SECTION 8-2

n^{th} Roots

COMMIT TO MEMORY!!!

Square roots that come out even:

$\sqrt{1} = 1$	$\sqrt{36} = 6$
$\sqrt{4} = 2$	$\sqrt{49} = 7$
$\sqrt{9} = 3$	$\sqrt{64} = 8$
$\sqrt{16} = 4$	$\sqrt{81} = 9$
$\sqrt{25} = 5$	$\sqrt{100} = 10$

Cubed roots that come out even:

$\sqrt[3]{1} = 1$	$\sqrt[3]{64} = 4$
$\sqrt[3]{8} = 2$	$\sqrt[3]{125} = 5$
$\sqrt[3]{27} = 3$	

USE OF THE ABSOLUTE VALUE IN AN n^{th}-ROOT ANSWER

Example: $\sqrt{144x^6} = 12\,|x^3|$

WHY???

we do not know whether the x was positive or negative to start with. Unless otherwise indicated a square root is assumed to be a positive answer so we must force the x^3 in the answer to be positive by including the absolute value

EXAMPLES (McConnell Method)

1) $\sqrt{81a^2b^4}$

factor trees all the way to the bottom (prime factorization)

$\sqrt{9} \quad \sqrt{9}$

$\sqrt{3}\ \sqrt{3}\ \sqrt{3}\ \sqrt{3}\ \sqrt{a}\ \sqrt{a}\ \sqrt{b}\ \sqrt{b}\ \sqrt{b}\ \sqrt{b}$

circle pairs, then use one of each pair for your answer

$= 3 \cdot 3 \cdot a \cdot b \cdot b$

$= 9ab^2$

$\sqrt[3]{27x^9y^3}$

$\sqrt[3]{3} \quad \sqrt[3]{9}$

$\sqrt[3]{3}\ \sqrt[3]{3}\ \sqrt[3]{3}\ \sqrt[3]{x}\ \sqrt[3]{x}\ \sqrt[3]{x}\ \sqrt[3]{x}\ \sqrt[3]{x}\ \sqrt[3]{x}\ \sqrt[3]{x}\ \sqrt[3]{x}\ \sqrt[3]{x}$

$\sqrt[3]{y}\ \sqrt[3]{y}\ \sqrt[3]{y}$

circle three of each since it is a cubed root, then use one of each for your

$= 3 \cdot x \cdot x \cdot x \cdot y$

$= 3x^3y$

EXAMPLES (Short-cut Method)

3) $\sqrt{49n^{10}p^{6}}$

$= \sqrt[2]{49n^{10}p^{6}}$

square root of 49 = 7, divide the exponents by the root no.

$= 7n^5p^3$

4) $\sqrt[3]{125d^{27}}$

cubed root of 125 = 5, divide the exponents by the root no.

$= 5d^9$

5) $\sqrt[3]{-8}$

$= -2$

6) $\sqrt[3]{-64(hj)^3k^{12}}$

$= -4(hj)^1k^4$

$= -4hjk^4$

7) $-\sqrt{36w^8}$

$= (-1) \cdot 6w^4$

$= -6w^4$

8) $\sqrt[4]{x^8y^{16}z^4}$

$= x^2y^4z$

9) $\sqrt{\dfrac{9}{100}}$

$= \dfrac{\sqrt{9}}{\sqrt{100}}$

$= \dfrac{3}{10}$

10) $\sqrt[3]{\dfrac{1}{27}}$

$= \dfrac{\sqrt[3]{1}}{\sqrt[3]{27}}$

$= \dfrac{1}{3}$

11) $-\sqrt[4]{(-9)^2}$

$= (-1)\sqrt[4]{81}$

$= -3$