

11.2 Summary: Simplifying Radical Expressions

In the left column of the table below, explain in words how to complete each given mathematical task (simplifying a square root, adding/subtracting, etc). In the right column, show all steps to fully simplify the given expression.

Process in words:	Mathematical work:
How to simplify a square root:	Simplify $-3\sqrt{108}$ $-3\sqrt{36 \cdot 3}$ $-3 \cdot 6\sqrt{3}$ $-18\sqrt{3}$
How to add or subtract square roots:	Simplify $2\sqrt{75} + 2\sqrt{48} - \sqrt{200}$ $2\sqrt{25 \cdot 3} + 2\sqrt{16 \cdot 3} - \sqrt{100 \cdot 2}$ $2 \cdot 5\sqrt{3} + 2 \cdot 4\sqrt{3} - 10\sqrt{2}$ $10\sqrt{3} + 8\sqrt{3} - 10\sqrt{2}$ $18\sqrt{3} - 10\sqrt{2}$
How to multiply square roots:	Simplify $\sqrt{12x} \cdot \sqrt{15xy^3}$ $\sqrt{180x^2y^3} = \sqrt{36 \cdot 5x^2y^3}$ $6xy\sqrt{5y}$
How to simplify a square root of a fraction	Simplify $\frac{\sqrt{14}}{\sqrt{12}} = \frac{\sqrt{14}}{2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{42}}{2\sqrt{9}}$ $= \frac{\sqrt{42}}{6}$

Practice- Simplify each expression fully!

1. $\sqrt{200}$ $10\sqrt{2}$	2. $\sqrt{45}$ $3\sqrt{5}$	3. $\sqrt{112} = \sqrt{16 \cdot 7}$ $4\sqrt{7}$
4. $\sqrt{400d}$ $20\sqrt{d}$	5. $\sqrt{9y^2}$ $3y$	6. $\sqrt{25n^3}$ $5n\sqrt{n}$
7. $\sqrt{3} \cdot \sqrt{21}$ $\sqrt{63}$ $3\sqrt{7}$	8. $\sqrt{20} \cdot \sqrt{15}$ $\sqrt{300}$ $10\sqrt{3}$	9. $\sqrt{10x} \cdot \sqrt{2x}$ $\sqrt{20x^2} \sqrt{4 \cdot 5x^2}$ $2x\sqrt{5}$
10. $10\sqrt{7} + 3\sqrt{7}$ $13\sqrt{7}$	11. $2\sqrt{27} + 3\sqrt{40} - 5\sqrt{48}$ $6\sqrt{3} + 6\sqrt{10} - 20\sqrt{3}$ $-14\sqrt{3} + 6\sqrt{10}$	12. $\sqrt{124m^4n^{10}} \sqrt{4 \cdot 31m^4n^{10}}$ $2m^2n^5\sqrt{31}$

Simplify the expression by rationalizing the denominator:

13. $\frac{4}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{4\sqrt{5}}{5}$	14. $\frac{\sqrt{3}}{\sqrt{50}} = \frac{\sqrt{3}}{5\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$ $= \frac{\sqrt{6}}{10}$	15. $\frac{\sqrt{9}}{\sqrt{75}} = \frac{3}{5\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$ $= \frac{3\sqrt{3}}{15} = \frac{\sqrt{3}}{5}$
16. $\frac{2}{\sqrt{p}} \cdot \frac{\sqrt{p}}{\sqrt{p}} = \frac{2\sqrt{p}}{p}$	17. $\frac{1}{\sqrt{3y}} \cdot \frac{\sqrt{3y}}{\sqrt{3y}} = \frac{\sqrt{3y}}{3y}$	18. $\frac{9}{\sqrt{2x}} \cdot \frac{\sqrt{2x}}{\sqrt{2x}} = \frac{9\sqrt{2x}}{2x}$