

Intermediate Algebra

7-1
Rational Exponents and
Radical Expressions

Laws of Exponents

$$x^m \cdot x^n = x^{m+n}$$

$$x^m + x^n = \text{as is}$$

$$(x^m)^n = x^{mn}$$

$$x^{-m} = \frac{1}{x^m}$$

$$(x+y)^2 = x^2 + 2xy + y^2$$

FOIL

$$(x+y)(x+y) = x^2 + xy + xy + y^2 = x^2 + 2xy + y^2$$

$$\frac{x^m}{x^n} = x^{m-n}$$

$$x^0 = 1$$

$$x^1 = x$$

$$3^{-2} = \frac{1}{9}$$

$$(x^m \cdot y^n)^k = x^{mk} \cdot y^{nk}$$

$$x^{\frac{1}{2}} = \sqrt{x}$$

$$x^{\frac{1}{2}} = \sqrt{x}$$

$$x^{\frac{1}{2}} \cdot x^{\frac{1}{2}} = x^{\frac{1}{2} + \frac{1}{2}} = x^1 = x$$

Book answer

Definition of Rational Exponents -

$$x^{\frac{m}{n}} = \sqrt[n]{x^m}$$

power (pointing to m)
index (pointing to n)

Simplify.

2) $81^{\frac{1}{2}}$

$$\sqrt[2]{81} = 9$$

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

reciprocal

$$\left(\frac{27}{8}\right)^{\frac{2}{3}} = \frac{\sqrt[3]{27^2}}{\sqrt[3]{8^2}} = \frac{3^2}{2^2} = \frac{9}{4}$$

18) $x^1 \cdot x^{-\frac{1}{2}}$

$$x^{1 + (-\frac{1}{2})} = x^{\frac{1}{2}} = \sqrt{x}$$

Book answer

Simplify.

$$26) \frac{b^{\frac{3}{4}}}{b^{-\frac{3}{4}}}$$

$$b^{\frac{3}{4} - (-\frac{3}{4})}$$

$$b^{\frac{3}{4} + \frac{3}{4}}$$

$$b^{\frac{3}{2} + \frac{3}{4}}$$

$$= \boxed{b^{\frac{9}{4}}}$$

$$42) (a^3 b^6)^{\frac{2}{3}}$$
$$= \boxed{a^2 \cdot b^4}$$

Simplify.

$$60) (27m^3 n^{-6})^{\frac{1}{3}} (m^{-\frac{1}{3}} n^{\frac{5}{6}})^6$$

$$(27^{\frac{1}{3}} m^1 n^{-2}) (m^{-2} n^5)$$

$$(3 \sqrt[3]{27} m^1 n^{-2}) (m^{-2} n^5)$$

$$= \frac{3m \cdot n^5}{n^2 m^2}$$

$$= \boxed{\frac{3n^3}{m}}$$

$$62) \left[\frac{x^{\frac{1}{2}} y^{\frac{5}{4}}}{y^{-\frac{3}{4}}} \right]^4$$

$$\frac{x^2 y^5}{y^3} = \boxed{\frac{y^2}{x^2}}$$

Simplify.

$$72) a^{-\frac{5}{3}} \cdot a^{\frac{2}{3}}$$

$$a^{-\frac{5}{3} + \frac{2}{3}}$$

$$a^{-\frac{3}{3} + \frac{2}{3}}$$

$$= \boxed{a^{-\frac{1}{3}}}$$

Assignment:

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