x}$       B)  $\frac{1}{7x}$       C)  $-\frac{x}{7}$       D)  $1 - \frac{x}{7}$

$$35) \frac{t+8}{t-4} \quad 35) \underline{\hspace{2cm}}$$

A)  $\frac{8+t}{4-t}$       B)  $\frac{t-8}{t+4}$       C)  $\frac{t+4}{t-8}$       D)  $\frac{t-4}{t+8}$

$$36) 4y^2 + 5y \quad 36) \underline{\hspace{2cm}}$$

A)  $1 - (4y^2 + 5y)$       B)  $\frac{1}{4y^2 + 5y}$       C)  $5y^2 + 4y$       D)  $\frac{4y^2}{5y}$

$$37) \frac{12}{x^2 + y^2} \quad 37) \underline{\hspace{2cm}}$$

A)  $\frac{1}{12x^2 + y^2}$       B)  $-\frac{12}{x^2 + y^2}$       C)  $\frac{1}{12x^2 + 12y^2x}$       D)  $\frac{x^2 + y^2}{12}$

$$38) \frac{x^2 + 8}{2 - x} \quad 38) \underline{\hspace{2cm}}$$

A)  $\frac{8 - x}{x^2 + 2}$       B)  $\frac{x^2 + 8}{x - 2}$       C)  $\frac{x^2 + 2}{8 - x}$       D)  $\frac{2 - x}{x^2 + 8}$

$$39) \frac{y^2 + 12y + 3}{y^2 - y + 11} \quad \text{39) } \underline{\hspace{2cm}}$$

A)  $\frac{y^2 - 3y + 12}{y^2 + y + 11}$       B)  $\frac{y^2 + 12y - 3}{y^2 - y - 11}$       C)  $\frac{y^2 - y + 11}{y^2 + 12y + 3}$       D)  $\frac{y^2 - y - 11}{y^2 + 12y - 3}$

$$40) \frac{x^2 + 2xy - y^2}{x^2 - 6xy + y^2} \quad \text{40) } \underline{\hspace{2cm}}$$

A)  $\frac{x^2 + 6xy + y^2}{x^2 - 2xy - y^2}$       B)  $\frac{x^2 - 2xy + y^2}{x^2 + 6xy - y^2}$       C)  $\frac{1}{x^2 - 6xy - y^2}$       D)  $\frac{x^2 - 6xy + y^2}{x^2 + 2xy - y^2}$

Divide and simplify.

$$41) \frac{5}{9} \div \frac{9}{4} \quad \text{41) } \underline{\hspace{2cm}}$$

A)  $\frac{5}{4}$       B)  $\frac{4}{5}$       C)  $\frac{20}{81}$       D)  $\frac{81}{20}$

$$42) \frac{3x^2}{4} \div \frac{x^3}{16} \quad \text{42) } \underline{\hspace{2cm}}$$

A)  $\frac{12}{x}$       B)  $\frac{x}{12}$       C)  $\frac{x^5}{21}$       D)  $\frac{12x^2}{x^3}$

$$43) \frac{7p - 7}{p} \div \frac{8p - 8}{5p^2} \quad \text{43) } \underline{\hspace{2cm}}$$

A)  $\frac{35p}{8}$       B)  $\frac{8}{35p}$   
 C)  $\frac{35p^3 - 35p^2}{8p^2 - 8p}$       D)  $\frac{56p^2 + 112p + 56}{5p^3}$

$$44) \frac{10}{y - x} \div \frac{5}{x - y} \quad \text{44) } \underline{\hspace{2cm}}$$

A) 2      B)  $\frac{2(x - y)}{y - x}$       C) -2      D) -10

$$45) \frac{-12 + 4x}{12} \div \frac{21 - 7x}{21} \quad \text{45) } \underline{\hspace{2cm}}$$

A)  $\frac{x - 3}{3 - x}$       B)  $\frac{x - 3}{x + 3}$       C) -1      D) 1

$$46) \frac{x^2 - 64}{x} \div \frac{3x + 24}{x - 8} \quad \text{46) } \underline{\hspace{2cm}}$$

A)  $\frac{3(x + 8)^2}{x}$       B)  $\frac{3x}{(x - 8)^2}$       C)  $\frac{(x - 8)^2}{x}$       D)  $\frac{(x - 8)^2}{3x}$

$$47) \frac{x^2 + 9x + 20}{x + 4} \div \frac{x^2 - 25}{4x - 20} \quad 47) \underline{\hspace{2cm}}$$

A)  $\frac{1}{4}$                       B)  $\frac{4x - 20}{x - 5}$                       C) 4                      D)  $\frac{(x + 5)^2}{4}$

$$48) \frac{z^2 + 12z + 35}{z^2 + 13z + 40} \div \frac{z^2 + 7z}{z^2 + 18z + 80} \quad 48) \underline{\hspace{2cm}}$$

A)  $z + 10$                       B)  $\frac{z}{z^2 + 13z + 40}$                       C)  $\frac{z + 10}{z^2 + 8z}$                       D)  $\frac{z + 10}{z}$

$$49) \frac{z^2 + 12z + 35}{z^2 + 14z + 49} \div \frac{z^2 + 5z}{z^2 + 4z - 21} \quad 49) \underline{\hspace{2cm}}$$

A)  $\frac{z - 3}{z^2 + 7z}$                       B)  $\frac{z}{z^2 + 14z + 49}$                       C)  $\frac{z - 3}{z}$                       D)  $z - 3$

$$50) \frac{a^2 + 3a - 28}{a^2 - 14a + 49} \div \frac{a^2 - 8a + 16}{a^2 + 6a - 7} \quad 50) \underline{\hspace{2cm}}$$

A)  $-\frac{a - 1}{a - 4}$                       B)  $\frac{(a + 7)^2(a - 1)}{(a - 7)^2(a - 4)}$                       C)  $\frac{(a + 7)^2(a - 1)}{(a - 7)^2}$                       D)  $\frac{(a - 4)^3}{(a - 7)^2(a - 1)}$

Find the LCM.

$$51) 20, 15 \quad 51) \underline{\hspace{2cm}}$$

A) 20                      B) 12                      C) 30                      D) 60

$$52) 10, 6, 15 \quad 52) \underline{\hspace{2cm}}$$

A) 15                      B) 10                      C) 6                      D) 30

$$53) 60, 24, 90 \quad 53) \underline{\hspace{2cm}}$$

A) 360                      B) 120                      C) 72                      D) 180

$$54) 500, 900, 450 \quad 54) \underline{\hspace{2cm}}$$

A) 2250                      B) 1500                      C) 4500                      D) 900

Add, first finding the LCD. Simplify, if possible.

$$55) \frac{8}{9} + \frac{2}{7} \quad 55) \underline{\hspace{2cm}}$$

A)  $\frac{37}{8}$                       B)  $\frac{10}{63}$                       C)  $\frac{74}{63}$                       D)  $\frac{5}{8}$

56)  $\frac{10}{13} + \frac{1}{8}$  56) \_\_\_\_\_  
 A)  $\frac{11}{21}$  B)  $\frac{93}{104}$  C)  $\frac{11}{104}$  D)  $\frac{31}{7}$

57)  $\frac{1}{24} + \frac{5}{54}$  57) \_\_\_\_\_  
 A)  $\frac{29}{13}$  B)  $\frac{1}{216}$  C)  $\frac{29}{216}$  D)  $\frac{1}{13}$

58)  $\frac{1}{4} + \frac{2}{7} + \frac{1}{3}$  58) \_\_\_\_\_  
 A)  $\frac{2}{7}$  B)  $\frac{1}{21}$  C)  $\frac{73}{14}$  D)  $\frac{73}{84}$

Find the LCM.

