RADICAL POWER RELATIONSHIPS!

$\sqrt{25} =$ 5 ...but we want to write this radical using only powers

We can write "25" using powers as 5^2

Now $(\quad)^{\text{what power?}}$ Would give us the same result as $\sqrt{25}$?

$(5^2)^{1/2} = \sqrt{25} = 5$

$= 5^1$

* $\sqrt{x} = x^{1/2}$ *

***LET'S TRY THIS AGAIN WITH $\sqrt{49}$**

$(7^2)^{1/2} = 7$

$\sqrt{49} = 49^{1/2}$

***LET'S TRY AGAIN WITH $\sqrt[3]{8}$**

$(2^3)^{1/3} = 2$

* $\sqrt[3]{x} = x^{1/3}$ *

GENERAL RULE: $\sqrt[n]{x^m} =$	**EXAMPLE A:** $\sqrt[3]{36x^8y^{40}}$	**EXAMPLE B:** $\sqrt[4]{16^5}$
$x^{M/N}$	$6x^{8/2}y^{40/2}$ $= 6x^4y^{20}$	$= 16^{5/4}$ $= (\sqrt[4]{16})^5$ $= 2^5 = 32$
	EXAMPLE C: $\sqrt[3]{8y^2}$ $2y^{2/3}$	**EXAMPLE D:** $\sqrt[3]{(m+n)^2}$ inside-out $((m+n)^{2/3})^{1/2}$ $= (m+n)^{2/6}$ $(m+n)^{1/3}$

PRACTICE! REWRITE EACH IN EXPONENTIAL FORM (NO RADICALS, BUT FRACTIONAL EXPONENTS ARE OKAY!)

1. $\sqrt[3]{64a^3b^{90}}$ $4b^{90/3}c$ $4bc^{30}$

2. $\sqrt[4]{16x^3}$ $2x^{3/4}$

3. $\sqrt[3]{x^4}$ $\sqrt[3]{27}$ $3^4 = 81$

4. $\sqrt[5]{(x-y)^3}$ $((x-y)^{3/5})^{1/2}$ $(x-y)^{2/5}$

5. $\sqrt[3]{32^3}$ $(\sqrt[5]{32})^3$ $2^3 = 8$

6. $(p^4q^4)^{1/4}$ $(pq)^{1/2}$