

Perform the indicated operation. Write your answer in simplest form.

<p>1.) $\sqrt[2]{32x^{10}y^{21}z^{15}}$ $2^2 \cdot 2^5 \cdot 2^3 \cdot 4 \sqrt{2x^2yz^3}$</p>	<p>2.) $7\sqrt[3]{40} + \sqrt[3]{135}$ $14\sqrt[3]{5} + 3\sqrt[3]{5}$ $17\sqrt[3]{5}$</p>
<p>3.) $\frac{4\sqrt{5}}{\sqrt{2x}} \cdot \frac{\sqrt{2x^3}}{\sqrt{(2x)^3}}$ $= \frac{4\sqrt{5 \cdot 8x^3}}{2x} = \frac{4\sqrt{40x^3}}{2x} = \frac{2\sqrt{40x^3}}{x}$</p>	<p>4.) $\frac{6}{3+2\sqrt{5}} \cdot \frac{3-2\sqrt{5}}{3-2\sqrt{5}}$ Bottom: $(3+2\sqrt{5})(3-2\sqrt{5})$ $9 - 6\sqrt{5} + 6\sqrt{5} - 4\sqrt{5}^2$ $9 - 4(5) = -11$ Top: $6(3-2\sqrt{5})$ $18 - 12\sqrt{5}$ $\frac{18-12\sqrt{5}}{-11} = \frac{-18+12\sqrt{5}}{11}$</p>
<p>Rewrite the expression in radical form. 5.) $(6x)^{\frac{2}{3}} = \sqrt[3]{(6x)^2}$ 6.) $x^{\frac{9}{5}} = (\sqrt[5]{x})^9$</p>	<p>Rewrite the expression with rational exponents. 7.) $(\sqrt{x})^4 = x^{\frac{4}{2}} = x^2$ 8.) $(\sqrt[4]{2x})^7 = (2x)^{\frac{7}{4}}$</p>
<p>9) Simplify the expression $(x^{12}y^4)^{\frac{1}{4}} \cdot \sqrt[4]{x^{20}y^{16}}$ $x^{12(\frac{1}{4})} y^{4(\frac{1}{4})} \cdot x^{\frac{20}{4}} y^{\frac{16}{4}}$ $x^3 y^1 \cdot x^5 y^4 = x^8 y^5$</p>	

Simplify each expression completely. Write your answer in simplest radical form.

<p>10) $(\frac{-27}{3-27})^{\frac{4}{3}}$ $(\frac{-27}{-24})^{\frac{4}{3}} = (\frac{3}{-2})^{\frac{4}{3}}$ $(\frac{-3}{2})^{\frac{4}{3}} = \frac{(-3)^4}{2^4} = \frac{81}{16}$</p>	<p>11) $(\frac{3}{3^2})^2 \cdot 3^{\frac{6}{2}}$ $(\frac{3}{9})^2 \cdot 3^3 = (\frac{1}{3})^2 \cdot 27 = \frac{1}{9} \cdot 27 = 3$</p>	<p>12) $3x^{\frac{2}{3}} \cdot 6x^{\frac{4}{3}} \cdot 2x^{\frac{5}{3}}$ $3 \cdot 6 \cdot 2 \cdot x^{\frac{2+4+5}{3}} = 36x^{\frac{11}{3}}$</p>
<p>13) $\sqrt{x^{\frac{2}{5}}} \cdot (x^{\frac{2}{5}})^{\frac{1}{2}}$ $x^{\frac{2}{5} \cdot \frac{1}{2}} \cdot x^{\frac{2}{5} \cdot \frac{1}{2}} = x^{\frac{1}{5}} \cdot x^{\frac{1}{5}} = x^{\frac{2}{5}} = \sqrt[5]{x^2}$</p>	<p>14) $\frac{x^{\frac{7}{5}}}{x^{\frac{4}{5}}} \cdot x^{\frac{2}{5} - \frac{4}{5}}$ $x^{\frac{7-4}{5}} \cdot x^{-\frac{2}{5}} = x^{\frac{3}{5}} \cdot x^{-\frac{2}{5}} = x^{\frac{1}{5}} = \sqrt[5]{x}$</p>	<p>15) $(16x^{-4}y^{20})^{\frac{1}{4}}$ $16^{\frac{1}{4}} x^{-4 \cdot \frac{1}{4}} y^{20 \cdot \frac{1}{4}} = 2x^{-1}y^5 = \frac{2y^5}{x}$</p>
<p>16.) $yx^{\frac{1}{3}} \cdot xy^{\frac{2}{3}}$ $x^{\frac{4}{3}} y^{\frac{5}{3}} = \sqrt[3]{x^4 y^5}$ $xy \sqrt[3]{xy^2}$</p>	<p>17.) $x^{\frac{5}{2}} y^2 \cdot (x^{\frac{3}{2}})^{-\frac{3}{2}}$ $x^{\frac{5}{2} - \frac{9}{4}} y^2 = x^{\frac{10-9}{4}} y^2 = x^{\frac{1}{4}} y^2 = \frac{y^2}{\sqrt[4]{x}}$</p>	
<p>18.) $(a^{-1}b^3 \cdot a^{-3}b^2)^3$ $a^{-3}b^9 \cdot a^{-9}b^6 = a^{-12}b^{15}$ $\frac{b^{15}}{a^{12}}$</p>		

