Left margin answers
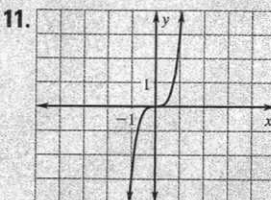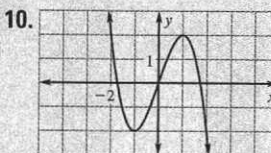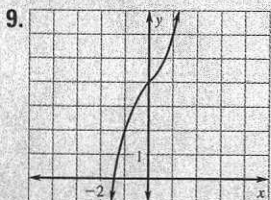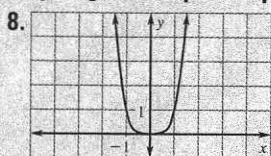
4. $\dfrac{-2y^2}{5x^4}$; quotient of powers property, negative exponent property, product of powers property

5. _____; power of a product property, negative exponent property

6. _____ product of powers property, negative exponent property

7. $7x^2y^2$; product of powers property, quotient of powers property, negative exponent property

8.

9.

10.

11.

25.

26. positive: 1, negative: 2 or 0, imaginary: 4 or 2

27. positive: 1, negative: 1, imaginary: 2

EXTRA PRACTICE

Chapter 5

5.1 Write the answer in scientific notation.

1. $(3.4 \times 10^3)(2.8 \times 10^8)$
9.52×10^{11}

2. $(5.8 \times 10^{-6})^4$
$1.1316496 \times 10^{-21}$

3. $\dfrac{4.6 \times 10^{-7}}{9.2 \times 10^{-9}}$ 5×10^1

5.1 Simplify the expression. Tell which properties of exponents you used. 4–7. See margin.

4. $\dfrac{-14x^{-3}y^5}{35xy^3}$

5. $(4a^5b^{-2})^{-3}$

6. $(2r^3s^3)(r^{-7}s^5)$

7. $\dfrac{xy^{-1}}{x^2y} \cdot \dfrac{7x^3}{y^{-4}}$

5.2 Graph the polynomial function. 8–11. See margin.

8. $f(x) = x^4$

9. $f(x) = x^3 + x + 4$

10. $f(x) = -x^3 + 3x$

11. $f(x) = x^5 + 2x^3$

5.3 Perform the indicated operation.

12. $(4z^3 + 9) + (3z^2 - 4z - 2)$
$4z^3 + 3z^2 - 4z + 7$

13. $(x^2 + 3x - 1) - (4x^2 + 7)$

14. $(3x - 4)^3$

5.4 Factor the polynomial completely using any method.

15. $3x^4 + 18x^3 + 27x^2$
$3x^2(x + 3)^2$

16. $343x^3 + 1000$
$(7x + 10)(49x^2 - 70x + 100)$

17. $2x^3 + x^2 - 8x - 4$
$(x - 2)(x + 2)(2x + 1)$

5.4 Find the real-number solutions of the equation.

18. $3x^3 + 18x^2 = 48x$

19. $x^4 + 32 = 14x^2$ $\pm\sqrt{7 \pm \sqrt{17}}$

20. $2x^3 + 48 = 3x^2 + 32x$ $-4, \frac{3}{2}, 4$

5.5 Divide using polynomial long division or synthetic division.

21. $(2x^3 + 4x^2 - 5x + 16) \div (x - 3)$

22. $(x^4 + 2x^3 - 7x^2 - 14) \div (x + 2)$
$x^3 - 7x + 14 + \dfrac{-42}{x + 2}$

5.6 Find all real zeros of the function.

23. $f(x) = 2x^3 + 3x^2 - 8x + 3$

24. $f(x) = 2x^4 + x^3 - 53x^2 - 14x + 20$ $-3 \pm \sqrt{5}, \frac{1}{2}, 5$

5.7 Determine the possible numbers of positive real zeros, negative real zeros, and imaginary zeros of the function. 25–27. See margin.

25. $f(x) = -x^3 + 2x^2 - 11x - 1$

26. $f(x) = 4x^5 + 3x^2 - 8x - 10$

27. $f(x) = x^4 - 3x^3 - 7x - 13$

5.8 Estimate the coordinates of each turning point and state whether each corresponds to a local maximum or a local minimum. Then estimate all real zeros and determine the least degree the function can have. 28–30. See margin.

28.

29.

30.
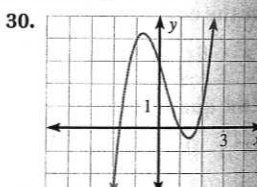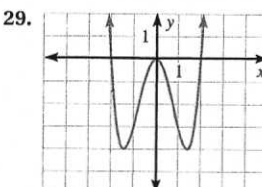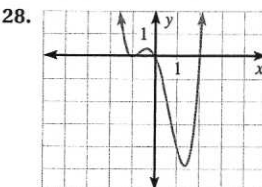
5.9 Use finite differences and a system of equations to find a polynomial function that fits the data in the table.

31.

x	1	2	3	4	5	6
y	2.5	11	27.5	55	96.5	155

$y = 0.5x^3 + x^2 + 2x - 1$

32.

x	1	2	3	4	5	6
y	−7	−6	39	188	525	1158

$y = x^4 - 3x^2 - 5x$

Bottom answers

28. $(-1, 0)$ local minimum, $(-0.5, 0.25)$ local maximum, $(1.5, -4.9)$ local minimum; $(-1, 0)$, $(-1, 0)$, $(0, 0)$, $(2, 0)$, degree 4

29. $(-1.5, -4)$ local minimum, $(0, 0)$ local maximum, $(1.5, -4)$ local minimum; $(-2, 0)$, $(0, 0)$, $(0, 0)$, $(2, 0)$, degree 4

30. $(-0.75, 4.25)$ local maximum, $(1.25, -0.25)$ local minimum; $(-1.75, 0)$, $(1, 0)$, $(1.75, 0)$, degree 3