9.1: Review of Radicals and Quadratic Equations

Note Title 1/28/2016

$\sqrt[2]{\quad}$ $x^{1/2}$

2nd degree

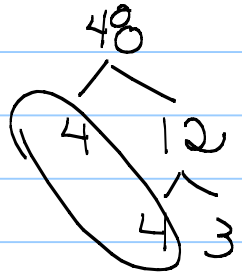
$ax^2 + bx + c = 0$

$\sqrt{x} = x$

Simplify $\sqrt[2]{48}$

$\sqrt{4 \cdot 4 \cdot 3}$

$4\sqrt{3}$



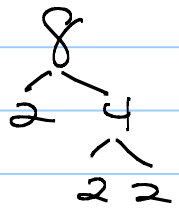
Simplify $\sqrt[2]{8}$

$\sqrt{4}\ \sqrt{2}$

$2\sqrt{2}$

alt $\sqrt{2 \cdot 2 \cdot 2}$

$2\sqrt{2}$



Connect to knowledge of polynomials:

Simplify $3x^2 + 4x - 2x^2$

$x^2 + 4x$

Simplify $\sqrt{18} + \sqrt{32} + \sqrt{75}$

$\sqrt{2 \cdot 3 \cdot 3} + \sqrt{4 \cdot 4 \cdot 2} + \sqrt{25} \cdot \sqrt{3}$

$3\sqrt{2} + 4\sqrt{2} + 5\sqrt{3}$

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

2 methods – pick which one you like

Question $\sqrt{32}$

$\sqrt{4}\sqrt{8}$

$2\sqrt{8}$ not simplified

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

$2 \cdot 2 \cdot \sqrt{2}$

$\boxed{4\sqrt{2}}$

RATIONALIZE THE DENOMINATOR

$\sqrt{\frac{3}{5}}$ know $= \frac{\sqrt{3}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{15}}{5}$

$\frac{\sqrt{5}}{\sqrt{5}} = 1$

INSIDE · INSIDE
OUTSIDE · OUTSIDE

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

$(5^{1/2})^2 = 5^{\frac{1}{2} \cdot \frac{2}{1}} = 5^1$

$\pm$? If you solve an equation, solution is $\pm$.

↳ $=$

If rewrite an expression, take sign given.

↳ no $=$

Simplify

$$\frac{6}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}} = \frac{2\cancel{6}\sqrt{3}}{\cancel{3}_1} = 2\sqrt{3}$$

rationalize

Quadratics: Solve $x^2 - 10x = -16$

↖ Fundamental Theorem of Algebra

FTA: our level, MAX number of solutions

$$x^2 - 10x + 16 = 0$$

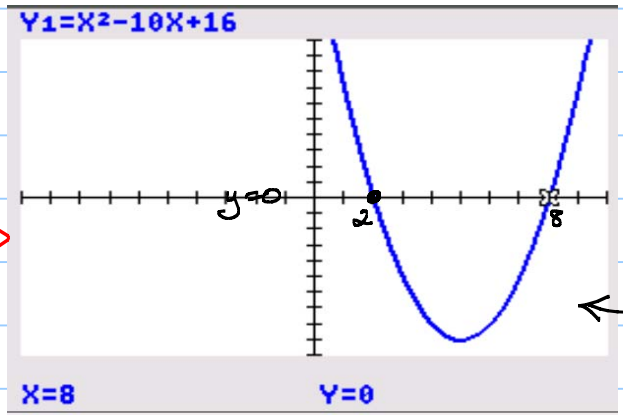
linear factors

$$(x-8)\cdot(x-2) = 0$$

$$x-8=0 \quad x-2=0$$

$$x = 8 \text{ or } x = 2$$

$y = x^2 - 10x + 16$



"Solutions" in Real number system are x-intercepts.