20) Rewrite $\sqrt[3]{27x^6} + \sqrt[3]{x}$ using rational exponents. Write your answer in simplest form.

$$\left(\frac{3^3 x^6}{3^3 x^3}\right)^{\frac{1}{3}} + x^{\frac{1}{3}}$$

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

21 - 26: Solve each equation; round any decimal to the HUNDREDTHS place. Remember to check for extraneous solutions

21.) $3 - 4x^2 = -85$

$$\begin{array}{r} -3 \quad -3 \\ \hline -4x^2 = \frac{-88}{-4} \\ \hline \end{array}$$

$$3 - 4(4.69)^2 = -85$$

$$-84.98 = -85$$

$$\sqrt{x^2} = \sqrt{22}$$

$$x = \pm 4.69$$

22.) $\sqrt[5]{(x-9)^5} = 238$

$$x - 9 = 2.99$$

$$+9 \quad +9$$

$$(11.99 - 9)^5 = 238$$

$$(2.99)^5 = 238$$

$$238 = 238$$

$$x = 11.99$$

23. $(x)^2 = (-15 + 8x)^2$

$$x^2 = -15 + 8x$$

$$x^2 - 8x + 15 = 0$$

$$(x-3)(x-5) = 0$$

$$x-3=0 \quad x-5=0$$

$$x=3 \quad x=5$$

Check

$$x=3$$

$$3 = \sqrt{-15 + 8(3)}$$

$$3 = \sqrt{-15 + 24}$$

$$3 = \sqrt{9}$$

$$3 = 3 \checkmark$$

$$x=5$$

$$5 = \sqrt{-15 + 8(5)}$$

$$5 = \sqrt{-15 + 40}$$

$$5 = \sqrt{25}$$

$$5 = 5 \checkmark$$

24. $(\sqrt{4x+8})^2 = (x+3)^2$

$$4x+8 = x^2 + 3x + 3x + 9$$

$$4x+8 = x^2 + 6x + 9$$

$$0 = x^2 + 2x + 1$$

$$0 = (x+1)(x+1)$$

$$x+1=0$$

$$x=-1$$

$$\sqrt{4(-1)+8} = -1+3$$

$$\sqrt{-4+8} = 2$$

$$\sqrt{4} = 2$$

$$2 = 2 \checkmark$$

25. $((5x+1)^{\frac{1}{2}})^2 = (4)^2$

$$5x+1 = 16$$

$$\begin{array}{r} -1 \quad -1 \\ \hline 5x = 15 \\ \hline \end{array}$$

$$x = 3$$

Check

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

$$(15+1)^{\frac{1}{2}} = 4$$

$$(16)^{\frac{1}{2}} = 4$$

$$4 = 4 \checkmark$$

26. $2\sqrt[3]{x+4} + 7 = 11$

$$\begin{array}{r} -7 \quad -7 \\ \hline 2\sqrt[3]{x+4} = 4 \\ \hline \end{array}$$

