

Chapter 7 Practice Test

Name KEY

Advanced Algebra

For problems 1 – 5, solve the equation. Check for extraneous solutions.

1. $(\sqrt{2x+1})^2 = (\sqrt{5x})^2$
 $2x+1 = 5x$
 $\begin{array}{r} 2x+1 \\ -2x \\ \hline 1 = 3x \\ \frac{1}{3} = \frac{3x}{3} \\ \frac{1}{3} = x \end{array}$

Check:
 $\sqrt{2(\frac{1}{3})+1} = \sqrt{5(\frac{1}{3})}$
 $\sqrt{\frac{2}{3}+1} = \sqrt{\frac{5}{3}}$
 $\sqrt{\frac{2}{3}+\frac{3}{3}} = \sqrt{\frac{5}{3}}$
 $\sqrt{\frac{5}{3}} = \sqrt{\frac{5}{3}}$ ✓

1. $x = \frac{1}{3}$

2. $(2x-1)^{1/5} + 2 = 3$
 $(2x-1)^{1/5} = 1$
 $\begin{array}{r} 2x-1 \\ +1 \\ \hline 2x = 2 \\ \frac{2x}{2} = \frac{2}{2} \\ x = 1 \end{array}$

Check:
 $(2(1)-1)^{1/5} + 2 = 3$
 $(2-1)^{1/5} + 2 = 3$
 $(1)^{1/5} + 2 = 3$
 $\sqrt[5]{1} + 2 = 3$
 $1 + 2 = 3$
 $3 = 3$ ✓

2. $x = 1$

3. $\sqrt{3x+13} - 5 = x$
 $(\sqrt{3x+13})^2 = (x+5)^2$
 $3x+13 = x^2+10x+25$
 $\begin{array}{r} 3x+13 \\ -3x-13 \\ \hline 0 = x^2+7x+12 \\ 0 = (x+4)(x+3) \\ x = -4 \quad x = -3 \end{array}$

Check: $x = -4$
 $\sqrt{3(-4)+13} - 5 = (-4)$
 $\sqrt{-12+13} - 5 = -4$
 $\sqrt{1} - 5 = -4$
 $1 - 5 = -4$
 $-4 = -4$ ✓

Check: $x = -3$
 $\sqrt{3(-3)+13} - 5 = (-3)$
 $\sqrt{-9+13} - 5 = -3$
 $\sqrt{4} - 5 = -3$
 $2 - 5 = -3$
 $-3 = -3$ ✓

3. $x = -4$ and $x = -3$

4. $(x+5)^{2/3} = 4$
 $(x+5)^1 = 4^{3/2}$
 $x+5 = (\sqrt{4})^3$
 $x+5 = (2)^3$
 $\begin{array}{r} x+5 \\ -5 \\ \hline x = 3 \end{array}$

Check:
 $(3+5)^{2/3} = 4$
 $(8)^{2/3} = 4$
 $(\sqrt[3]{8})^2 = 4$
 $(2)^2 = 4$
 $4 = 4$ ✓

4. $x = 3$

5. $\sqrt{3+(4-x)^{3/2}} = 11$
 $(4-x)^{3/2} = 8$
 $4-x = (\sqrt{8})^2$
 $4-x = (2)^2$
 $\begin{array}{r} 4-x \\ -4 \\ \hline -x = 4 \\ \frac{-x}{-1} = \frac{4}{-1} \\ x = 0 \end{array}$

Check:
 $3 + (4-(0))^{3/2} = 11$
 $3 + (4)^{3/2} = 11$
 $3 + (\sqrt{4})^3 = 11$
 $3 + (2)^3 = 11$
 $3 + 8 = 11$
 $11 = 11$ ✓

5. $x = 0$

6. A spherical water tank holds 15,000 ft³ of water. Find the diameter of the tank.

(HINT: $V = \frac{\pi}{6}d^3$.)

$$\frac{\pi}{6} \cdot 15,000 = \frac{\pi}{6} d^3$$

$$\sqrt[3]{\frac{90,000}{\pi}} = \sqrt[3]{d^3}$$

$$30.6 \approx d$$

6. Diameter: ≈ 30.6 ft.

For problems 7 – 11, simplify each radical expression. Assume all variables are positive. Do not use decimals.

