

3. Practice

Assignment Guide

1 Objective

- A B** Core 1–12, 24–30, 33–58
- C** Extension 60

2 Objective

- A B** Core 13–23, 31–32, 59
- C** Extension 61

Standardized Test Prep 62–65

Mixed Review 66–72

Exercise 17 Challenge interested students to research why the life expectancies for males and females differ. Invite students to share their findings with the class.

Careers

Exercise 17 Insurance companies use vital statistics, such as life expectancies of males and females, and current age, to determine the cost of life insurance.

Enrichment 6-1

Retaching 6-1

Practice 6-1

Find a cubic model for each function. Then use your model to estimate the value of y when $x = 7$.

1.	x	0	2	4	6	8	10
	y	25	21	20	23	19	17

2.	x	0	3	4	6	8	10
	y	31	42	43	44	51	62

- Write each polynomial in standard form. Then classify it by degree and by number of terms.
- | | | |
|-------------------------|---------------------------|-----------------------|
| 3. $4x + x + 2$ | 4. $-3 + 3x - 3x$ | 5. $6x^2 - 1$ |
| 6. $1 - 2x + 5x^2$ | 7. $5x^2 - 3x^2$ | 8. $2x^2 - 3x - 4x^2$ |
| 9. $-1 + 2x^2$ | 10. $5x^2 - 3x^2$ | 11. $5x - 7x^2$ |
| 12. $2 + 3x^2 - 2$ | 13. $6 + 2x^2 - 4 + x^2$ | 14. $4x - 5x$ |
| 15. $x^2(p^2 + p - 1)$ | 16. $x(x + 5) - 5(x + 5)$ | 17. $x(x - 5) - 5x$ |
| 18. $(3x)^2$ | 19. $-(3 - 8)$ | 20. $6(2) - 5$ |
| 21. $\frac{7}{4} + x^2$ | 22. $2x^2 - 4x - 3$ | 23. $2x^2 - 2x^2$ |

24. The lengths of the sides of a triangle are $x + 4$ units, x units, and $x + 1$ units. Express the perimeter of the triangle as a polynomial in standard form.

25. Find a cubic function to model the data below. (Hint: Use the number of years past 1900 for x .) Then use the function to estimate the average monthly Social Security benefits for a retired worker in 2005.

Average Monthly Social Security Benefits, 1940–1999

Year	1940	1950	1960	1970	1980	1990	1999
Amount (in dollars)	22.74	29.03	41.73	123.82	121.10	158.86	190.75

Source: www.ssa.gov

26. Find a cubic function to model the data below. (Hint: Use x to represent the gestation period.) Then use the function to estimate the longevity of an animal with a gestation period of 125 days.

Gestation and Longevity of Certain Animals

Animal	Rat	Squirrel	Pig	Cow	Elephant
Gestation (in days)	21	44	115	280	624
Longevity (in years)	3	9	10	12	40

Source: www.infoplease.com

The function $f(x) = 0.0009033x^4 - 0.05193x^3 + 0.959x^2 - 3.899x + 38.86$ is an approximate model for a quartic function.

To estimate gold production in 1988, you can use the Table option of a graphing calculator to find that $f(13) \approx 61.96$. According to the model, about 62 million troy ounces of gold were produced in 1988.

Check Understanding

- 3 Use the quartic model in Example 3 to estimate gold production in 1997. **75.9 million troy oz**

EXERCISES

Practice and Problem Solving

For more practice, see *Extra Practice*.

Practice by Example

Example 1
(page 301)

Write each polynomial in standard form. Then classify it by degree and by number of terms. **1–12. See margin.**

- | | | |
|--------------------------|----------------------|------------------------|
| 1. $7x + 3x + 5$ | 2. $5 - 3x$ | 3. $2m^2 - 3 + 7m$ |
| 4. $-x^3 + x^4 + x$ | 5. $-4p + 3p + 2p^2$ | 6. $5a^2 + 3a^3 + 1$ |
| 7. $-x^5$ | 8. $3 + 12x^4$ | 9. $6x^3 - x^3$ |
| 10. $7x^3 - 10x^3 + x^3$ | 11. $4x + 5x^2 + 8$ | 12. $x^2 - x^4 + 2x^2$ |

