Al Moattasem International School

Jubail

Level 8 – Revision 5

Indices Revision Work Sheet 1

Chapter 4

Topic Indices

Answer Key

To simplify fractional exponents, rewrite the expression as a radical raised to a power. The denominator of the fractional exponent is the root and the numerator is the power.

In other words: $x^{m/n} = \sqrt[n]{x^m} = \left(\sqrt[n]{x}\right)^m$

1) Solution

$27^{2/3} = \left(\sqrt[3]{27}\right)^2$ Rewrite as a radical.

$= 3^2$ Simplify.

$= 9$ Simplify.

The answer is **9.**

Sometimes you need to write a radical expression using a fractional exponent.

2) Solution

$\sqrt[4]{y^6} = y^{6/4}$ Rewrite as a fractional exponent.

$= y^{3/2}$ Simplify.

The answer is $\boldsymbol{y^{3/2}}$.

Sometimes there will be many variables in the radicand. Simplify each variable one at a time, then multiply.

3) Solution

$\sqrt[3]{8x^5y^6z^{11}} = \sqrt[3]{8} \cdot \sqrt[3]{x^5} \cdot \sqrt[3]{y^6} \cdot \sqrt[3]{z^{11}}$ Rewrite the expression.

$= 2 \cdot x\sqrt[3]{x^2} \cdot y^2 \cdot z^3\sqrt[3]{z^2}$ Simplify.

$= 2xy^2z^3 \cdot \sqrt[3]{x^2z^2}$ Simplify.

The answer is $\boldsymbol{2xy^2z^3 \cdot \sqrt[3]{x^2z^2}}$.

4) Solution

POWER RULE:

To raise a power to another power, write the base and MULTIPLY the exponents.

$$(x^m)^n = x^{m \cdot n}$$

A. $(x^3)^2 = x^6$

B. $(3^2)^4 = 3^8$

C. $(z^5)^2 = z^{10}$

5) Solution

EXPANDED POWER RULE:

$$(xy)^m = x^m y^n \qquad \left(\frac{x}{y}\right)^m = \frac{x^m}{y^m}$$

A. $(2a)^3 = 2^3 a^3 = 8a^3$

B. $(6x^3)^2 = 6^2 (x^3)^2 = 36x^6$

C. $\left(\frac{x^2}{y}\right)^4 = \frac{(x^2)^4}{y^4} = \frac{x^8}{y^4}$

D. $\left(\frac{2x}{3y^2}\right)^3 = \frac{(2x)^3}{(3y^2)^3} = \frac{2^3 x^3}{3^3 (y^2)^3} = \frac{8x^3}{27y^6}$

6) Solution

NEGATIVE EXPONENTS:

If a factor in the numerator or denominator is moved across the fraction bar, the sign of the exponent is changed.

$$x^{-m} = \frac{1}{x^m} \qquad \frac{1}{x^{-m}} = x^m \qquad \left(\frac{x}{y}\right)^{-n} = \left(\frac{y}{x}\right)^{n}$$

A. $x^{-3} = \frac{1}{x^3}$

B. $4^{-2} = \frac{1}{4^2} = \frac{1}{16}$

C. $-4x^5y^{-2} = \frac{-4x^5}{y^2}$

D. $\left(\frac{x^2}{y}\right)^{-3} = \left(\frac{y}{x^2}\right)^{3} = \frac{y^3}{x^6}$

E. $(3x^{-2}y)(-2xy^{-3}) = -6x^{-1}y^{-2} = \frac{-6}{xy^2}$

F. $\frac{a^{-2}b^3}{c^{-4}d^{-1}} = \frac{b^3c^4d}{a^2}$

G. $(-2x^2y^{-4})^{-2} = \left(\frac{-2x^2}{y^4}\right)^{-2} = \left(\frac{y^4}{-2x^2}\right)^{2} = \frac{y^8}{4x^4}$

7) Solution

a) $2 \times 2 \times 2 \times 2 = 2^4$

b) $7 \times 2 \times 2 = 7 \times 2^2$

c) $\frac{5\times5\times5\times5\times5\times5}{5\times5\times5\times5} = 5^2$

d) $5 \times 7 \times 5 = 7 \times 5^2$

8) Solution

$88^0 = 1$ (Since $a^0 = 1$)