59)  $50x^5y, 60x^4y^3, 30x^2y^4$  59) \_\_\_\_\_  
 A)  $100x^5y^4$  B)  $300x^5y^4$  C)  $150x^{20}y^{12}$  D)  $60x^5y$

60)  $42x, 6x^2, 7x^3$  60) \_\_\_\_\_  
 A)  $42x^2$  B)  $7x^3$  C)  $42x^5$  D)  $42x^3$

61)  $8xy, 12x^2$  61) \_\_\_\_\_  
 A)  $24x^2y$  B)  $24xy^3$  C)  $24xy^2$  D)  $24x^3y$

62)  $t, t - 6$  62) \_\_\_\_\_  
 A) 12 B)  $t$  C)  $t - 6$  D)  $t(t - 6)$

63)  $4a - 12, a^2 - 3a$  63) \_\_\_\_\_  
 A)  $4a^2 - 3$  B)  $4a(a - 3)$  C)  $4a^2 - 12$  D)  $4a - 3$

64)  $n, 8 + n, 8 - n$  64) \_\_\_\_\_  
 A)  $64n^2$  B)  $n^2 + 64$   
 C)  $n + 8$  D)  $n(8 + n)(8 - n)$

65)  $r^2 + 10r + 25, r^2 + 5r$  65) \_\_\_\_\_  
 A)  $r(r + 1)(r + 5)$  B)  $r(r + 5)$  C)  $(r + 5)^2$  D)  $r(r + 5)^2$

66)  $m^2 + 4m, m^2 + 7m + 12$  66) \_\_\_\_\_  
 A)  $m(m + 1)^2$  B)  $m(m + 4)(m + 3)$   
 C)  $m(x + 1)(m + 3)$  D)  $(m + 1)^2$



67)  $x^2 - 8x + 16, x^2 - 3x - 4$

A)  $(x - 4)(x + 1)$

C)  $(x - 4)(x - 4)$

B)  $(x + 4)(x + 4)(x + 1)$

D)  $(x - 4)(x - 4)(x + 1)$

67) \_\_\_\_\_

68)  $x^2 + 4x + 3, -6x - 6$

A)  $-6(x - 3)(x - 1)$

C)  $-6(x + 3)(x + 1)$

B)  $-6(x - 3)(x + 1)$

D)  $-6(x + 3)(x - 1)$

68) \_\_\_\_\_

Add. Simplify, if possible.

69)  $\frac{6}{8} + \frac{4}{8}$

A) 5

B)  $\frac{5}{4}$

C)  $\frac{4}{5}$

D)  $\frac{5}{2}$

69) \_\_\_\_\_

70)  $\frac{5}{13x} + \frac{3}{13x}$

A)  $\frac{8}{26x}$

B) 1

C)  $\frac{8}{13x}$

D)  $\frac{13x}{8}$

70) \_\_\_\_\_

71)  $\frac{9}{8x^2} + \frac{3}{8x^2}$

A)  $\frac{3}{2x^2}$

B)  $\frac{3}{4x^4}$

C) 3

D)  $\frac{2}{3x^2}$

71) \_\_\_\_\_

72)  $\frac{3x+4}{2x-3} + \frac{3-7x}{-3+2x}$

A)  $\frac{7x+1}{2x-3}$

B)  $-2x - \frac{7}{3}$

C)  $\frac{-4x+7}{4x-6}$

D)  $\frac{-4x+7}{2x-3}$

72) \_\_\_\_\_

73)  $\frac{7}{x+y} + \frac{8}{y+x}$

A)  $\frac{-1}{x+y}$

B)  $\frac{15}{2x+2y}$

C)  $\frac{15}{x+y}$

D)  $\frac{7}{x} + \frac{8}{y}$

73) \_\_\_\_\_

74)  $\frac{m^2 - 10m}{m - 6} + \frac{24}{m - 6}$

A)  $m - 6$

B)  $m + 4$

C)  $\frac{m^2 - 10m + 24}{m - 6}$

D)  $m - 4$

74) \_\_\_\_\_

- 75)  $\frac{6}{x-3} + \frac{4}{3-x}$  75) \_\_\_\_\_  
 A)  $\frac{10}{x-3}$  B)  $\frac{2}{x-3}$  C)  $\frac{-2}{x-3}$  D)  $\frac{24}{x-3}$
- 76)  $\frac{5}{2-m} + \frac{4}{m-2}$  76) \_\_\_\_\_  
 A)  $\frac{1}{2-m}$  B)  $\frac{20}{2-m}$  C)  $\frac{-1}{2-m}$  D)  $\frac{9}{2-m}$
- 77)  $\frac{4}{m-n^2} + \frac{9}{n^2-m}$  77) \_\_\_\_\_  
 A)  $\frac{5}{m-n^2}$  B)  $\frac{13}{m-n^2}$  C)  $\frac{36}{m-n^2}$  D)  $\frac{-5}{m-n^2}$
- 78)  $\frac{6}{9x-7} + \frac{1}{7-9x}$  78) \_\_\_\_\_  
 A)  $\frac{7}{9x-7}$  B)  $\frac{-5}{9x-7}$  C)  $\frac{5}{9x-7}$  D)  $\frac{-7}{9x-7}$
- 79)  $\frac{x+5}{x-8} + \frac{x-4}{8-x} + \frac{9(x+1)}{x-8}$  79) \_\_\_\_\_  
 A)  $\frac{9x+18}{(x-8)^3}$  B)  $\frac{9x+18}{x-8}$  C)  $\frac{11x+10}{x-8}$  D)  $\frac{9x+10}{x-8}$
- 80)  $\frac{2}{21x} + \frac{4}{15x^2}$  80) \_\_\_\_\_  
 A)  $\frac{6}{21x+15x^2}$  B)  $\frac{48}{105x^2}$  C)  $\frac{6}{315x^2}$  D)  $\frac{2(5x+14)}{105x^2}$
- 81)  $\frac{3}{r} + \frac{4}{r-5}$  81) \_\_\_\_\_  
 A)  $\frac{15r-7}{r(r-5)}$  B)  $\frac{7r-15}{r(5-r)}$  C)  $\frac{15r-7}{r(5-r)}$  D)  $\frac{7r-15}{r(r-5)}$
- 82)  $\frac{5}{r} + \frac{9}{r-7}$  82) \_\_\_\_\_  
 A)  $\frac{14r-35}{r(7-r)}$  B)  $\frac{14r-35}{r(r-7)}$  C)  $\frac{35r-14}{r(r-7)}$  D)  $\frac{35r-14}{r(7-r)}$

