

5-1 Practice

Polynomial Functions

Form K

Write each polynomial in standard form. Then classify it by degree and by number of terms.

1. $4x^3 - 3 + 2x^2$

To start, write the terms of the polynomial with their degrees in descending order.

$4x^3 + 2x^2 - 3$

2. $8 - x^5 + 9x^2 - 2x$

3. $6x + 2x^4 - 2$

4. $-6x^3$

5. $3 + 24x^2$

Determine the end behavior of the graph of each polynomial function.

6. $y = 5x^3 - 2x^2 + 1$

7. $y = 5 - x + 4x^2$

8. $y = x - x^2 + 10$

9. $y = 3x^2 + 9 - x^3$

10. $y = 8x^2 - 4x^4 + 5x^7 - 2$

11. $y = 20 - x^5$

12. $y = 1 + 2x + 4x^3 - 8x^4$

13. $y = 15 - 5x^6 + 2x - 22x^3$

14. $y = 3x + 10 + 8x^4 - x^2$

Describe the shape of the graph of each cubic function by determining the end behavior and number of turning points.

15. $y = x^3 + 2x$

To start, make a table of values to help you sketch the middle part of the graph.

x	y
-2	-12
-1	-3
0	0
1	3
2	12

16. $y = -3x^3 + 4x^2 - 1$

17. $y = 4x^3 + 2x^2 - x$

Determine the degree of the polynomial function with the given data.

18.

x	y
-3	-43
-2	-10
-1	1
0	2
1	5
2	22
3	65

19.

x	y
-3	65
-2	5
-1	-5
0	-1
1	5
2	25
3	95

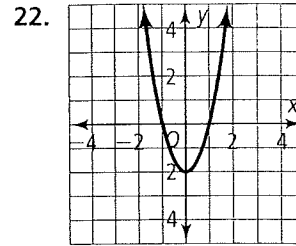
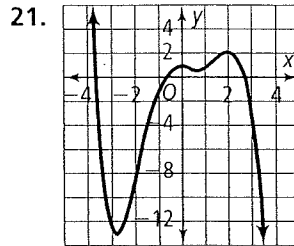
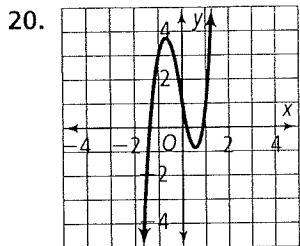
5-1

Practice (continued)

Form K

Polynomial Functions

Determine the sign of the leading coefficient and the degree of the polynomial function for each graph.



23. **Error Analysis** A student claims the function $y = -2x^3 + 5x - 7$ is a 3rd degree polynomial with ending behavior of down and up. Describe the error the student made. What is wrong with this statement?

24. The table to the right shows data representing a polynomial function.

- What is the degree of the polynomial function?
- What are the second differences of the y -values?
- What are the differences when they are constant?

x	y
-3	98
-2	20
-1	6
0	2
1	2
2	48
3	230

Classify each polynomial by degree and by number of terms. Simplify first if necessary.

25. $3x^5 - 6x^2 - 5 + x^2$

26. $a - 2a + 3a^2$

27. $(5x^2 + 2x - 8) + (5x^2 - 4x)$

28. $c^3(5 - c^2)$

29. $(5s^3 - 2s^2) - (s^4 + 1)$

30. $x(3x)(x + 2)$

31. $(2s - 1)(3s + 3)$

32. 5

33. **Open-Ended** Write a fourth-degree polynomial function. Make a table of values and a graph.

5-2

Practice

Form K

Polynomials, Linear Factors, and Zeros

Write each polynomial in factored form. Check by multiplication.

1. $x^3 + 11x^2 + 30x$

To start, factor out the GCF, x .

$x(x^2 + 11x + 30)$

2. $x^3 - 3x^2 - x + 3$

3. $x^2 - 4x - 12$

4. $x^3 - 81x$

5. $x^3 + 9x^2 + 18x$

Find the zeros of each function. Then graph the function.

6. $y = (x + 2)(x + 3)$

7. $y = x(x - 1)(x + 3)$

8. $y = (x - 4)(x - 1)$

9. $y = x(x - 5)(x + 2)$

Write a polynomial function in standard form with the given zeros.

10. $x = -2, 1, 4$

To start, write a linear factor for each zero.

$(x - (-2))(x - 1)(x - 4)$

Simplify

$(x + 2)(x - 1)(x - 4)$

11. $x = 3, 0$

12. $3, -8, 0$

13. $x = 3, -2, 1$

14. $x = -4, 1$

5-2 Practice (continued)

Polynomials, Linear Factors, and Zeros

Form K

Find the zeros of each function. State the multiplicity of multiple zeros.

15. $y = (x - 3)^2(x + 1)$

To start, identify the zeros.

The zeros are 3 and -1 .

16. $y = x^2 + 3x + 2$

17. $y = (x + 5)^2$

18. $y = (x - 9)^2$

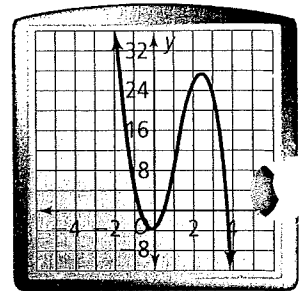
19. $y = 2x^2 - 2x$

Find the relative maximum and relative minimum of the graph of each function.

20. $f(x) = -3x^3 + 10x^2 + 6x - 3$

To start, use a graphing calculator.

(An approximate viewing window is

 $-5 \leq x \leq 5$ and $-10 \leq y \leq 30$.)

21. $f(x) = x^3 + 4x^2 - x + 1$

22. $f(x) = x^3 - 6x + 9$

23. **Reasoning** A polynomial function has a zero at $x = b$. Find one of its factors.

24. The side of a cube measures $2x + 1$ units long. Express the volume of the cube as a polynomial.

25. The length of a box is 2 times the height. The sum of the length, width, and height of the box is 10 centimeters.
- Write expressions for the dimensions of the box.
 - Write a polynomial function for the volume of the box. (To start, write the function in factored form).
 - Find the maximum volume of the box and the dimensions of the box that generates this volume.