Chapter 3 Test Review Name Key

Perform the indicated operation.

Let $f(x)=x^{\frac{1}{2}}-3$ *and* $g(x)=x^{\frac{1}{2}}+5$.

Find the following. Simplify and give the domain when asked.

1. $g(9)-f(4)=$

$(9^{\frac{1}{2}}+5)-(4^{\frac{1}{2}}-3)$

$(3+5)-(2-3)$

$8-(-1)=9$

2. $g(f(16))=$

$g(16^{\frac{1}{2}}-3)$

$g(4-3)$

$g(1)=1^{\frac{1}{2}}+5=1+5$

6

3. $g(f(x))=$

$(x^{\frac{1}{2}}-3)^{\frac{1}{2}}+5$

$x\geq 9$

DOMAIN: $x\geq 9$

4. $f(x)+g(x)$

$(x^{\frac{1}{2}}-3)+(x^{\frac{1}{2}}+5)$

$2x^{\frac{1}{2}}+2$

DOMAIN: $x\geq 0$

5. $g(x)-f(x)$

$(x^{\frac{1}{2}}+5)-(x^{\frac{1}{2}}-3)$

8

DOMAIN: $x\geq 0$

6. $f(x)\cdot g(x)$

$(x^{\frac{1}{2}}-3)(x^{\frac{1}{2}}+5)$

$x+5x^{\frac{1}{2}}-3x^{\frac{1}{2}}-15$

$x+2x^{\frac{1}{2}}-15$

DOMAIN: $x\geq 0$

Let $f(x)=2x+1$ *and* $g(x)=x-7$. Find the following.

7. $g(2)-f(-3)=$

$(2-7)-(2(-3)+1)$

$(-5)-(-6+1)$

$-5-(-5)=0$

8. $g(f(-2))=$

$g(2\cdot -2+1)$

$g(-3)=-3-7$

-10

9. $g(f(x))=$

$(2x+1)-7$

$2x+1-7=2x-6$

DOMAIN: $\mathbb{R}$

10. $f(x)+g(x)$

$(2x+1)+(x-7)$

$3x-6$

DOMAIN: $\mathbb{R}$

11. $g(x)-f(x)$

$(x-7)-(2x+1)$

$-x-8$

DOMAIN: $\mathbb{R}$

12. $f(x)\cdot g(x)$

$(2x+1)(x-7)$

$2x^2-13x-7$

DOMAIN: $\mathbb{R}$

13. Find the inverse function.

$f(x) = -3x^3 - 2$

$x = -3y^3 - 2$

$+2 \quad +2$

$x + 2 = -3y^3$

$\frac{x+2}{-3} = \frac{-3y^3}{-3}$

$\sqrt[3]{y^3} = \sqrt[3]{\frac{x+2}{-3}}$

$f^{-1}(x) = \sqrt[3]{\frac{x+2}{-3}}$

14. Find the inverse function.

$f(x) = x^3 + 7$

$x = y^3 + 7$

$-7 \quad -7$

$\sqrt[3]{x-7} = \sqrt[3]{y^3}$

$f^{-1}(x) = \sqrt[3]{x-7}$

15. Find the inverse function.

$f(x) = x^3 - 9$

$x = y^3 - 9$

$+9 \quad +9$

$\sqrt[3]{x+9} = \sqrt[3]{y^3}$

$f^{-1}(x) = \sqrt[3]{x+9}$

16. Find the inverse function.

$f(x) = 2x - 2$

$x = 2y - 2$

$+2 \quad +2$

$\frac{x+2}{2} = \frac{2y}{2}$

$f^{-1}(x) = \frac{x+2}{2}$

17. Find the inverse function.

$f(x) = -5x - 7$

$x = -5y - 7$

$+7 \quad +7$

$\frac{x+7}{-5} = \frac{-5y}{-5}$

$f^{-1}(x) = \frac{x+7}{-5}$

18. Find the inverse function.

$f(x) = x^3 + 12$

$x = y^3 + 12$

$-12 \quad -12$

$\sqrt[3]{x-12} = \sqrt[3]{y^3}$

$f^{-1}(x) = \sqrt[3]{x-12}$

Solve the equation. Check for extraneous solutions.