$$83) \frac{m+3}{m^2-4m+3} + \frac{4m-1}{m^2-5m+6}$$

83) \_\_\_\_\_

A)  $\frac{5m+2}{2m^2-9m+9}$

B)  $5m+2$

C)  $\frac{5m^2-4m-5}{(m-3)(m-1)(m-2)}$

D)  $\frac{5m^2-4m-5}{(m+3)(m+1)(m+2)}$

$$84) \frac{4}{y^2-3y+2} + \frac{6}{y^2-1}$$

84) \_\_\_\_\_

A)  $\frac{48y-8}{(y-1)(y+1)(y-2)}$

B)  $\frac{8y-10}{(y-1)(y+1)(y-2)}$

C)  $\frac{10y-8}{(y-1)(y+1)(y-2)}$

D)  $\frac{10y-8}{(y-1)(y-2)}$

$$85) \frac{x}{x^2-1} + \frac{4x}{x-x^2}$$

85) \_\_\_\_\_

A)  $\frac{-3x-4}{(x-1)(x+1)}$

B)  $\frac{-3x^3+x^2-4x}{(x^2-1)(x-x^2)}$

C)  $\frac{-3x+4}{(x-1)(x+1)}$

D)  $\frac{-3x^2-4x}{x(x-1)(x+1)}$

$$86) \frac{7}{(x+5)^2} + \frac{2}{x+5}$$

86) \_\_\_\_\_

A)  $\frac{9}{x+5}$

B)  $\frac{2x+17}{(x+5)^2}$

C)  $\frac{2x+9}{(x+5)^2}$

D)  $\frac{7x+37}{(x+5)^2}$

$$87) \frac{9}{x^4y} + \frac{7}{xy^3}$$

87) \_\_\_\_\_

A)  $\frac{16}{xy}$

B)  $\frac{7x^4+9y^3}{x^4y^3}$

C)  $\frac{7x^3+9y^2}{x^4y^3}$

D)  $\frac{16}{x^4y^3}$

Subtract. Simplify, if possible.

$$88) \frac{18}{23x} - \frac{6}{23x}$$

88) \_\_\_\_\_

A) 12

B)  $\frac{12}{46x}$

C)  $\frac{12}{23x}$

D)  $\frac{23x}{12}$

$$89) \frac{8}{7x^2} - \frac{2}{7x^2}$$

89) \_\_\_\_\_

A) 6

B)  $\frac{6}{7x^2}$

C)  $\frac{6}{14x^4}$

D)  $\frac{7}{6x^2}$

- 90)  $\frac{24}{q-7} - \frac{7}{q-7}$  90) \_\_\_\_\_  
 A)  $\frac{24(q-7)}{7(q-7)}$  B)  $\frac{31}{q-7}$  C)  $\frac{17}{q-7}$  D)  $\frac{17}{q}$
- 91)  $\frac{2x+6}{x^2+7x+10} - \frac{x+1}{x^2+7x+10}$  91) \_\_\_\_\_  
 A)  $\frac{7}{x^2+7x+10}$  B)  $x+5$  C)  $\frac{x+7}{x^2+7x+10}$  D)  $\frac{1}{x+2}$
- 92)  $\frac{3x+24}{x^2-3x-18} - \frac{x+18}{x^2-3x-18}$  92) \_\_\_\_\_  
 A)  $\frac{2}{x-6}$  B)  $\frac{2x+42}{x^2-3x-18}$  C)  $2x+6$  D)  $\frac{1}{x-3}$
- 93)  $\frac{5}{6-y} - \frac{7}{y-6}$  93) \_\_\_\_\_  
 A)  $\frac{12}{6-y}$  B)  $\frac{2}{6-y}$  C)  $\frac{35}{6-y}$  D)  $\frac{-2}{6-y}$
- 94)  $\frac{-2}{y-3} - \frac{7}{3-y}$  94) \_\_\_\_\_  
 A)  $\frac{-14}{y-3}$  B)  $\frac{5}{y-3}$  C)  $\frac{9}{y-3}$  D)  $\frac{-9}{y-3}$
- 95)  $\frac{3}{6x-7} - \frac{2}{7-6x}$  95) \_\_\_\_\_  
 A)  $\frac{-1}{6x-7}$  B)  $\frac{1}{6x-7}$  C)  $\frac{5}{6x-7}$  D)  $\frac{-5}{6x-7}$
- 96)  $\frac{2x-4}{x^2-4} - \frac{2x-4}{4-x^2}$  96) \_\_\_\_\_  
 A)  $\frac{4}{x-2}$  B)  $\frac{4}{x+2}$  C) 4 D) 0
- 97)  $\frac{3(y-1)}{5y-3} - \frac{y-3}{3-5y} - \frac{4y}{5y-3}$  97) \_\_\_\_\_  
 A)  $\frac{-6}{5y-3}$  B)  $\frac{6}{5y-3}$   
 C)  $\frac{-6}{(5y-3)(3-5y)}$  D)  $\frac{-2y}{5y-3}$

- 98)  $\frac{3}{14x} - \frac{9}{10x^2}$  98) \_\_\_\_\_  
 A)  $-\frac{6}{140x^2}$  B)  $\frac{-6}{14x + 10x^2}$  C)  $\frac{18}{70x^2}$  D)  $\frac{3(5x - 21)}{70x^2}$
- 99)  $\frac{3x - 5}{4x^4} - \frac{8x - 2}{16x}$  99) \_\_\_\_\_  
 A)  $\frac{-2x^4 + 0.5x^3 + 3x - 5}{4x^4}$  B)  $\frac{-8x^5 + 2x^4 + 12x^2 - 20x}{16x^5}$   
 C)  $\frac{-8x^4 + 2x^3 + 12x - 20}{16x^4}$  D)  $\frac{-5x - 3}{16x^4}$
- 100)  $\frac{8x + 4y}{3x^2y} - \frac{5x - 5y}{xy^2}$  100) \_\_\_\_\_  
 A)  $\frac{15x^2 - 7xy + 4y^2}{3x^2y^2}$  B)  $\frac{-15x^2 + 23xy + 4y^2}{3x^2y^2}$   
 C)  $\frac{8x^2y^2 + 4xy^3 - 15x^3y + 15x^2y^2}{3x^3y^3}$  D)  $\frac{3x + 9y}{3x^2y^2}$
- 101)  $\frac{x}{x^2 - 16} - \frac{8}{x^2 + 5x + 4}$  101) \_\_\_\_\_  
 A)  $\frac{x^2 - 7}{(x - 4)(x + 4)(x + 1)}$  B)  $\frac{x^2 - 7x + 32}{(x - 4)(x + 4)(x + 1)}$   
 C)  $\frac{x^2 + 7x + 32}{(x - 4)(x + 4)(x + 1)}$  D)  $\frac{x^2 - 7x + 32}{(x - 4)(x + 4)}$
- 102)  $\frac{9}{x + 9} - \frac{9}{x - 9}$  102) \_\_\_\_\_  
 A) 0 B)  $\frac{2x^2}{x^2 + 81}$  C)  $\frac{2x^2 - 162}{x^2 + 81}$  D)  $\frac{-162}{x^2 - 81}$
- 103)  $\frac{8x}{x^2 - 4} - \frac{x}{x - 2}$  103) \_\_\_\_\_  
 A)  $\frac{x^2 + 10x}{x^2 - 4}$  B)  $\frac{-x^2 + 6x}{x^2 - 4}$  C)  $\frac{x^2 + 6x}{x^2 - 4}$  D)  $\frac{-x^2 + 10x}{x^2 - 4}$
- 104)  $\frac{3x}{x^2 - 25} - \frac{1}{5 - x}$  104) \_\_\_\_\_  
 A)  $\frac{4x - 5}{x^2 - 25}$  B)  $\frac{2x - 5}{x^2 - 25}$  C)  $\frac{3x - 1}{x^2 - 25}$  D)  $\frac{4x + 5}{x^2 - 25}$

