

16 The square root of $625 = 25$

20 The -square root of $121 = -11$

24 The square root of $1/9 = 1/3$

28 ± 30

32 -10

36 17

40 -25

44 no

48 yes

52 no

56 -11.14

60 3.16

64 ± 12

9.3 Simplifying Radicals

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Rules of Radicals

I. No Perfect Square Factors other than 1, Inside the Radical.

II. No Fractions Inside the Radical.

III. No Radical can be in the Denominator of a Fraction.

Properties to help the Rules

$$i. \sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$$

ex: $\sqrt[20]{4 \cdot 5} = \sqrt{4} \cdot \sqrt{5}$
 $= \underline{\underline{2\sqrt{5}}}$

$$ii. \sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$

ex: $\sqrt{\frac{4}{25}} = \frac{\sqrt{4}}{\sqrt{25}} = \underline{\underline{\frac{2}{5}}}$

ex1)

$$\begin{aligned}\sqrt{50} &= \sqrt{25 \cdot 2} = \sqrt{25} \cdot \sqrt{2} \\ &= \underline{\underline{5\sqrt{2}}}\end{aligned}$$

ex2)

$$\begin{aligned}\sqrt{48} &= \sqrt{4 \cdot 12} \\ &= \sqrt{4} \cdot \sqrt{12} \\ &= 2\sqrt{12} \\ &= 2\sqrt{4 \cdot 3} = 2\sqrt{4} \cdot \sqrt{3} \\ &= 2 \cdot 2\sqrt{3} \\ &= \underline{\underline{4\sqrt{3}}}\end{aligned}$$

Magic #'s

4
9
16
25
36
49
64
81
100

ex3)

$$\begin{aligned}\sqrt{180} &= \sqrt{9 \cdot 20} & \sqrt{180} \\ &= \sqrt{9} \cdot \sqrt{20} &= \sqrt{36 \cdot 5} \\ &= 3\sqrt{20} &= \sqrt{36} \cdot \sqrt{5} \\ &= 3\sqrt{4 \cdot 5} &= 6\sqrt{5} \\ &= 3\sqrt{4} \cdot \sqrt{5} \\ &= 3 \cdot 2\sqrt{5} \\ &= \underline{\underline{6\sqrt{5}}} = \sqrt{36} \cdot \sqrt{5} = \sqrt{180}\end{aligned}$$

ex4

(32/50)
4/5
.8

$$\sqrt{\frac{32}{50}} = \frac{\sqrt{32}}{\sqrt{50}} = \frac{\sqrt{16} \cdot \sqrt{2}}{\sqrt{25} \cdot \sqrt{2}} = \frac{4\sqrt{2}}{5\sqrt{2}} = \frac{4}{5}$$

$$\frac{2 \times}{3 \times} = \frac{2}{3} \quad \left\} \quad \frac{5}{25} = \frac{1}{5}$$

$$\sqrt{\frac{32 \div 2}{50 \div 2}} = \sqrt{\frac{16}{25}} = \frac{\sqrt{16}}{\sqrt{25}} = \frac{4}{5}$$

$$\sqrt{2} \cdot \sqrt{2} = \sqrt{2 \cdot 2} = \sqrt{4} = 2$$

$$\sqrt{3} \cdot \sqrt{3} = \sqrt{9} = \underline{\underline{3}}$$

$$\sqrt{5} \cdot \sqrt{5} = \sqrt{25} = \underline{\underline{5}}$$

When we multiply a Rad. By itself the solution is the Radicand

$$\begin{aligned} \sqrt{2} \cdot \sqrt{10} &= \sqrt{20} = \sqrt{4 \cdot 5} \\ &= \underline{\underline{2\sqrt{5}}} \end{aligned}$$

$$\begin{aligned} \sqrt{2} \cdot \sqrt{10} &= \sqrt{2} \cdot \sqrt{2} \cdot \sqrt{5} \\ &= \underline{\underline{2\sqrt{5}}} \end{aligned}$$

Rationalize the Denominator

fixes Rule 3

$$\sqrt{\frac{1}{18}} = \frac{\sqrt{1}}{\sqrt{18}} = \frac{1}{\sqrt{9 \cdot 2}} = \frac{1}{3\sqrt{2}}$$

This Breaks Rule 3.

$$\frac{1}{3\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{3 \cdot 2} = \frac{\sqrt{2}}{6}$$

* by 1

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

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√(1/18)
.2357022604
1/(3√(2))
.2357022604
√(2)/6
.2357022604
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O.T.L.
pg 514-515

21-43 (o)

47-73 (e o o)