SQUARE ROOTS

$\sqrt{9} = 3$ ~~or -3~~

↖ principal root

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

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

$\sqrt{72} = \sqrt{9 \cdot 8}$
$= 3\sqrt{8}$
$= 3\sqrt{4 \cdot 2}$
$= 6\sqrt{2}$

$\sqrt{36 \cdot 2}$
$6\sqrt{2}$

Addition/Subtraction

$2\sqrt{3} + 8\sqrt{3} = 10\sqrt{3}$

$5\sqrt{2} - 3\sqrt{7} - 9\sqrt{2} + 6\sqrt{7}$
$= -4\sqrt{2} + 3\sqrt{7}$

$\sqrt{\underset{4 \cdot 6}{24}} + \sqrt{\underset{9 \cdot 6}{54}}$
$= 2\sqrt{6} + 3\sqrt{6}$
$= \boxed{5\sqrt{6}}$

October 13, 2021

Multiplication

$\sqrt{2} \cdot \sqrt{6} = \sqrt{12} = 2\sqrt{3}$ (4·3)

$3\sqrt{6} \cdot 5\sqrt{3} = 15\sqrt{18}$ (9·2)

$= 15 \cdot 3\sqrt{2}$

$= 45\sqrt{2}$

$\sqrt{24} \cdot \sqrt{72}$ (4·6, 36·2)

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

$= 12\sqrt{12}$ (4·3)

$= 24\sqrt{3}$

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

FOIL

First Outer Inner Last

$15 - 6\sqrt{5} + 20\sqrt{5} - 8 \cdot \sqrt{25}$ (5)

$= -40$

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

Division

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

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

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

$$\frac{3\sqrt{5}}{9_3} = \frac{\sqrt{5}}{3}$$

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

↳ Rationalizing the Denominator
removing a square root from the denominator

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

$$\sqrt{\frac{11}{12}} = \frac{\sqrt{11}}{\sqrt{\underset{4 \cdot 3}{12}}} = \frac{\sqrt{11}}{2\sqrt{3}} \cdot \underbrace{\frac{\sqrt{3}}{\sqrt{3}}}_{3} = \boxed{\frac{\sqrt{33}}{6}}$$