$$105) \frac{7}{z^2 - 3z} - \frac{3}{z - 3}$$

105) \_\_\_\_\_

A)  $\frac{7z + 3}{z^2 - 3z}$

B)  $\frac{3z - 7}{z - 3}$

C)  $\frac{7 + 3z}{z^2 - 3z}$

D)  $\frac{7 - 3z}{z^2 - 3z}$

$$106) \frac{9x}{x^2 - 5x + 6} - \frac{36}{x^2 - 6x + 8}$$

106) \_\_\_\_\_

A)  $\frac{9}{(x - 2)(x - 3)}$

B)  $\frac{9(x - 6)}{(x - 3)(x - 4)}$

C)  $\frac{9x - 36}{(x - 2)(x - 3)(x - 4)}$

D)  $\frac{x - 6}{(x - 3)(x - 4)}$

$$107) \frac{15xy}{x^2 - y^2} - \frac{x - y}{x + y}$$

107) \_\_\_\_\_

A)  $\frac{-x^2 + 13xy - y^2}{(x + y)(x + y)}$

B)  $\frac{x^2 + 13xy + y^2}{(x + y)(x - y)}$

C)  $\frac{x^2 + 17xy + y^2}{(x + y)(x - y)}$

D)  $\frac{-x^2 + 17xy - y^2}{(x + y)(x - y)}$

$$108) \frac{r}{r - s} - \frac{r}{r + s}$$

108) \_\_\_\_\_

A)  $-\frac{r}{s}$

B) 0

C)  $\frac{2rs}{(r - s)(r + s)}$

D)  $\frac{2r^2 - 2rs}{(r - s)^2}$

Perform the indicated operation. Simplify, if possible.

$$109) \frac{5x}{x - 8} - \frac{6x - 2}{8 - x} - \frac{2x}{x - 8}$$

109) \_\_\_\_\_

A)  $\frac{9x - 2}{3x + 24}$

B)  $\frac{13x - 2}{x + 8}$

C)  $\frac{13x + 2}{x - 8}$

D)  $\frac{9x - 2}{x - 8}$

$$110) \frac{b}{b^2 - 25} + \frac{5}{b + 5} - \frac{6}{b}$$

110) \_\_\_\_\_

A)  $\frac{6b^2 - 25b + 150}{b(b + 5)(b - 5)}$

B)  $\frac{-25(b - 6)}{b(b + 5)(b - 5)}$

C)  $\frac{25(b + 6)}{b(b + 5)(b - 5)}$

D)  $\frac{25(b - 6)}{(b + 5)(b - 5)}$

$$111) \frac{2ab}{a^2 - b^2} - \frac{b}{a - b} + 4$$

$$A) \frac{4a + 5b}{a + b}$$

$$C) \frac{2ab - b + 4}{a + b + 1}$$

$$B) \frac{(a - b)(4a + 5b)}{a^2 - b^2}$$

$$D) \frac{4a + 5b}{a^2 - b^2}$$

111) \_\_\_\_\_

$$112) \frac{25x}{3(5x + 1)} - \frac{1}{3x(5x + 1)} + \frac{12}{x}$$

$$A) \frac{25x^2 + 180x + 35}{3x}$$

$$C) \frac{5(x + 7)}{15x^2 + 3x}$$

$$B) \frac{25x^2 + 180x + 35}{15x^2 + 3x}$$

$$D) \frac{5(x + 7)}{3x}$$

112) \_\_\_\_\_

$$113) \frac{-25x}{7(5x + 1)} + \frac{1}{7x(5x + 1)} - \frac{3}{x}$$

$$A) -\frac{5(x + 4)}{35x^2 + 7x}$$

$$C) \frac{-25x^2 - 105x - 20}{7x}$$

$$B) \frac{-25x^2 - 105x - 20}{35x^2 + 7x}$$

$$D) -\frac{5(x + 4)}{7x}$$

113) \_\_\_\_\_

$$114) \frac{4(y - 1)}{5y - 2} - \frac{y - 4}{2 - 5y} - \frac{5y}{5y - 2}$$

$$A) \frac{-2y}{5y - 2}$$

$$C) \frac{-8}{5y - 2}$$

$$B) \frac{-8}{(5y - 2)(2 - 5y)}$$

$$D) \frac{8}{5y - 2}$$

114) \_\_\_\_\_

$$115) \frac{3x + 9}{x + 2} + \frac{x + 3}{x + 4} - \frac{2x + 10}{(x + 2)(x + 4)}$$

$$A) 4$$

$$B) \frac{3}{(x + 2)}$$

$$C) \frac{4}{(x + 2)(x + 4)}$$

$$D) \frac{1}{(x + 2)(x + 4)}$$

115) \_\_\_\_\_

Simplify.

$$116) \frac{\frac{1}{a} + 1}{\frac{1}{a} - 1}$$

$$A) 1 - a^2$$

$$B) 1$$

$$C) \frac{a}{1 - a^2}$$

$$D) \frac{1 + a}{1 - a}$$

116) \_\_\_\_\_

$$117) \frac{4 + \frac{2}{x}}{\frac{x}{4} + \frac{1}{8}} \quad 117) \underline{\hspace{2cm}}$$

A)  $\frac{16}{x}$

B)  $\frac{x}{16}$

C) 16

D) 1

$$118) \frac{5 + \frac{1}{3}}{3 - \frac{2}{27}} \quad 118) \underline{\hspace{2cm}}$$

A)  $\frac{288}{79}$

B)  $\frac{432}{79}$

C)  $\frac{216}{79}$

D)  $\frac{144}{79}$

$$119) \frac{\frac{1}{5} - \frac{1}{y}}{\frac{5-y}{5}} \quad 119) \underline{\hspace{2cm}}$$

A)  $\frac{-1}{y}$

B)  $\frac{1}{y}$

C)  $\frac{-5}{y}$

D) -y

$$120) \frac{\frac{3}{2x^3} - \frac{5}{4x}}{\frac{5}{2x} + \frac{5}{2x^3}} \quad 120) \underline{\hspace{2cm}}$$

A)  $\frac{6 - 5x^2}{10x^2 + 10}$

B)  $\frac{6 - 10x^2}{10x^2 + 10}$

C)  $\frac{6 + 5x^2}{10x^2 + 2}$

D)  $\frac{3 - 5x^2}{2x^2 - 10}$

$$121) \frac{\frac{1}{m} + \frac{1}{z}}{\frac{1}{m} - \frac{1}{z}} \quad 121) \underline{\hspace{2cm}}$$

A)  $\frac{z - m}{z}$

B)  $\frac{z + m}{z}$

C)  $\frac{z + m}{m}$

D)  $\frac{z + m}{z - m}$

$$122) \frac{\frac{1}{x^2} - \frac{4}{y^2}}{4y - 8x} \quad 122) \underline{\hspace{2cm}}$$

A)  $4x - 8y^2$

B)  $\frac{y + 2x}{4x^2y^2}$

C)  $\frac{y^2 + 2x}{4x^2}$

D)  $\frac{x + 2y}{4x^2y}$



$$123) \frac{\frac{\frac{x}{5y} - \frac{2}{10y^3}}{\frac{2}{10y^3} - \frac{x}{5y}}}{\frac{2}{10y^3} - \frac{x}{5y}} \quad 123) \underline{\hspace{2cm}}$$

A) 1

B)  $\frac{2xy^2 - 2}{2 - 2xy^2}$

C)  $\frac{2xy^2 - 2}{2xy^2 + 2}$

D) -1

$$124) \frac{x + 4 + \frac{4}{x}}{x + 5 + \frac{6}{x}} \quad 124) \underline{\hspace{2cm}}$$

A)  $\frac{x+2}{x+3}$

B)  $\frac{x+2}{x^2+3x}$

C)  $\frac{x^2+4x+4}{x^2+5x+6}$

D)  $\frac{(x+2)^2}{x+3}$

$$125) \frac{\frac{5}{x+2} + \frac{2}{x}}{\frac{4}{x+2} + \frac{4}{x}} \quad 125) \underline{\hspace{2cm}}$$

A)  $\frac{7x+4}{8x+8}$

B)  $\frac{7x+10}{8x+8}$

C)  $\frac{7x+2}{8x}$

D)  $\frac{9}{10}$

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

Answer the question.

