**Special Types of Factoring**

| | |
|---|---|
| Difference of two squares | $x^2 - y^2 = (x + y)(x - y)$ |
| Perfect square trinomial | $x^2 + 2xy + y^2 = (x + y)^2$ |
| | $x^2 - 2xy + y^2 = (x - y)^2$ |
| Differences of two cubes | $x^3 - y^3 = (x - y)(x^2 + xy + y^2)$ |
| Sum of two cubes | $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$ |

## 3.7 Exercises

*Factor each of the following. See Examples 1–4.*

**1.** $x^2 - 25$ **2.** $9 - p^2$ **3.** $36m^2 - 25$
**4.** $4x^2 - 49$ **5.** $16y^2 - 81q^2$ **6.** $9m^2 - 100r^2$
**7.** $16 - 25a^2b^2$ **8.** $49 - 64x^2z^2$ **9.** $a^4 - 4b^4$
**10.** $m^2p^2 - 49r^2s^2$ **11.** $x^2 + 4x + 4$ **12.** $y^2 + 6y + 9$
**13.** $a^2 - 10a + 25$ **14.** $b^2 - 8b + 16$ **15.** $9r^2 - 6rs + s^2$
**16.** $4a^2 - 20ab + 25b^2$ **17.** $25x^2y^2 - 20xy + 4$ **18.** $9k^2q^2 + 24kq + 16$
**19.** $72m^2 - 120mp + 50p^2$ **20.** $100y^2 - 100yz + 25z^2$ **21.** $8a^3 + 1$
**22.** $125a^3 - 1$ **23.** $27x^3 - 64y^3$ **24.** $8a^3 + 125m^3$
**25.** $64x^3 + 125y^3$ **26.** $216z^3 - x^3$ **27.** $125m^3 - 8p^3$
**28.** $64y^3 - 1331x^3$ **29.** $1000 + 27r^3s^3$ **30.** $343 + 1000a^3b^3$
**31.** $64y^6 + 1$ **32.** $m^6 - 8$

*Factor each of the following.*

**33.** $(x + y)^2 - 16$ **34.** $(a + b)^2 - 100$ **35.** $25 - (r + 3s)^2$
**36.** $81 - (2k + z)^2$ **37.** $m^2 - (3p - 5)^2$ **38.** $w^2 - (2z - 3)^2$
**39.** $(a + b)^2 - (a - b)^2$ **40.** $(c - d)^2 - (c + d)^2$ **41.** $(a + b)^2 + 2(a + b) + 1$
**42.** $(x + y)^2 + 6(x + y) + 9$ **43.** $(m - p)^2 + 4(m - p) + 4$ **44.** $(w - r)^2 + 8(w - r) + 16$
**45.** $p^2 - 6p + 9 - r^2$ **46.** $k^2 - 10k + 25 - z^2$ **47.** $9y^2 - 30y + 25 - 16x^2$
**48.** $25a^2 - 20a + 4 - 9b^2$ **49.** $r^2 - 16s^2 + 24s - 9$ **50.** $t^2 - 16u^2 + 8u - 1$
**51.** $64 - (a - b)^3$ **52.** $(r + 1)^3 - 1$ **53.** $(p - 5)^3 + 125$
**54.** $m^3 + (m + 3)^3$ **55.** $a^3 - (a - 4)^3$ **56.** $(p + q)^3 - (p - q)^3$

*Find a value of b or c so that the following will be perfect squares.*

**57.** $p^2 + 6p + c$ **58.** $y^2 - 14y + c$ **59.** $9z^2 - 30z + c$
**60.** $16r^2 + 24r + c$ **61.** $16q^2 + bq + 25$ **62.** $36x^2 + bx + 25$

*Factor each of the following. Assume that all variables used as exponents represent positive integers.*

**63.** $16m^{4x} - 9$ **64.** $100m^{2q} - 81$ **65.** $64r^{8z} - 1$
**66.** $4 - 49x^{4y}$ **67.** $100m^{2z} - 9p^{8z}$ **68.** $16k^{8b} - 25m^{4b}$
**69.** $9a^{4z} - 30a^{2z} + 25$ **70.** $121p^{8k} + 44p^{4k} + 4$ **71.** $x^{3n} - 8$
**72.** $216 + b^{3k}$ **73.** $27z^{12y} + 125x^{6y}$ **74.** $1000k^{15r} - m^{21r}$

*Review Exercises* *Factor completely. See Sections 3.5 and 3.6.*

**75.** $16y^2 - 24y + 32y^3$ **76.** $9z^2 - 10z^5 + z^7$ **77.** $xy + 2y + 4x + 8$
**78.** $a^2b^2 + 3b^2 + 2a^2 + 6$ **79.** $y^2 + y - 2$ **80.** $m^2 - 4m - 21$
**81.** $6r^2 + 19rz - 7z^2$ **82.** $10w^2 + 19wx + 6x^2$