

# Algebra I CP – Final Exam Review 2019

## Chapter 8: Exponents

1. Write  $(\sqrt[3]{x})^5$  in rational exponent notation.

2. Write  $y^{\frac{7}{2}}$  in radical notation.

**Simplify the expression.**

3.  $100^{\frac{3}{2}}$

4.  $121^{\frac{-1}{2}}$

5.  $216^{\frac{2}{3}}$

6.  $27^{\frac{1}{3}}$

7.  $6^{\frac{1}{2}} \cdot 6^{\frac{3}{2}}$

8.  $\frac{8^{\frac{1}{2}}}{8^{\frac{1}{6}}}$

**Simplify.**

9.  $(3x^3y^2)(-5x^4y^6)$

10.  $(2y^2z^3)^4$

11.  $a^3 \cdot a^6$

12.  $(-5a^2b)(3a^4)$

13.  $(2ab^2c^3)^4$

14.  $(x^4)^3$

15.  $(3p^3)^2 + 6p - (-2p^2)^3$

16.  $(5m^3)^3 + (6m)^2$

17.  $(12y)^2 + 7x^2y - 8y^2 + (11y)x^2$

18.  $(x^4)(x^3)$

19.  $y^{-3} \cdot y^3$

20.  $\frac{x^5}{x^3}$

21.  $\frac{10a^{10}b^5}{2a^{11}b^2}$

22.  $\frac{64x^4y^{-3}z^{-1}}{16x^{-2}yz^3}$

23.  $\left(\frac{3x^2 \cdot 5x}{5x}\right)^0$

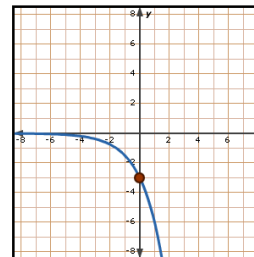
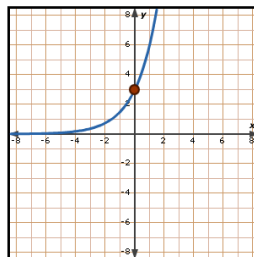
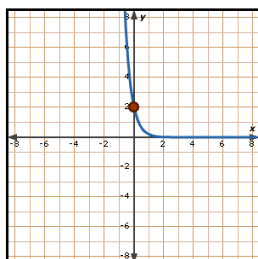
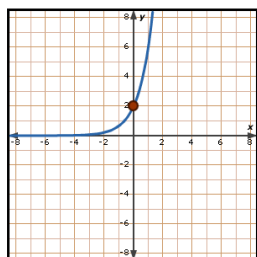
24.  $\frac{15x^3y^2z^4}{10x^4y^4z^2}$

25.  $\frac{3y^3}{5} \cdot \left(\frac{10x^7}{9y^8}\right)^2$

26.  $\left(\frac{3x^5}{10y^2}\right)^3 \cdot \frac{5}{x^4}$

27.  $\frac{-3a^{-4}b^7}{21a^2b^7c^{-5}}$

28. Identify each picture as growth or decay. Then identify the graph of  $y = 3 \cdot 2^x$ .



Write a rule for the following functions.

29.

<b>x</b>	-2	-1	0	1	2
<b>y</b>	$-\frac{1}{16}$	$-\frac{1}{4}$	-1	-4	-16

30.

<b>x</b>	-2	-1	0	1	2
<b>y</b>	25	5	1	$\frac{1}{5}$	$\frac{1}{25}$

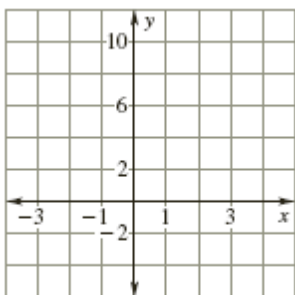
Circle whether the function represents exponential growth or decay. Graph the function. Identify its domain and range.