126) For  $x \neq 3$ , the rational expression  $\frac{8(x-3)}{x-3}$  is equal to 8. Can the same be said for  $\frac{8x-3}{x-3}$ ? Explain why or why not. 126)                     

$\frac{8x-3}{x-3}$ ? Explain why or why not.

127) If 8 is substituted for x in the rational expression  $\frac{x-8}{x^2-64}$ , the result is  $\frac{0}{0}$ . 127)                     

Mathematicians have been known to say "Any number divided by itself is 1." Does this mean that this expression is equal to 1 for  $x = 8$ ? Explain why or why not.

128) Explain in your own words how to multiply rational expressions. (How would you explain this to a student in this class who was absent from class?). 128)                     

129) Explain in your own words how to divide rational expressions. (How would you explain this to a student in this class who was absent from class?). 129)

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

- 130) If the rational expression  $\frac{8x^9y^5}{7p^6q}$  represents the area of a rectangle and  $\frac{7x^8y^3}{p^5}$  represents the length of the rectangle, what rational expression represents the width? 130) \_\_\_\_\_
- A)  $\frac{8x^{17}y^8}{p^{11}q}$       B)  $\frac{8xy^2}{49pq}$       C)  $\frac{8x^{17}y^8}{49p^{11}q}$       D)  $\frac{8xy^2}{14pq}$
- 131) In the given problem  $\frac{16(y+9)}{4(y-7)} \div \frac{?}{(y-7)(y-6)} = \frac{4(y-6)}{(y-9)}$ , what must be the polynomial that is represented by the question mark? 131) \_\_\_\_\_
- A)  $\frac{(y-6)2(y-7)^2}{(y-9)(y+9)}$       B)  $(y+9)(y-9)$
- C)  $\frac{16(y+9)}{(y-9)(y-7)^2}$       D)  $(y-9)(y-9)$

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

- 132) Explain why the least common denominator of two (different) prime numbers is the product of the two numbers. 132) \_\_\_\_\_
- 133) Explain why, when one number is a factor of another, the least common denominator of the numbers is the larger number. 133) \_\_\_\_\_
- 134) Describe two ways in which multiplying by 1 is used in adding or subtracting using fractional notation. 134) \_\_\_\_\_
- 135) Without multiplying by the least common denominator and solving, explain why the rational equation  $\frac{x}{x-3} = \frac{3}{x-3}$  has no solution. (Hint: Examine both numerators and denominators carefully.) 135) \_\_\_\_\_

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

Solve the equation.

- 136)  $\frac{6}{x} = \frac{5}{x} + 8$  136) \_\_\_\_\_
- A)  $\frac{1}{8}$       B)  $\frac{1}{11}$       C) 8      D)  $\frac{8}{11}$

- 137)  $\frac{6}{x} + \frac{5}{6} = 1$  137) \_\_\_\_\_  
 A) 6 B)  $\frac{11}{6}$  C) 11 D) 36
- 138)  $\frac{29}{x} = 6 - \frac{1}{x}$  138) \_\_\_\_\_  
 A)  $\frac{3}{14}$  B) 5 C) 4 D)  $\frac{29}{6}$
- 139)  $\frac{x}{3} - \frac{x}{9} = 7$  139) \_\_\_\_\_  
 A) 21 B) 27 C) 63 D)  $\frac{63}{2}$
- 140)  $x + \frac{10}{x} = 7$  140) \_\_\_\_\_  
 A) 10 B) -5, -2 C) 5, 2 D) 7, 10
- 141)  $\frac{x}{5} - \frac{5}{x} = 0$  141) \_\_\_\_\_  
 A) 5 B) -5, 0, 5 C) -5, 5 D) No solution
- 142)  $\frac{x-8}{x+2} = \frac{4}{9}$  142) \_\_\_\_\_  
 A)  $\frac{80}{13}$  B) 16 C)  $-\frac{64}{5}$  D) 2
- 143)  $\frac{4}{x+6} = \frac{6}{x-5}$  143) \_\_\_\_\_  
 A)  $-\frac{11}{2}$  B) -28 C)  $\frac{28}{5}$  D) -8
- 144)  $\frac{x+6}{5} - \frac{x-6}{3} = 1$  144) \_\_\_\_\_  
 A)  $\frac{47}{2}$  B)  $\frac{33}{2}$  C)  $\frac{33}{8}$  D)  $-\frac{27}{2}$
- 145)  $\frac{9}{x+1} = \frac{5}{x}$  145) \_\_\_\_\_  
 A)  $\frac{5}{14}$  B)  $-\frac{5}{4}$  C)  $\frac{5}{4}$  D)  $\frac{4}{5}$

- 146)  $\frac{x}{x-2} - 5 = \frac{2}{x-2}$  146) \_\_\_\_\_  
 A)  $-\frac{1}{2}$  B) 2 C) -2 D) No solution
- 147)  $\frac{3}{y} = \frac{y}{2y-3}$  147) \_\_\_\_\_  
 A) -3, 3 B) -3, -3 C) 3, -3 D) 3, 3
- 148)  $\frac{2}{t} = \frac{t}{3t-4}$  148) \_\_\_\_\_  
 A) 0, 3 B) 2, 3 C) 2, 4 D) 3, 2
- 149)  $\frac{x+7}{x-2} = \frac{6}{2-x}$  149) \_\_\_\_\_  
 A) -1 B) 1 C) 13 D) -13
- 150)  $\frac{1}{x-4} + \frac{1}{2x-8} = \frac{3}{2}$  150) \_\_\_\_\_  
 A) 5 B) 15 C) 1 D) -3
- 151)  $\frac{-5x}{3x+18} = \frac{7x}{6x+36} + \frac{6x-1}{x+6}$  151) \_\_\_\_\_  
 A)  $\frac{6}{53}$  B)  $-\frac{6}{53}$  C)  $\frac{1}{53}$  D) 6
- 152)  $\frac{-1}{y+5} - \frac{8}{y-5} = \frac{10}{y^2-25}$  152) \_\_\_\_\_  
 A) -5 B) 45 C) 5 D)  $\sqrt{7}$
- 153)  $\frac{9}{m-2} - \frac{6}{m+2} = \frac{6}{m^2-4}$  153) \_\_\_\_\_  
 A) -8 B)  $\sqrt{52}$  C) -24 D) 8
- 154)  $\frac{-8}{x+8} = \frac{x}{x+8}$  154) \_\_\_\_\_  
 A) No solution B) 0 C) -8 D) 8
- 155)  $\frac{5}{10-x} = \frac{5-x}{x-10}$  155) \_\_\_\_\_  
 A) 10 B) No solution C) 5 D) 0

$$156) \frac{1}{y+3} - \frac{8}{y-3} = \frac{8}{y^2-9} \quad 156) \underline{\hspace{2cm}}$$

A)  $\sqrt{9}$                       B) 35                      C) 5                      D) -5

$$157) \frac{y+1}{y+6} - \frac{y}{y^2-36} = \frac{y-3}{y-6} \quad 157) \underline{\hspace{2cm}}$$

A)  $\frac{4}{3}$                       B)  $\frac{4}{5}$                       C) 1                      D)  $\frac{3}{4}$

$$158) \frac{x}{x+5} - \frac{5}{x-5} = \frac{x^2+25}{x^2-25} \quad 158) \underline{\hspace{2cm}}$$

A) No solution                      B) -5                      C) -5, 5                      D) 5

Solve the problem.

