

Chapter 9 Section 4: Special Cubic Factorizations

Problems

Notes:

(1) You may need to first factor out the greatest common factor from the entire expression before you can apply one of these formulas.

(2) Keep in mind the following factoring formulas when doing these problems:

$$\boxed{a^3 - b^3 = (a - b)(a^2 + ab + b^2)}$$
$$\boxed{a^3 + b^3 = (a + b)(a^2 - ab + b^2)}$$

(3) Also it will be helpful to know a few perfect cubes:

$1^3 = 1$	$6^3 = 216$
$2^3 = 8$	$7^3 = 343$
$3^3 = 27$	$8^3 = 512$
$4^3 = 64$	$9^3 = 729$
$5^3 = 125$	$10^3 = 1000$

Factor each of the following polynomials.

1. $x^3 - 125 =$ _____

2. $x^3 - 729 =$ _____

3. $y^3 - 512 =$ _____

4. $y^3 - 216 =$ _____

5. $x^3 + 729 =$ _____

6. $x^3 + 125 =$ _____

7. $z^3 + 216 =$ _____

8. $p^3 + 512 =$ _____

9. $343 - x^3 =$ _____

10. $27 - x^3 =$ _____

11. $27p^3 + 1000q^3 =$

12. $1000m^3 + 27n^3 =$

13. $512u^3 - 125v^3 =$

14. $343u^3 - 8v^3 =$

15. $729m^3 + 125n^3 =$

16. $512p^3 + 729q^3 =$

17. $343x^3 - y^3 =$

18. $216x^3 - y^3 =$

19. $216x^3 + y^3 =$

20. $343x^3 + y^3 =$

Hint: In problems #21 - #30, first factor out the greatest common factor.

21. $192y^3 - 375$

22. $270z^3 - 80$

23. $2t^4 - 54t$

24. $81r^5 - 3r^2$

25. $16x^6 + 2x^3y^3$

26. $3x^6 + 81x^3y^3$

27. $270m^5 + 80m^2$

28. $192n^7 + 375n^4$

29. $30x^6 - 810x^3y^3$

30. $32x^7 - 4x^4y^3$

One factor of a sum or difference of cubes is given. Which sum or difference of cubes is it?

31. $w^2 + 2w + 4 =$

32. $x^2 + 5x + 25 =$

33. $9x^2 - 3x + 1 =$

34. $16x^2 - 4x + 1 =$

35. $4y^2 - 6yz + 9z^2 =$

36. $25t^2 + 30tu + 36u^2 =$