31.  $y = 2 \cdot \left(\frac{1}{5}\right)^x$  Growth/Decay

32.  $y = -3 \cdot 6^x$  Growth/Decay

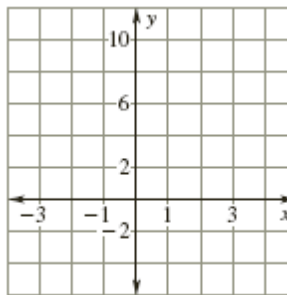
	-2	-1	0	1	2

	-2	-1	0	1	2



D: \_\_\_\_\_

R: \_\_\_\_\_



D: \_\_\_\_\_

R: \_\_\_\_\_

**CHAPTER 8 ANSWERS**

1.  $x^{\frac{5}{3}}$     2.  $(\sqrt{y})^7$  or  $\sqrt{y^7}$     3.  $(\sqrt{100})^3 = 1000$     4.  $\frac{1}{\sqrt{121}} = \frac{1}{11}$     5.  $(\sqrt[3]{216})^2 = 36$     6.  $\sqrt[3]{27} = 3$
7.  $6^2 = 36$     8.  $8^{\frac{1}{3}} = 2$     9.  $-15x^7y^8$     10.  $16y^8z^{12}$     11.  $a^9$     12.  $-15a^6b$
13.  $16a^4b^8c^{12}$     14.  $x^{12}$     15.  $17p^6 + 6p$     16.  $125m^9 + 36m^2$     17.  $136y^2 + 18x^2y$     18.  $x^7$
19. 1    20.  $x^2$     21.  $\frac{5b^3}{a}$     22.  $\frac{4x^6}{y^4z^4}$     23. 1    24.  $\frac{3z^2}{2xy^2}$
25.  $\frac{20x^{14}}{27y^{13}}$     26.  $\frac{27x^{11}}{200y^6}$     27.  $\frac{-c^5}{7a^6}$     28. G, D, G, G    29.  $y = -1 \cdot (4)^x$     30.  $y = 1 \cdot \left(\frac{1}{5}\right)^x$

31. Decay, D: all reals, R:  $y > 0$

32. Growth, D: all reals, R:  $y < 0$

	-2	-1	0	1	2
	50	10	2	0.4	.08

	-2	-1	0	1	2
	-.083	-.5	-3	-18	-108

# Chapter 9: Factoring

**Use this polynomial to answer #1:**  $3x - 4x^5 - 12 + 5x^3$

- (a) Is the polynomial in order? If not, put it in order.  
(b) What is the leading coefficient of the polynomial?  
(c) What is the degree of the polynomial?

**Simplify.**

2.  $(h^2 + 4h - 4) + (5h^2 - 8h + 2)$       3.  $(9b^3 - 13b^2 + b) - (-13b^3 - 5b + 14)$       4.  $(5x^2 - x - 7) + (2x^2 + 3x + 4)$

5.  $(5x^2 + 16x - 9) - (3x^2 - 4x + 1)$       6.  $z^2(4z^4 + z^3 - 11z^2 - 6)$       7.  $-10pq(3pq + 4p - 5q^2)$

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

9.  $(a - 6)^2$

10.  $(2x - y)(2x + y)$

11.  $(7y - 4)(2y + 5)$

12.  $(2x - 4)(x + 2)$

13.  $(3y - 5)^2$

14.  $3(x + 4)^2$

15.  $(3k - 1)(4k + 9)$

16.  $(5x - 9)(3x - 4)$

**Factor completely.**

17.  $8a^2b^3 + 10ab^2$

18.  $20xy - 100x^2y^2$

19.  $y^2 - 64$

20.  $2x^2 - 200$

21.  $x^2 - 5x + 6$

22.  $9x^2 - 30x + 25$

23.  $16x^2 + 8x + 1$

24.  $2x^2 - 4x + 18$

25.  $6a^2 - 10a - 4$

26.  $a^2 - 12a + 27$

27.  $-2h^2 + 5h + 3$

28.  $y^3 + y - 9y^2 - 9$

29.  $5n^3 - 4n^2 + 25n - 20$

**Solve the equation by factoring.**

30.  $(3x - 2)(x + 5) = 0$

31.  $x^2 - 10x + 21 = 0$

32.  $x^2 - 5x = 14$

33.  $3a^2 = 4a$

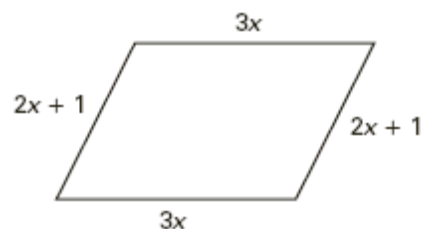
34.  $m^2 + 22m = -23m$

35.  $s(s - 1) = 72$

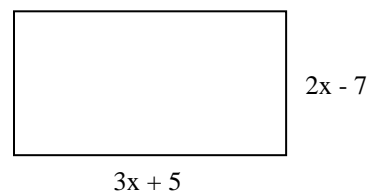
36. Find the zeros of the function:  $f(x) = 3x^3 + 18x^2 + 24x$

