

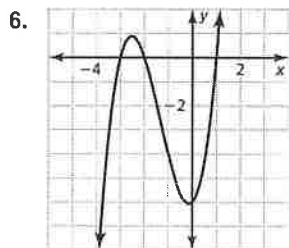
# Answers

## 4.3 Extra Practice

- $x + 9 + \frac{39}{x-3}$
- $x - 4 + \frac{16x-64}{x^2-16}$
- $x^2 + 3x + 6$
- $x^2 + 3x + 8 + \frac{11x}{x^2-x}$
- $x - 8 - \frac{14}{x-2}$
- $x^2 + 2x + 2$
- $2x^2 - 6x + 18 - \frac{108}{x+3}$
- $2x^3 - 3x^2 - x + \frac{4}{x-4}$
- A;  $(4)^2 - (4) - 8 = 4$  so the remainder must be 4.
- D;  $(4)^2 - (4) + 8 = 20$  so the remainder must be 20.
- B;  $(4)^2 + (4) - 8 = 12$  so the remainder must be 12.
- C;  $(4)^2 + (4) + 8 = 28$  so the remainder must be 28.
- $f(2) = -48$
- $f(-1) = 4$
- $f(-5) = -560$
- $f(3) = 78$
- $k = 46$

## 4.3 Review & Refresh

- $x = 7$
- $x = \pm 5i$
- $f(-2) = -15$
- $y = \frac{1}{3}(x+1)^2 - 2$
- $k = 2$



- $2x^2 - 2x + 2 + \frac{-5x+7}{x^2+x-3}$
- $x = 9$
- $x = -4$
- $\frac{1}{4}$ , or 25%
- $2x^2\sqrt{10x}$
- $\frac{\sqrt{5}}{8}$
- $-2\sqrt{3}$

14. at least 10 yd and at most 90 yd

## 4.4 Extra Practice

- $20x(x-6)(x-5)$
- $m(m+3)(m-3)(m^2+9)$
- $(3a+2b)(9a^2-6ab+4b^2)$
- $t^3(5t+2)(t+1)(t-1)$
- $(y+4)(y-4)(y^2+3)$
- $5(p-1)(p^2+1)$
- $10(3k+2)(3k-2)(9k^2+4)$
- $(a^2+1)(a^2+a+1)(a-1)$
- $2x^4(x-7)(x+3)$
- $(5z^2-6)(z+1)$
- $2(2x-5)(3x+2)$
- $3m^2(1-2m)(1+2m)(1+4m^2)$
- $x(2x-1)^2$
- $5m^2(m-7)^2$
- $$-1 \begin{array}{|c|c|c|c|} \hline 1 & 0 & -13 & -12 \\ \hline & -1 & 1 & 12 \\ \hline 1 & -1 & -12 & 0 \\ \hline \end{array}$$

$$f(x) = (x+1)(x-4)(x+3)$$
- $$2 \begin{array}{|c|c|c|c|} \hline 6 & 8 & -34 & -12 \\ \hline & 12 & 40 & 12 \\ \hline 6 & 20 & 6 & 0 \\ \hline \end{array}$$

$$f(x) = 2(x-2)(x+3)(3x+1)$$

# Answers

$$17. \begin{array}{r|rrrr} 5 & 2 & -12 & 6 & 20 & 0 \\ & & 10 & -10 & -20 & 0 \\ \hline & 2 & -2 & -4 & 0 & 0 \end{array}$$

$$f(x) = 2x(x-5)(x-2)(x+1)$$

18. a.  $(a+b)(a-b)(5c-3d)$

b.  $(x^n + 3)^2$

19.  $k = 9$

$$6 \begin{array}{r|rrrr} 3 & -17 & -9 & 18 \\ & 18 & 6 & -18 \\ \hline & 3 & 1 & -3 & 0 \end{array}$$

## 4.4 Review & Refresh

1.  $x = 1$  and  $x = -1$ ; Explanations will vary.

2.  $x = \frac{1}{4}$  and  $x = 7$ ; Explanations will vary.

3.  $x = -3 \pm \sqrt{26}$ ; Explanations will vary.

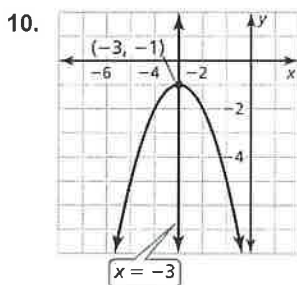
4.  $x = \frac{3 \pm \sqrt{17}}{4}$ ; Explanations will vary.

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

6. The area is  $3x^2 - 7x + 2$  and the perimeter is  $8x - 10$ .

7.  $(z+3)(z-3)(z-4)$     8.  $(9b^2 - 5)(9b^2 + 5)$

9. exponential growth function; The common factor is  $\frac{3}{2}$ .



11. yes;  $y = 15x + 88$ ; 448; You have \$448 in your savings account after 24 months.

