## <u>Math 114</u> <u>Rational Expressions Review</u>

#### Solve.

- [1]w varies directly as y and inversely as z.[2]b varies directly as the square root of c.w = 12 when y = 8 and z = 5.b = 12 when c = 16.Find the value of w when y = 6 and z = 15.Find the value of c when b = 18.
- [3] The height of a 1 liter water bottle varies inversely with the square of the radius of its base. A bottle with radius 5.4 cm is 11 cm tall. How tall is a bottle with radius 4.1 cm ?
- [4] The cost of insuring a delivery varies jointly with the number of items in the delivery and the value of each item. It costs \$15 to insure a delivery of 25 items each valued at \$20 dollars. How much does it cost to insure a delivery of 3 items each valued at \$80 ?

#### [5] **DELETED**

[6] DH

DELETED

DELETED

[7]

### Write equations for the following problems, then solve.

- [8] A number divided by twelve is equal to eight divided by three.
- [9] Five divided by four is equal to the sum of a number and seven divided by twelve.
- [10] A number divided by six is equal to the sum of that number and two divided by twelve.
- [11] A number divided by seven is equal to one divided by the sum of that number and six.

# Write proportions for the following problems. YOU DO NOT NEED TO SOLVE THEM.

- [12] A car can travel 387 kilometers on 24 liters of gas. How far can it travel on 17 liters of gas ?
- [13] A car can travel 185 kilometers on 13 liters of gas.How many liters of gas does it need to travel 243 kilometers ?
- [14] On a blueprint, 3 centimeters represents 20 meters. What length on the blueprint represents 37 meters ?
- [15] A music service charges \$17 for 19 downloads. How many downloads can be purchased for \$68 ?

#### Solve for x in the following similar triangles.



#### Simplify.

$$[19] \quad \frac{x^3 + 8x^2 - 48x}{3x^2 + 6x - 72} \qquad [20] \quad \frac{6x^2 - x - 1}{2x^2 + 9x - 5} \qquad [21] \quad \frac{\frac{3}{x - 2} - 2}{\frac{4}{x - 2} + 1} \qquad [22] \quad \frac{\frac{2}{x - 3} - \frac{3}{x}}{\frac{5}{x - 3} + \frac{2}{x}}$$

## Perform the algebraic operations and simplify.

$$\begin{bmatrix} 23 \end{bmatrix} \quad \frac{4x^2 - 1}{x^2 - 16} \cdot \frac{x^2 - 4x}{2x + 1} \\ \begin{bmatrix} 24 \end{bmatrix} \quad \frac{2x^2 - x - 6}{3x^2 + 4x + 1} \cdot \frac{3x^2 + 7x + 2}{2x^2 + 7x + 6} \\ \begin{bmatrix} 25 \end{bmatrix} \quad \frac{x^2 + 2x - 15}{x^2 + 3x - 10} \div \frac{x^2 - 9}{x^2 - 9x + 14} \\ \begin{bmatrix} 26 \end{bmatrix} \quad \frac{9x^2 - 25}{2x - 2} \div \frac{6x - 10}{x^2 - 1} \\ \end{bmatrix}$$

[25] 
$$\frac{x^2 + 2x - 15}{x^2 + 3x - 10} \div \frac{x^2 - 9}{x^2 - 9x + 14}$$

$$[27] \quad \frac{x^2 - 5x}{2x - 8} + \frac{12 - 2x}{2x - 8} \qquad [28] \quad \frac{2x^2 - x}{x^2 - 9} - \frac{x^2 + 12}{x^2 - 9}$$

[29] 
$$\frac{x}{x+2} + \frac{2}{x-3}$$
 [30]  $\frac{x}{x+2} - \frac{6}{x^2 + x - 2}$ 

[31] 
$$\frac{x+1}{x^2-7x+6} - \frac{x-2}{x^2-4x-12}$$

# Solve for x.

$$\begin{bmatrix} 32 \end{bmatrix} \quad \frac{x-1}{3} = \frac{8}{x+4} \qquad \begin{bmatrix} 33 \end{bmatrix} \quad \frac{3}{x} + \frac{10}{x^2} = 1 \qquad \begin{bmatrix} 34 \end{bmatrix} \quad \frac{6}{x+3} - \frac{2}{x+2} = 1 \\ \begin{bmatrix} 35 \end{bmatrix} \quad \frac{4}{x^2-4} - \frac{2}{x^2-2x} = \frac{3}{x^2+2x} \\ \end{bmatrix}$$

Find the equations of the horizontal and vertical asymptotes of  $y = \frac{7-9x}{12x+8}$ . [36]

# ANSWERS

| [1]  | w = 3                                 | [2]                | <i>c</i> = 36                         | [3]                | 19.1 cm  | [4]  | \$7.20                               |
|------|---------------------------------------|--------------------|---------------------------------------|--------------------|--|------|--------------------------------------|
| [5]  | DELETED                               | [6]                | DELETED                               | [7]                | DELETED  | [8]  | $\frac{x}{12} = \frac{8}{3}, x = 32$ |
| [9]  | $\frac{5}{4} = \frac{x+7}{12}, x = 8$ | [10]               | $\frac{x}{6} = \frac{x+2}{12}, x = 2$ | [11]               | $\frac{x}{7} = \frac{1}{x+6}, x = 1 \text{ or } x$ | =-7  |                                      |
| [12] | $\frac{387}{24} = \frac{x}{17}$       | [13]               | $\frac{185}{13} = \frac{243}{x}$      | [14]               | $\frac{3}{20} = \frac{x}{37}$                      | [15] | $\frac{17}{19} = \frac{68}{x}$       |
| [16] | <i>x</i> = 25                         | [17]               | <i>x</i> = 3                          | [18]               | <i>x</i> = 5                                       | [19] | $\frac{x(x+12)}{3(x+6)}$             |
| [20] | $\frac{3x+1}{x+5}$                    | [21]               | $\frac{7-2x}{x+2}$                    | [22]               | $\frac{9-x}{7x-6}$                                 | [23] | $\frac{x(2x-1)}{x+4}$                |
| [24] | $\frac{x-2}{x+1}$                     | [25]               | $\frac{x-7}{x+3}$                     | [26]               | $\frac{(3x+5)(x+1)}{4}$                            | [27] | $\frac{x-3}{2}$                      |
| [28] | $\frac{x-4}{x-3}$                     | [29]               | $\frac{x^2-x+4}{(x+2)(x-3)}$          | [30]               | $\frac{x-3}{x-1}$                                  | [31] | $\frac{6x}{(x-1)(x-6)(x+2)}$         |
| [32] | x = 4 or $x = -7$                     | [33]               | x = 5  or  x = -2                     | [34]               | x = 0  or  x = -1                                  | [35] | no solution                          |
| [36] | horizontal asymptote:                 | $y = -\frac{1}{2}$ | $\frac{3}{4}$ , vertical asymptote:   | $x = -\frac{2}{3}$ |  |      |                                      |