

Fractional Exponents are Radicals

Power
root

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Algebra II

Given Fractional Exponents

1. Evaluate each of the following:

a) Evaluate: $81^{\frac{3}{4}}$

$$\sqrt[4]{81^3}$$

$$3^3$$

$$27$$

b) Evaluate: $\left(\frac{8}{27}\right)^{\frac{2}{3}}$ $\left(\frac{27}{8}\right)^{\frac{2}{3}}$

$$\sqrt[3]{\frac{27}{8}^2}$$

$$\left(\frac{3}{2}\right)^2 = \frac{9}{4}$$

c) Evaluate: $125^{\frac{5}{3}}$

$$\sqrt[3]{125^5}$$

$$5^5 = 3125$$

d) Evaluate: $\left(\frac{4}{81}\right)^{\frac{5}{2}}$ $\left(\frac{81}{4}\right)^{\frac{5}{2}}$

$$\sqrt{\frac{81}{4}^5}$$

$$\left(\frac{9}{2}\right)^5 = \frac{59049}{32}$$

5. Express each of the following without exponents:

a) $5x^{\frac{1}{3}}$

$$\sqrt[3]{5x}$$

b) $(5x)^{\frac{1}{3}}$

$$\sqrt[3]{5x}$$

3. The expression $x^{-\frac{2}{5}}$ is equivalent to

(1) $-\sqrt[2]{x^5}$

(2) $-\sqrt[5]{x^2}$

(3) $\frac{1}{\sqrt[2]{x^5}}$

~~(4)~~ $\frac{1}{\sqrt[5]{x^2}}$

$$\frac{1}{x^{\frac{2}{5}}}$$

$$\frac{1}{\sqrt[5]{x^2}}$$

4. If $n > 0$, the expression $\left(\frac{1}{n}\right)^{\frac{2}{3}}$ is equal to

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

(2) $-n^{\frac{3}{2}}$

~~(3) $\sqrt[3]{n^2}$~~

~~(4) $\sqrt[3]{n^3}$~~

~~(1) $n^{\frac{2}{3}}$~~

~~(2) $n^{\frac{3}{2}}$~~

$\sqrt[3]{n^2}$

5. Which expression is equivalent to $(9x^2y^6)^{-\frac{1}{2}}$?

~~1) $\frac{1}{3xy^3}$~~

2) $3xy^3$

3) $\frac{3}{xy^3}$

4) $\frac{xy^3}{3}$

$9^{-\frac{1}{2}}x^{-1}y^{-3}$

$\frac{1}{9^{\frac{1}{2}}xy^3}$

$\frac{1}{3xy^3}$

6. The expression $(x^2 - 1)^{-\frac{2}{3}}$ is equivalent to

1) $\sqrt[3]{(x^2 - 1)^2}$

~~2) $\frac{1}{\sqrt[3]{(x^2 - 1)^2}}$~~

3) $\sqrt{(x^2 - 1)^3}$

4) $\frac{1}{\sqrt{(x^2 - 1)^3}}$

$\frac{1}{(x^2 - 1)^{\frac{2}{3}}}$

$\frac{1}{\sqrt[3]{(x^2 - 1)^2}}$

7. When simplified, the expression $\left(\frac{w^{-5}}{w^{-9}}\right)^{\frac{1}{2}}$ is equivalent to

1) w^{-7}

~~2) w^2~~

3) w^7

4) w^{14}

$\frac{w^{-\frac{5}{2}}}{w^{-\frac{9}{2}}}$

$\frac{w^{\frac{9}{2}}}{w^{\frac{5}{2}}}$

$w^{\frac{9}{2} - \frac{5}{2}}$

w^2