Review of Exponents

1. Evaluate each of the following, using the laws of exponents. Leave your final answer as a fraction in lowest terms, if applicable.

a) $\left(7^3\right)^2 \div 7^4$

b) $(0.4)^5 \div (0.4)^3$

c) $\left(\sqrt{3}\right)^5 \times \left(\sqrt{3}\right)^3$

d) $25^{\frac{3}{2}}$

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

f) $(-2)^3 \times (-2)^3$

g) $4^{-2} - 8^{-1}$

h) $\left(a^4 \div a^7\right) \times a^3$

i) $(0.3)^3 \div (0.3)^5$

j) $\left(p^2\right)^3 \div \left(p^3\right)^2$

k) $\left(3^2\right)^3 \div 3^{-2}$

l) $\left(3^{-1}\right)^3 \times 3^2$

m) $(-2)^3 \times 2^{-4}$

n) $\left(2^3\right)^{-2} \times \left(2^{-2}\right)^2$

o) $\left(6^3\right)^4 \div 12^6$

2. Simplify each of the following, using the exponent laws. Leave all final answers with positive exponents.

a) $\dfrac{x^5 y^2}{x^3 y^4}$

b) $\left(xy^2\right)\left(x^3 y^2\right)$

c) $\dfrac{\left(3a^2 b\right)^2}{\left(ab^2\right)^3}$

d) $\dfrac{8g^2 h^4}{\left(gh^2\right)^3}$

e) $\left(xy^2\right)^3$

f) $\dfrac{\left(b^2\right)^3 c^4}{(bc)^5}$

g) $\dfrac{5x^3 y^{-4}}{2x^{-2} y^2}$

h) $\dfrac{\pi x^2 y}{4xy^3}$

i) $\left(5x^2 y\right)^{-2}$

j) $\left(a^2 bc^{-1}\right)^3$

k) $\left(a^2 b^{-1}\right)^{-3}$

l) $(ab)^4 \left(\dfrac{a^{-2}}{b^{-2}}\right)^2$

3. Simplify each of the following, leaving final answers with positive exponents.

a) $\left(3x^{-2} y^3\right)^{-1}$

b) $\left(a^{\frac{1}{4}} b^{\frac{-1}{3}}\right)^{-2}$

c) $\left(\dfrac{x^{-3}}{x^{-1}}\right)^{-2}$

d) $\dfrac{\left(4x^2 y^{\frac{1}{3}}\right)^{\frac{1}{2}}}{\left(8xy^{\frac{1}{4}}\right)^{\frac{1}{3}}}$

e) $\dfrac{\left(4a^{-2}\right)\left(2a^3 b^2\right)}{12a^4 b^3}$

f) $\dfrac{\left(5x^{-2} y^0\right)^3}{\left(25x^2 y\right)^{\frac{1}{2}}}$

4. Simplify, using the exponent laws.

a) $\left(64x^4\right)^{\frac{1}{2}}$

b) $\sqrt[4]{16^3}$

c) $(27)^{\frac{4}{3}}$

d) $\sqrt{2a^{\frac{1}{2}}} \times \sqrt{32a^{\frac{3}{4}}}$

e) $\sqrt[3]{27p^6}$

f) $\sqrt[5]{32a^{10}}$

g) $a^{3.4} \times a^{3.6}$

h) $\sqrt[3]{5^2} \div \sqrt[4]{5^5}$

i) $\left(\sqrt[3]{t}\right)^2 \times \sqrt{t^5}$

ANSWERS:

1.a) 49 b) $\dfrac{4}{25}$ c) 81 d) 125 e) 4 f) 64 g) $\dfrac{-1}{16}$ h) 1 i) $\dfrac{100}{9}$ j) 1 k) 6561 l) $\dfrac{1}{3}$ m) $\dfrac{-1}{2}$

n) $\dfrac{1}{1024}$ o) 729

2.a) $\dfrac{x^2}{y^2}$ b) $x^4 y^4$ c) $\dfrac{9a}{b^4}$ d) $\dfrac{8}{gh^2}$ e) $x^3 y^6$ f) $\dfrac{b}{c}$ g) $\dfrac{5x^5}{2y^6}$ h) $\dfrac{\pi x}{4y^2}$ i) $\dfrac{1}{25x^4 y^2}$ j) $\dfrac{a^6 b^3}{c^3}$

k) $\dfrac{b^3}{a^6}$ l) b^8

3.a) $\dfrac{x^2}{3y^3}$ b) $\dfrac{b^{\frac{2}{3}}}{a^{\frac{1}{2}}}$ c) x^4 d) $x^{\frac{2}{3}} y^{\frac{1}{12}}$ e) $\dfrac{2}{3a^3 b}$ f) $\dfrac{25}{x^7 y^{\frac{1}{2}}}$

4.a) $8x^2$ b) 8 c) 81 d) $8a^{\frac{5}{4}}$ e) $3p^2$ f) $2a^2$ g) a^7 h) $5^{\frac{-7}{12}}$ or $\dfrac{1}{5^{\frac{7}{12}}}$ i) $t^{\frac{19}{6}}$