Sections 10.1-10.4: Radical Expressions and Graphs, Rational Exponents, Simplifying Radical Expressions, and Adding and Subtracting Radical Expressions

Assume all variables are positive real numbers

1. Simplify the following. Express your answers in simplest radical form.

\[ \begin{align*}
\sqrt[3]{\frac{49}{36}} & \quad -\sqrt[3]{48} & \quad (-64)^{1/2} & \quad \sqrt[3]{-343} \\
81^{1/3} & \quad \sqrt{54} & \quad \frac{22}{121^{1/2}} & \quad \sqrt[3]{\frac{16}{8}}
\end{align*} \]

2. Perform the indicated operations, expressing your answer in simplest exponent form.

(a) \( \sqrt[3]{\sqrt{3x}} \)

(b) \( \frac{\sqrt{x^5}}{\sqrt{x^3}} \)

(c) \( \sqrt[3]{\sqrt{x^{32}}} \)

(d) \( \frac{3x^3 \frac{1}{x^2} \sqrt{x}}{\sqrt[6]{\frac{1}{x^3}}} \)

(e) \( \sqrt[5]{x^5}(3\sqrt[5]{x^5} + 5\sqrt[5]{x^{11}}) \)

3. Perform the indicated operations. Express your answers in simplest radical form.

(a) \( 3\sqrt{5} - \sqrt{20} + 2\sqrt{15} \)

(b) \( x\sqrt{x^3y} - y\sqrt{xy^3} \)

(c) \( 2\sqrt{2} + \frac{\sqrt{2}}{\sqrt{8}} \)

4. Find the distance between \((8,13)\) and \((2,5)\). Express your solution in simplest radical form.

5. Find the perimeter of a rectangle with sides of length \( \sqrt{192} \) and width \( \sqrt{48} \). Express your solution in simplest radical form.