159) Martha can rake the leaves in her yard in 2 hours. Her younger brother can do the job in 7 hours. How long will it take them to do the job if they work together? 159)           

A)  $\frac{9}{14}$  hr                      B)  $\frac{14}{5}$  hr                      C)  $\frac{14}{9}$  hr                      D) 7 hr

160) Frank can type a report in 4 hours and James takes 7 hours. How long will it take the two of them typing together? 160)           

A) 7 hr                      B)  $\frac{11}{28}$  hr                      C)  $\frac{28}{11}$  hr                      D)  $\frac{28}{3}$  hr

161) A contractor finds that it takes Sam Tockett 9 hours to construct a wall of a certain size. It takes Jim Lowell 7 hours to construct the same wall. How long would it take if they worked together? 161)           

A) 16 hours                      B)  $\frac{16}{63}$  of an hour                      C) 1 hour                      D)  $3\frac{15}{16}$  hours

162) The Epson Stylus 850 can print Helen's class project in 12 minutes. The Epson Stylus 500 can print the project in 36 minutes. If the two printers work together, how long would they take to print out the project? 162)           

A)  $\frac{1}{9}$  of a minute                      B) 72 minutes                      C) 8 minutes                      D) 9 minutes

163) Chuck and Dana agree to meet in Chicago for the weekend. Chuck travels 216 miles in the same time that Dana travels 192 miles. If Chuck's rate of travel is 4 mph more than Dana's, and they travel the same length of time, at what speed does Chuck travel? 163)           

A) 30 mph                      B) 42 mph                      C) 36 mph                      D) 32 mph

164) Tom Quig traveled 280 miles east of St. Louis. For most of the trip he averaged 60 mph, but for one period of time he was slowed to 10 mph due to a major accident. If the total time of travel was 8 hours, how many miles did he drive at the reduced speed? 164)           

A) 40 miles                      B) 50 miles                      C) 35 miles                      D) 60 miles

- 165) A man rode a bicycle for 12 miles and then hiked an additional 8 miles. The total time for the trip was 5 hours. If his rate when he was riding a bicycle was 10 miles per hour faster than his rate walking, what was each rate? 165) \_\_\_\_\_
- A) Bike: 12 mph      B) Bike: 13 mph      C) Bike: 14.5 mph      D) Bike: 11.5 mph  
Hike: 2 mph      Hike: 3 mph      Hike: 4.5 mph      Hike: 1.5 mph

- 166) A loaded moving truck is traveling 20 mph faster than a freight train. In the time it takes the train to travel 120 miles, the truck travels 200 miles. Find the speed of the truck. 166) \_\_\_\_\_
- A) 20 mph      B) 100 mph      C) 50 mph      D) 10 mph

- 167) Fred bicycles 5 km/h slower than Samantha. In the time it takes Fred to bicycle 56 km, Samantha travels 76 km. How fast does Fred bicycle? 167) \_\_\_\_\_
- A) 9 km/h      B) 19 km/h      C) 28 km/h      D) 14 km/h

Find the ratio. Simplify, if possible.

- 168) If Alison's company charged \$88.64 for 4 hours of work, how much did they charge per hour? 168) \_\_\_\_\_
- A) \$22.16/hour      B) \$4.00/hour      C) \$29.55/hour      D) \$26.16/hour

- 169) David's paycheck for a week at the video store was \$111.32. If he worked 23 hours that week, what was his pay rate? 169) \_\_\_\_\_
- A) \$4.86/hour      B) \$4.61/hour      C) \$4.84/hour      D) \$5.06/hour

- 170) Mara can type 1485 words in  $\frac{3}{4}$  hour (45 minutes). How many words per minute can she type? 170) \_\_\_\_\_
- A) 44 words/minute      B) 25 words/minute  
C) 33 words/minute      D) 1114 words/minute

- 171) A machine can fill 1064 boxes of cereal in 0.2 hour. How many boxes of cereal can it fill per hour? 171) \_\_\_\_\_
- A) 1064 boxes/hour      B) 213 boxes/hour  
C) 5320 boxes/hour      D) 3547 boxes/hour

Solve the problem.

- 172) Dr. Wong can see 12 patients in 3 hours. At this rate, how long would it take her to see 24 patients? 172) \_\_\_\_\_
- A) 36 hours      B) 6 hours      C) 96 hours      D) 5 hours

- 173) Maria and Charlie can deliver 44 papers in 4 hours. How long would it take them to deliver 33 papers? 173) \_\_\_\_\_
- A) 132 hours      B) 3.8 hours      C) 3.0 hours      D) 5.3 hours

- 174) Sven can type 58 words per minute. How many words would he type in  $\frac{1}{2}$  hour (30 minutes)? 174) \_\_\_\_\_
- A) 29 words      B) 870 words      C) 116 words      D) 1740 words

- 175) A machine can fill 7260 cartons of milk in 0.8 hour. How many cartons of milk can it fill per hour? 175) \_\_\_\_\_  
 A) 8067 cartons B) 5808 cartons C) 7261 cartons D) 9075 cartons
- 176) In a cake recipe, the ratio of milk to flour is  $\frac{5}{9}$ . If 4 cups of milk are used, how many cups of flour are used? 176) \_\_\_\_\_  
 A)  $\frac{20}{9}$  cups B)  $\frac{5}{36}$  cups C)  $\frac{45}{4}$  cups D)  $\frac{36}{5}$  cups
- 177) To determine the number of fish in a lake, a park ranger catches 280 fish, tags them, and returns them to the lake. Later, 144 fish are caught, and it is found that 36 of them are tagged. Estimate the number of fish in the lake. 177) \_\_\_\_\_  
 A) 70 B) 1120 C) 1,451,520 D) 19
- 178) A quality-control inspector examined 270 calculators and found 11 of them to be defective. At this rate, how many defective calculators will there be in a batch of 15,390 calculators? 178) \_\_\_\_\_  
 A) 57 B) 5 C) 627 D) 2970
- 179) The ratio of the weight of an object on Mars to the weight of an object on Earth is 0.4 to 1. How much will a 160-pound astronaut weigh on Mars? 179) \_\_\_\_\_  
 A) 64 pounds B) 400 pounds C) 250 pounds D) 40 pounds

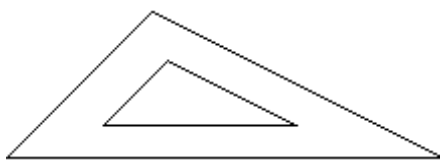
For the pair of similar triangles, find the length of the indicated side.