37. Find the zeros of the function:  $f(x) = x^3 + 6x^2 - 4x - 24$

38. Find a polynomial that represents the PERIMETER of the figure.



39. Find a polynomial that represents the AREA of the figure.



**CHAPTER 9 ANSWERS**

1.  $-4x^5 + 5x^3 + 3x - 12$   
LC: -4, Deg: 5

2.  $6h^2 - 4h - 2$

3.  $22b^3 - 13b^2 + 6b - 14$

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

5.  $2x^2 + 20x - 10$

6.  $4z^6 + z^5 - 11z^4 - 6z^2$

7.  $-30p^2q^2 - 40p^2q + 50pq^3$

8.  $x^2 - x - 6$

9.  $a^2 - 12a + 36$

10.  $4x^2 - y^2$

11.  $14y^2 + 27y - 20$

12.  $2x^2 - 8$

13.  $9y^2 - 30y + 25$

14.  $3x^2 + 24x + 48$

15.  $12k^2 + 23k - 9$

16.  $15x^2 - 47x + 36$

17.  $2ab^2(4ab + 5)$

18.  $20xy(1 - 5xy)$

19.  $(y + 8)(y - 8)$

20.  $2(x + 10)(x - 10)$

21.  $(x - 3)(x - 2)$

22.  $(3x - 5)^2$

23.  $(4x + 1)^2$

24.  $2(x^2 - 2x + 9)$

25.  $2(3a + 1)(a - 2)$

26.  $(a - 3)(a - 9)$

27.  $-(2h + 1)(h - 3)$

28.  $(y^2 + 1)(y - 9)$

29.  $(n^2 + 5)(5n - 4)$

30.  $x = \frac{2}{3}, -5$

31.  $x = 7, 3$

32.  $x = 7, -2$

33.  $a = \frac{4}{3}, 0$

34.  $m = 0, -45$

35.  $s = -8, 9$

36.  $x = 0, -4, -2$

37.  $x = 2, -2, -6$

38.  $10x + 2$

39.  $6x^2 - 11x - 35$

# Chapter 10: Quadratics

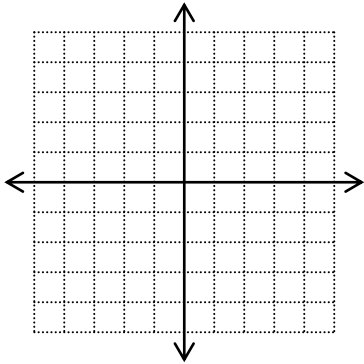
Graph each parabola and the parent graph  $y = x^2$  together on the same graph and compare them.

