

Mathematics 20-1
 Chapter 5: Radical Expressions and Equations
 Final Exam Review Assignment

Name: Answers
 Date: _____

1. Convert each entire radical to a mixed radical in simplest form.

$$\begin{aligned} \text{a) } & \sqrt{200} \\ &= \sqrt{100 \cdot 2} \\ &= 10\sqrt{2} \end{aligned}$$

$$\begin{aligned} \text{b) } & \sqrt{24x^3y^4z^5}; x, y, z \geq 0 \\ &= 2xy^2z^2\sqrt{6xz} \end{aligned}$$

$$\begin{aligned} \text{c) } & 3\sqrt{18} \\ &= 3\sqrt{9 \cdot 2} \\ &= 3(3)\sqrt{2} \\ &= 9\sqrt{2} \end{aligned}$$

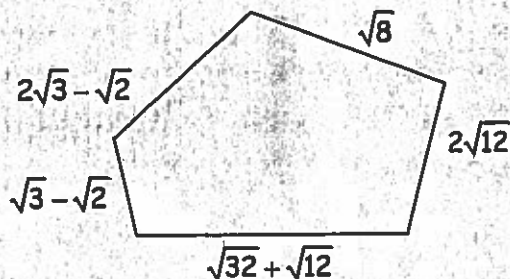
$$\begin{aligned} \text{d) } & -\frac{1}{5}\sqrt{125} \\ &= -\frac{1}{5}\sqrt{25 \cdot 5} \\ &= -\frac{1}{5}(5)\sqrt{5} \\ &= -\sqrt{5} \end{aligned}$$

2. Simplify radicals and combine like terms.

$$\begin{aligned} \text{a) } & \sqrt{32} + \sqrt{50} \\ &= 4\sqrt{2} + 5\sqrt{2} \\ &= 9\sqrt{2} \end{aligned}$$

$$\begin{aligned} \text{b) } & 18\sqrt{27} - 25\sqrt{75} \\ &= 18(3\sqrt{3}) - 25(5)\sqrt{3} \\ &= 54\sqrt{3} - 125\sqrt{3} \\ &= -71\sqrt{3} \end{aligned}$$

3. Determine the perimeter in simplest mixed radical form.



$$\begin{aligned} & \sqrt{8} + 2\sqrt{12} + \sqrt{32} + \sqrt{12} + \sqrt{3} - \sqrt{2} + 2\sqrt{3} - \sqrt{2} \\ &= 2\sqrt{2} + 2(2\sqrt{3}) + 4\sqrt{2} + 2\sqrt{3} + \sqrt{3} - \sqrt{2} + 2\sqrt{3} - \sqrt{2} \\ &= 4\sqrt{2} + 4\sqrt{3} + 2\sqrt{3} + \sqrt{3} + 2\sqrt{3} \\ &= 4\sqrt{2} + 9\sqrt{3} \end{aligned}$$

4. Simplify. Express all products or quotients in simplest mixed radical form.

$$\begin{aligned} \text{a) } & 2\sqrt{24} \times 5\sqrt{6} \\ &= 2(2\sqrt{6}) \times 5\sqrt{6} \\ &= 4\sqrt{6} \cdot 5\sqrt{6} \\ &= 20(6) \\ &= 120 \end{aligned}$$

$$\begin{aligned} \text{b) } & 2\sqrt{2}(3\sqrt{32} - 2\sqrt{50}) \\ &= 2\sqrt{2}(3 \cdot 4\sqrt{2} - 2 \cdot 5\sqrt{2}) \\ &= 2\sqrt{2}(12\sqrt{2} - 10\sqrt{2}) \\ &= 2\sqrt{2}(2\sqrt{2}) \\ &= 4(2) \\ &= 8 \end{aligned}$$

$$\begin{aligned} \text{c) } & 2(\sqrt{3} - 3\sqrt{2}) - 3(6\sqrt{3} - 2\sqrt{2}) \\ &= 2\sqrt{3} - 6\sqrt{2} - 18\sqrt{3} + 6\sqrt{2} \\ &= -16\sqrt{3} \end{aligned}$$

$$\begin{aligned} \text{d) } & \frac{\sqrt{48}}{\sqrt{3}} \\ &= \frac{4\sqrt{3}}{\sqrt{3}} \\ &= 4 \end{aligned}$$

$$\begin{aligned} \text{e) } & \frac{24\sqrt{21}}{6\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} \\ &= \frac{4\sqrt{63}}{3} \\ &= \frac{4 \cdot 3\sqrt{7}}{3} \\ &= 4\sqrt{7} \end{aligned}$$

