

**Completely factor each expression.** (20 points)

(1)  $15x^3 - 6x^2 + 5x - 2 =$  \_\_\_\_\_

(2)  $25x^2 - 16 =$  \_\_\_\_\_

(3)  $x^2 - 10x + 24 =$  \_\_\_\_\_

(4)  $4x^2 - 19x - 5 =$  \_\_\_\_\_

(5)  $2x^3 - 3x^2 - 8x + 12 =$  \_\_\_\_\_

**Solve by factoring.** (12 points)

(6)  $x^2 + x = 6$  \_\_\_\_\_

(7)  $2x^2 - x - 15 = 0$  \_\_\_\_\_

**Write the ratio in lowest terms.** (5 points)

(8) 8 ounces to 2 pounds. (1 pound = 16 ounces) \_\_\_\_\_

**Solve the proportion.** (5 points)

(9)  $\frac{x+2}{5} = \frac{x}{3}$  \_\_\_\_\_

**Set up and use a proportion to answer the question.** (6 points)

(10) If 4 concert tickets cost \$296, how much would 7 of the same type of ticket cost?  
\_\_\_\_\_

**Write in the lowest terms. (7 points)**

$$(11) \frac{3x^3}{3x^3 - 6x^2} = \underline{\hspace{10em}}$$

$$(12) \frac{4x^2 - 16}{x^2 - 7x + 10} = \underline{\hspace{10em}}$$

**Multiply or divide and simplify. (14 points)**

$$(13) \frac{x^2 - x - 6}{3x - 9} \cdot \frac{x^2 - 9}{x^2 + 6x + 9} = \underline{\hspace{10em}}$$

$$(14) \frac{x^2 - x - 6}{2x^2 + 9x + 10} \div \frac{x^2 - 25}{2x^2 + 15x + 25} = \underline{\hspace{10em}}$$

**Add or subtract and simplify.** (16 points)

$$(15) \frac{6x - 5}{x - 3} - \frac{2x + 7}{x - 3} = \underline{\hspace{10cm}}$$

$$(16) \frac{5}{x - 2} - \frac{2x}{x^2 - 4} = \underline{\hspace{10cm}}$$

$$(17) \frac{2x - 3}{x} - \frac{7}{x + 1} = \underline{\hspace{10cm}}$$

**Solve each equation.** (15 points)

(18)  $\frac{3x}{4} - 6 = \frac{x}{4}$  \_\_\_\_\_

(19)  $\frac{x+1}{3} + \frac{x-1}{5} = \frac{2}{15}$  \_\_\_\_\_

(20)  $\frac{x^2}{x+1} + 2 = \frac{1}{x+1}$  \_\_\_\_\_

## Answers

1.  $(3x^2 + 1)(5x - 2)$
2.  $(5x - 4)(5x + 4)$
3.  $(x - 4)(x - 6)$
4.  $(4x + 1)(x - 5)$
5.  $(2x - 3)(x - 2)(x + 2)$
6. Two solutions :  $x = -3$  and  $x = 2$  .
7. Two solutions :  $x = -\frac{5}{2}$  and  $x = 3$  .
8. The ratio is  $\frac{1}{4}$  .
9. One solution:  $x = 3$  .
10. 7 tickets would cost \$518 .
11.  $\frac{x}{x - 2}$
12.  $\frac{4(x + 2)}{x - 5}$
13.  $\frac{(x + 2)(x - 3)}{3(x + 3)}$
14.  $\frac{x - 3}{x - 5}$
15. 4
16.  $\frac{3x + 10}{(x - 2)(x + 2)}$
17.  $\frac{2x^2 - 8x - 3}{x(x + 1)}$
18.  $x = 12$
19.  $x = 0$
20. You get  $x = -1$ , but this cannot be accepted as solution, because  $x = -1$  is extraneous.