## Simplifying and Rationalizing Radicals

ame: Hirsch 1st

Simplifying Radicals:

STEP 1: Create a factor tree

• If Even: Divide by 2 until you can't anymore

• If Odd: Divide by 3 or 5 until you get an even answer. Then start dividing by 2.

STEP 2: Group outside numbers into "couples"

• For every "couple", they get to come out of the house (radical) and get married.

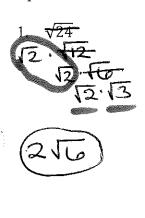
• For every number without a partner, they must stay in the house.

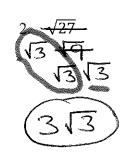
STEP 3: Simplify

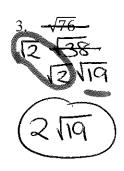
• If you have more than 1 number out of the house, these numbers get multiplied.

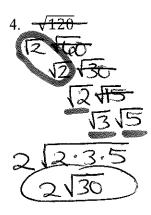
• If you have more than 1 number in the house, these numbers get multiplied.

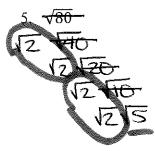
Another Method... You don't always have to start by dividing by smaller numbers. If you know a perfect square that will divide evenly into your number you can always start there instead and still couple them up.

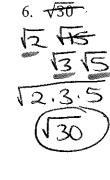


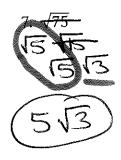


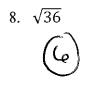




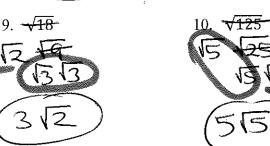


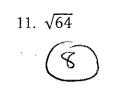


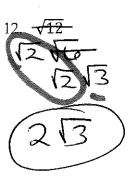












## Rationalizing Radicals

STEP 1: Multiply the numerator and denominator by the radical in the denominator.

STEP 2: Simplify where appropriate. Remember you should not end up with a radical in the denominator.

$$1. \frac{4}{\sqrt{3}} \circ \sqrt{3}$$

$$4\sqrt{3}$$

$$3$$

$$2. \frac{10}{\sqrt{5}}, \frac{15}{\sqrt{5}}$$

$$10\sqrt{5} = 2\sqrt{5}$$

3. 
$$\frac{2}{3\sqrt{2}} \cdot \sqrt{2}$$

$$\frac{2\sqrt{2}}{3 \cdot 2} = \frac{2\sqrt{2}}{6}$$

$$= \sqrt{2}$$

$$4. \frac{2\sqrt{5}}{3\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$\frac{2\sqrt{10}}{3 \cdot 2} = \frac{2\sqrt{10}}{\sqrt{0}}$$

$$= \frac{2\sqrt{10}}{3}$$

$$5. \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$$

$$6. \frac{1}{\sqrt{7}}, \frac{1}{\sqrt{7}}$$

$$1\sqrt{2} = \sqrt{2}$$

$$1\sqrt{7} = \sqrt{7}$$

$$1\sqrt{7} = \sqrt{7}$$

$$6. \frac{1}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}}$$

$$\frac{1\sqrt{7}}{7} = \frac{\sqrt{7}}{7}$$

7. 
$$\frac{4}{\sqrt{5}}$$
°  $\frac{\sqrt{5}}{\sqrt{5}}$ 

$$8. \frac{6}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$\frac{6\sqrt{2}}{2} = 3\sqrt{2}$$

9. 
$$\frac{1}{3\sqrt{16}}$$
,  $\frac{1}{\sqrt{16}}$ 
 $\frac{\sqrt{16}}{3 \cdot 16} = \frac{4}{48}$ 
 $= \frac{1}{12}$ 

$$10. \frac{8}{3\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$\frac{8\sqrt{2}}{3 \cdot 2}$$

$$\frac{8\sqrt{2}}{\sqrt{2}}$$

$$\frac{\sqrt{2}}{\sqrt{2}}$$

11. 
$$\frac{2}{5\sqrt{3}} \cdot \sqrt{3}$$

$$2\sqrt{3}$$

$$5 \cdot 3$$

$$2\sqrt{3}$$

$$2\sqrt{3}$$

$$15$$

$$12. \frac{2\sqrt{3}}{5\sqrt{5}} \sqrt{5}$$

$$2\sqrt{15}$$

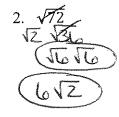
$$2\sqrt{15}$$

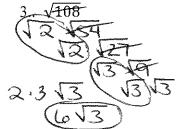
$$2\sqrt{15}$$

$$2\sqrt{5}$$

For a Grade: Simplify the following, rationalizing if needed.







5. 
$$\frac{7}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

$$6. \frac{8}{\sqrt{2}} \sqrt[3]{2}$$

$$\frac{8\sqrt{2}}{\sqrt{2}}$$

$$\frac{\sqrt{2}}{\sqrt{2}}$$

$$\sqrt{4\sqrt{2}}$$

7. 
$$\frac{7}{3\sqrt{5}} \cdot \sqrt{5}$$
7.  $\frac{7}{3\sqrt{5}} \cdot \sqrt{5}$ 
7.  $\frac{7}{3\sqrt{5}} \cdot \sqrt{5}$ 

8. 
$$\frac{3\sqrt{5}}{4\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$