

5.2 Solving Polynomial Equations Algebraically • Form A

All work must be completed in a clear and organized manner on a separate sheet of paper. Final answers only, boxed in on this sheet.

Examples 1–3

Factor completely. If the polynomial is not factorable, write *prime*.

1. $64x^4 + xy^3$

2. $x^6y^3 + y^9$

3. $w^3 - 2y^3$

4. $12ax^2 - 20cy^2 - 18bx^2 - 10ay^2 + 15by^2 + 24cx^2$

5. $8x^5 - 25y^3 + 80x^4 - x^2y^3 + 200x^3 - 10xy^3$

Example 4

Solve each equation.

6. $x^3 = 3x^2$

7. $b^3 - 8b^2 + 16b = 0$

Example 6

Write each expression in quadratic form, if possible.

8. $x^4 + 12x^2 - 8$

9. $8x^6 + 6x^3 + 7$

10. $9x^8 - 21x^4 + 12$

Example 7

Solve each equation.

11. $x^4 + 6x^2 + 5 = 0$

12. $4x^4 - 14x^2 + 12 = 0$

13. $4x^4 - 5x^2 - 6 = 0$

Mixed Exercise

Factor completely. If the polynomial is not factorable, write *prime*.

14. $x^4 - 625$

15. $x^5 - 16x$

16. $x^6 - 4x^4 - 8x^4 + 32x^2 + 16x^2 - 64$

17. **DECOR** Each box in a set of decorative storage boxes is a cube.

- a. The sides of the smallest box are 30% of the length of the sides of the largest box. The volume of the largest box is 7784 cubic inches more than the volume of the smallest box. Define one or more variables, and write an equation that represents the situation.

- b. What are the lengths of the sides of the largest and smallest boxes?

- c. Two of the other boxes have a total volume of 1728 cubic inches. The length of the sides of the smaller of these boxes is 75% of those of the larger box. Write and solve an equation to find the lengths of the sides of the boxes.



Solve each equation.

18. $x^4 - 16x^2 - 720 = 0$

19. $x^4 + 6x^2 - 91 = 0$

20. $64x^3 + 1 = 0$

21. $6x^4 - 5x^2 - 4 = 0$

22. $18x^4 + 43x^2 - 5 = 0$

23. $3x^4 - 22x^2 - 45 = 0$

24. $x^6 - 26x^3 - 27 = 0$

25. $4x^4 - 4x^2 - x^2 + 1 = 0$

26. $x^4 + 8x^2 + 15 = 0$

Factor completely. If the polynomial is not factorable, write *prime*.

27. $21x^3 - 18x^2y + 24xy^2$

28. $a^2 + 7a - 18$

29. $b^2 + 8b + 7$

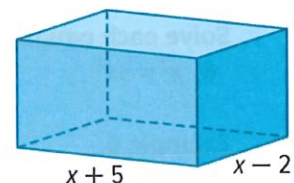
30. $4f^2 - 64$

31. $9x^2 + 25$

32. $7x^2 - 14x$

33. $n^3 - 125$

34. **REASONING** A rectangular box has dimensions of x inches, $(x + 5)$ inches, and $(x - 2)$ inches. If the volume of the box is $30x$ cubic inches. Find the dimensions of the box. Explain your reasoning.



35. **WRITE** If the equation $ax^2 + bx + c = 0$ has solutions $x = m$ and $x = n$, what are the solutions to $ax^4 + bx^2 + c = 0$. Explain your reasoning.

36. **PERSEVERE** Solve $6x - 11\sqrt{3x} + 12 = 0$.

37. **CREATE** The cubic form of an equation is $ax^3 + bx^2 + cx + d = 0$. Write an equation with degree 6 that can be written in cubic form.