**Parent:**  $y = x^2$

x					
y					

1.  $y = -2x^2$

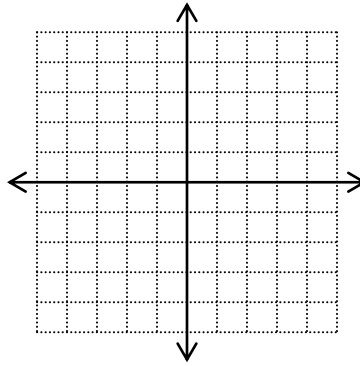
x					
y					



Compare: \_\_\_\_\_

2.  $y = \frac{3}{8}x^2$

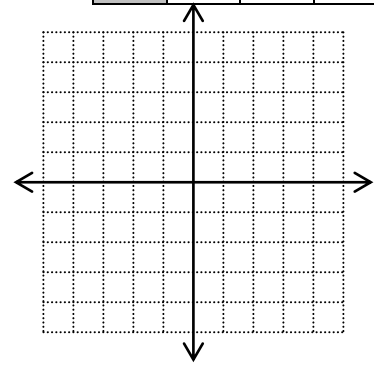
x					
y					



Compare: \_\_\_\_\_

3.  $y = x^2 - 5$

x					
y					



Compare: \_\_\_\_\_

**Fill in the missing information and graph.**

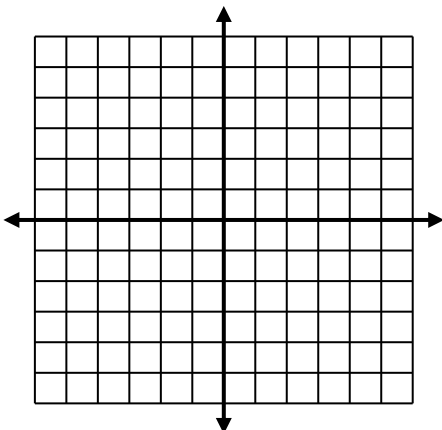
4.  $y = x^2 - 2x + 3$

Axis of Symmetry: \_\_\_\_\_

Vertex: (\_\_\_\_, \_\_\_\_)

Max or Min Value: \_\_\_\_\_

x					
y					



Solution(s): \_\_\_\_\_

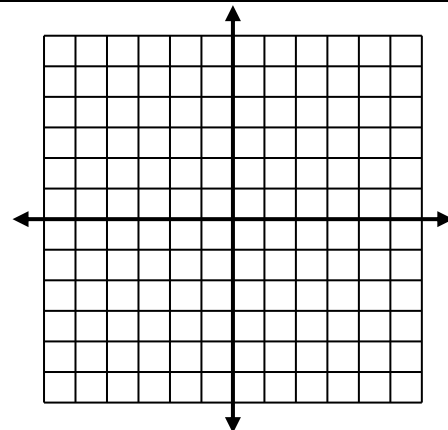
5.  $y = x^2 + 6x + 8$

Axis of Symmetry: \_\_\_\_\_

Vertex: (\_\_\_\_, \_\_\_\_)

Max or Min Value: \_\_\_\_\_

x					
y					



Solution(s): \_\_\_\_\_

Solve the following equations using the square root property.

6.  $x^2 + 6 = 13$

7.  $14 - x^2 = 17$

8.  $6(x + 8)^2 = 18$

Given the following equations, find the solutions/roots/zeros by completing the square.

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

10.  $c^2 - 14c = 15$

11.  $x^2 - 8x = 9$

Use complete the square to convert the quadratic to vertex form:  $y = a(x - h)^2 + k$ .  
Identify the vertex and axis of symmetry.

12.  $y = x^2 + 8x + 15$

13.  $y = x^2 - 12x + 36$

14.  $y = x^2 - 2x - 3$

Axis of Symmetry: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

Vertex: (\_\_\_\_, \_\_\_\_)

Vertex: (\_\_\_\_, \_\_\_\_)

Vertex: (\_\_\_\_, \_\_\_\_)

Given the following equations: a) Find the value of the Discriminant; b) Tell whether the equation has two real solutions, one real solution, or no real solutions.

15.  $3x^2 + 6x + 2 = 0$

16.  $x^2 + 1 = 2x$

17.  $2x^2 + 3x + 5 = 0$

A) \_\_\_\_\_

A) \_\_\_\_\_

A) \_\_\_\_\_

B) \_\_\_\_\_

B) \_\_\_\_\_

B) \_\_\_\_\_



Solve the following equations by using the quadratic formula.

18.  $5x^2 + 2x - 3 = 0$

19.  $2x^2 - 3x = -5$

20.  $x^2 + 6x - 10 = 0$

By which type of function can the data in the table be modeled: linear, exponential or quadratic?

21.

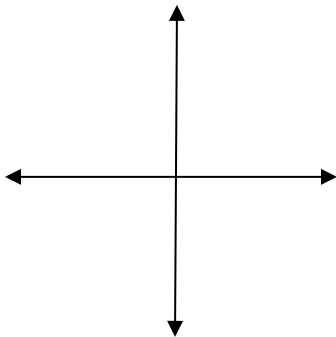
x	-3	-2	-1	0	1
y	13.5	6	1.5	0	1.5

22.

