

The Big Question

Simplify.

Show, and explain, all of your work!

$$\begin{aligned} & \frac{\sqrt{x(x^{2n+1})}}{\sqrt[3]{x^{3n}}} \\ &= \frac{\overset{\text{just } x^1}{\downarrow} (x(x^{2n+1}))^{1/2}}{(x^{3n})^{1/3}} \longrightarrow \sqrt{x} \text{ is just } x^{1/2} \\ & \qquad \qquad \qquad \longrightarrow \sqrt[3]{x} \text{ is just } x^{1/3} \\ &= \frac{(x^{1+2n+1})^{1/2}}{x^{3n \cdot \frac{1}{3}}} \longrightarrow \text{used product rule} \\ &= \frac{(x^{2n+2})^{1/2}}{x^{\frac{3n}{3}}} \longleftarrow \text{multiply the } \frac{1}{2} \text{ by } 2n+2 \\ &= \frac{x^{(2n+2)(\frac{1}{2})}}{x^n} \\ &= \frac{x^{\frac{2n+2}{2}}}{x^n} \\ &= \frac{x^{n+1}}{x^n} \longleftarrow \text{quotient rule} \\ &= x^{(n+1)-n} \longrightarrow x^{n-n+1} \longrightarrow x^1 \\ &= \boxed{x} \end{aligned}$$