

# 9-5 Factoring Differences of Squares

(Pages 501—506)

You can use the **difference of squares** rule to factor binomials that can be written in the form  $a^2 - b^2$ . Sometimes the terms of a binomial have common factors. If so, the GCF should always be factored out first.

<b>Difference of Squares</b>	$a^2 - b^2 = (a + b)(a - b)$ or $(a - b)(a + b)$
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### Examples

**a. Factor  $b^2 - 49$ .**

$$\begin{aligned}
 b^2 - 49 &= (b)^2 - (7)^2 && b \cdot b = b^2 \text{ and } 7 \cdot 7 = 49 \\
 &= (b - 7)(b + 7) && \text{Use the difference of squares.}
 \end{aligned}$$

**b. Factor  $7g^3h^2 - 28g^5$ .**

$$\begin{aligned}
 7g^3h^2 - 28g^5 & && \text{Check for a GCF.} \\
 &= 7g^3(h^2 - 4g^2) && \text{GCF of } 7g^3h^2 \text{ and } 28g^5 \text{ is } 7g^3. \\
 &= 7g^3(h - 2g)(h + 2g) && h^2 = h \cdot h \text{ and } 4g^2 = 2g \cdot 2g.
 \end{aligned}$$

### Try These Together

Factor each polynomial, if possible. If the polynomial cannot be factored, write prime.

1.  $x^2 - 4$

2.  $y^2 + 16$

3.  $a^2 - 144$

*HINT: Both terms of the binomial must be squares. Also, the sum of two squares cannot be factored using the difference of two squares rule.*

### Practice

Factor each polynomial, if possible. If the polynomial cannot be factored, write prime.

4.  $9b^2 - 25$

5.  $4c^2 - 7$

6.  $4z^2 - 16$

7.  $9z^2 - 19$

8.  $-25 + 81x^2$

9.  $v^2q^2 - 0.49r^2$

10.  $a^2b^2 - 0.36c^2$

11.  $a^2b^2c^2 - x^2y^2z^2$

12.  $x^2y^2 - 3$

13.  $t^7 - t^3u^4$

14.  $x^5 - x^3y^2$

15.  $64k^2 - 24$

16. Factor  $\frac{4}{25}x^2 - \frac{9}{16}y^2$ . (*Hint: Find fractions that when squared equal  $\frac{4}{25}$  and  $\frac{9}{16}$ .*)

17. **Standardized Test Practice** Factor  $x^2 - (y + z)^2$ .

**A**  $(x + y + z)(x - y + z)$

**B**  $(x + y + z)(x + y - z)$

**C**  $(x + y + z)(x - y - z)$

**D**  $(x + y - z)(x - y + z)$

**Answers:** 1.  $(x + 2)(x - 2)$  2. prime 3.  $(a - 12)(a + 12)$  4.  $(3b + 5)(3b - 5)$  5. prime 6.  $4(z + 2)(z - 2)$  7. prime  
 8.  $(9x + 5)(9x - 5)$  9.  $(vq + 0.7r)(vq - 0.7r)$  10.  $(ab - 0.6c)(ab + 0.6c)$  11.  $(abc)(xyz)$  12. prime  
 13.  $t^3(t^4 - u^4)$  14.  $x^3(x^2 - y^2)$  15.  $(x + y)(x - y)$  16.  $(\frac{2}{5}x - \frac{3}{4}y)(\frac{2}{5}x + \frac{3}{4}y)$  17. C