

Name: _____

Operations with Radicals

Exercise 1: Combine the following expressions, if possible. Assume that all variables under an even root are nonnegative.

1) $4\sqrt{3} - 2\sqrt{3}$

2) $\sqrt[3]{x^4y^2} + 7x\sqrt[3]{xy^2}$

3) $6y\sqrt{a} - 2y\sqrt{a}$

4) $2\sqrt[3]{x^8y^6} - 3y^2\sqrt[3]{8x^8}$

5) $5x\sqrt{6} - 3x\sqrt{6} - 2x\sqrt{6}$

6) $5a^2\sqrt{27ab^3} - 6b\sqrt{12a^5b}$

7) $5\sqrt[3]{16} - 4\sqrt[3]{54}$

8) $\sqrt[3]{-27r^6} - 4r\sqrt[3]{64r^3}$

9) $\frac{1}{2}\sqrt{128} + \frac{1}{3}\sqrt{225}$

10) $5\sqrt{y} - 2\sqrt[3]{y}$

Exercise 2: Multiply or divide as indicated and simplify. Assume that all variables under an even root are nonnegative.

1) $(2\sqrt{3})(5\sqrt{7})$

2) $(3\sqrt[3]{3})(6\sqrt[3]{9})$

3) $(\sqrt{x+5})(\sqrt{x-3})$

4) $(\sqrt{x-3})^2$

5) $(2\sqrt{a} - 3\sqrt{b})^2$

6) $(\sqrt{v} + 7)(\sqrt{v} - 7)$

7) $(5 - \sqrt{v})(5 + \sqrt{v})$

8) $(\sqrt{s} - \sqrt{2s})(\sqrt{s} + \sqrt{2s})$

Exercise 3: Find $f(x) + g(x)$ and $f(x) - g(x)$:

1) $f(x) = \sqrt[3]{81}$ and $g(x) = \sqrt[3]{75}$

2) $f(x) = \sqrt{20a^3b^2}$ and $g(x) = \sqrt{45a^5}$

Exercise 4: Find $f(x) \cdot g(x)$ if $f(x) = \sqrt{x} - 1$ and $g(x) = \sqrt{x} + 3$.

Exercise 5: Evaluate and simplify $\sqrt{b^2 - 4ac}$ if $a = 2$, $b = -6$, and $c = 3$.

Exercise 6: Show that $\sqrt{a+b} = \sqrt{a} + \sqrt{b}$ is not true by using $a = 9$ and $b = 16$ and simplifying both sides.

Exercise 7: The length of a diagonal of a rectangular box with length l , width w , and height h is given by $d = \sqrt{l^2 + w^2 + h^2}$. Find the length of the diagonal of a rectangular box that is 3 feet wide, 4 feet long, and 12 feet high.

Exercise 8: Simplify

1) $\sqrt{x^2 - 16x + 64}$

2) $\sqrt{x^2 - 8x + 16}$

3) $\sqrt{x^2 + 4x + 4}$

4) $\sqrt{x^2 + 20x + 100}$