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

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

$$x+4 = 8$$

$$\begin{array}{r} -4 \quad -4 \\ \hline x = 4 \end{array}$$

Check

$$2\sqrt[3]{4+4} + 7 = 11$$

$$2\sqrt[3]{8} + 7 = 11$$

$$2(2) + 7 = 11$$

$$4 + 7 = 11$$

$$11 = 11 \checkmark$$

27. A stone is dropped from a height of 350 feet. The time it takes for the stone to fall to a height of h feet is given by the function $t = \frac{1}{4}\sqrt{350-h}$ where t is the time in seconds. What is the height of the stone after 4 seconds?

$$4(4) = \left(\frac{1}{4}\sqrt{350-h}\right)$$

$$16 = \sqrt{350-h}$$

$$256 = 350-h$$

$$-94 = -h$$

$$94 = h$$

Describe the transformations, sketch the function, and then identify the characteristics.

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

State parent function: $p(x) = \sqrt[3]{x}$

Transformations:	Table:	Graph:										
<p>Reflect over x axis Right 2</p>	<table border="1"> <thead> <tr> <th>X</th> <th>F(x)</th> </tr> </thead> <tbody> <tr> <td>-6</td> <td>2</td> </tr> <tr> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>0</td> </tr> <tr> <td>3</td> <td>-1</td> </tr> </tbody> </table>	X	F(x)	-6	2	1	1	2	0	3	-1	
X	F(x)											
-6	2											
1	1											
2	0											
3	-1											
Characteristics:												
<p>Domain: $(-\infty, \infty)$</p>	<p>Range: $(-\infty, \infty)$</p>	<p>x-intercept: $(2, 0)$ y-intercept: $(0, 1.26)$</p>										
<p>Interval of Increase: NONE Interval of Decrease: $(-\infty, \infty)$</p>	<p>Relative Maximum: NONE Relative Minimum: NONE</p>	<p>End Behavior: as $x \rightarrow \infty, f(x) \rightarrow -\infty$ as $x \rightarrow -\infty, f(x) \rightarrow \infty$</p>										

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

State parent function: $p(x) = \sqrt{x}$

Transformations:	Table:	Graph:												
<p>Stretched by factor of 2 left 1 down -3</p>	<table border="1"> <thead> <tr> <th>X</th> <th>F(x)</th> </tr> </thead> <tbody> <tr> <td>-1</td> <td>-3</td> </tr> <tr> <td>0</td> <td>-1</td> </tr> <tr> <td>3</td> <td>1</td> </tr> <tr> <td>8</td> <td>3</td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	X	F(x)	-1	-3	0	-1	3	1	8	3			
X	F(x)													
-1	-3													
0	-1													
3	1													
8	3													
Characteristics:														
<p>Domain: $[-1, \infty)$</p>	<p>Range: $[-3, \infty)$</p>	<p>x-intercept: $(1.25, 0)$ y-intercept: $(0, -1)$</p>												
<p>Interval of Increase: $[-1, \infty)$</p> <p>Interval of Decrease: NONE</p>	<p>Relative Maximum: None</p> <p>Relative Minimum: $(-1, -3)$</p>	<p>End Behavior: as $x \rightarrow \infty, f(x) \rightarrow \infty$ as $x \rightarrow -1, f(x) \rightarrow -3$</p>												

30. Perform the indicated operation $2\sqrt{x^4y^3} * 5\sqrt{x^3yz^2}$

$$10\sqrt{x^7y^4z^2}$$

$$10x^3y^2z\sqrt{x}$$

31. State the radical conjugate for the expression $\frac{5}{4-\sqrt{5}}$

$$4 + \sqrt{5}$$