7. $3\sqrt{48} + \sqrt{27}$

$$3 \cdot \sqrt{16 \cdot 3} + \sqrt{9 \cdot 3}$$

$$3 \cdot 4 \cdot \sqrt{3} + 3 \cdot \sqrt{3}$$

$$12\sqrt{3} + 3\sqrt{3}$$

$$15\sqrt{3}$$

7. $15\sqrt{3}$

8. $\sqrt[5]{-32x^{10}} \cdot \sqrt[5]{y^{25}z^5}$

$$\sqrt[5]{-32} \cdot \sqrt[5]{x^{10}} \cdot \sqrt[5]{y^{25}} \cdot \sqrt[5]{z^5}$$

$$-2 \cdot x^2 \cdot y^5 \cdot z$$

$$-2x^2y^5z$$

8. $-2x^2y^5z$

9. $3\sqrt{27x^5y^3} \cdot 5\sqrt{48x^4y^5}$

$$3 \cdot 5 \cdot \sqrt{27} \cdot \sqrt{48} \cdot \sqrt{x^4} \cdot \sqrt{y^3}$$

$$15 \cdot \sqrt{9 \cdot 3} \cdot \sqrt{16 \cdot 3} \cdot \sqrt{x^4} \cdot \sqrt{y^3}$$

$$15 \cdot 3 \cdot \sqrt{3} \cdot 4 \cdot \sqrt{3} \cdot x^2 \cdot y^{\frac{3}{2}}$$

$$15 \cdot 3 \cdot 4 \cdot 3 \cdot x^2 \cdot y^{\frac{3}{2}}$$

$$540 \cdot x^2 \cdot y^{\frac{3}{2}}$$

$$540x^2y^{\frac{3}{2}}$$

9. $540x^2y^{\frac{3}{2}}$

10. $(8^{-2}x^9y^{-12})^{\frac{1}{3}}$

$$8^{-\frac{2}{3}} \cdot x^{\frac{9}{3}} \cdot y^{-\frac{12}{3}}$$

$$\frac{1}{8^{\frac{2}{3}}} \cdot \frac{x^3}{1} \cdot \frac{1}{y^4}$$

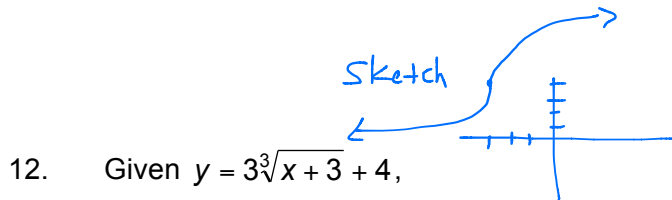
$$\frac{x^3}{8^{\frac{2}{3}} y^4} = \frac{x^3}{4y^4}$$

$(\sqrt[3]{8})^2 = (2)^2 = 4$

10. $\frac{x^3}{4y^4}$

$$\begin{aligned}
 11. \quad \frac{4-3\sqrt{5}}{3-2\sqrt{5}} \cdot \frac{3+2\sqrt{5}}{3+2\sqrt{5}} &= \frac{12+8\sqrt{5}-9\sqrt{5}-6(5)}{9+6\sqrt{5}-6\sqrt{5}-4(5)} \\
 &= \frac{-18-\sqrt{5}}{9-20} \\
 &= \frac{-18-\sqrt{5}}{-11}
 \end{aligned}$$

$$11. \quad \frac{-18-\sqrt{5}}{-11}$$



a. what is the domain?

12a. $(-\infty, \infty)$

b. what is the range?

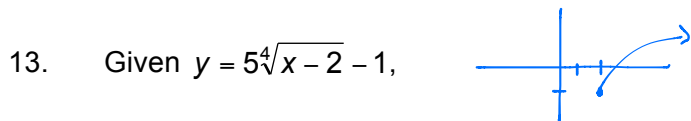
12b. $(-\infty, \infty)$

c. describe the horizontal shift.

12c. Horizontal shift LEFT 3

d. describe the vertical shift.

12d. Vertical shift UP 4



a. what is the domain?

13a. $[2, \infty)$

b. what is the range?

13b. $[-1, \infty)$

c. describe the horizontal shift.