Example 2
(page 302)

Find a cubic model for each set of values. **13–17. See back of book.**

13. $(-2, -7), (-1, 0), (0, 1), (1, 2), (2, 9)$ 14. $(0, -12), (1, 10), (2, 4), (3, 42)$
 15. $(-1, 2.5), (0, 1), (1, 1.5), (2, 13)$ 16. $(-3, 91), (-2, 84), (-1, 93), (0, 100)$

17. **Vital Statistics** The data at the right indicate that the life expectancy for residents of the United States has been increasing. Recall that in Chapter 3 you found a linear model for this data set.
- Find a quadratic model for the data set.
 - Find a cubic model for the data set.
 - Graph each model. Compare the quadratic and cubic models to determine which one is a better fit.

Life Expectancy (years)

Year of Birth	Males	Females
1970	67.1	74.7
1980	70.0	77.4
1990	71.8	78.8
2000	73.2	80.2
2010	74.5	81.3

SOURCE: U.S. Bureau of the Census. Go to www.PHSchool.com for a data update. Web Code: agg-2041

Example 3
(pages 302–303)

Find a cubic model for each function. Then use your model to estimate the value of y when $x = 17$. **18–23. See back of book.**

18. $(-1, -3), (0, 0), (1, -1), (2, 0)$ 19. $(10, 0), (11, 121), (12, 288), (13, 507)$
 20. $(10, 500), (14, 588), (16, 512), (20, 0)$ 21. $(1, 91), (10, 95), (20, 260), (30, 365)$

22.

x	0	3	5	6	9	11	12	14	16	18	20
y	42	31	26	21	17	15	19	22	28	30	29

23.

x	0	2	3	6	8	10	12	14	16	18	20
y	4.1	6	15.7	21.1	23.6	23.1	24.7	24.9	23.9	25.2	29.5

Apply Your Skills

24. **Open-Ended** Write a third-degree polynomial function. Make a table of values and a graph. Find the x - and y -intercepts. **Check students' work.**

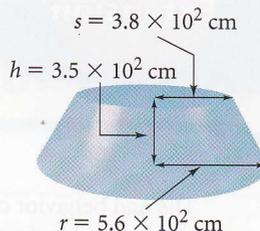
- 303–305 Exercises
 $0x + 5$; linear binomial
 $3x + 5$; linear binomial
 $m^2 + 7m - 3$;
 quadratic trinomial

- | | |
|--|-----------------------------------|
| 4. $x^4 - x^3 + x$; quartic trinomial | 7. $-x^5$; quintic monomial |
| 5. $2p^2 - p$; quadratic binomial | 8. $12x^4 + 3$; quartic binomial |
| 6. $3a^3 + 5a^2 + 1$; cubic trinomial | 9. $5x^3$; cubic monomial |
| | 10. $-2x^3$; cubic monomial |

11. $5x^2 + 4x + 8$;
quadratic trinomial
 12. $-x^4 + 3x^3$;
quartic binomial

Challenge

60. Geometry Use the formula $V = \frac{\pi h}{3}(r^2 + rs + s^2)$ to find the volume of the truncated cone. Express your answer in scientific notation with the appropriate number of significant digits.



61. Critical Thinking Recall that each family of functions has a simplest function called the parent function.

- a. Compare the graphs of $y = x^3$ and $y = x^3 + 4$. Describe how the graph of $y = x^3 + 4$ relates to the graph of $y = x^3$. **up 4 units**
- b. Compare the graphs of $y = x^3$ and $y = 4x^3$. Describe how the graph of $y = 4x^3$ relates to the graph of $y = x^3$. **$y = 4x^3$ is more narrow.**
- c. Identify the parent function among the functions in parts (a) and (b). **$y = x^3$**

FCAT Practice

Multiple Choice

Compare the boxed quantity in Column A with the boxed quantity in Column B. Choose the best answer.

- A. The quantity in Column A is greater.
- B. The quantity in Column B is greater.
- C. The two quantities are equal.
- D. The relationship cannot be determined from the information given.

