

Name: _____

Date: _____

Learning Goal 0.2**Expectations for algebra from previous years.****More Questions – Solutions**

1. Simplify the following expressions, rationalizing any denominators. All exponents must be whole numbers.

$$\begin{aligned}
 \text{a. } & (n^4)^{-1/3} \times 2n^{-1} \\
 &= n^{-4/3} \times 2n^{-1} \\
 &= 2n^{-7/3} \\
 &= \frac{2}{n^{7/3}} \\
 &= \frac{2}{\sqrt[3]{n^7}} \\
 &= \frac{2}{n^2\sqrt[3]{n}} \\
 &= \frac{2\sqrt[3]{n^2}}{n^3}
 \end{aligned}$$

$$\begin{aligned}
 \text{b. } & \left(\frac{x^2y}{y^{-2}}\right)^{-2} \\
 &= \left(\frac{y^{-2}}{x^2y}\right)^2 \\
 &= \left(\frac{1}{x^2y^3}\right)^2 \\
 &= \frac{1}{x^4y^6}
 \end{aligned}$$

$$\begin{aligned}
 \text{c. } & \frac{(32pm^{-1})^{-1/4} \times 2m^{-1}p^3}{2pq^2} \\
 &= \frac{2m^{-1}p^3}{(2^5pm^{-1})^{1/4} \times 2pq^2} \\
 &= \frac{p^2}{2^{5/4}p^{1/4}m^{-1/4} \times mq^2} \\
 &= \frac{m^{1/4}p^2}{2^{5/4}p^{1/4} \times mq^2} \\
 &= \frac{p^{7/4}}{2^{5/4}m^{3/4}q^2} \\
 &= \frac{p \times \sqrt[4]{p^3}}{2q^2 \times \sqrt[4]{2m^3}} \\
 &= \frac{p \times \sqrt[4]{8mp^3}}{4mq^2}
 \end{aligned}$$

$$\begin{aligned}
 \text{d. } & \left(\frac{x^{1/2}y^{-2}}{x^2y^{1/2}}\right)^4 \\
 &= \frac{x^2y^{-8}}{x^8y^2} \\
 &= \frac{1}{x^6y^{10}}
 \end{aligned}$$

$$\begin{aligned}
 \text{e. } & \frac{(2x^{-3}z^2)^3}{x^3y^4z^2 \times x^{-4}z^3} \\
 &= \frac{8x^{-9}z^6}{x^{-1}y^4z^5} \\
 &= \frac{8z}{x^8y^4}
 \end{aligned}$$

$$\begin{aligned}
 \text{f. } & (8x^{n+2}y^{n+1})^{2/n} \\
 &= (64x^{2n+4}y^{2n+2})^{1/n} \\
 &= \sqrt[n]{64x^{2n+4}y^{2n+2}} \\
 &= x^2y^2 \times \sqrt[n]{64x^4y^2}
 \end{aligned}$$

2. Rationalize and simplify the following expressions.

$$\begin{aligned}
 \text{a. } \frac{\sqrt{2}}{\sqrt{12}} - \frac{5\sqrt{3}}{\sqrt{8}} &= \frac{1}{\sqrt{6}} - \frac{5\sqrt{3}}{\sqrt{8}} \\
 &= \frac{\sqrt{6}}{6} - \frac{5\sqrt{24}}{8} \\
 &= \frac{\sqrt{6}}{6} - \frac{10\sqrt{6}}{8} \\
 &= \frac{4\sqrt{6}}{24} - \frac{30\sqrt{6}}{24} \\
 &= -\frac{26\sqrt{6}}{24} \\
 &= -\frac{13\sqrt{6}}{12}
 \end{aligned}$$

$$\begin{aligned}
 \text{b. } \frac{2\sqrt{x} + 3\sqrt{y}}{\sqrt{x} - \sqrt{y}} &= \frac{2\sqrt{x} + 3\sqrt{y}}{\sqrt{x} - \sqrt{y}} \times \frac{\sqrt{x} + \sqrt{y}}{\sqrt{x} + \sqrt{y}} \\
 &= \frac{2x + 5\sqrt{xy} + 3y}{x - y}
 \end{aligned}$$

$$\begin{aligned}
 \text{c. } \frac{2\sqrt{2}}{\sqrt{16} - \sqrt{12}} &= \frac{2\sqrt{2}}{4 - 2\sqrt{3}} \\
 &= \frac{2\sqrt{2}}{4 - 2\sqrt{3}} \times \frac{4 + 2\sqrt{3}}{4 + 2\sqrt{3}} \\
 &= \frac{8\sqrt{2} + 4\sqrt{6}}{16 - 12} \\
 &= \frac{8\sqrt{2} + 4\sqrt{6}}{4} \\
 &= 2\sqrt{2} + \sqrt{6}
 \end{aligned}$$

