Evaluate each of the following.

**a.** $9^{\frac{1}{2}} x 9^{\frac{1}{2}}=$ **b.** $\sqrt{9} x \sqrt{9}=$

Therefore, $9^{\frac{1}{2}}=$

In general $ a^{\frac{1}{2}}=$

**c.** $8^{\frac{1}{3}} x 8^{\frac{1}{3}} x 8^{\frac{1}{3}}=$ **d.** $\sqrt[3]{8} x \sqrt[3]{8} x \sqrt[3]{8}$ **x**

Therefore: $8^{\frac{1}{3}}=$

In general: $ b^{\frac{1}{3}}=$

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| **Exponents in the form** $\frac{1}{n}$$x^{\frac{1}{n}}=\sqrt[n]{x}$ where n is a natural number. (Read the nth root of x) |

**Examples:** Write each of the following in radical form. Evaluate, if possible.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| a. $64^{\frac{1}{2}}$ | b.$ 27^{\frac{1}{3}}$ | c. $1024^{\frac{1}{5}}$ | d. $16^{\frac{1}{4}}$ | e. $9^{-\frac{1}{2}}$ |
| **f.** $(-64)^{\frac{1}{3}}$ | **g.** $(-243)^{\frac{1}{5}}$ | **h.** $(-625)^{\frac{1}{4}}$ | **i.** $(-81)^{\frac{1}{2}}$ |  |

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| **Take Note:**Given $\sqrt[n]{x}$, if n is an even number, then $x\geq 0$ for the nth root to be real. if n is an odd number, then x can be any real number. |

Use the exponent laws to express $x^{\frac{2}{3}}$ in two ways. **Recall:** Power law (am)n = amn

**a.** $x^{\frac{2}{3}}$ **b.** $x^{\frac{2}{3}}$

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| **Exponents in the form** $\frac{m}{n}$**:**$x^{\frac{m}{n}}=\sqrt[n]{x^{m}}$where m and n are natural numbers. |

**Examples:** Write each of the following in radical form. Evaluate, if possible.

|  |  |  |
| --- | --- | --- |
| **a.** $8^{\frac{2}{3}}$ | **b.** $-25^{\frac{5}{2}}$ | **c.** $256^{-\frac{3}{4}}$ |
| **d.** $64^{-1.5}$ | **e. (**$-27^{-\frac{2}{3}})$ | **f.** $-27^{-\frac{2}{3}}$ |
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