



Got It? 3. **Geometry** A rectangular prism has volume $60x^3 + 34x^2 + 4x$. What expressions can represent the dimensions of the prism? Use factoring.

Here is a summary of what to remember as you factor polynomials.

Take note

Summary Factoring Polynomials

1. Factor out the greatest common factor (GCF).
2. If the polynomial has two terms or three terms, look for a difference of two squares, a perfect-square trinomial, or a pair of binomial factors.
3. If the polynomial has four or more terms, group terms and factor to find common binomial factors.
4. As a final check, make sure there are no common factors other than 1.



Lesson Check

Do you know HOW?

Factor each expression.

1. $20r^3 + 8r^2 + 15r + 6$
2. $6d^3 + 3d^2 - 10d - 5$
3. $24x^3 + 60x^2 + 36x + 90$
4. A rectangular prism has a volume of $36x^3 + 36x^2 + 8x$. What expressions can represent the dimensions of the prism? Use factoring.

Do you UNDERSTAND? MATHEMATICAL PRACTICES

- Vocabulary** Tell whether you would factor the polynomial by grouping. Explain your answer.
5. $x^2 - 6x + 9$
 6. $4w^2 + 23w + 15$
 7. $24t^3 - 42t^2 - 28t + 49$
 8. **Reasoning** Can you factor the polynomial $6q^3 + 2q^2 + 12q - 3$ by grouping? Explain.



Practice and Problem-Solving Exercises MATHEMATICAL PRACTICES

A Practice

Find the GCF of the first two terms and the GCF of the last two terms for each polynomial.

See Problem 1.

9. $2z^3 + 6z^2 + 3z + 9$
10. $10g^3 - 25g^2 + 4g - 10$
11. $2r^3 + 12r^2 - 5r - 30$
12. $6p^3 + 3p^2 + 2p + 1$

Factor each expression.

- | | | |
|--------------------------------|-------------------------------|--------------------------------|
| 13. $15q^3 + 40q^2 + 3q + 8$ | 14. $14y^3 + 8y^2 + 7y + 4$ | 15. $14z^3 - 35z^2 + 16z - 40$ |
| 16. $11w^3 - 9w^2 + 11w - 9$ | 17. $8m^3 + 12m^2 - 2m - 3$ | 18. $12k^3 - 27k^2 - 40k + 90$ |
| 19. $20v^3 + 24v^2 - 25v - 30$ | 20. $18h^3 + 45h^2 - 8h - 20$ | 21. $12y^3 + 4y^2 - 9y - 3$ |

Factor completely.

◀ See Problem 2.

22. $8p^3 - 32p^2 + 28p - 112$

23. $3w^4 - 2w^3 + 18w^2 - 12w$

24. $5g^4 - 5g^3 + 20g^2 - 20g$

25. $6q^4 + 3q^3 - 24q^2 - 12q$

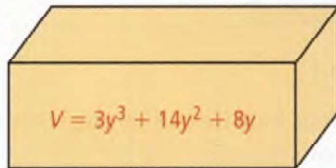
26. $36v^3 - 126v^2 + 48v - 168$

27. $4d^3 - 6d^2 + 16d - 24$

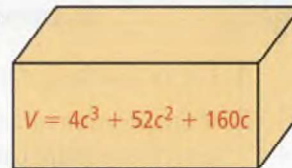
Find expressions for the possible dimensions of each rectangular prism.

◀ See Problem 3.

28.



29.



STEM 30. **Carpentry** A trunk in the shape of a rectangular prism has a volume of $6x^3 + 38x^2 - 28x$. What expressions can represent the dimensions of the trunk?

B Apply

Factor completely.

31. $9t^3 - 90t^2 + 144t$

32. $60y^4 - 300y^3 - 42y^2 + 210y$

33. $8m^3 + 32m^2 + 40m + 160$

34. $10p^2 - 5pq - 180q^2$

© 35. **Error Analysis** Describe and correct the error made in factoring completely.

~~$$4x^4 + 12x^3 + 8x^2 + 24x = 4(x^4 + 3x^3 + 2x^2 + 6x)$$
$$= 4[x^3(x + 3) + 2x(x + 3)]$$
$$= 4(x^3 + 2x)(x + 3)$$~~

© 36. a. Factor $(20x^3 - 5x^2) + (44x - 11)$.

b. Factor $(20x^3 + 44x) + (-5x^2 - 11)$.

c. **Reasoning** Why can you factor the same polynomial using different pairs of terms?

© 37. **Writing** Describe how to factor the expression $6x^5 + 4x^4 + 12x^3 + 8x^2 + 9x + 6$.

© 38. **Think About a Plan** Bat houses, such as the one at the right, are large wooden structures that people mount on buildings to attract bats. What expressions can represent the dimensions of the bat house?

- Into how many factors should you factor the expression for the volume?
- What is the first step in factoring this expression?

© 39. **Open-Ended** Write a four-term polynomial that you can factor by grouping. Factor your polynomial.

40. **Art** The pedestal of a sculpture is a rectangular prism with a volume of $63x^3 - 28x$. What expressions can represent the dimensions of the pedestal? Use factoring.