$$\begin{aligned} \text{f) } & \frac{3\sqrt{2}}{2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} \\ &= \frac{3\sqrt{6}}{2(3)} \\ &= \frac{\sqrt{6}}{2} \end{aligned}$$

$$\begin{aligned}
 \text{g) } & \frac{4}{2-\sqrt{3}} \cdot \frac{2+\sqrt{3}}{2+\sqrt{3}} \\
 & = \frac{8+4\sqrt{3}}{4-3} \\
 & = \frac{8+4\sqrt{3}}{1} \\
 & = 8+4\sqrt{3}
 \end{aligned}$$

$$\begin{aligned}
 \text{h) } & \frac{\sqrt{2}}{\sqrt{12}-\sqrt{8}} = \frac{\sqrt{2}}{2\sqrt{3}-2\sqrt{2}} \cdot \frac{2\sqrt{3}+2\sqrt{2}}{2\sqrt{3}+2\sqrt{2}} \\
 & = \frac{2\sqrt{6}+2(2)}{4(3)-4(2)} \\
 & = \frac{2\sqrt{6}+4}{4(3)-4(2)} \\
 & = \frac{2\sqrt{6}+4}{12-8} \\
 & = \frac{2\sqrt{6}+4}{4} \\
 & = \frac{2(\sqrt{6}+2)}{4} \\
 & = \frac{\sqrt{6}+2}{2}
 \end{aligned}$$

$$\begin{aligned}
 & \frac{3\sqrt{5}-2\sqrt{3}}{3\sqrt{5}+2\sqrt{3}} \cdot \frac{3\sqrt{5}-2\sqrt{3}}{3\sqrt{5}-2\sqrt{3}} \\
 & = \frac{9(5)-6\sqrt{15}-6\sqrt{15}+4(3)}{9(5)-4(3)} \\
 & = \frac{45-12\sqrt{15}+12}{45-12} \\
 & = \frac{57-12\sqrt{15}}{33}
 \end{aligned}$$

5. Algebraically solve the following radical equations.

$$\begin{aligned}
 \text{a) } & (\sqrt{2x-3})^2 = (5)^2 \\
 & 2x-3 = 25 \\
 & 2x = 25+3 \\
 & \frac{2x}{2} = \frac{28}{2} \\
 & x = 14
 \end{aligned}$$

LHS $\frac{\text{Verify}}{\sqrt{28-3}}$ RHS
5 ✓

$$\begin{aligned}
 \text{b) } & (\sqrt{x+2})^2 = (x)^2 \\
 & x+2 = x^2 \\
 & x^2-x-2 = 0 \\
 & (x-2)(x+1) = 0 \\
 & x=2 \quad x=-1
 \end{aligned}$$

P-2
S-1
-2, 1
Verify
x=2
LHS $\frac{\text{Verify}}{\sqrt{4}}$ RHS 2 ✓
x=-1
LHS $\frac{\text{Verify}}{\sqrt{1}}$ RHS 1 ✓

$$\begin{aligned}
 \text{c) } & \sqrt{x-3} + \sqrt{x} = 3 \\
 & (\sqrt{x-3})^2 = (3-\sqrt{x})^2 \\
 & x-3 = 9-3\sqrt{x}-3\sqrt{x}+x \\
 & x-3 = 9-6\sqrt{x}+x \\
 & -12 = -6\sqrt{x} \\
 & \frac{-12}{-6} = \frac{-6\sqrt{x}}{-6} \\
 & 2 = \sqrt{x} \\
 & (-2)^2 = (\sqrt{x})^2 \quad \text{Verify} \\
 & 4 = x
 \end{aligned}$$

x=4
LHS $\frac{\text{Verify}}{\sqrt{4-3} + \sqrt{4}}$ RHS 3 ✓
1+2
3

$$\begin{aligned}
 \text{d) } & (\sqrt{2x^2-7})^2 = (3-x)^2 \\
 & 2x^2-7 = (3-x)(3-x) \\
 & 2x^2-7 = 9-3x-3x+x^2 \\
 & x^2+6x-16 = 0 \\
 & (x+8)(x-2) = 0 \\
 & x=-8 \quad x=2
 \end{aligned}$$

P-16
S 6
8, -2
Verify
x=-8
LHS $\frac{\text{Verify}}{\sqrt{2(64)-7}}$ RHS 3-(-8) 3+8
 $\frac{\text{Verify}}{\sqrt{128-7}}$ 3+8
 $\frac{\text{Verify}}{\sqrt{121}}$ 11 ✓
x=2
LHS $\frac{\text{Verify}}{\sqrt{2(4)-7}}$ RHS 3-2
 $\frac{\text{Verify}}{\sqrt{8-7}}$ 1 ✓
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