

1) Evaluate and simplify each of the following:

$$\begin{aligned} \text{a) } 100^{\frac{1}{2}} \\ \sqrt{100} \\ \boxed{10} \end{aligned}$$

$$\begin{aligned} \text{b) } (-125)^{\frac{1}{3}} \\ \sqrt[3]{-125} \\ \boxed{-5} \end{aligned}$$

$$\begin{aligned} \text{c) } -4^{\frac{3}{2}} \\ -(\sqrt{4})^3 \\ -2^3 \\ \boxed{-8} \end{aligned}$$

$$\begin{aligned} \text{d) } 4^{\frac{3}{2}} \\ (\sqrt{4})^3 \\ 2^3 \\ \boxed{8} \end{aligned}$$

$$\begin{aligned} \text{e) } \left(\frac{100}{9}\right)^{\frac{1}{2}} \\ \left(\frac{9}{100}\right)^{\frac{1}{2}} \\ \sqrt{\frac{9}{100}} = \boxed{\frac{3}{10}} \end{aligned}$$

$$\begin{aligned} \text{f) } \left(\frac{8}{27}\right)^{\frac{1}{3}} \\ \sqrt[3]{\frac{8}{27}} \\ \boxed{\frac{2}{3}} \end{aligned}$$

$$\begin{aligned} \text{g) } \left(\frac{64}{9}\right)^{\frac{1}{2}} \\ \left(\frac{9}{64}\right)^{\frac{1}{2}} \\ \sqrt{\frac{9}{64}} = \boxed{\frac{3}{8}} \end{aligned}$$

$$\begin{aligned} \text{h) } \left(\frac{16}{25}\right)^{\frac{3}{2}} \\ \left(\sqrt{\frac{16}{25}}\right)^3 \\ \left(\frac{4}{5}\right)^3 = \boxed{\frac{64}{125}} \end{aligned}$$

$$\begin{aligned} \text{i) } \left(\frac{81}{16}\right)^{\frac{1}{4}} \\ \left(\frac{16}{81}\right)^{\frac{1}{4}} \\ \sqrt[4]{\frac{16}{81}} = \boxed{\frac{2}{3}} \end{aligned}$$

$$\begin{aligned} \text{j) } \left(\frac{125x^3}{8y^3}\right)^{\frac{1}{3}} \\ \sqrt[3]{\frac{125x^3}{8y^3}} \\ \boxed{\frac{5x}{2y}} \end{aligned}$$

$$\begin{aligned} \text{k) } \left(\frac{1000x^3}{27y^3}\right)^{\frac{1}{3}} \\ \left(\frac{27y^3}{1000x^3}\right)^{\frac{1}{3}} \rightarrow \sqrt[3]{\frac{27y^3}{1000x^3}} \\ \boxed{\frac{3y}{10x}} \end{aligned}$$

2) Solve each of the following equations for the indicated variable. Show all work!

$$\begin{aligned} \text{a) } (x^{\frac{1}{2}})^2 = (9)^2 \\ \boxed{x = 81} \end{aligned}$$

$$\begin{aligned} \text{b) } 81x^{\frac{1}{3}} = 81 \\ \frac{81}{81} x^{\frac{1}{3}} = \frac{81}{81} \\ (x^{\frac{1}{3}})^3 = (1)^3 \\ \boxed{x = 1} \end{aligned}$$

$$\begin{aligned} \text{c) } \frac{50}{5} = \frac{5x^2}{5} \\ (10)^2 = (x^{\frac{1}{2}})^2 \\ \boxed{100 = x} \end{aligned}$$

$$\begin{aligned} \text{d) } \frac{4b^{\frac{2}{3}}}{4} = \frac{81}{4} \\ (b^{\frac{2}{3}})^{-\frac{3}{2}} = \left(\frac{81}{4}\right)^{-\frac{3}{2}} \\ b = \left(\frac{4}{81}\right)^{\frac{3}{2}} \\ b = \left(\sqrt{\frac{4}{81}}\right)^3 \\ b = \left(\frac{2}{9}\right)^3 \quad \boxed{b = \frac{8}{729}} \end{aligned}$$

$$\begin{aligned} \text{e) } \frac{100h^{\frac{2}{3}}}{100} = \frac{9}{100} \\ (h^{\frac{2}{3}})^{-\frac{3}{2}} = \left(\frac{9}{100}\right)^{-\frac{3}{2}} \\ h = \left(\frac{100}{9}\right)^{\frac{3}{2}} \\ h = \left(\sqrt{\frac{100}{9}}\right)^3 \\ h = \left(\frac{10}{3}\right)^3 \quad \boxed{h = \frac{1000}{27}} \end{aligned}$$

$$\begin{aligned} \text{f) } \frac{2x^{-1}}{2} = \frac{162}{2} \\ (x^{-1})^{-\frac{1}{2}} (81)^{-\frac{1}{4}} \\ x = \left(\frac{1}{81}\right)^{\frac{1}{4}} \\ x = \sqrt[4]{\frac{1}{81}} \\ \boxed{x = \frac{1}{3}} \end{aligned}$$