**Topic**: Power rule for fractional powers

Question: Differentiate the function.

$$f(x) = \sqrt{x}$$

**Answer choices:** 

$$\mathbf{A} \qquad f'(x) = -\frac{1}{2}\sqrt{x}$$

$$\mathsf{B} \qquad f'(x) = -\frac{1}{2\sqrt{x}}$$

$$C f'(x) = \frac{1}{2\sqrt{x}}$$

$$D f'(x) = \frac{1}{2}\sqrt{x}$$

**Solution**: C

Rewrite the function by converting the radical into a fractional exponent.

$$f(x) = x^{\frac{1}{2}}$$

Apply power rule to differentiate the function.

$$f'(x) = \frac{1}{2}x^{\frac{1}{2}-1}$$

$$f'(x) = \frac{1}{2}x^{-\frac{1}{2}}$$

Because the original function was given in terms of a root, rewrite this answer with a root instead of a fractional exponent.

$$f'(x) = \frac{1}{2x^{\frac{1}{2}}}$$

$$f'(x) = \frac{1}{2\sqrt{x}}$$

**Topic**: Power rule for fractional powers

Question: Differentiate the function.

$$f(x) = \frac{4}{\sqrt{x}}$$

**Answer choices:** 

$$\mathbf{A} \qquad f'(x) = -\frac{2}{\sqrt{x^3}}$$

$$\mathsf{B} \qquad f'(x) = -\frac{2}{\sqrt{x}}$$

C 
$$f'(x) = -2\sqrt{x^3}$$
D 
$$f'(x) = -2\sqrt{x}$$

$$D f'(x) = -2\sqrt{x}$$

## Solution: A

Rewrite the function by converting the radical into a fractional exponent.

$$f(x) = \frac{4}{x^{\frac{1}{2}}}$$

$$f(x) = 4x^{-\frac{1}{2}}$$

Apply power rule to differentiate the function.

$$f'(x) = 4\left(-\frac{1}{2}\right)x^{-\frac{1}{2}-1}$$

$$f'(x) = -\frac{4}{2}x^{-\frac{1}{2} - \frac{2}{2}}$$

$$f'(x) = -2x^{-\frac{3}{2}}$$

Because the original function was given in terms of a root, rewrite this answer with a root instead of a fractional exponent.

$$f'(x) = -\frac{2}{x^{\frac{3}{2}}}$$

$$f'(x) = -\frac{2}{\sqrt{x^3}}$$

**Topic**: Power rule for fractional powers

Question: Differentiate the function.

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

**Answer choices:** 

$$A f'(x) = -\frac{10}{3} \sqrt[3]{x^5}$$

B 
$$f'(x) = -\frac{10}{3\sqrt[3]{x^5}}$$

$$C f'(x) = -\frac{10}{3\sqrt[3]{x}}$$

$$D \qquad f'(x) = -\frac{10}{3}\sqrt[3]{x}$$



Solution: B

Rewrite the function by converting the radical into a fractional exponent.

$$f(x) = \frac{5}{x^{\frac{2}{3}}}$$

$$f(x) = 5x^{-\frac{2}{3}}$$

Apply power rule to differentiate the function.

$$f'(x) = 5\left(-\frac{2}{3}\right)x^{-\frac{2}{3}-1}$$

$$f'(x) = -\frac{10}{3}x^{-\frac{2}{3} - \frac{3}{3}}$$

$$f'(x) = -\frac{10}{3}x^{-\frac{5}{3}}$$

Because the original function was given in terms of a root, rewrite this answer with a root instead of a fractional exponent.

$$f'(x) = -\frac{10}{3x^{\frac{5}{3}}}$$

$$f'(x) = -\frac{10}{3\sqrt[3]{x^5}}$$