

5.05 Reducing Fractions with Radicals

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ANSWERS TO ALL EXERCISES ARE INCLUDED AT THE END OF THIS PAGE

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

1. $\frac{10x}{5} = 2x$

2. $\frac{10x+3}{5}$ does not reduce

(Don't divide out the 5!)

3. $\frac{3+10x}{5} \neq \frac{13x}{5}$

(Don't combine unlike terms!)

4. $\frac{5+10x}{5}$ may be factored

$$\frac{5(1+2x)}{5}$$

$$(1+2x)$$

FRACTIONS WITH RADICALS

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

(Notice that $\sqrt{5}$ is not divided out!)

$\frac{10\sqrt{5}+3}{5}$ does not reduce

(Don't divide out the 5!)

$$\frac{3+10\sqrt{5}}{5} \neq \frac{13\sqrt{5}}{5}$$

(Don't combine unlike terms!)

$$\frac{5+10\sqrt{5}}{5}$$

$$\frac{5(1+2\sqrt{5})}{5}$$

$$(1+2\sqrt{5})$$

EXERCISES.

Factor and reduce each of the following exercises if possible.

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

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

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

$(\quad)\sqrt{6}$

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

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

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

7. $\frac{15\sqrt{20}}{6}$

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

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

$\frac{15\sqrt{\quad}\sqrt{\quad}}{6}$

$\frac{15\cdot(\quad)\sqrt{5}}{6}$

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

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.
$$\frac{8+4\sqrt{2}}{4}$$

$$4(\quad)$$

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

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

17.
$$\frac{\sqrt{8}+4\sqrt{3}}{8}$$

$$\frac{2\sqrt{2}+4\sqrt{3}}{8}$$

$$(\quad)(\sqrt{2}+2\sqrt{3})$$

18.
$$\frac{\sqrt{8}-4\sqrt{3}}{12}$$

19.
$$\frac{\sqrt{8}+4\sqrt{2}}{12}$$

$$(\quad)\sqrt{2}+4\sqrt{2}$$

$$\frac{(\quad)\sqrt{2}}{12}$$

20.
$$\frac{\sqrt{27}-\sqrt{75}}{12}$$

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

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

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

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

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

26. $\frac{6\sqrt{27} - 2\sqrt{45}}{24}$

ANSWERS 5.05

p. 432 - 434:

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. $\frac{3\sqrt{3} - \sqrt{5}}{4}$.

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