

**Concept and Vocabulary Check:**

Fill in each blank by writing the letter of the technique (a through h) for factoring the polynomial shown below.

1.  $-3x^2 + 21x$

\_\_\_\_\_

3.  $27x^3 - 1$

\_\_\_\_\_

5.  $4x^2 + 8x + 3$

\_\_\_\_\_

7.  $5x^2 + 10x$

\_\_\_\_\_

2.  $16x^2 - 25$

\_\_\_\_\_

4.  $x^2 + 7x + xy + 7y$

\_\_\_\_\_

6.  $9x^2 + 24x + 16$

\_\_\_\_\_

8.  $x^3 + 1000$

\_\_\_\_\_

a. Factoring out the GCF

b. Factoring out the negative GCF

c. Factoring by Grouping

d. Factoring trinomials by the AC method

e. Factoring the difference of two squares  
 $A^2 - B^2 = (A + B)(A - B)$

f. Factoring perfect square trinomials

$$A^2 + 2AB + B^2 = (A + B)^2$$

$$A^2 - 2AB + B^2 = (A - B)^2$$

g. Factoring the sum of two cubes

$$A^3 + B^3 = (A + B)(A^2 - AB + B^2)$$

h. Factoring the difference of two cubes

$$A^3 - B^3 = (A - B)(A^2 + AB + B^2)$$

**Practice Exercises:**

In exercises 1 - 121, factor completely or state that the polynomial is prime. Check your factorizations using multiplication.

1.  $-7x^2 + 35x$

5.  $27x^3 - 1$

9.  $14x^2 - 9x + 1$

23.  $2x^4 - 162$

15.  $6x^2 + x - 15$

27.  $3x^3 - 24x^2 + 48x$

17.  $5x^3 - 20x$

29.  $2x^5 + 2x^2$

21.  $5x^2 - 5x - 30$

31.  $6x^2 + 8x$

$$33. -2y^2 + 2y + 112$$

$$49. 9y^2 + 13y + 4$$

$$37. y^2 + 8y - 16$$

$$53. 16y^2 + 24y + 9$$

$$41. r^2 - 25r$$

$$55. -4y^3 + 28y^2 - 40y$$

$$45. x^3 - 4x$$

$$57. y^5 - 81y$$

$$59. 20a^4 - 45a^2$$

$$69. 2y^3 + 3y^2 - 50y - 75$$

$$63. 12y^2 - 11y + 2$$

$$73. 8x^5 - 2x^3$$

$$65. 9y^2 - 64$$

$$75. 3x^2 + 243$$

$$67. 9y^2 + 64$$

$$77. x^4 + 8x$$

$$81. 6x^2 + 8xy$$

$$95. 7x^5y - 7xy^5$$

$$83. xy - 7x + 3y - 21$$

$$97. 10x^3y - 14x^2y^2 + 4xy^3$$

$$87. 72a^3b^2 + 12a^2 - 24a^4b^2$$

$$101. 15a^2 + 11ab - 14b^2$$

$$91. 48x^4y - 3x^2y$$

$$105. a^2y - b^2y - a^2x + b^2x$$

109.  $2x^4 + 6x^3y + 2x^2y^2$

117.  $(x - 7)^2 - 4a^2$

113.  $10x^2(x + 1) - 7x(x + 1) - 6(x + 1)$

121.  $y^7 + y$

**Applications:**

123. A rock is dropped from the top of a 256-foot cliff. The height, in feet, of the rock above the water after  $t$  seconds is modeled by the polynomial  $256 - 16t^2$ . Factor this expression completely.

125. First, **COPY** the figure from page 459 for this problem below. Then, express the area of the shaded ring shown in the figure in terms of  $\pi$ . Then factor this expression completely.