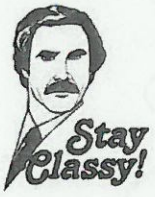
Name: Answer key Date: 9/4/14

0A Prerequisite skills: Working with Radicals

Notes / Homework

Simplifying Radicals $\sqrt{20} = 2\sqrt{5}$

Why? Aren't they ugly enough?



Hey, don't be mean. We always leave expressions in simplified terms. Fractions and radicals, especially. It's the classy thing to do.

How do you simplify a radical? Very easily. This is how I do it:

1. It helps to make a list of perfect squares on the side of your paper
2. Starting at the bottom of the list and work your way up the right column find the largest perfect square that is a factor of your radicand.
3. Split your radicand into a perfect square and a non–perfect square $\sqrt{45} = \sqrt{9 * 5}$
4. Cross out the perfect square and write its square root outside the radical $3\sqrt{\cancel{9} * 5}$
5. Done. Rewrite the answer neatly. $3\sqrt{5}$

$2^2 = 4$
$3^2 = 9$
$4^2 = 16$
$5^2 = 25$
$6^2 = 36$
$7^2 = 49$
$8^2 = 64$
$9^2 = 81$
$10^2 = 100$
$11^2 = 121$
$12^2 = 144$

Things to remember:

- If there is a number hanging out in front of the radical, just multiply it with the number you took out, since the original operation was multiplication. : $6\sqrt{32} = 6\sqrt{\cancel{16} * 2} = 6 * 4\sqrt{2} = 24\sqrt{2}$
- If you don't take out the largest perfect square right away, you'll just have to do it again. No biggie. Honestly, sometimes you just don't feel like hunting that long.

$$\sqrt{160} = \sqrt{4 * 40} = 2\sqrt{40} = 2\sqrt{\cancel{4} * 10} = 2 * 2\sqrt{10} = 4\sqrt{10}$$

- If your original radicand is a perfect square, the radical should disappear completely $\sqrt{49} = 7$
- If BOTH numbers you split it up into are perfect squares, then your original was a perfect square. Silly.

$$\sqrt{36} = \sqrt{4 * 9} = \sqrt{\cancel{4} * \cancel{9}} = 2 * 3 = 6 \quad or \ldots \sqrt{36} = 6$$

- When you **multiply** or **divide**, outside stuff operates with outsides stuff. Inside stuff with inside stuff.

$3\sqrt{6} * 2\sqrt{2} = 6\sqrt{12} = 12\sqrt{3}$ or $\frac{4\sqrt{30}}{6\sqrt{2}} = \frac{2\sqrt{15}}{3}$

- Separate and simplify the radical when you have fractions $\sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{\sqrt{4}} = \frac{\sqrt{3}}{2}$
- NEVER leave a radical in the denominator → Rationalize!!! $\frac{5}{\sqrt{2}}\left(\frac{\sqrt{2}}{\sqrt{2}}\right) = \frac{5\sqrt{2}}{2}$

1. $\sqrt{24}$ $2\sqrt{6}$ (4·6)

2. $2\sqrt{128}$ $16\sqrt{2}$ (8 64·2)

3. $\sqrt{48}$ $4\sqrt{3}$ (16·3)

4. $\sqrt{720}$ $12\sqrt{5}$ (144·5)

5. $3\sqrt{75}$ $15\sqrt{3}$ (5 25 3)

6. $\sqrt{828}$ $6\sqrt{23}$ (36·23)

7. $\sqrt{784}$ 28 (16·49)

8. $\sqrt{120}$ $2\sqrt{30}$ (4·30)

9. $\sqrt{90}$ $3\sqrt{10}$ (9·10)

10. $\sqrt{96}$ $4\sqrt{6}$ (16·6)

Perform the given operations and simplify.

11. $(4\sqrt{3})^2$ 48 (16·3)

12. $(2\sqrt{2})^2$ 8 (4·2)

13. $(5\sqrt{5})(\sqrt{3})$ $5\sqrt{15}$ ($5\sqrt{15}$)

14. $\left(\frac{\sqrt{2}}{3}\right)\left(\frac{\sqrt{6}}{4}\right)$ $\frac{\sqrt{3}}{6}$ ($\frac{\sqrt{12}}{12}$)

15. $(2\sqrt{3})(4\sqrt{6})$ $24\sqrt{2}$ ($8\sqrt{18}$)

Rationalize the denominators and simplify all fractions.

16. $\frac{1}{\sqrt{2}}$ $\frac{\sqrt{2}}{2}$

17. $\frac{3}{\sqrt{5}}$ $\frac{3\sqrt{5}}{5}$

18. $\frac{7}{\sqrt{7}}$ $\sqrt{7}$

19. $\frac{\sqrt{5}}{\sqrt{10}}$ $\frac{\sqrt{2}}{2}$

20. $\frac{4}{\sqrt{2}}$ $2\sqrt{2}$

21. $\frac{\sqrt{3}/2}{1/6}$ $3\sqrt{3}$ ($\frac{\sqrt{3}}{2} \cdot \frac{6}{1}$)

22. $\frac{1/2}{\sqrt{3}/4}$ $\frac{2\sqrt{3}}{3}$ ($\frac{1}{2} \cdot \frac{4}{\sqrt{3}}$)

23. $\frac{3}{\sqrt{2}} \cdot \frac{2}{\sqrt{3}}$ $\sqrt{6}$ ($\frac{6}{\sqrt{6}}$)