19. $2\sqrt[3]{8x} + 9 = 5$

$-9 \quad -9$

$\frac{2\sqrt[3]{8x}}{2} = \frac{-4}{2}$

$(\sqrt[3]{8x})^3 = (-2)^3$

$8x = -8$

$x = -1$

Check

$2\sqrt[3]{8 \cdot -1} + 9 = 5$

$2\sqrt[3]{-8} + 9 = 5$

$2 \cdot -2 + 9 = 5$ ✓

20. $\left(\sqrt{(x+7)^3}\right)^2 = (8)^2$

$\sqrt[3]{(x+7)^3} = \sqrt[3]{64}$

$x + 7 = 4$

$-7 \quad -7$

$x = -3$

Check

$\sqrt{(-3+7)^3} = 8$

$\sqrt{4^3} = 8$

$\sqrt{64} = 8$ ✓

21. $\left(\sqrt{x+9}\right)^2 = \left(3 - \sqrt{x}\right)^2$

$x + 9 = (3 - \sqrt{x})(3 - \sqrt{x})$

$x + 9 = 9 - 6\sqrt{x} + x$

$-x \quad -9 \quad -9 \quad -x$

$\frac{0}{-6} = \frac{-6\sqrt{x}}{-6}$

$(0)^2 = (\sqrt{x})^2$

$x = 0$

Check

$\sqrt{0+9} = 3 - \sqrt{0}$

$3 = 3$ ✓

22. $\frac{4(x+3)^{\frac{1}{3}}}{4} = \frac{20}{4}$

$(x+3)^{\frac{3}{3}} = 5^{\frac{3}{3}}$

$x + 3 = 125$

$-3 \quad -3$

$x = 122$

Check

$4(122+3)^{\frac{1}{3}} = 20$

$4(125)^{\frac{1}{3}} = 20$

$4 \cdot 5 = 20$ ✓

23. $-5+3(x+2)^{\frac{1}{3}}=76$ Check

$+5 \quad +5$

$\frac{3(x+2)^{\frac{1}{3}}}{3}=\frac{81}{3}$

$(x+2)^{\frac{3}{3}\cdot\frac{1}{1}}=27^{\frac{3}{1}}$

$x+2=19683$

$-2 \quad -2$

$x=19681$

$-5+3(27)=76$

✓

24. $(x-3)^2=(\sqrt{x-1})^2$ Check

$(x-3)(x-3)=x-1$

$x^2-6x+9=x-1$

$-x+1 \quad -x+1$

$x^2-7x+10=0$

$(x-5)(x-2)=0$

5 2 ext

$5-3=\sqrt{5-1}$

$2=\sqrt{4}$ ✓

$2-3=\sqrt{2-1}$

$-1=\sqrt{1}$

X

25. $(\sqrt{7x})^2=(\sqrt{x+36})^2$ Check:

$7x=x+36$

$-x \quad -x$

$\frac{6x}{6}=\frac{36}{6}$

$x=6$

$\sqrt{7\cdot 6}=\sqrt{6+36}$

✓

26. $(\sqrt[3]{5x})^3=(5)^3$ Check:

$\frac{5x}{5}=\frac{125}{5}$

$x=25$

$\sqrt[3]{5\cdot 25}=5$

$\sqrt[3]{125}=5$ ✓

27. $(\sqrt{x^2+7x+19})^2=(3)^2$ Check:

$x^2+7x+19=9$

$-9 \quad -9$

$x^2+7x+10=0$

$(x+5)(x+2)=0$

$-5 \quad -2$

$\sqrt{(-5)^2+7(-5)+19}$

$\sqrt{25-35+19}$

$\sqrt{9}=3$ ✓

$\sqrt{(-2)^2+7(-2)+19}$

$\sqrt{4-14+19}$

$\sqrt{9}=3$ ✓

28. $(\sqrt{x^2-5x+1})^2=(4-x)^2$ Check:

$x^2-5x+1=(4-x)(4-x)$

$x^2-5x+1=16-8x+x^2$

$-x^2 \quad -x^2$

$-5x+1=16-8x$

$+8x \quad +8x$

$3x-15=0$

$+15 \quad +15$

$\frac{3x}{3}=\frac{15}{3}$

$x=5$

ext

$\sqrt{(5)^2-5(5)+1}$

$\sqrt{25-25+1}$

$\sqrt{1}=+5$

$\sqrt{1}=-1$ X

no solution

Simplify the following expressions. (No negative exponents)

29. $a^{\frac{1}{3}} \cdot a^{\frac{1}{2}}$

$a^{\frac{1}{3}+\frac{1}{2}}$

$a^{\frac{5}{6}}$

30. $81^{-\frac{1}{4}}$

$\frac{1}{\sqrt[4]{81}} = \frac{1}{3}$

31. $243^{\frac{4}{5}}$

$(\sqrt[5]{243})^4 = 3^4$

81

32. $(8x^6)^{\frac{2}{3}}$

$8^{\frac{2}{3}} x^{\frac{12}{3}}$

$4x^4$

33. $(-27)^{\frac{4}{3}}$

$(\sqrt[3]{-27})^4$

$(-3)^4 = 81$

34. $\sqrt{8} + \sqrt{2}$

$2\sqrt{2} + 1\sqrt{2}$

$3\sqrt{2}$

35. $\left(x^{\frac{4}{3}}\right)^{\frac{2}{5}}$

$x^{\frac{8}{15}}$

36. $\left(\frac{2}{16^{\frac{3}{2}}}\right)^{-1}$

$\left(\frac{16^{\frac{3}{2}}}{2}\right)^{-1} = \frac{(\sqrt{16})^3}{2} \quad \frac{64}{2}$