13c. Horizontal shift RIGHT 2

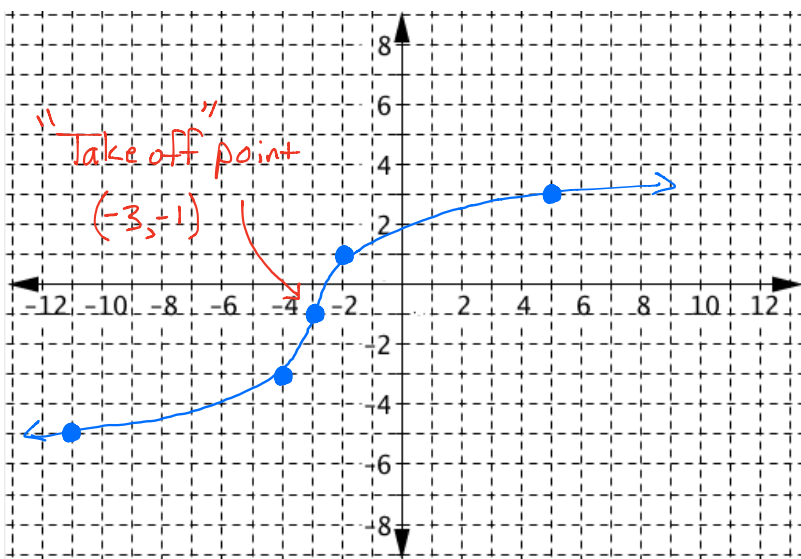
d. describe the vertical shift.

13d. Vertical shift DOWN 1

14. Graph the function $y = 2\sqrt[3]{x+3} - 1$ and state the domain and range of the function.

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

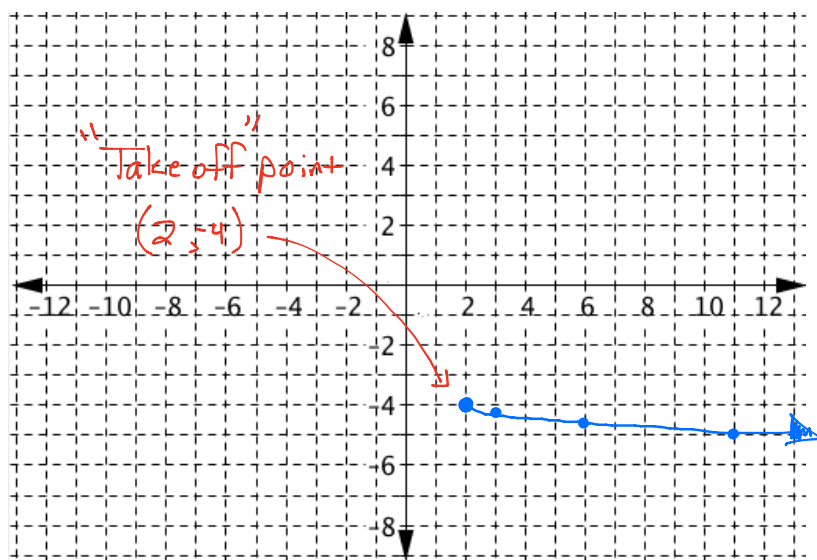


Shift Left 3	X	Y	$\sqrt[3]{X}$	Stretch by 2	Shift Down 1
-30	-3	-27	-3	-6	-7
-11	-3	-8	-2	-4	-5
-4	-3	-1	-1	-2	-3
-3	-3	0	0	0	-1
-2	-3	1	1	2	1
5	-3	8	2	4	3
24	-3	27	3	6	5

15. Graph the function $y = -\frac{1}{3}\sqrt{x-2} - 4$ and state the domain and range of the function.

Domain: $[2, \infty)$ $L \rightarrow R$

Range: $(-\infty, -4]$ $B \rightarrow \text{Top}$



Shift Right 2	X	Y	\sqrt{X}	Reflect and Compress by $-\frac{1}{3}$	Shift Down 4
2	+2	0	0	0	-4
3	+2	1	1	$-\frac{1}{3}$	$-4\frac{1}{3}$
6	+2	4	2	$-\frac{2}{3}$	$-4\frac{2}{3}$
11	+2	9	3	-1	-5
18	+2	16	4	$-\frac{4}{3}$	$-5\frac{1}{3}$

$-4 - \frac{1}{3} = -4\frac{1}{3}$
 $-4 - \frac{2}{3} = -4\frac{2}{3}$
 $-4 - \frac{4}{3} = -5\frac{1}{3}$