Right Triangles – Simplifying Radicals

Notes Section 8.1 Name_____

Review of Simplifying

- Make a factor bush
- Find perfect squares (or pairs) and square root them to move to outside of radical
- Multiply all inside numbers together and multiply all numbers outside radical together.

Simplify.

1. $\sqrt{18}$ $= \sqrt{9}\sqrt{2}$
   $= 3\sqrt{2}$

2. $\sqrt{28}$ $= \sqrt{4 \cdot 7}$
   $= 2\sqrt{7}$

3. $3\sqrt{27}$ $= 3 \cdot \sqrt{9}\sqrt{3}$
   $= 3 \cdot 3 \cdot \sqrt{3}$
   $= 9\sqrt{3}$

4. $\sqrt{108}$ $= \sqrt{9}\sqrt{12}$
   $= 3 \cdot \sqrt{4}\sqrt{3}$
   $= 3 \cdot 2 \cdot \sqrt{3}$
   $= 6\sqrt{3}$

5. $\sqrt{5^2} = 5$

   $\sqrt{5^2} = \sqrt{25} = 5$

6. $\sqrt{x^5}$ $= \sqrt{x^2}\sqrt{x^2}\sqrt{x}$
   $= x \cdot x \cdot \sqrt{x}$
   $= x^2\sqrt{x}$

Review of Multiplying

- First simplify each separate radical if needed
- Then multiply all numbers inside the radical together and all numbers outside the radical together
- Finally simplify again if needed

Multiply. Simplify your answer.

7. $\sqrt{3} \cdot \sqrt{3}$ $= \sqrt{9}$
   $= 3$

8. $-(\sqrt{3})^2$ $= -\sqrt{9}$
   $= -3$

9. $(-\sqrt{3})^2$ $= (-\sqrt{3})(-\sqrt{3})$
   $= +\sqrt{9}$
   $= 3$

10. $\sqrt{3^2} = 3$

11. $\sqrt{3} \cdot \sqrt{2} = \sqrt{6}$

12. $\sqrt{10} \cdot \sqrt{2}$ $= \sqrt{20}$
    $= \sqrt{4}\sqrt{5}$
    $= 2\sqrt{5}$

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Notes Section 8.1 Name_____

Review of Division

- First if possible divide the radicands together and the numbers outside the radical together.
- Then, simplify each separate radical if needed
- Finally, if needed simplify again.

13. $\frac{\sqrt{27}}{\sqrt{3}} = \sqrt{9}$
$= 3$

14. $\frac{\sqrt{48}}{\sqrt{6}} = \sqrt{8}$
$= \sqrt{4}\sqrt{2}$
$= 2\sqrt{2}$

15. $\frac{8\sqrt{15}}{5\sqrt{3}} = \frac{8\sqrt{5}}{5}$

16. $\frac{11\sqrt{55}}{\sqrt{11}} = 11\sqrt{5}$

Rationalize The Denominator

You rationalize when there is a radical in the denominator of the fraction that does not simplify out on its own (like yesterday's division problems).

- First try to simplify with division
- Is there still a radical in the denominator? If so, multiply by 1 in its "clever form of 1". This means to create a fraction that is equivalent to one using that radical.

17. $\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

18. $\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

19. $\frac{\sqrt{8}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{24}}{3}$
$= \frac{\sqrt{4}\sqrt{6}}{3}$
$= \frac{2\sqrt{6}}{3}$

20. $\frac{\sqrt{11}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{22}}{2}$