perfect squares: 1 4 9 16 25 36 49 64 81 100 121 144 169 196 225 256 289 324 361 400
perfect cubes: 1 8 27 64 125 216 343 512 729 1000

Principles of Algebra Name/Date Clee / Today

ALL PROBLEMS CAN BE COMPLETED ON THIS WORKSHEET

WS 14E.1 – Simplifying Radicals with Conjugates

#1-8, Simplify each radical expression.

1. $(4-2\sqrt{3})^2 = (4-2\sqrt{3})(4-2\sqrt{3})$

F O I L

$= 16 - 8\sqrt{3} - 8\sqrt{3} + 4\sqrt{9}$

$= 16 - 16\sqrt{3} + 12$

$= \boxed{28 - 16\sqrt{3}}$

2. $(4-2\sqrt{3})(4+2\sqrt{3})$ ← conjugates (outside/inside will cancel)

F O I L

$= 16 + 8\sqrt{3} - 8\sqrt{3} - 4\sqrt{9}$

$= 16 - 12$

$= \boxed{4}$

3. $\frac{2}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{2\sqrt{5}}{\sqrt{25}}$

$= \boxed{\frac{2\sqrt{5}}{5}}$

4. $\frac{2}{1+\sqrt{5}} \cdot \frac{(1-\sqrt{5})}{(1-\sqrt{5})}$ ← conjugate shortcut (FØYL)

$= \frac{2-2\sqrt{5}}{1-\sqrt{25}} = \frac{2-2\sqrt{5}}{-4} = \boxed{\frac{-1+\sqrt{5}}{2}}$

5. $\frac{4}{2\sqrt{3}-2} \cdot \frac{(2\sqrt{3}+2)}{(2\sqrt{3}+2)}$ ← conjugate shortcut (FØYL)

$= \frac{8\sqrt{3}+8}{4\sqrt{9}-4} = \frac{8\sqrt{3}+8}{12-4}$

$= \frac{8\sqrt{3}+8}{8} = \boxed{\sqrt{3}+1}$

6. $\frac{7-3\sqrt{6}}{\sqrt{5}-\sqrt{6}} \cdot \frac{(\sqrt{5}+\sqrt{6})}{(\sqrt{5}+\sqrt{6})}$ ← all 4 steps of FOIL ← conjugate shortcut (FØYL)

$= \frac{7\sqrt{5}+7\sqrt{6}-3\sqrt{30}-3\sqrt{36}}{\sqrt{25}-\sqrt{36}}$

$= \frac{7\sqrt{5}+7\sqrt{6}-3\sqrt{30}-18}{-1}$

$= \boxed{-7\sqrt{5}-7\sqrt{6}+3\sqrt{30}+18}$

7. $\frac{3+\sqrt{8}}{2-2\sqrt{8}} \cdot \frac{(2+2\sqrt{8})}{(2+2\sqrt{8})}$ ← all 4 steps of FOIL ← conjugate shortcut (FØYL)

$= \frac{6+6\sqrt{8}+2\sqrt{8}+2\sqrt{64}}{4-4\sqrt{64}}$

$= \frac{6+8\sqrt{4\cdot 2}+16}{4-32} = \frac{22+16\sqrt{2}}{-28}$

$= \boxed{\frac{-11-8\sqrt{2}}{14}}$

8. $\frac{2+\sqrt{10}}{\sqrt{2}-3\sqrt{5}} \cdot \frac{(\sqrt{2}+3\sqrt{5})}{(\sqrt{2}+3\sqrt{5})}$ ← all 4 steps of FOIL ← conjugate shortcut (FØYL)

$= \frac{2\sqrt{2}+6\sqrt{5}+\sqrt{20}+3\sqrt{50}}{\sqrt{4}-9\sqrt{25}}$

$= \frac{2\sqrt{2}+6\sqrt{5}+\sqrt{4\cdot 5}+3\sqrt{25\cdot 2}}{2-45}$

$= \boxed{\frac{17\sqrt{2}+8\sqrt{5}}{-43}}$ OR $\boxed{\frac{-17\sqrt{2}-8\sqrt{5}}{43}}$