3.3 Rational Exponents – Worksheet
MCR3U
Jensen

1) Evaluate each cube root.

a) $\sqrt[3]{64}$

b) $(-1000)^{\frac{1}{3}}$

c) $\sqrt[3]{\frac{1}{8}}$

d) $\left(\frac{8}{27}\right)^{\frac{1}{3}}$

2) Evaluate each root.

a) $81^{\frac{1}{4}}$

b) $\sqrt[4]{\frac{16}{625}}$

c) $64^{\frac{1}{6}}$

d) $\sqrt[5]{-100\,000}$

3) Evaluate.

a) $8^{\frac{2}{3}}$

b) $32^{\frac{4}{5}}$

c) $(-64)^{\frac{5}{3}}$

d) $\left(\frac{1}{10\,000}\right)^{\frac{3}{4}}$

4) Evaluate.

a) $16^{-\frac{1}{4}}$

b) $25^{-\frac{3}{2}}$

c) $\left(\frac{1}{8}\right)^{-\frac{7}{3}}$

d) $\left(-\frac{1}{32}\right)^{-\frac{2}{5}}$

e) $\left(\frac{10\,000}{81}\right)^{-\frac{3}{4}}$

f) $\left(-\frac{8}{27}\right)^{-\frac{2}{3}}$

5) Simplify. Express your answers using only positive exponents.

a) $x^{\frac{1}{4}} \cdot x^{\frac{1}{4}}$

b) $\left(m^{\frac{1}{3}}\right)\left(m^{\frac{3}{4}}\right)$

c) $\dfrac{w^{\frac{1}{2}}}{w^{\frac{1}{3}}}$

d) $\dfrac{ab^2}{a^{\frac{1}{2}}b^{\frac{1}{3}}}$

e) $\left(y^{\frac{1}{2}}\right)^{\frac{2}{3}}$

f) $\left(u^{\frac{3}{4}}v^{\frac{1}{2}}\right)^{\frac{2}{9}}$

6) Simplify. Express your answers using only positive exponents.

a) $k^{\frac{3}{4}} \div k^{-\frac{1}{4}}$

b) $\dfrac{p^{-\frac{2}{3}}}{p^{\frac{5}{6}}}$

c) $\left(y^{\frac{2}{3}}\right)^{-3}$

d) $\left(w^{-\frac{8}{9}}\right)^{-\frac{3}{4}}$

e) $(8x)^{\frac{2}{3}}(27x)^{-\frac{1}{3}}$

f) $5\left(7y^{-\frac{2}{3}}\right)^{-2}$

7) The surface area, S, of a sphere can be expressed in terms of its volume, V, using the formula $S(V) = (4\pi)^{\frac{1}{3}}(3V)^{\frac{2}{3}}$. A beach ball has a volume of 24 000 cm³. Find its surface area, to the nearest hundred square centimeters.

Answers

1. a) 4   **b)** -10 **c)** $\frac{1}{2}$ **d)** $\frac{2}{3}$

2. a) 3   **b)** $\frac{2}{5}$ **c)** 2   **d)** -10

3. a) 4   **b)** 16   **c)** -1024 **d)** $\frac{1}{1000}$

4. a) $\frac{1}{2}$ **b)** $\frac{1}{125}$ **c)** 128

   d) 4   **e)** $\frac{27}{1000}$ **f)** $\frac{9}{4}$

5. a) $x^{\frac{1}{2}}$ **b)** $m^{\frac{13}{12}}$ **c)** $w^{\frac{1}{6}}$

   d) $a^{\frac{1}{2}}b^{\frac{5}{3}}$ **e)** $y^{\frac{1}{3}}$ **f)** $u^{\frac{1}{6}}v^{\frac{1}{9}}$

6. a) k **b)** $\dfrac{1}{p^{\frac{3}{2}}}$ **c)** $\dfrac{1}{y^{2}}$

   d) $w^{\frac{2}{3}}$ **e)** $\frac{4}{3}x^{\frac{1}{3}}$ **f)** $\frac{5}{49}y^{\frac{4}{3}}$

7. 4000 cm²