9.4 – Simplifying Radicals with Variables

Simplify the following radicals.

1. $\sqrt{x^4} =$

$\sqrt{x \cdot x \cdot x \cdot x}$

$x \cdot x =$

x^2

2. $\sqrt{36x^8} =$

$6\sqrt{x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x} =$

$6 \cdot x \cdot x \cdot x \cdot x =$

$6x^4$

3. $\sqrt{98x^9y^4} =$

$7\sqrt{2 \cdot x^8 \times y^4}$

$7x^4y^2\sqrt{2x}$

$\begin{array}{r|l} 7 & 98 \\ \hline & 49 \\ \hline & 7 \end{array}$

4. $5\sqrt{300x^{16}} =$

$5 \cdot 2 \cdot 5 \times^8 \sqrt{3} =$

$50x^8\sqrt{3}$

$\begin{array}{r|l} 2 & 300 \\ \hline 2 & 150 \\ \hline 5 & 75 \\ \hline 5 & 15 \\ \hline & 3 \end{array}$

5. $\sqrt{x^5} =$

$\sqrt{x \cdot x \cdot x \cdot x \cdot x}$

$x \cdot x \cdot \sqrt{x}$

$x^2\sqrt{x}$

6. $\sqrt{24x^7} =$

$2\sqrt{x^6 \cdot x \cdot 2 \cdot 3}$

$2x^3\sqrt{6x}$

$\begin{array}{r|l} 2 & 24 \\ \hline 2 & 12 \\ \hline 2 & 6 \\ \hline & 3 \end{array}$

7. $\sqrt{72x^9y^{13}} =$

$6\sqrt{2 \cdot x^8 \cdot x \cdot y^{12} \cdot y}$

$6x^4y^6\sqrt{2xy}$

$\begin{array}{r|l} 2 & 72 \\ \hline 2 & 36 \\ \hline 2 & 18 \\ \hline 3 & 9 \\ \hline & 3 \end{array}$