

# SQUARE ROOTS

$$\sqrt[2]{9} = \sqrt{9} = 3$$

$$\sqrt{121} = 11$$

$$\begin{aligned}\sqrt{28} &= \sqrt{4 \cdot 7} \\ &= 2\sqrt{7}\end{aligned}$$

$$\sqrt{45} = \sqrt{9 \cdot 5} = 3\sqrt{5}$$

$$\begin{aligned}\sqrt{72} &= \sqrt{9 \cdot 8} = 3\sqrt{8} = 3\sqrt{4 \cdot 2} \\ &= 6\sqrt{2}\end{aligned}$$

$\swarrow \sqrt{36 \cdot 2} \searrow$

$$2\sqrt{3} + 5\sqrt{3} = 7\sqrt{3}$$

$$\begin{aligned}5\sqrt{2} - 3\sqrt{7} - 9\sqrt{2} &= \\ -4\sqrt{2} - 3\sqrt{7}\end{aligned}$$

$$\sqrt{\frac{24}{46}} + \sqrt{\frac{54}{96}}$$

$$\begin{aligned}2\sqrt{6} + 3\sqrt{6} \\ = \boxed{5\sqrt{6}}\end{aligned}$$

## Multiplication

$$\begin{aligned}\sqrt{2} \cdot \sqrt{6} &= \sqrt{12} \\ &= \sqrt{4 \cdot 3} \\ &= 2\sqrt{3}\end{aligned}$$

$$\begin{aligned}3\sqrt{6} \cdot 5\sqrt{3} &= 15\sqrt{18} \\ &= 15\sqrt{9 \cdot 2} \\ &= 45\sqrt{2}\end{aligned}$$

$$\begin{aligned}\sqrt{24} \cdot \sqrt{48} &= 2\sqrt{6} \cdot 4\sqrt{3} \\ &= 8\sqrt{18} \\ &= 24\sqrt{2}\end{aligned}$$

$$(3 + 4\sqrt{5})(5 - 2\sqrt{5})$$

F O I L  
First Outer Inner Last

$$= 15 - 6\sqrt{5} + 20\sqrt{5} - 8 \cdot 5$$

$$= \boxed{-25 + 14\sqrt{5}}$$

## DIVISION

$$\frac{\sqrt{21}}{\sqrt{7}} = \sqrt{3}$$

$$\sqrt{\frac{36}{25}} = \frac{\sqrt{36}}{\sqrt{25}} = \frac{6}{5}$$

$$\sqrt{\frac{20}{81}} = \frac{\sqrt{20}}{\sqrt{81}} = \frac{\sqrt{4 \cdot 5}}{9} = \frac{2\sqrt{5}}{9}$$

$$\frac{5 \cdot \sqrt{7}}{\sqrt{7} \cdot \sqrt{7}} = \frac{5\sqrt{7}}{7}$$

Rationalizing the denominator  
- get rid of  $\sqrt{\quad}$  in denominator

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

$$\sqrt{\frac{11}{12}} = \frac{\sqrt{11}}{\sqrt{12}} = \frac{\sqrt{11} \cdot \sqrt{3}}{2\sqrt{3} \cdot \sqrt{3}} = \frac{\sqrt{33}}{6}$$

fol  $\frac{3+4\sqrt{7}}{5-2\sqrt{7}} \cdot \frac{(5+2\sqrt{7})}{(5+2\sqrt{7})}$

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$$= \frac{15 + 6\sqrt{7} + 20\sqrt{7} + \overbrace{8 \cdot 7}^{56}}{25 + \cancel{10\sqrt{7}} - \cancel{10\sqrt{7}} - \underbrace{4 \cdot 7}_{-28}}$$

$$= \frac{-71 + 26\sqrt{7}}{+3}$$

Multiply by the conjugate of the denominator

$$\begin{array}{cc} 2+\sqrt{3} & 2-\sqrt{3} \\ -4-3\sqrt{5} & -4+3\sqrt{5} \end{array}$$

$$\frac{1}{-2} \quad \frac{-1}{2}$$