P7: 9.1: Review of Radicals & Quadratic Equations

2nd degree polynomial

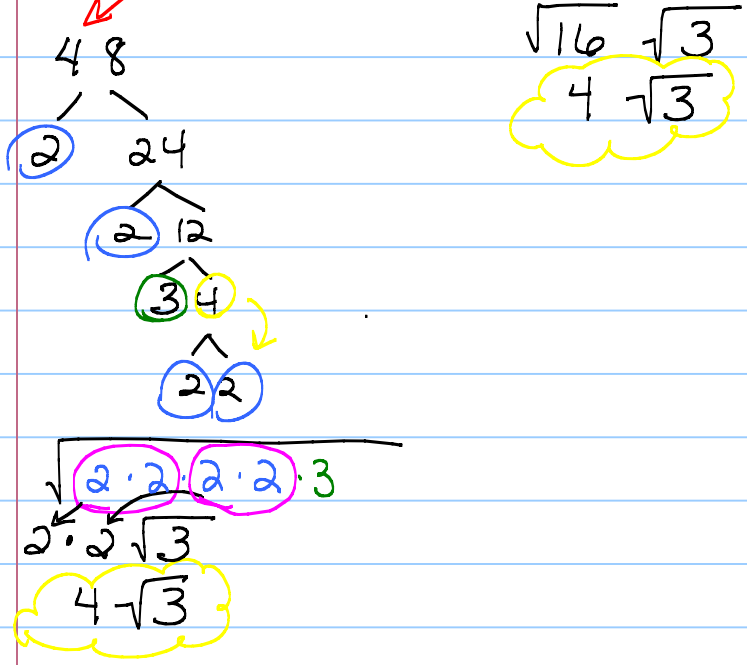
implied $\sqrt[2]{x}$ $\quad x^{1/2}$ $\quad ax^2+bx+c=0$

DISCLAIMER: The following notes are provided as explanation of what's going on mathematically. You do not need to write all of this for your homework.

Strugglers: Learn "Divisibility Rules"

1. Simplify $\sqrt{48}$

FACTORING / LOOK FOR PERFECT SQ



$\sqrt{16}\sqrt{3}$

$4\sqrt{3}$

Q: ±?

If solving equation ($x^2=4$, $x=\pm2$) (= → then ±)

If solving expression, use sign given. (no =)

Ex2 Simplify $\sqrt{200}$

saw $\sqrt{100}\cdot\sqrt{2}$

$10\sqrt{2}$

Ex3 Simp $\sqrt{32} = \sqrt{16}\cdot\sqrt{2} = 4\sqrt{2}$

Ex 4 $\sqrt{(4+9)} = \sqrt{13}$

ORDER OF OPERATIONS!
Parenth. Exp, Mult & Div, Add + Subtract

Ex 5 $\sqrt{5^2+12^2}$

$\sqrt{25+144}$

$\sqrt{169} = 13$

Decimal answers unacceptable unless specifically requested.

Connect to knowledge of polynomials

Simplify $12x^2 + 10x - 5x^2$

$7x^2 + 10x$

Ex: $\sqrt{18} + \sqrt{32} + \sqrt{75}$

mix + match methods

$18 = 6 \cdot 3$, $6 = 2 \cdot 3$

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

$3\sqrt{2}$

$\sqrt{16} \cdot \sqrt{2}$

$+ 4\sqrt{2} + 5\sqrt{3}$

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

Q: $5\sqrt{18}$

$5\sqrt{9}\sqrt{2}$

$5 \cdot 3 \cdot \sqrt{2}$

$15\sqrt{2}$

RATIONALIZE THE DENOMINATOR

Ex $\sqrt{\frac{5}{3}} \rightarrow \frac{\sqrt{5}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{15}}{3}$

$\frac{\sqrt{3}}{\sqrt{3}} = 1$

Ex $\frac{6}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{6\sqrt{3}}{\sqrt{9}} = \frac{2\cancel{6}\sqrt{3}}{\cancel{3}} = 2\sqrt{3}$

QUADRATICS: 2ND degree polynomials

Ex $x^2 - 10x = -16$ ← Equation

x^2: degree ⇒ Fundamental Theorem of Algebra in our class

FTA is MAX number of solutions

$x^2 - 10x + 16 = 0$

$(x-8)(x-2) = 0$

$x - 8 = 0$ or $x - 2 = 0$

$x = 8$ or $x = 2$