7.1 Practice WITH CalcChat® AND CalcView®

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In Exercises 1–8, find the degree of the monomial. *Example 1*

1. $4g$
2. $-\frac{4}{9}$
3. $-1.75k^2$
4. $23x^4$
5. s^8t
6. $8m^2n^4$
7. $9xy^3z^7$
8. $-3q^4rs^6$

In Exercises 9–16, write the polynomial in standard form. Identify the degree and leading coefficient of the polynomial. Then classify the polynomial by the number of terms. *Examples 2 and 3*

9. $3t^8$
10. $\sqrt{7}n^4$
11. $7 + 3p^2$
12. $4w^{11} - w^{12}$
13. $6c^2 + 2c^4 - c$
14. $8d - 2 - 4d^3$
15. $5z + 2z^3 + 3z^4$
16. $\pi r^2 - \frac{5}{7}r^8 + 2r^5$

17. **MP REASONING** The expression $\frac{4}{3}\pi r^3$ represents the volume of a sphere with radius r. Explain why this expression is a monomial. Then identify its degree.

18. **MODELING REAL LIFE** The amount of money you have after investing \$400 for 8 years and \$600 for 6 years at the same interest rate is represented by $400x^8 + 600x^6$, where x is the growth factor.
    a. Classify the polynomial by the number of terms.
    b. Interpret the coefficients and the exponents of the polynomial.

In Exercises 19–26, find the sum. *Example 4*

19. $(5y + 4) + (-2y + 6)$
20. $(-8x - 12) + (9x + 4)$
21. $(2n^2 - 5n - 6) + (-n^2 - 3n + 11)$
22. $(-3p^3 + 5p^2 - 2p) + (-p^3 - 8p^2 - 15p)$
23. $(3g^2 - g) + (3g^2 - 8g + 4)$
24. $(9r^2 + 4r - 7) + (3r^2 - 3r)$
25. $\left(\frac{1}{4}a - a^3 - 3\right) + \left(2a^3 - \frac{1}{2}a^2 + 8\right)$
26. $\left(s^3 - \frac{1}{2}s - 9\right) + \left(2s^2 - \frac{1}{3}s^3 + s\right)$

In Exercises 27–34, find the difference. *Example 5*

27. $(d - 9) - (3d - 1)$
28. $(6x + 9) - (7x + 1)$
29. $(y^2 - 4y + 9) - (3y^2 - 6y - 9)$
30. $(4m^2 - m + 2) - (-3m^2 + 10m + 4)$
31. $(k^3 - 7k + 2) - (k^2 - 12)$
32. $(-r - 10) - (-4r^3 + r^2 + 7r)$
33. $(t^4 - 1.5t^2 + t) - (12 - 9.5t^2 - 7t)$
34. $(4.5d - 6d^3 + 3d^2) - (10d^3 + 7d - 2.5)$

ERROR ANALYSIS **In Exercises 35 and 36, describe and correct the error in finding the sum or difference.**

35. ✗
$$\begin{aligned}(x^2 + x) - (2x^2 - 3x) &= (x^2 + x) + (-2x^2 - 3x)\\ &= (x^2 - 2x^2) + (x - 3x)\\ &= -x^2 - 2x\end{aligned}$$

36. ✗
$$\begin{array}{r} x^3 - 4x^2 + 3 \\ +\ -3x^3 + 8x\ -\ 2 \\ \hline -2x^3 + 4x^2 + 1 \end{array}$$

37. **MODELING REAL LIFE** The cost (in dollars) of making b bracelets is represented by $4 + 5b$. The cost (in dollars) of making b necklaces is represented by $8b + 6$. Write a polynomial that represents how much more it costs to make b necklaces than b bracelets.

38. MODELING REAL LIFE The number of individual memberships at a fitness center in m months is represented by $142 + 12m$. The number of family memberships at the center in m months is represented by $52 + 6m$. Write a polynomial that represents the total number of memberships at the fitness center.

In Exercises 39–42, find the sum or difference.

39. $(2s^2 - 5st - t^2) - (s^2 + 7st - t^2)$

40. $(a^2 - 3ab + 2b^2) + (-4a^2 + 5ab - b^2)$

41. $(c^2 - 6d^2) + (c^2 - 2cd + 2d^2)$

42. $(-x^2 + 9xy) - (x^2 + 6xy - 8y^2)$

43. MODELING REAL LIFE A water rocket is launched straight into the air from a height of 6 feet with an initial velocity of 60 feet per second. At the same time, a second water rocket is launched straight into the air from the ground with an initial velocity of 50 feet per second. The polynomials $-16t^2 + 60t + 6$ and $-16t^2 + 50t$ represent the heights (in feet) of the rockets after t seconds. *Example 6*

a. Write a polynomial that represents the distance between the heights of the rockets after t seconds.

b. Interpret any coefficients and constants of the polynomial in part (a).

44. MODELING REAL LIFE During a 7-year period, the amounts (in millions of dollars) spent each year on buying new vehicles N and used vehicles U by United States residents are modeled by the equations

$$N = -0.028t^3 + 0.06t^2 + 0.1t + 17$$

$$U = -0.38t^2 + 1.5t + 42$$

where $t = 1$ represents the first year in the 7-year period.

a. Write a polynomial that represents the total amount spent each year on buying new and used vehicles in the 7-year period.

b. How much is spent on buying new and used vehicles in the fifth year?

45. WRITING Explain how you know that the set of polynomials is closed under addition and subtraction.

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46. COLLEGE PREP Which of the following expressions is *not* a polynomial?

Ⓐ $a^3 + 4a$ Ⓑ $x^2 - 8^x$

Ⓒ $b - 2^{-1}$ Ⓓ $-\frac{\pi}{3} + 6y^8z$

MP REASONING In Exercises 47–50, complete the statement with *always*, *sometimes*, or *never*. Explain your reasoning.

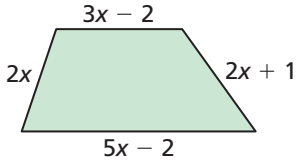
47. The terms of a polynomial are _____ monomials.

48. The difference of two trinomials is _____ a trinomial.

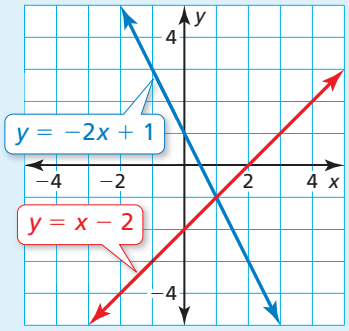
49. A binomial is _____ a polynomial of degree 2.

50. The sum of two polynomials is _____ a polynomial.

51. CONNECTING CONCEPTS Write the polynomial in standard form that represents the perimeter of the quadrilateral.



52. HOW DO YOU SEE IT? The right side of the equation of each line is a polynomial.



a. The absolute value of the difference of the two polynomials represents the vertical distance between points on the lines with the same x-value. Write this expression.

b. When does the expression in part (a) equal 0? How does this value relate to the graph?

53. MAKING AN ARGUMENT Does the order in which you add polynomials matter? Justify your answer.