

$$\sqrt[2]{8a^3} = \sqrt[2]{2 \cdot 2 \cdot 2 \cdot a \cdot a \cdot a} = \boxed{2a\sqrt{2a}}$$

$\begin{matrix} \uparrow \\ \textcircled{2} \end{matrix}$
 $\begin{matrix} \uparrow \\ \textcircled{4} \end{matrix}$
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$$\sqrt[3]{250a^4b^5} = \sqrt[3]{5 \cdot 5 \cdot 5 \cdot 2 \cdot a \cdot a \cdot a \cdot a \cdot b \cdot b \cdot b \cdot b \cdot b} = \boxed{5ab^3\sqrt[3]{2ab^2}}$$

$\begin{matrix} \uparrow \\ \textcircled{5} \end{matrix}$
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 $\begin{matrix} \uparrow \\ \textcircled{5} \end{matrix}$
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$$\sqrt[10]{10^{\frac{5}{2}}} = \sqrt[10]{10^{\frac{5}{2}}} = \boxed{\sqrt[2]{10}}$$

★ 10 and 5 share common denominator.

$$\sqrt[9]{8^{\frac{1}{3}}a^{\frac{2}{3}}b^{\frac{6}{3}}} = \sqrt[9]{2^3a^{\frac{2}{3}}b^2} = \sqrt[\frac{9}{3}]{2^{\frac{3}{3}}a^{\frac{2}{3}}b^{\frac{6}{3}}} = \boxed{\sqrt[3]{2ab^2}}$$

$$\sqrt[12]{125a^6b^9} = \sqrt[12]{5^3a^6b^9} = \sqrt[\frac{12}{3}]{5^{\frac{3}{3}}a^{\frac{6}{3}}b^{\frac{9}{3}}} = \boxed{\sqrt[4]{5a^2b^3}}$$