- 180) 180) \_\_\_\_\_



In the left triangle, the hypotenuse has length 10, and the longer leg has length 8. In the right triangle, the hypotenuse has length 5, the longer leg has length 4, and the shorter leg has length 3. Find the length,  $x$ , of the shorter leg of the left triangle.

- A)  $x = 9$  B)  $x = 3$  C)  $x = 4$  D)  $x = 6$
- 181) 181) \_\_\_\_\_

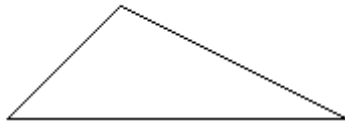
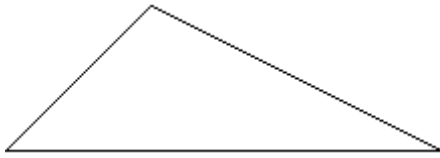


In the outer triangle, the shortest side has length 6, and the middle side has length 9. In the inner triangle, the shortest side has length 2, the middle side has length 3, and the longest side has length 4. Find the length,  $x$ , of the longest side of the outer triangle.

- A)  $x = 16$  B)  $x = 11$  C)  $x = 4$  D)  $x = 12$

182)

182) \_\_\_\_\_



In the upper triangle, the shortest side has length 16, and the middle side has length 24. In the lower triangle, the shortest side has length 12, the middle side has length 18, and the longest side has length 24. Find the length,  $x$ , of the longest side of the upper triangle.

A)  $x = 32$

B)  $x = 30$

C)  $x = 40$

D)  $x = 24$

Given the values of  $x$  and  $y$ , find an equation of variation in which  $y$  varies directly as  $x$ .

183)  $y = 50$ , when  $x = 10$

183) \_\_\_\_\_

A)  $y = 50x$

B)  $y = \frac{500}{x}$

C)  $y = 6x$

D)  $y = 5x$

184)  $y = 28$ , when  $x = 8$

184) \_\_\_\_\_

A)  $y = 3.5x$

B)  $y = 3.5x$

C)  $y = 28x$

D)  $y = 0.29x$

185)  $y = 2.1$ , when  $x = 1.2$

185) \_\_\_\_\_

A)  $y = \frac{1}{1.75}x$

B)  $y = 2.1x$

C)  $y = \frac{2.52}{x}$

D)  $y = 1.75x$

186)  $y = 0.8$ , when  $x = 0.5$

186) \_\_\_\_\_

A)  $x = 0.8y$

B)  $y = 1.6x$

C)  $y = 0.8x$

D)  $x = 1.6y$

187)  $y = 23.76$ , when  $x = 8.8$

187) \_\_\_\_\_

A)  $x = 2.7y$

B)  $y = 0.37x$

C)  $y = 2.7x$

D)  $y = 8.8x$

188)  $y = 80$ , when  $x = 260$

188) \_\_\_\_\_

A)  $y = 80x$

B)  $y = 0.41x$

C)  $y = 0.31x$

D)  $y = 3.25x$

189)  $y = 230$ , when  $x = 90$

189) \_\_\_\_\_

A)  $y = 2.56x$

B)  $y = 0.39x$

C)  $x = 2.56y$

D)  $x = 140y$

Solve the problem.

190) The interest  $I$  earned in 1 yr on a fixed principal varies directly as the interest rate  $r$ . An investment earns \$25.38 at an interest rate of 3.55%. Find an equation of variation.

190) \_\_\_\_\_

A)  $I = -\frac{355}{2538}r$

B)  $I = \frac{2183}{100}r$

C)  $I = \frac{2538}{355}r$

D)  $I = \frac{355}{2538}r$



- 191) The distance a vehicle can travel at a fixed speed varies directly as time. If a vehicle travels 900 miles in 15 minutes, how far will it travel in 10 minutes? 191) \_\_\_\_\_  
 A) 600 miles                      B)  $\frac{2}{5}$  miles                      C) 40 miles                      D)  $\frac{5}{2}$  miles
- 192) The amount of money that Pablo makes in a given week varies directly as the number of hours he works that week. In a week in which he works 28 hours, he makes \$504. How much will he make in a week in which he works 44 hours? 192) \_\_\_\_\_  
 A) \$802                      B) \$787                      C) \$807                      D) \$792
- 193) A force is applied to a spring in order to compress it. The distance the spring is compressed from its natural length is denoted by  $x$ , and the force applied varies directly as  $x$ . If a force of 35 N compresses the spring by 1.0 m, then what force is required to compress the spring by 1.8 m? 193) \_\_\_\_\_  
 A) 68 N                      B) 65 N                      C) 66 N                      D) 63 N
- 194) The time  $T$  necessary to make an enlargement of a photo negative varies directly as the area  $A$  of the enlargement. If 120 seconds are required to make a 3-by-5 enlargement, find the time required for a 6-by-8 enlargement. 194) \_\_\_\_\_  
 A) 336 sec                      B) 432 sec                      C) 480 sec                      D) 384 sec
- 195) The mass of a liquid varies directly as its volume  $V$ . If the mass of the liquid in a cubical container 5 cm on a side is 250 g, find the mass of the liquid in a cubical container 3 cm on a side. 195) \_\_\_\_\_  
 A) 6 g                      B) 27 g                      C) 54 g                      D) 12 g
- 196) The distance  $D$  that a spring is stretched by a hanging object varies directly as the weight  $W$  of the object. If a 19-kg object stretches a spring 10 cm, find the distance when the weight is 29-kg. 196) \_\_\_\_\_  
 A) 15.26 cm                      B) 55.1 cm                      C) 58 cm                      D) 0.53 cm
- 197) The number  $G$  of gears a machine can make varies directly as the time  $T$  it operates. If it can make 2706 gears in 14 hours, how many gears can it make in 3 hours? 197) \_\_\_\_\_  
 A) 2723 gears                      B) 579.86 gears                      C) 193.29 gears                      D) 0.0155 gears
- 198) According to Ohm's law, the electric current  $I$ , in amperes, in a circuit varies directly as the voltage  $V$ . When 20 volts are applied, the current is 3 amperes. What is the current when 10 volts are applied? 198) \_\_\_\_\_  
 A) 66.666667 amperes                      B) 6.67 amperes  
 C) 33 amperes                      D) 1.5 amperes
- 199) The weight  $W$  of an object on the Moon varies directly as the weight  $E$  on earth. A person who weighs 168 lb on earth weighs 33.6 lb on the Moon. How much would a 122-lb person weigh on the Moon? 199) \_\_\_\_\_  
 A) 0.2 lb                      B) 323.6 lb                      C) 610 lb                      D) 24.4 lb

Find an equation of variation in which y varies inversely as x and the following is true.

