Functions & Trig. -

Operations with Rationals

Name ____________________________

Rewrite the expression using rational exponent notation.

1.) $\sqrt[3]{x^2}$ $= x^{\frac{2}{3}}$

2.) $\left(\sqrt[3]{x}\right)^2$ $= \left(x^{\frac{1}{3}}\right)^2 = x^{\frac{2}{3}}$

3.) For $x \geq 0$, which equation is ***false***?

(a) $\left(x^{\frac{2}{3}}\right)^2 = \sqrt[3]{x^4}$

$x^{4/3} = x^{\frac{4}{3}}$

(c) $\left(x^{\frac{3}{2}}\right)^{\frac{1}{2}} = \sqrt[4]{x^3}$

$x^{\frac{3}{4}} = x^{\frac{3}{4}}$

(b) $\left(x^3\right)^{\frac{1}{4}} = \sqrt[4]{x^3}$

$x^{\frac{3}{4}} = x^{\frac{3}{4}}$

(d) $\left(x^{\frac{3}{2}}\right)^2 = \sqrt[4]{x^3}$

$x^{\frac{6}{2}}$

$x^3 \neq x^{\frac{3}{4}}$

4.) Explain how $\left(3^{\frac{1}{5}}\right)^2$ can be written as the equivalent radical expression $\sqrt[5]{9}$.

$\left(3^2\right)^{\frac{1}{5}} = (9)^{1/5} = \sqrt[5]{9^1}$

The order of exponents can be switched.

The square of 3 is 9.

The exponent $\frac{1}{5}$ is the fifth root.

5.) Simplify: $x \bullet x$ $= x^2$

6.) Simplify: $x^3 \bullet x^4$ $= x^7$

add exponents

7.) Write $\sqrt[3]{x} \bullet \sqrt[4]{x}$ as a single term with a rational exponent.

$$x^{\frac{1}{3}} \cdot x^{\frac{1}{4}} = x^{\frac{4}{12}} \cdot x^{\frac{3}{12}} = \boxed{x^{\frac{7}{12}}}$$

8.) Write $\dfrac{\sqrt[3]{x}}{\sqrt[6]{x}}$ as a single term with a rational exponent.

$$\frac{x^{\frac{1}{3}}}{x^{\frac{1}{6}}} = \frac{x^{\frac{2}{6}}}{x^{\frac{1}{6}}} = \boxed{x^{\frac{1}{6}}}$$

Divide, we subtract exponents.

9.) Write $\left(\sqrt[7]{x^2}\right)\left(\sqrt[5]{x^3}\right)$ as a single term in simplest radical form.

$$x^{\frac{2}{7}} \cdot x^{\frac{3}{5}} = x^{\frac{10}{35}} \cdot x^{\frac{21}{35}} = x^{\frac{31}{35}} = \boxed{\sqrt[35]{x^{31}}}$$