Adv Alg

th 9/15/16
Pd. 1

How do I simplify + do operations on $\sqrt{\ }$?

Radical: $\sqrt{\ }$ aka square root or cube root

$\sqrt[n]{x^m}$

n = index
x = variable/number
m = exponent on variable/number

When no index is visible ⇒ index is 2

$\sqrt[2]{\ } = \sqrt{\ }$ ⇒ square root

$\sqrt[3]{\ }$ ⇒ cube root

$\sqrt[4]{\ }$ ⇒ fourth root

... and so on

RULES

① +/− radicals: +/− coeff. of like radicals

ex) $2\sqrt{3} + 3\sqrt{3} = 5\sqrt{3}$

ex) $\sqrt{7} - 4\sqrt{7} = -3\sqrt{7}$

ex) $\sqrt{11} - \sqrt{2}$ can't do +/−

② multiplying: multiply radicals as long as the index are the same

ex) $\sqrt{3} \cdot \sqrt{2} = \sqrt{3 \cdot 2} = \sqrt{6}$

ex) $\sqrt[3]{3} \cdot \sqrt{2}$ cannot be simplified bc indices are different

ex) $\sqrt[4]{5} \cdot \sqrt[4]{3} = \sqrt[4]{5 \cdot 3} = \sqrt[4]{15}$

③ ÷ : $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

ex) $\sqrt{\frac{11}{4}} = \frac{\sqrt{11}}{\sqrt{4}} = \frac{\sqrt{11}}{2}$

Simplifying Radicals: Does the number under the radical have a factor that is a perfect square or cube, depending on the index?

ex) $\sqrt{200} = \sqrt{2 \cdot 100}$
$= \sqrt{2} \cdot \sqrt{100}$
$= 10\sqrt{2}$

ex) $\sqrt{50} = \sqrt{25 \cdot 2}$
$= \sqrt{25} \cdot \sqrt{2}$
$= \boxed{5\sqrt{2}}$ simplified

Perfect Sq.

$1^2 = 1$
$2^2 = 4$
$3^2 = 9$
$4^2 = 16$
$5^2 = 25$
$6^2 = 36$
⋮

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, ...

ex) $\sqrt{48} = \sqrt{16 \cdot 3}$

$= \sqrt{16} \cdot \sqrt{3}$

$= \boxed{4\sqrt{3}}$

Radical $\rightleftharpoons$ Exponential

$$\sqrt[n]{x^m} \rightleftharpoons x^{m/n}$$

ex) $\sqrt{x} = \sqrt[2]{x^1} \Rightarrow x^{1/2}$

ex) $z^{3/4} \Rightarrow \sqrt[4]{z^3}$

not test material