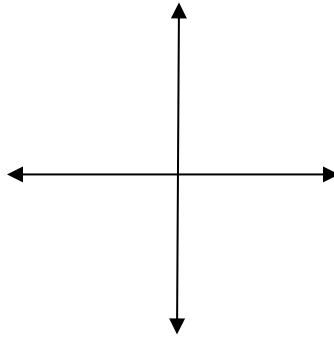
x	-2	-1	0	1	2
y	1	2	4	8	16

23. Draw the graph of a parabola which has:

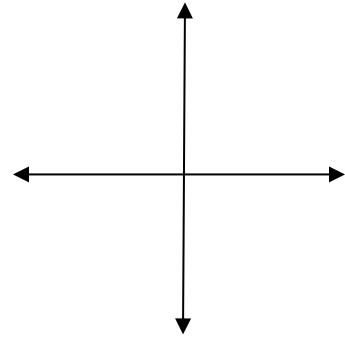
a) No real roots



b) One real root



c) Two real roots



Solve the quadratic using any method.

24.  $x^2 - 14x = 0$

25.  $-5x^2 + x - 13 = 0$

26.  $9x^2 - 16 = 0$

27. The length of Rachel's rectangular garden is 6 yards more than its width. The area of the garden is 91 square yards. What are the dimensions of the garden?

Tell whether the table represents a linear, exponential, or quadratic function.

28.

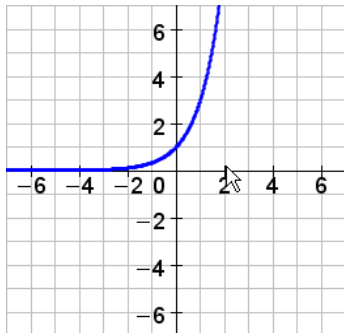
x	0	1	2	3	4
y	-3	-1	1	3	5

29.

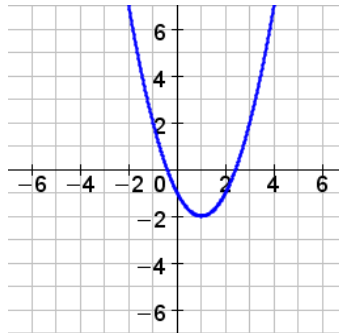
x	-2	-1	0	1	2
y	80	40	20	10	5

Tell whether the graph represents a linear, exponential, or quadratic function.

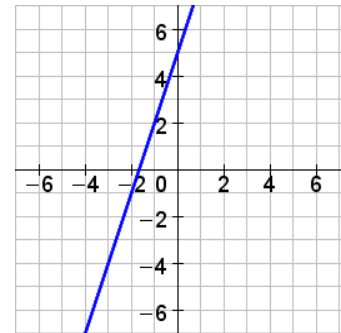
30.



31.



32.



**CHAPTER 10 ANSWERS**

1. reflection and vertical stretch    2. vertical shrink    3. translated down 5

4. a. o. s:  $x = 1$ , vertex:  $(1, 2)$ , min value: 2, solutions: none

x	-1	0	1	2	3
y	6	3	2	3	6

5. a.o.s:  $x = -3$ , vertex:  $(-3, -1)$ , min value: -1, solutions: -2, -4

x	-5	-4	-3	-2	-1
y	3	0	-1	0	3

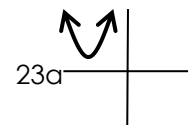
6.  $x = \pm\sqrt{7}$     7. no solution    8.  $x = -8 \pm \sqrt{3}$     9.  $x = 1, -3$

10.  $c = 15, -1$     11.  $x = 9, -1$     12.  $y = (x+4)^2 - 1$   
 a.o.s:  $x = -4$     13.  $y = (x-6)^2$   
 a.o.s:  $x = 6$     14.  $y = (x-1)^2 - 4$   
 vertex:  $(-4, -1)$     vertex:  $(6, 0)$     a.o.s:  $x = 1$   
 vertex:  $(1, -4)$

15. 12, 2 real    16. 0, 1 real    17. -31, no real    18.  $x = -1, 3/5$     19. no solution    20.  $x = \frac{-6 \pm \sqrt{76}}{2}$

21. quadratic – table is symmetric, second differences the same

22. exponential – y's multiplied by 2



- 23b.    23c.    24.  $x = 0, 14$     25. no solution    26.  $x = \pm \frac{4}{3}$     27. L = 13 yd; W = 7 yd.