200)  $y = 23$ , when  $x = 3$

A)  $y = \frac{26}{x}$

B)  $y = \frac{7.67}{x}$

C)  $y = \frac{69}{x}$

D)  $y = 7.67x$

200) \_\_\_\_\_

201)  $y = 5$ , when  $x = 20$

A)  $y = \frac{0.25}{x}$

B)  $y = \frac{25}{x}$

C)  $y = 100x$

D)  $y = \frac{100}{x}$

201) \_\_\_\_\_

202)  $y = 49$ , when  $x = 32$

A)  $y = \frac{1.53}{x}$

B)  $y = \frac{1568}{x}$

C)  $y = 1.53x$

D)  $y = 1568x$

202) \_\_\_\_\_

203)  $y = 0.6$ , when  $x = 0.9$

A)  $y = \frac{1.5}{x}$

B)  $y = \frac{0.67}{x}$

C)  $y = \frac{0.54}{x}$

D)  $y = 0.67x$

203) \_\_\_\_\_

204)  $y = 5.25$ , when  $x = 0.24$

A)  $y = 21.88x$

B)  $y = \frac{1.66}{x}$

C)  $y = \frac{1.26}{x}$

D)  $y = \frac{21.88}{x}$

204) \_\_\_\_\_

205)  $y = 0.625$ , when  $x = 8$

A)  $y = 5x$

B)  $y = \frac{5}{x}$

C)  $y = \frac{8}{x}$

D)  $y = \frac{6}{x}$

205) \_\_\_\_\_

Solve the problem.

206) The volume V of a gas varies inversely as the pressure P on it. The volume of a gas is  $300 \text{ cm}^3$  under a pressure of  $31 \text{ kg/cm}^2$ . Find an equation of variation.

A)  $V = \frac{9300}{P}$

B)  $V = \frac{P}{9300}$

C)  $V = 9300P$

D)  $V = \frac{1}{P}$

206) \_\_\_\_\_

207) If x varies inversely as v, and  $x = 40$  when  $v = 4$ , find x when  $v = 32$ .

A)  $x = 20$

B)  $x = 8$

C)  $x = 5$

D)  $x = 16$

207) \_\_\_\_\_

208) It takes 8 hours for 6 people to paint a house. How long will it take 2 people to do the job?

A) 2.4 hr

B) 26.4 hr

C) 24 hr

D) 2.7 hr

208) \_\_\_\_\_

209) The volume V of a gas varies inversely as the pressure P on it. The volume of a gas is  $250 \text{ cm}^3$  under a pressure of  $18 \text{ kg/cm}^2$ . What will be its volume under a pressure of  $36 \text{ kg/cm}^2$ ?

A)  $500 \text{ cm}^3$

B)  $125 \text{ cm}^3$

C)  $113 \text{ cm}^3$

D)  $475 \text{ cm}^3$

209) \_\_\_\_\_

210) The speed of a vehicle is inversely proportional to the time it takes to travel a fixed distance. If a vehicle travels a fixed distance at 10 miles per hour in 15 minutes, how fast must it travel to cover the same distance in 30 minutes?

A) 45 miles per hour

B)  $\frac{1}{20}$  miles per hour

C) 20 miles per hour

D) 5 miles per hour

210) \_\_\_\_\_

211) If the area of a rectangle is fixed, the length of the rectangle varies inversely as the width. If the length of a rectangle is 25 inches and its width is 45 inches, find the length of a rectangle with a width of 15 inches.

A)  $\frac{3}{25}$  inches

B) 75 inches

C)  $\frac{25}{3}$  inches

D) 27 inches

211) \_\_\_\_\_

212) The gravitational attraction  $A$  between two masses varies inversely as the square of the distance between them. The force of attraction is 4 lb when the masses are 3 ft apart, what is the attraction when the masses are 6 ft apart?

A) 3 lb

B) 1 lb

C) 2 lb

D) 4 lb

212) \_\_\_\_\_

## Answer Key

Testname: UNTITLED4

- 1) B
- 2) B
- 3) C
- 4) C
- 5) D
- 6) D
- 7) C
- 8) C
- 9) A
- 10) D
- 11) D
- 12) B
- 13) B
- 14) B
- 15) B
- 16) C
- 17) A
- 18) B
- 19) D
- 20) C
- 21) C
- 22) D
- 23) C
- 24) C
- 25) C
- 26) B
- 27) D
- 28) C
- 29) A
- 30) C
- 31) A
- 32) A
- 33) C
- 34) A
- 35) D
- 36) B
- 37) D
- 38) D
- 39) C
- 40) D
- 41) C
- 42) A

Answer Key

Testname: UNTITLED4

- 43) A
- 44) C
- 45) C
- 46) D
- 47) C
- 48) D
- 49) C
- 50) B
- 51) D
- 52) D
- 53) A
- 54) C
- 55) C
- 56) B
- 57) C
- 58) D
- 59) B
- 60) D
- 61) A
- 62) D
- 63) B
- 64) D
- 65) D
- 66) B
- 67) D
- 68) C
- 69) B
- 70) C
- 71) A
- 72) D
- 73) C
- 74) D
- 75) B
- 76) A
- 77) D
- 78) C
- 79) B
- 80) D
- 81) D
- 82) B
- 83) C
- 84) C

Answer Key

Testname: UNTITLED4

- 85) A
- 86) B
- 87) C
- 88) C
- 89) B
- 90) C
- 91) D
- 92) A
- 93) A
- 94) B
- 95) C
- 96) B
- 97) A
- 98) D
- 99) C
- 100) B
- 101) B
- 102) D
- 103) B
- 104) D
- 105) D
- 106) B
- 107) D
- 108) C
- 109) D
- 110) B
- 111) A
- 112) D
- 113) D
- 114) C
- 115) A
- 116) D
- 117) A
- 118) D
- 119) A
- 120) A
- 121) D
- 122) B
- 123) D
- 124) A
- 125) A
- 126) Answers will vary.

Answer Key

Testname: UNTITLED4

- 127) Answers will vary.
- 128) Answers will vary.
- 129) Answers will vary.
- 130) B
- 131) B
- 132) The numbers have no common factors, so the least common denominator must contain all the factors of both numbers and, hence, is their product.
- 133) Every prime factor of the smaller number is contained in the prime factorization of the larger number. Then the least common denominator will contain each prime factor exactly the number of times it appears in the larger number, and hence, is the larger number.
- 134) Multiplying by 1 is used to write each fraction with the least common denominator as its denominator and to simplify the sum or difference.
- 135) Since the denominators are the same, the numerators must be the same. Then  $x = 3$ ; but this value of  $x$  makes the denominators 0, so the equation has no solution.
- 136) A
- 137) D
- 138) B
- 139) D
- 140) C
- 141) C
- 142) B
- 143) B
- 144) B
- 145) C
- 146) D
- 147) D
- 148) C
- 149) D
- 150) A
- 151) A
- 152) A
- 153) A
- 154) A
- 155) B
- 156) D
- 157) A
- 158) A
- 159) C
- 160) C
- 161) D
- 162) D
- 163) C
- 164) A

Answer Key

Testname: UNTITLED4

- 165) A
- 166) C
- 167) D
- 168) A
- 169) C
- 170) C
- 171) C
- 172) B
- 173) C
- 174) D
- 175) D
- 176) D
- 177) B
- 178) C
- 179) A
- 180) D
- 181) D
- 182) A
- 183) D
- 184) B
- 185) D
- 186) B
- 187) C
- 188) C
- 189) A
- 190) C
- 191) A
- 192) D
- 193) D
- 194) D
- 195) C
- 196) A
- 197) B
- 198) D
- 199) D
- 200) C
- 201) D
- 202) B
- 203) C
- 204) C
- 205) B
- 206) A



## Answer Key

Testname: UNTITLED4

207) C

208) C

209) B

210) D

211) B

212) B