Sec. 4.6 – Applying the Exponent Laws

Exponent Laws

Product of powers law

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

When the bases of the powers are the same, add the exponents.

$2^3 \cdot 2^4 = 2^{3+4}$

$= 2^7$

Quotient of powers law

$\dfrac{a^m}{a^n} = a^{m-n}$

When the bases of the powers are the same, subtract the exponents.

$\dfrac{3^9}{3^5} = 3^{9-5}$

$= 3^4$

Power of a power law

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

Multiply the exponents.

$\left(4^2\right)^5 = 4^{2 \cdot 5}$

$= 4^{10}$

1. Simplify by writing as a single power. Explain your reasoning.

a) $0.8^2 \cdot 0.8^{-7}$

b) $\left[\left(-\dfrac{4}{5}\right)^2\right]^{-3} \div \left[\left(-\dfrac{4}{5}\right)^4\right]^{-5}$

c) $\dfrac{\left(1.5^{-3}\right)^{-5}}{1.5^5}$

d) $\dfrac{9^{\frac{5}{4}} \cdot 9^{-\frac{1}{4}}}{9^{\frac{3}{4}}}$

2. Simplify. Explain your reasoning.

a) $m^4 n^{-2} \cdot m^2 n^3$

b) $\dfrac{6x^4 y^{-3}}{14xy^2}$

3. Simplify. Explain your reasoning.

a) $\qquad (25a^4b^2)^{\frac{3}{2}}$

b) $\qquad \left(x^3y^{-\frac{3}{2}}\right)\left(x^{-1}y^{\frac{1}{2}}\right)$

c) $\dfrac{12x^{-5}y^{\frac{5}{2}}}{3x^{\frac{1}{2}}y^{-\frac{1}{2}}}$

d) $\qquad \left(\dfrac{50x^2y^4}{2x^4y^7}\right)^{\frac{1}{2}}$

4. A cone with height and radius equal has volume 18 cm^3. What are the radius and height of the cone to the nearest tenth of a centimetre?