28. Linear    29. Exponential    30. Exponential    31. Quadratic    32. Linear

# Chapter 11: Radicals

Graph and compare to the parent function:  $y = \sqrt{x}$

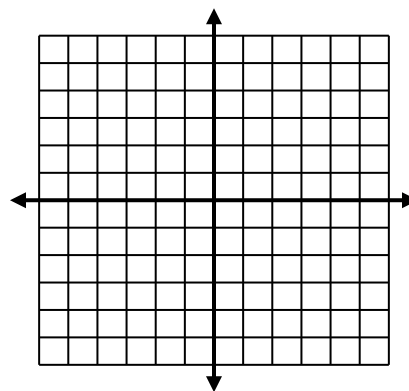
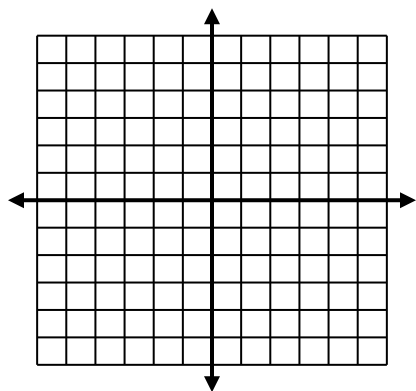
x	0	1	2	3	4
y	0	1	1.4	1.7	2

1.  $y = -2\sqrt{x+1}$

2.  $y = 2\sqrt{x} - 1$

x	-1	0	1	2
y				

x	0	1	2	3
y				



Compare to  $y = \sqrt{x}$ :

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Compare to  $y = \sqrt{x}$ :

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Simplify the following.**

3.  $\sqrt{200}$

4.  $\sqrt{25x^3}$

5.  $\sqrt{9a^6}$

6.  $\sqrt{64y^4}$

7.  $\sqrt{27c^5}$

8.  $\sqrt{32r^2s^4t^5}$

9.  $\sqrt{40x^4y^5z^3}$

10.  $\sqrt{3} \cdot \sqrt{18}$

11.  $7\sqrt{30} \cdot 2\sqrt{6}$

12.  $\sqrt{\frac{1}{25}}$

13.  $\sqrt{\frac{121}{49}}$

14.  $\sqrt{\frac{7}{100}}$

**Simplify the expression by rationalizing the denominator.**

15.  $\frac{4}{\sqrt{5}}$

16.  $\sqrt{\frac{1}{3}}$

17.  $\sqrt{\frac{5}{48}}$

18.  $\sqrt{\frac{8}{3n^3}}$

19.  $\frac{1}{\sqrt{5}}$

20.  $\sqrt{\frac{9}{75}}$

**Simplify the following expressions.**

21.  $3\sqrt{5} + \sqrt{5} - 3\sqrt{5}$

22.  $5\sqrt{18} + 2\sqrt{32}$

23.  $4\sqrt{6} + \sqrt{30} - 3\sqrt{24}$

24.  $\sqrt{7}(4 - \sqrt{7})$

25.  $(2 - \sqrt{6})^2$

26.  $(2 + \sqrt{5})(1 - 2\sqrt{3})$

**Solve the equation. Check for extraneous solutions.**

27.  $\sqrt{5x} - 4 = 16$

28.  $\sqrt{3x+8} = \sqrt{x+4}$

$$29. \sqrt{3x+4} = 4$$

$$30. \sqrt{5x-6} = x$$

**CHAPTER 11 ANSWERS**

1. 

	-1	0	1	2
	0	-2	-2.8	-3.5

 reflection, v. stretch, left 1
2. 

