

5-7

Practice

Form G

The Binomial Theorem

Expand each binomial.

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|---------------------|---------------------|----------------------|----------------------|
| 1. $(x + 2)^4$ | 2. $(a + 2)^7$ | 3. $(x + y)^7$ | 4. $(d - 2)^9$ |
| 5. $(2x - 3)^8$ | 6. $(x - 1)^9$ | 7. $(2x^2 - 2y^2)^6$ | 8. $(x^5 + 2y)^7$ |
| 9. $(n - 3)^3$ | 10. $(2n + 2)^4$ | 11. $(n - 6)^5$ | 12. $(n - 1)^6$ |
| 13. $(2a + 2)^3$ | 14. $(x^2 - y^2)^4$ | 15. $(2x + 3y)^5$ | 16. $(2x^2 + y^2)^6$ |
| 17. $(x^2 - y^2)^3$ | 18. $(2b + c)^4$ | 19. $(3m - 2n)^5$ | 20. $(x^3 - y^4)^6$ |

Find the specified term of each binomial expansion.

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|--------------------------------------|--------------------------------------|
| 21. third term of $(x + 3)^{12}$ | 22. second term of $(x + 3)^9$ |
| 23. twelfth term of $(2 + x)^{11}$ | 24. third term of $(x - 2)^{12}$ |
| 25. eighth term of $(x - 2y)^{15}$ | 26. seventh term of $(x - 2y)^6$ |
| 27. fifth term of $(x^2 + y^2)^{13}$ | 28. fourth term of $(x^2 - 2y)^{11}$ |
29. The term $126c^4d^5$ appears in the expansion of $(c + d)^n$. What is n ?
30. The coefficient of the second term in the expansion of $(r + s)^n$ is 7. Find the value of n , and write the complete term.

State the number of terms in each expansion and give the first two terms.

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|--------------------|--------------------|-------------------|
| 31. $(d + e)^{12}$ | 32. $(x - y)^{15}$ | 33. $(2a + b)^5$ |
| 34. $(x - 3y)^7$ | 35. $(4 - 2x)^8$ | 36. $(x^2 + y)^6$ |
37. The side of a number cube is $x + 4$ units long. Write a binomial for the volume of the number cube. Use the Binomial Theorem to expand and rewrite the expression in standard form.

5-7**Practice** (continued)

Form G

The Binomial Theorem

Expand each binomial.

38. $(x + 1)^7$

39. $(x + 4)^8$

40. $(x - 3y)^6$

41. $(x + 2)^5$

42. $(x^2 - y^2)^5$

43. $(3 + y)^5$

44. $(x^2 + 3)^6$

45. $(x - 5)^7$

46. $(x - 4y)^4$

47. **Open-Ended** Write a binomial in the form $(a + b)^n$ that has 3 as the coefficient of the first term.

48. Use Pascal's Triangle to determine the binomial of the expanded expression $x^6 + 6x^5 + 15x^4 + 20x^3 + 15x^2 + 6x + 1$.

49. **Error Analysis** Your friend expands the binomial $(x - 2)^6$ as $x^6 + 12x^5 + 30x^4 + 160x^3 + 240x^2 + 192x + 64$. What mistake did your friend make? What is the correct expansion?

50. **Reasoning** Without writing any of the previous terms, how do you know that 2187 is the eighth term of the expansion of the binomial $(x + 3)^7$?

51. In the expansion of $(3x - y)^6$, one of the terms contains the factor y^4 .

- What is the exponent of $3x$ in this term?
- What is the coefficient of this term?

52. You are shipping a cubic glass sculpture. Each side of the sculpture is x in. long. To adequately protect the sculpture, the shipping box must leave room for 5 in. of padding on either side in every dimension. Write and expand a binomial for the volume of the shipping box.