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

FL

multiply by the conjugate

$6+\sqrt{2}$ $\quad 6-\sqrt{2}$

$-3-\sqrt{7}$ $\quad -3+\sqrt{7}$

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

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

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

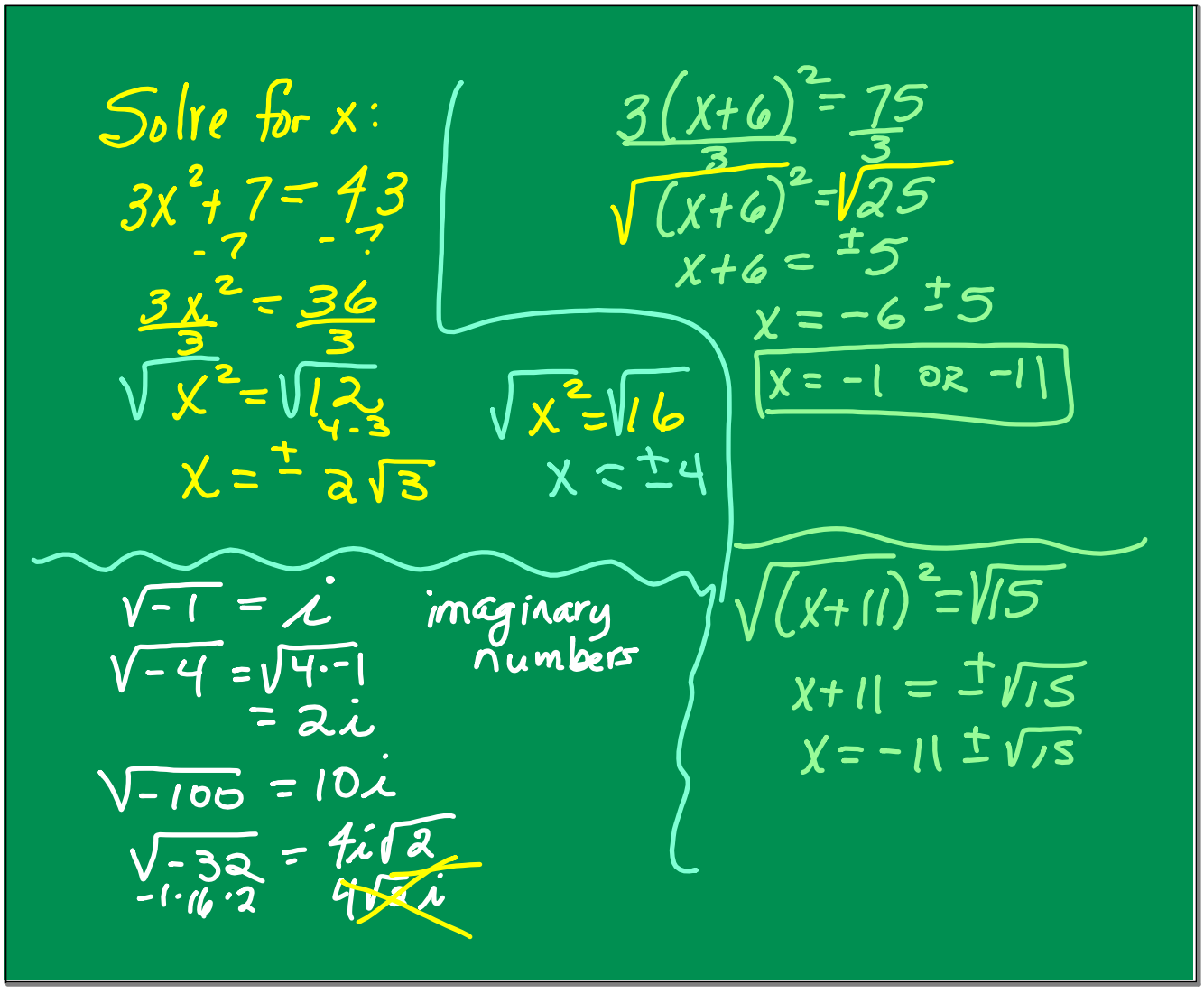
$\frac{-1}{2}$ $\quad \frac{1}{-2}$ $\quad -\frac{1}{2}$

$$\frac{7+6\sqrt{5}}{9+3\sqrt{5}}\cdot\frac{(9-3\sqrt{5})}{(9-3\sqrt{5})}$$

$$\frac{63-21\sqrt{5}+54\sqrt{5}-\overbrace{18\cdot 5}^{90}}{81-\underbrace{9\cdot 5}_{45}}$$

$$\frac{-27+33\sqrt{5}}{36}$$

$$\frac{-9+11\sqrt{5}}{12}$$


Solve for x:
$3x^2 + 7 = 43$
$-7 \quad -7$
$\frac{3x^2}{3} = \frac{36}{3}$
$\sqrt{x^2} = \sqrt{12}$
$4 \cdot 3$
$x = \pm 2\sqrt{3}$
$\sqrt{x^2} = \sqrt{16}$
$x = \pm 4$
$\frac{3(x+6)^2}{3} = \frac{75}{3}$
$\sqrt{(x+6)^2} = \sqrt{25}$
$x+6 = \pm 5$
$x = -6 \pm 5$
$x = -1$ OR -11
$\sqrt{-1} = i$
imaginary numbers
$\sqrt{-4} = \sqrt{4 \cdot -1}$
$= 2i$
$\sqrt{-100} = 10i$
$\sqrt{-32}$
$-1 \cdot 16 \cdot 2$
$4i\sqrt{2}$
$4\sqrt{2}i$
$\sqrt{(x+11)^2} = \sqrt{15}$
$x+11 = \pm\sqrt{15}$
$x = -11 \pm \sqrt{15}$