32

37. $a^{-\frac{3}{5}}$

$\frac{1}{a^{\frac{3}{5}}}$ or $\frac{\sqrt[5]{9^2}}{a}$

38. $\sqrt[3]{-81x^3y^6z^9}$

$\sqrt[3]{-27} \cdot \sqrt[3]{x^3y^6z^9}$

$-3xy^2\sqrt[3]{3}$

$-3^{1/3} x^{3/3} y^{6/3} z^{9/3}$

39. $\sqrt[4]{81x^5y^7z^8}$

$\sqrt[4]{81}\sqrt[4]{x^4}\sqrt[4]{x^1}\sqrt[4]{y^4}\sqrt[4]{y^3}\sqrt[4]{z^8}$

$3xyz^2\sqrt[4]{xy^3}$

$3^{1/4} x^{4/4} x^{1/4} y^{4/4} y^{3/4} z^{8/4}$

40. $\frac{1}{b^{-\frac{7}{6}}}$

$b^{\frac{7}{6}}$

41. $\left(7^{\frac{1}{2}} \cdot 27^{\frac{1}{3}}\right)^2$

$7^1 \cdot 27^{\frac{2}{3}}$

$7 \cdot (\sqrt[3]{27})^2$

$7 \cdot 3^2$

$7 \cdot 9$

63

42. Describe how to obtain the graph of $f(x)$ from the graph of $g(x)$.

$g(x) = \sqrt[3]{x}$: $f(x) = \sqrt[3]{x+3} - 5$

A. Move g(x) right 3 and down 5

B. Move g(x) left 3 and down 5

C. Move g(x) down 3 and left 5

D. Move of g(x) right 3 and up 5

43. Describe how to obtain the graph of $f(x)$ from the graph of $g(x)$

$g(x) = \sqrt{x}$: $f(x) = -\sqrt{x}$

A. Reflect g(x) over y = 0 (x axis)

B. Reflect g(x) over x = 0 (y axis)

C. Reflect g(x) over y= x

D. Move g(x) down one.

44. Describe how to obtain the graph of $f(x)$ from the graph of $g(x)$.

$g(x)=\sqrt{x}$: $f(x)=\sqrt{x-3}+2$

A. Move g(x) right 3 and down 2

B. Move g(x) left 3 and down 2

C. Move g(x) up 3 and right 2.

D. Move g(x) right 3 and up 2

45. Describe how to obtain the graph of $f(x)$ from the graph of $g(x)$.

$g(x)=\sqrt[3]{x}$ $f(x)=-\sqrt[3]{x+a}-b$

A. Move $g(x)$ right a units, down b and reflect over x axis

B. Move $g(x)$ left a units, up b, and reflect over x axis.

C. Move $g(x)$ left a units, down b, and reflect over x axis.

D. Move $g(x)$ left a units, and down b units.

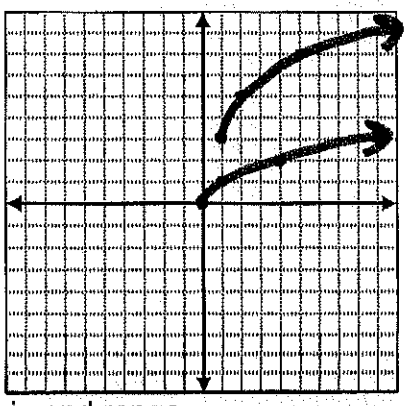
46. Inverse functions are reflections of one another over which line? $y=x$

47. For a function's inverse to be a function, the original function must pass the horizontal line test.

Graph the following functions. Clearly mark as many points as you can fit on the graph.

48. parent function: $f(x)=\sqrt{x}$

$f(x)=2\sqrt{x-1}+3$



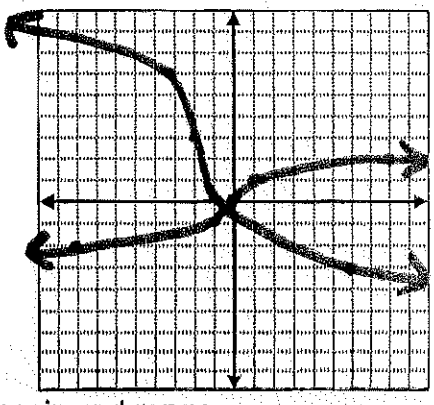
State the domain and range

$f(x)=\sqrt{x}$ D: $x\geq 0$ R: $y\geq 0$

$f(x)=2\sqrt{x-1}+3$ D: $x\geq 1$ R: $y\geq 3$

49. parent function: $f(x)=\sqrt[3]{x}$

$f(x)=-3\sqrt[3]{x+2}+3$



State the domain and range

$f(x)=\sqrt[3]{x}$ D: $\mathbb{R}$ R: $\mathbb{R}$

$f(x)=-3\sqrt[3]{x+2}+3$ D: $\mathbb{R}$ R: $\mathbb{R}$