9/14 Algebra1 - Downing

Exponent Pre-Assessment

Simplifying Radicals

Perfect Squares

$2^2 = 4$	$\sqrt{4} = 2$
$3^2 = 9$	$\sqrt{9} = 3$
$4^2 = 16$	$\sqrt{16} = 4$
$5^2 = 25$	$\sqrt{25} = 5$
$6^2 = 36$	$\sqrt{36} = 6$
$7^2 = 49$	$\sqrt{49} = 7$
$8^2 = 64$	$\sqrt{64} = 8$
$9^2 = 81$	$\sqrt{81} = 9$
$10^2 = 100$	$\sqrt{100} = 10$

* Radicals can multiply and divide with other radicals (but not add or subtract) *

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

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

$2\sqrt{5} \cdot 3\sqrt{2} = \boxed{6\sqrt{10}}$

* To be simplified, a radical cannot have a factor in it that is a perfect square. *

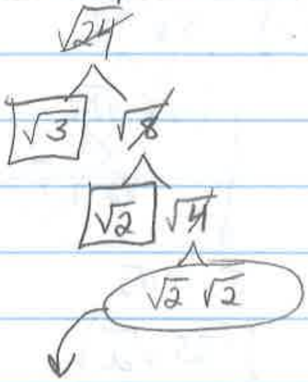
What if the root is not a perfect square?

Why we look for pairs

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

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

Example



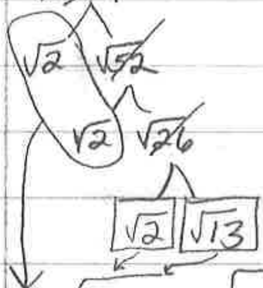
$2\sqrt{3} \cdot \sqrt{2}$

$\boxed{2\sqrt{6}}$

Steps

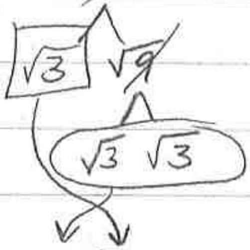
1. Factor out the radicand
2. Look for pairs of the same number.
3. Your pair come out from under the radical as <u>one</u> number
4. The numbers without a pair, stay inside the radical.

Ex) $\sqrt{104}$



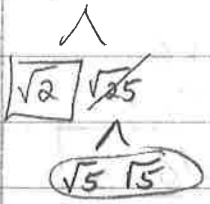
$2\sqrt{2\cdot 13} = \boxed{2\sqrt{26}}$

Ex) $\sqrt{27}$



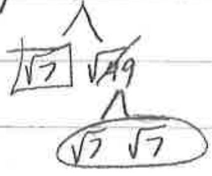
$3\sqrt{3}$

Ex) $\sqrt{50}$



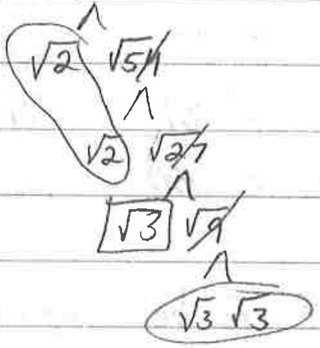
$= \boxed{5\sqrt{2}}$

Ex) $\sqrt{343}$



$= \boxed{7\sqrt{7}}$

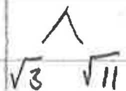
Ex) $\sqrt{108}$



$2\cdot 3\sqrt{3}$

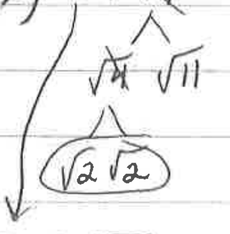
$= \boxed{6\sqrt{3}}$

Ex) $\sqrt{33}$



$= \boxed{\sqrt{33}}$

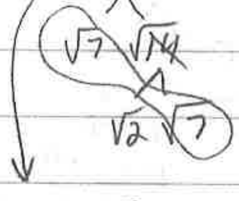
Ex) $3\sqrt{44}$



$3\cdot 2\sqrt{11}$

$\boxed{6\sqrt{11}}$

Ex) $-5\sqrt{98}$



$-5\cdot 7\sqrt{2}$

$\boxed{-35\sqrt{2}}$

Ex) $-8\sqrt{252}$

$= 2\cdot 3\sqrt{7}$

$6\sqrt{7}$

9/14 Algebra - Downing (con't)

Basics of Exponents

$$\underset{\text{Base}}{X}^{3 \longleftarrow \text{exponent}}$$

Expanded Form =

$x^3 = x \cdot x \cdot x$

$(-2)^3 = (-2) \cdot (-2)(-2)$

$-2^3 = -1 \cdot 2 \cdot 2 \cdot 2$

$(2x)^3 = 2x \cdot 2x \cdot 2x$

$2x^3 = 2 \cdot x \cdot x \cdot x$

$x^2 y z^3 = x^2 y^1 z^3$

$$\begin{tikzcd}
3^3 = 27 \arrow[d, bend left, "\div 3"] \\
3^2 = 9 \arrow[d, bend left, "\div 3"] \\
3^1 = 3 \arrow[d, bend left, "\div 3"] \\
3^0 = 1 \arrow[d, bend left, "\div 3"] \\
3^{-1} = \frac{1}{3} \arrow[d, bend left, "\div 3"] \\
3^{-2} = \frac{1}{9} \arrow[d, bend left, "\div 3"] \\
3^{-3} = \frac{1}{27}
\end{tikzcd}$$

★ If an exponent is negative:
Cross the line and change the sign

Ex) $\frac{3^{-2}}{1} = \frac{1}{3^2} = \frac{1}{9}$ Ex) $2^{-4} = \frac{1}{2^4} = \frac{1}{16}$ Ex) $\frac{1}{4^{-3}} = \frac{4^3}{1} = 64$

Zero Exponent Property: ANY nonzero number raised to the zero power is 1

Ex) $7^0 = 1$

$3{,}986^0 = 1$

$x^0 = 1$

$xy^0 = x$

$x^0 y = y$

$(xy)^0 = 1$

HW - Worksheet
(Radicals + Prop. of Exponents (Integers only) WS)
Front side only