

## 5-2

## Practice

Form G

## Polynomials, Linear Factors, and Zeros

Write each polynomial in factored form. Check by multiplication.

1.  $2x^3 + 10x^2 + 12x$

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

3.  $-3x^3 + 18x^2 - 27x$

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

5.  $x^3 + 7x^2 + 15x + 9$

6.  $2x^4 + 23x^3 + 60x^2 - 125x - 500$

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

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

8.  $y = (x + 2)(x - 3)$

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

10.  $y = (x - 6)(x + 3)$

11.  $y = (x + 4)^2(x + 1)$

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

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

13.  $x = -1, 3, 4$

14.  $x = 1, 1, 2$

15.  $x = -3, 0, 0, 5$

16.  $x = 4, 2, -3, 0$

17.  $x = -1, 5, -2$

18.  $x = -6, 0$

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

19.  $y = (x - 5)^3$

20.  $y = x(x - 8)^2$

21.  $y = (x - 2)(x + 7)^3$

22.  $y = x^4 - 8x^3 + 16x^2$

23.  $y = 9x^3 - 81x$

24.  $y = (2x + 5)(x - 3)^2$

## 5-2

## Practice (continued)

Form G

## Polynomials, Linear Factors, and Zeros

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

25.  $f(x) = x^3 - 7x^2 + 10x$

26.  $f(x) = x^3 - x^2 - 9x + 9$

27.  $f(x) = x^4 + x^3 - 3x^2 - 5x - 2$

28.  $f(x) = x^2 - 6x + 9$

29. A rectangular box has a square base. The combined length of a side of the square base, and the height is 20 in. Let  $x$  be the length of a side of the base of the box.

- Write a polynomial function in factored form modeling the volume  $V$  of the box.
- What is the maximum possible volume of the box?

30. **Reasoning** A polynomial function has a zero at  $x = -2a$ . Find one of its factors.

31. The side of a cube measures  $3x + 2$  units long. Express the volume of the cube as a polynomial.

32. **Writing** The volume of a box is  $x^3 - 3x^2 + 3x - 1$  cubic units. Explain how to find the length of a side if the box is a cube.

33. You have a block of wood that you want to use to make a sculpture. The block is currently  $3x$  units wide,  $4x$  units high, and  $5x$  units deep. You need to remove 1 unit from each dimension before you can begin your sculpture.

- What is the original volume of the block?
- What is the new volume of the block?
- What is the volume of the wood that you remove?

34. What are the zeros and the multiplicity of each zero for the polynomial function  $x^4 - 2x^2 + 1$ ?

35. **Error Analysis** On your homework, you wrote that the polynomial function from the given zeros  $x = 3, 0, -9, 1$  is  $y = x^4 + 5x^3 - 33x^2 + 27x$ . Your friend wrote that the polynomial function is  $y = x^3 + 5x^2 - 33x + 27$ . Who is correct? What mistake was made?