

5.4 Factoring Binomials

Solutions

Factor. 1. $x^2 - 9 = x^2 - 3^2$ $= (x + 3)(x - 3)$	2. $x^2 - 25$
3. $x^2 - a^2 = x^2 - a^2$ $= (x + a)(x - a)$	4. $x^2 - y^2$
5. $25x^2 - 9y^2 = (5x)^2 - (3y)^2$ $= (5x + 3y)(5x - 3y)$	6. $36x^2 - 49y^2$
7. $9x^2 - 1 = (3x)^2 - 1^2$ $= (3x + 1)(3x - 1)$	8. $y^2 - 1$
9. $1 - 4x^2 = 1^2 - (2x)^2$ $= (1 + 2x)(1 - 2x)$	10. $1 - w^2$
11. $x^4 - 16 = (x^2)^2 - 4^2$ $= (x^2 + 4)(x^2 - 4)$ $= (x^2 + 4)(x + 2)(x - 2)$	12. $x^4 - 81$
Answers: 1. $(x + 3)(x - 3)$; 3. $(x + a)(x - a)$; 5. $(5x + 3y)(5x - 3y)$; 7. $(3x + 1)(3x - 1)$; 9. $(1 + 2x)(1 - 2x)$; 11. $(x^2 + 4)(x + 2)(x - 2)$	

Factor.

13. $x^3 + 8 = x^3 - 2^3$

$$= (x + 2)(x^2 - 2x + 2^2)$$

$$= (x + 2)(x^2 - 2x + 4)$$

14. $x^3 + 27$

15. $x^3 - 64 = x^3 - 4^3$

$$= (x - 4)(x^2 + 4x + 4^2)$$

$$= (x - 4)(x^2 + 4x + 16)$$

16. $x^3 - 8$

Factor completely.

17. $5x^3 - 40y^3 = 5(x^3 - 8y^3) = 5(x^3 - (2y)^3)$

$$= 5(x - 2y)(x^2 + 2xy + (2y)^2)$$

$$= 5(x - 2y)(x^2 + 2xy + 4y^2)$$

18. $2x^3 + 54y^3$

19. $x^6 - 64 = (x^3)^2 - 8^2$

$$= (x^3 + 8)(x^3 - 8)$$

$$= (x^3 + 2^3)(x^3 - 2^3)$$

$$= (x + 2)(x^2 - 2x + 2^2)(x - 2)(x^2 + 2x + 2^2)$$

$$= (x + 2)(x^2 - 2x + 4)(x - 2)(x^2 + 2x + 4)$$

20. $1 - y^6$

Answers: 13. $(x + 2)(x^2 - 2x + 4)$; 15. $(x - 4)(x^2 + 4x + 16)$; 17. $5(x - 2y)(x^2 + 2xy + 4y^2)$; 19. $(x + 2)(x^2 - 2x + 4)(x - 2)(x^2 + 2x + 4)$