	0	1	2	3
	-1	1	1.8	2.5

 2. v. stretch, down 1
3.  $10\sqrt{2}$     4.  $5x\sqrt{x}$     5.  $3a^3$     6.  $8y^2$     7.  $3c^2\sqrt{3c}$     8.  $4rs^2t^2\sqrt{2t}$     9.  $2x^2y^2z\sqrt{10yz}$
10.  $3\sqrt{6}$     11.  $84\sqrt{5}$     12.  $\frac{1}{5}$     13.  $\frac{11}{7}$     14.  $\frac{\sqrt{7}}{10}$     15.  $\frac{4\sqrt{5}}{5}$     16.  $\frac{\sqrt{3}}{3}$
17.  $\frac{\sqrt{15}}{12}$     18.  $\frac{2\sqrt{6n}}{3n^2}$     19.  $\frac{\sqrt{5}}{5}$     20.  $\frac{\sqrt{3}}{5}$     21.  $\sqrt{5}$     22.  $23\sqrt{2}$     23.  $-2\sqrt{6} + \sqrt{30}$
24.  $4\sqrt{7}-7$     25.  $10-4\sqrt{6}$     26.  $2-4\sqrt{3}+\sqrt{5}-2\sqrt{15}$     27.  $x = 80$     28.  $x = -2$     29.  $x = 4$     30.  $x = 2,3$
35.  $\sqrt{37}$     36.  $4\sqrt{2}$

## Chapter 12: Rational Functions

**Identify the excluded values and simplify the expression.**

1.  $\frac{9x^3 - 18x^4}{3x^2}$

2.  $\frac{15m}{3m + 6m^2}$

3.  $\frac{6x^5}{48x^7}$

4.  $\frac{m+3}{m^2-9}$

$x \neq$  \_\_\_\_\_

$m \neq$  \_\_\_\_\_

$x \neq$  \_\_\_\_\_

$m \neq$  \_\_\_\_\_

**Find the product, then simplify.**

5.  $\frac{8}{x^2} \cdot \frac{x^4}{4x}$

6.  $\frac{x+3}{2x+8} \cdot \frac{x}{x^2+7x+12}$

7.  $\frac{3x-6}{x^2-x-2} \cdot (x^2+6x+5)$

**Find the quotient, then simplify.**

8.  $\frac{5x^2}{7} \div \frac{10x^3}{21}$

9.  $\frac{3x+12}{4x-18} \div \frac{2x+8}{x+4}$

10.  $\frac{x^2-25}{2x^2+12x+16} \div \frac{x^2+7x+10}{x^2-4}$

**Find the sum or difference.**

11.  $\frac{t}{4} + \frac{2t}{4}$

12.  $\frac{x+2}{5} - \frac{x-6}{5}$

13.  $\frac{5}{x-1} + \frac{x}{x-1}$

14.  $\frac{8x}{2x} + \frac{6}{2x}$

15.  $\frac{2}{x^2} - \frac{8}{x^2}$

16.  $\frac{3x+5}{x^3} - \frac{2x+5}{x^3}$

**Find the LCD for:**

17.  $\frac{3}{20a^2}$  and  $\frac{1}{24ab^3}$

18.  $\frac{11}{56x^3y}$  and  $\frac{10}{49ax^2}$

**Find the sum or difference.**

19.  $\frac{t}{3} + \frac{2t}{7}$

20.  $\frac{x+2}{3} + \frac{x-6}{5}$

21.  $\frac{5}{x-1} + \frac{x}{x-1}$

22.  $\frac{8x}{3} + \frac{1}{5x}$

23.  $\frac{2}{3x^2} - \frac{8}{5x}$

**CHAPTER 12 ANSWERS**

1.  $3x(1-2x), x \neq 0$

2.  $\frac{5}{1+2m}, x \neq 0, -\frac{1}{2}$

3.  $\frac{1}{8x^2}, x \neq 0$

4.  $\frac{1}{m-3}, x \neq -3, 3$

5.  $2x$

6.  $\frac{x}{2(x+4)^2}$

7.  $3(x+5)$

8.  $\frac{3}{2x}$

9.  $\frac{3(x+4)}{4(2x-9)}$

10.  $\frac{(x-5)(x-2)}{2(x+4)(x+2)}$

11.  $\frac{3t}{4}$

12.  $\frac{8}{5}$

13.  $\frac{x+5}{x-1}$

14.  $\frac{4x+3}{x}$

15.  $-\frac{6}{x^2}$

16.  $\frac{1}{x^2}$

17.  $120a^2b^3$

18.  $392ax^3y$

19.  $\frac{13t}{21}$

20.  $\frac{8x-8}{15}$

21.  $\frac{5+x}{x-1}$

22.  $\frac{40x^2+3}{15x}$

23.  $\frac{-24x+10}{15x^2}$