$$\begin{aligned}
 \text{d. } \frac{2\sqrt{2}}{2\sqrt{3} - \sqrt{8}} &= \frac{2\sqrt{2}}{2\sqrt{3} - 2\sqrt{2}} \\
 &= \frac{2\sqrt{2}}{2\sqrt{3} - 2\sqrt{2}} \times \frac{2\sqrt{3} + 2\sqrt{2}}{2\sqrt{3} + 2\sqrt{2}} \\
 &= \frac{4\sqrt{6} + 4\sqrt{4}}{12 - 8} \\
 &= \frac{4\sqrt{6} + 8}{4} \\
 &= \sqrt{6} + 2
 \end{aligned}$$

$$\begin{aligned}
 \text{e. } \frac{3}{\sqrt{5} - \sqrt{2}} &= \frac{3}{\sqrt{5} - \sqrt{2}} \times \frac{\sqrt{5} + \sqrt{2}}{\sqrt{5} + \sqrt{2}} \\
 &= \frac{3(\sqrt{5} + \sqrt{2})}{5 - 2} \\
 &= \frac{3(\sqrt{5} + \sqrt{2})}{3} \\
 &= \sqrt{5} + \sqrt{2}
 \end{aligned}$$

$$\begin{aligned}
 \text{f. } \frac{2\sqrt{3} - \sqrt{2}}{5\sqrt{2} + \sqrt{3}} &= \frac{2\sqrt{3} - \sqrt{2}}{5\sqrt{2} + \sqrt{3}} \times \frac{5\sqrt{2} - \sqrt{3}}{5\sqrt{2} - \sqrt{3}} \\
 &= \frac{10\sqrt{6} - 2\sqrt{9} - 5\sqrt{4} - \sqrt{6}}{50 - 3} \\
 &= \frac{9\sqrt{6} - 16}{47}
 \end{aligned}$$

3. Rationalize the numerator.

$$\begin{aligned}
 \text{a. } & \frac{\sqrt{5} - 1}{4} \\
 &= \frac{\sqrt{5} - 1}{4} \times \frac{\sqrt{5} + 1}{\sqrt{5} + 1} \\
 &= \frac{5 - 1}{4(\sqrt{5} + 1)} \\
 &= \frac{4}{4(\sqrt{5} + 1)} \\
 &= \frac{1}{\sqrt{5} + 1}
 \end{aligned}$$

$$\begin{aligned}
 \text{b. } & \frac{2 - 3\sqrt{2}}{2} \\
 &= \frac{2 - 3\sqrt{2}}{2} \times \frac{2 + 3\sqrt{2}}{2 + 3\sqrt{2}} \\
 &= \frac{4 - 18}{2(2 + 3\sqrt{2})} \\
 &= \frac{-14}{2(2 + 3\sqrt{2})} \\
 &= \frac{-7}{2 + 3\sqrt{2}}
 \end{aligned}$$

$$\begin{aligned}
 \text{c. } & \frac{\sqrt{5} + 2}{2\sqrt{5} - 1} \\
 &= \frac{\sqrt{5} + 2}{2\sqrt{5} - 1} \times \frac{\sqrt{5} - 2}{\sqrt{5} - 2} \\
 &= \frac{5 - 4}{10 - 4\sqrt{5} - \sqrt{5} + 2} \\
 &= \frac{1}{12 - 5\sqrt{5}}
 \end{aligned}$$

$$\begin{aligned}
 \text{d. } & \frac{\sqrt{a} - 2}{a - 4} \\
 &= \frac{\sqrt{a} - 2}{a - 4} \times \frac{\sqrt{a} + 2}{\sqrt{a} + 2} \\
 &= \frac{a\sqrt{a} + 2a - 4\sqrt{a} - 8}{(a - 4)(\sqrt{a} + 2)} \\
 &= \frac{1}{\sqrt{a} + 2}
 \end{aligned}$$

$$\begin{aligned}
 \text{e. } & \frac{\sqrt{x+4} - 2}{x} \\
 &= \frac{\sqrt{x+4} - 2}{x} \times \frac{\sqrt{x+4} + 2}{\sqrt{x+4} + 2} \\
 &= \frac{(x+4) - 4}{x(\sqrt{x+4} + 2)} \\
 &= \frac{x}{x(\sqrt{x+4} + 2)} \\
 &= \frac{1}{\sqrt{x+4} + 2}
 \end{aligned}$$

$$\begin{aligned}
 \text{f. } & \frac{\sqrt{x+h} - x}{x} \\
 &= \frac{\sqrt{x+h} - x}{x} \times \frac{\sqrt{x+h} + x}{\sqrt{x+h} + x} \\
 &= \frac{(x+h) - x^2}{x(\sqrt{x+h} + x^2)} \\
 &= -\frac{x^2 - x - h}{x\sqrt{x+h} + x^2}
 \end{aligned}$$