3.03 *Reducing Fractions with Radicals*

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Radicals often occur within fractional expressions. When this occurs, it is important to know whether or not the expression may be reduced. There are no new principles in this section. The same rules from the chapter on algebraic fractions still apply here. It is just that somehow they look different until you get used to them. Compare the following examples:

	ALGEBRAIC FRACTIONS	FRACTIONS WITH RADICALS
1.	$\frac{10X}{5} = 2X$	$\frac{10\sqrt{5}}{5} = 2\sqrt{5}$ **(Notice that $\sqrt{5}$ is not affected!)**
2.	$\frac{10X + 3}{5}$ does not reduce **(Don't divide out the 5!)**	$\frac{10\sqrt{5} + 3}{5}$ does not reduce
3.	$\frac{3 + 10X}{5} \neq \frac{13X}{5}$ **(Don't combine unlike terms!)**	$\frac{3 + 10\sqrt{5}}{5} \neq \frac{13\sqrt{5}}{5}$
4.	$\frac{5 + 10X}{5}$ **may be factored** $= \frac{5(1 + 2X)}{5}$ **and reduced** $= (1 + 2X)$	$\frac{5 + 10\sqrt{5}}{5}$ $= \frac{5(1 + 2\sqrt{5})}{5}$ $= (1 + 2\sqrt{5})$

Factor and reduce each of the following exercises if possible.

1. $\frac{9\sqrt{6}}{3} = (\quad)\sqrt{6}$

2. $\frac{12\sqrt{6}}{6} =$

3. $\frac{9\sqrt{6}}{6} =$

4. $\frac{20\sqrt{5}}{100} =$

5. $\frac{35\sqrt{5}}{30} =$

6. $\frac{38\sqrt{19}}{57} =$

7. $\frac{15\sqrt{20}}{6} = \frac{15\cdot(\quad)\sqrt{5}}{6}$

$= \frac{(\quad)\sqrt{5}}{6}$

$= \_\_\_\_\_$

8. $\frac{20\sqrt{20}}{40} =$

9. $\frac{6\sqrt{20}}{40} =$

10. $\frac{2\sqrt{18}}{6} =$

11. $\frac{\sqrt{75}}{25} =$

12. $\frac{\sqrt{40}}{20} =$

13. $\frac{9\sqrt{3} + 3}{6} = \frac{3(3\sqrt{3} + 1)}{6}$

$= \_\_\_\_\_$

14. $\frac{8 + 4\sqrt{2}}{4} = \frac{4(\quad)}{4}$

$= \_\_\_\_\_$

15. $\frac{5\sqrt{10} + 10\sqrt{5}}{25} = \_\_\_\_\_$

$= \_\_\_\_\_$

16. $\frac{14 - 7\sqrt{3}}{21} = \_\_\_\_\_$

$= \_\_\_\_\_$

17. $\dfrac{\sqrt{8} + 4\sqrt{3}}{8} = \dfrac{2\sqrt{2} + 4\sqrt{3}}{8}$

$= \dfrac{(\quad)(\sqrt{2} + 2\sqrt{3})}{8}$

$= \underline{\qquad\qquad}$

18. $\dfrac{\sqrt{8} - 4\sqrt{3}}{12} = \underline{\qquad\qquad}$

$= \underline{\qquad\qquad}$

$= \underline{\qquad\qquad}$

19. $\dfrac{\sqrt{8} + 4\sqrt{2}}{12} = \dfrac{(\quad)\sqrt{2} + 4\sqrt{2}}{12}$

$= \dfrac{(\quad)\sqrt{2})}{12}$

$= \underline{\qquad\qquad}$

20. $\dfrac{\sqrt{27} - \sqrt{75}}{12} = \underline{\qquad\qquad}$

$= \underline{\qquad\qquad}$

$= \underline{\qquad\qquad}$

21. $\dfrac{\sqrt{27} + \sqrt{18}}{12}$

22. $\dfrac{\sqrt{48} - \sqrt{80}}{20}$

23. $\dfrac{5\sqrt{8} - 6\sqrt{300}}{10} =$

24. $\dfrac{5\sqrt{8} - 6\sqrt{50}}{10} =$

[See p.255, #59.]

25. $\dfrac{6\sqrt{24} + 4\sqrt{50}}{12} =$

26. $\dfrac{(6\sqrt{3} - 2\sqrt{15})^2}{24} =$

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p. 257-258:

1. $3\sqrt{6}$; 2. $2\sqrt{6}$; 3. $\frac{3\sqrt{6}}{2}$; 4. $\frac{\sqrt{5}}{5}$; 5. $\frac{7\sqrt{5}}{6}$; 6. $\frac{2\sqrt{19}}{3}$;

7. $5\sqrt{5}$; 8. $\sqrt{5}$; 9. $\frac{3\sqrt{5}}{10}$; 10. $\sqrt{2}$; 11. $\frac{\sqrt{3}}{5}$; 12. $\frac{\sqrt{10}}{10}$;

13. $\frac{3\sqrt{3}+1}{2}$; 14. $2+\sqrt{2}$; 15. $\frac{\sqrt{10}+2\sqrt{5}}{5}$; 16. $\frac{2-\sqrt{3}}{3}$;

17. $\frac{\sqrt{2}+2\sqrt{3}}{4}$; 18. $\frac{\sqrt{2}-2\sqrt{3}}{6}$; 19. $\frac{\sqrt{2}}{2}$; 20. $\frac{-\sqrt{3}}{6}$;

21. $\frac{\sqrt{3}+\sqrt{2}}{4}$; 22. $\frac{\sqrt{3}-\sqrt{5}}{5}$; 23. $\sqrt{2}-6\sqrt{3}$; 24. $-2\sqrt{2}$;

25. $\frac{3\sqrt{6}+5\sqrt{2}}{3}$; 26. $7-3\sqrt{5}$.

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