

Unit 1 Final Review – Powers and Exponents

1. Classify the following numbers as rational or irrational. Justify your answer.

a) $-\frac{7}{149}$ b) $\sqrt{27}$ c) $0.\overline{04}$ d) $\frac{\pi}{4}$

2. Express the following entire radicals as mixed radicals.

a) $\sqrt{90}$ b) $5\sqrt{48}$ c) $\sqrt{52}$ d) $2\sqrt{192}$ e) $\sqrt{\frac{32}{50}}$

3. Write as a radical.

a) $2^{\frac{1}{3}}$ b) $7^{\frac{3}{2}}$ c) $2x^{\frac{3}{4}}$ d) $m^{-\frac{2}{3}}$ e) $-5^{\frac{5}{3}}$ f) $(-5)^{\frac{7}{3}}$

4. Write in exponential form.

a) $\sqrt[5]{6}$ b) $\sqrt[11]{2^5}$ c) $\sqrt[3]{-3}$ d) $-\sqrt[4]{x^3}$ e) $(\sqrt[4]{3m})^5$ f) $\frac{1}{\sqrt{x}}$ g) $\sqrt[3]{\frac{2}{m^6}}$

5. Evaluate each expression.

a) $4^{\frac{5}{2}}$ b) $16^{0.5}$ c) $64^{-\frac{1}{2}}$ d) $\frac{1}{\frac{36^{-\frac{2}{3}}}{3^{-1}+3^{-3}}}$ e) $\left(\frac{8}{27}\right)^{\frac{1}{3}}$
 f) $\sqrt[3]{\sqrt{64}}$ g) $\frac{38}{a^0+b^0}$ h) $5^{-1} + 2^{-3}$ i) $\frac{3^{-1}+3^{-3}}{3^{-4}}$ j) $(-27)^{-\frac{5}{3}}$

6. Simplify each expression. Express your final answer with exponents.

a) $\sqrt{m^7} \cdot \sqrt[5]{m^3}$ b) $\sqrt[4]{\sqrt{6561n^{16}}}$ c) $\sqrt{\sqrt[3]{27x^{12}}}$

7. Simplify each expression. Express your final answer with positive exponents.

a) $(64a^{12}b^{15})^{\frac{2}{3}}$ b) $2^{-n}(2^n - 2^{1+n})$ c) $\frac{(5^x)^0}{5^2x^5}$ d) $\left(\frac{150x^3y}{6x^{-5}y^3}\right)^{\frac{3}{2}}$
 e) $\left(x^{\frac{1}{2}} \cdot x^{\frac{3}{2}}\right)^3$ f) $\frac{(2a^2c)^5}{(4a^2c^3)^2}$ g) $\frac{(x^{a-1})^3}{(x^{2a})(x)}$ h) $\left(\frac{w^{-12}y^6}{-8x^3}\right)^{-\frac{1}{3}}$
 i) $\left(\frac{-54x^6y}{2x^{-3}y^4}\right)^{\frac{4}{3}}$ j) $\frac{(6x^{-1}y)^{-2}}{(xy^{-1})^2}$ k) $\left[\left(x^{\frac{5}{4}}\right)\left(x^{\frac{7}{3}}\right)\right]^{-\frac{1}{2}}$ l) $(-7a^{-2}b^3c^{-1})^{-3}$
 m) $\left(\frac{a^4}{625}\right)^{-\frac{3}{4}}$ n) $\left(\frac{-2x^{-3}}{3y^{-4}}\right)^{-2}$ o) $x^4 \div x^0$ p) $(-2x^2y^3)(-5xy^5)$
 q) $\frac{2}{(2xy^6)^{-2}}$ r) $(-6m^{-4}n^2) \div (2m^{-1}n^{-6})$ s) $\frac{(-2s^{-2}t)(5s^{-3}t^2)}{4s^2t^{-3}}$