

Topic: Fractional exponents**Question:** Choose the equivalent expression.

$$3^{-\frac{2}{3}}$$

Answer choices:

A $\frac{1}{3^2}$

B $\frac{1}{\sqrt[3]{9}}$

C $-3^{\frac{2}{3}}$

D $9^{\frac{1}{3}}$



Solution: B

First, we'll deal with the negative exponent.

Remember that

$$x^{-a} = \frac{1}{x^a} \quad \text{and} \quad x^a = \frac{1}{x^{-a}}$$

Therefore, we can rewrite $3^{-2/3}$ as

$$\frac{1}{3^{2/3}}$$

In the fractional exponent $2/3$, 2 is the power and 3 is the root, which means we can rewrite the expression as

$$\frac{1}{\sqrt[3]{3^2}}$$

$$\frac{1}{\sqrt[3]{9}}$$



Topic: Fractional exponents**Question:** Simplify the expression.

$$\left(\frac{1}{3}\right)^{\frac{3}{2}}$$

Answer choices:

A $\frac{1}{3\sqrt{3}}$

B $\frac{\sqrt{3}}{3}$

C $\frac{1}{9}$

D $\frac{1}{3}$



Solution: A

We can rewrite the expression by breaking up the exponent.

$$\left(\frac{1}{3}\right)^{\frac{3}{2}}$$

$$\left[\left(\frac{1}{3}\right)^3\right]^{\frac{1}{2}}$$

$$\left(\frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3}\right)^{\frac{1}{2}}$$

Raising a number to the power $1/2$ is the same as taking the square root of that number, so we get

$$\sqrt{\frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3}}$$

$$\sqrt{\frac{1}{27}}$$

$$\frac{\sqrt{1}}{\sqrt{27}}$$

$$\frac{1}{\sqrt{9 \cdot 3}}$$

$$\frac{1}{\sqrt{9}\sqrt{3}}$$



$$\frac{1}{3\sqrt{3}}$$



Topic: Fractional exponents**Question:** Simplify the radical expression.

$$\sqrt[3]{6\sqrt{6}}$$

Answer choices:

A 6^3

B $6^{\frac{2}{3}}$

C $\sqrt{6}$

D $\sqrt[3]{6^{\frac{1}{4}}}$



Solution: C

We need to remember that $\sqrt{x} = x^{\frac{1}{2}}$ and rewrite

$$\sqrt[3]{6\sqrt{6}}$$

as

$$\sqrt[3]{6 \cdot 6^{\frac{1}{2}}}$$

$$\sqrt[3]{6^1 \cdot 6^{\frac{1}{2}}}$$

Since $x^a \cdot x^b = x^{a+b}$, we can add the exponents and get

$$\sqrt[3]{6^{1+\frac{1}{2}}}$$

$$\sqrt[3]{6^{\frac{3}{2}}}$$

Since $\sqrt[3]{x} = x^{\frac{1}{3}}$, we can change the expression to

$$\left(6^{\frac{3}{2}}\right)^{\frac{1}{3}}$$

Now we have an expression of the form $(6^c)^d$, with $c = 3/2$ and $d = 1/3$, so we can multiply the exponents.

$$6^{\frac{3}{2} \cdot \frac{1}{3}}$$

$$6^{\frac{1}{2}}$$

$$\sqrt{6}$$