Column A

Column B

62.	B	the degree of the quadratic term of a polynomial	the degree of the cubic term of a polynomial
63.	A	the degree of $-5x^2 + 1 + 2x^2$, written in standard form	the degree of $x^2 - 2x^2 + x^2 + 4$, written in standard form
64.	A	the leading coefficient of $3x + 1$	the constant term of $x^3 + 5x^2 - 3$

Short Response

65. Why is finding the degree of a polynomial simplified when the polynomial is written in standard form? **See back of book.**

Mixed Review

Lesson 5-8

Use the discriminant to find the number of real solutions.

- 66.** $3x^2 + x - 6 = 0$ **2** **67.** $5x^2 - 9 = 0$ **2** **68.** $-x^2 + 2x - 8 = 0$
none

Lesson 5-3

69. Graph $f(x) = 3x^2 - 1$. Translate the graph right five units and down two units. What is the vertex of the new graph? **See back of book.**

Lesson 4-4

Each matrix represents the vertices of a polygon. Translate each figure 3 units left and 2 units down. Express your answer as a matrix. **70-72. See back of book.**

- 70.** $\begin{bmatrix} 4 & 0 & 4 & 8 \\ -6 & -1 & 2 & -1 \end{bmatrix}$ **71.** $\begin{bmatrix} 5 & 0 & -3 \\ 7 & 0 & 2 \end{bmatrix}$ **72.** $\begin{bmatrix} 1 & 2 & 1 & 2 \\ -1 & -1 & -2 & -2 \end{bmatrix}$

Lesson 6-1 Polynomial Functions 305

- $-c^2 + 16$; binomial
- $-9d^3 - 13$; binomial
- $16x^2 - x - 5$; trinomial
- $2x^3 - 6x + 17$; trinomial

- 37.** $a + 4b$; binomial
- 38.** $-12y$; monomial
- 39.** $8x^2 - 6y$; binomial
- 40.** $-3a + 2$; binomial

- 41.** $2x^3 + 9x^2 + 5x + 27$; polynomial of 4 terms
- 42.** $-4x^4 - 3x^3 + 5x - 54$; polynomial of 4 terms
- 43.** $80x^3 - 109x^2 + 7x - 75$; polynomial of 4 terms

Resources

- For additional practice with a variety of test item formats:
- FCAT Practice, p. 357
 - FCAT Strategies, p. 352
 - FCAT Daily Practice and Strategies Transparencies

Error Prevention

Exercise 64 Tell students to read carefully. Exercises 62 and 63 compare the degree in each column. Exercise 64 compares the leading coefficient to the constant term.

- 44.** $2x^3 - 2x^2 + 8x - 27$; polynomial of 4 terms
- 45.** $10a^2 - 3ab + 10$; trinomial
- 46.** $8x^3 + 2x^2$; binomial
- 47.** $30x^3 - 10x^2$; binomial
- 48.** $2a^3 - 5a^2 - 2a + 5$; polynomial of 4 terms
- 49.** $b^3 - 6b^2 + 9b$; trinomial
- 50.** $x^3 - 6x^2 + 12x - 8$; polynomial of 4 terms
- 51.** $x^4 + 2x^2 + 1$; trinomial
- 52.** $8x^3 + 60x^2 + 150x + 126$; polynomial of 4 terms
- 53.** $a^3 - a^2b - b^2a + b^3$; polynomial of 4 terms
- 54.** $a^4 - 4a^3 + 6a^2 - 4a + 1$; polynomial of 5 terms
- 55.** $12s^3 + 61s^2 + 68s - 21$; polynomial of 4 terms
- 56.** $x^3 + 2x^2 - x - 4$; trinomial
- 57.** $8c^3 - 26c + 12$; trinomial
- 58.** $s^4 - 2t^2s^2 + 4$; trinomial
- 59a.** $y = 0.7166x + 47.61$
 $y = 0.0009365x^3 - 0.07442x^2 + 2.293x + 41.41$
 $y = -0.00004789x^4 + 0.004666x^3 - 0.1647x^2 + 2.980x + 40.78$