## 4.5 Extra Practice

1.  $r = 0$ ,  $r = \frac{1}{6}$ , and  $r = -\frac{1}{6}$

2.  $x = 0$ ,  $x = -1$ , and  $x = -3$

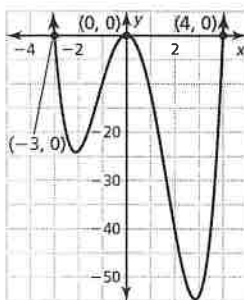
3.  $m = 0$ ,  $m = \frac{1}{5}$ , and  $m = -\frac{1}{5}$

4.  $y = 3$ ,  $y = -3$ ,  $y = -2$ , and  $y = 2$

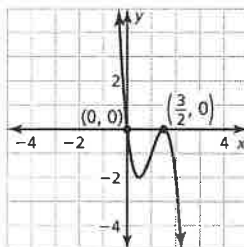
5.  $x = \frac{1}{2}$ ,  $x = -1$ , and  $x = 1$

6.  $c = \frac{5}{2}$  and  $c = -\frac{5}{2}$

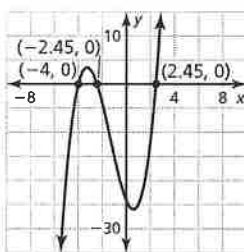
7.  $x = 0$ ,  $x = -3$ , and  $x = 4$



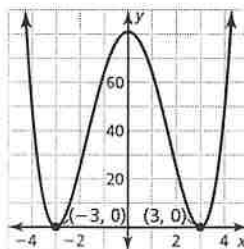
8.  $x = 0$  and  $x = \frac{3}{2}$



9.  $x = -4$ ,  $x = \sqrt{6}$ , and  $x = -\sqrt{6}$



10.  $x = -3$  and  $x = 3$



# Answers

11.  $x = -4, x = 3,$  and  $x = 9$

12.  $-4, -\sqrt{12}, \frac{1}{3}, \sqrt{12}$

13.  $g(x) = x^3 - 3x^2 - 26x + 70$

14.  $3, -\frac{1}{2}, 2$  or  $-\frac{1}{2}, 3, 2$

## 4.5 Review & Refresh

1.  $9b^2 - 16$                       2.  $36x^2 + 12x + 1$

3.  $512p^3 - 384p^2 + 96p - 8$

4.  $m^3n^3 + 27m^2n^2 + 243mn + 729$

5.  $x^3 - 7x^2 + 4x - 9$

6. linear function; The graph of  $f$  is a vertical translation 1 unit down of the parent linear function.

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

8.  $f(x) = \left(x + \frac{5}{2}\right)^2 + \frac{3}{4}$ ; vertex:  $\left(-\frac{5}{2}, \frac{3}{4}\right)$

9.  $-5, -3,$  and  $6$                       10.  $\frac{1}{8}$  and  $\frac{7}{3}$

11.  $x = \pm\sqrt{2}$                               12.  $x = \pm 3i$

13.  $x = \pm i\sqrt{5}$                               14.  $x = 5 \pm \sqrt{14}$

15. 2 million headphones

## 4.6 Extra Practice

1.  $3; -\frac{1}{2}, 3 - \sqrt{7},$  and  $3 + \sqrt{7}$

2.  $4; -3, 2, 3i,$  and  $-3i$

3.  $-2, 3, 1 - 3i,$  and  $1 + 3i$

4.  $-5, 4 - 3i,$  and  $4 + 3i$

5.  $-7, 7, i,$  and  $-i$

6.  $-\frac{1}{5}, 1 - i\sqrt{3},$  and  $1 + i\sqrt{3}$

7. 2; The graph shows 1 real zero, so the remaining zeros must be imaginary.

8. 0; The graph shows 4 real zeros, so all of the zeros are real.

9.  $f(x) = x^3 - 4x^2 - 25x + 28$

10.  $f(x) = x^3 - 10x^2 - 5x + 50$

11.  $f(x) = x^4 - 11x^3 + 25x^2 - 11x + 24$

12.  $f(x) = x^5 - 8x^4 + 31x^3 - 60x^2 + 26x$

13.

Positive real zeros	Negative real zeros	Imaginary zeros	Total zeros
2	1	2	5
0	1	4	5

14.

Positive real zeros	Negative real zeros	Imaginary zeros	Total zeros
3	3	0	6
3	1	2	6
1	3	2	6
1	1	4	6

15. real; The function has degree 4, so it must have four solutions. Because imaginary solutions come in conjugate pairs, there must be an even number of imaginary solutions. Given that one of the first three zeros is real and two of the first three zeros are imaginary, the fourth must be real.

## 4.6 Review & Refresh

1. D; The function has zeros at  $-2, 0,$  and  $1.$

2. B; The function has zeros at  $-2, 1,$  and  $3.$

3. A; The function has zeros at  $-1, 0,$  and  $2.$

4. C; The function has zeros at  $-3, -1,$  and  $2.$

5.  $1\frac{2}{3}$  cups of Solution A and  $3\frac{1}{3}$  cups of Solution B

6.  $g(x) = -(x + 5)^2 - 9$