September 27th

exponent rules

How can we use exponent rules to simplify complex math problems in Algebra 2?

$x \cdot x \cdot x \cdot x = x^4$
$x + x + x + x = 4x$
> not the same!

$\pi r^2 = \text{area}$
$2\pi r = \text{cir}$

Name	Rule	Examples
Product Rule	$a^m \cdot a^n = a^{m+n}$	$4^2 \cdot 4^3 = 4^{2+3} = 4^5$
Quotient Rule	$\frac{a^m}{a^n} = a^{m-n}$	$\frac{5^9}{5^3} = 5^{9-3} = 5^6$
Power Rule	$(a^m)^n = a^{m \cdot n}$	$(3^2)^3 = 3^{2 \cdot 3} = 3^6$
Power of a Product	$(ab)^n = a^n b^n$	$(2 \cdot 5)^2 = 2^2 \cdot 5^2 = 4 \cdot 25$
Zero Exponent	$a^0 = 1$	$10002^0 = 1$
Neg. Exponent	$a^{-n} = \frac{1}{a^n}$	$5^{-2} = \frac{1}{5^2} = \frac{1}{25}$
Fractional Exponent	$a^{\frac{m}{n}} = \sqrt[n]{a^m}$	$4^{2/3} = \sqrt[3]{4^2} = \sqrt[3]{16}$

Why does this work?

$\frac{8x^5}{4x^2} = 2x^3$ } $\frac{8\, x \cdot x \cdot x \cdot x \cdot x}{4\, x \cdot x} = \frac{8}{4} x \cdot x \cdot x = 2x^3$

$\frac{125x^4y^3 3^{-2}}{5xy^2 3} = \frac{25x^3y^5}{3^3} = \boxed{25x^3y^5 3^{-3}}$

Percentage Error:

approximation - value given to a # which is close to it's true value

estimation - a # found by prediction (estimate #'s 1st)

$38.7 \times 5.1 \rightarrow 40 \times 5 = 200$

percentage error =
$E = \frac{|V_A - V_E|}{V_E} \times 100\%$

$\text{error} = V_A - V_E$

500m × 400m: $200000\ m^2$

$\frac{|250000 - 200000|}{200000} \cdot 100$

25% error

V_A = approximate value
V_E = Exact value

• a measurement is accurate to ± ½ the smallest division scale

Practice *

9.26.18

1 $\frac{6.2\times10^6}{3.1\times10^3} = \boxed{2.00\times10^3}$

2 $\frac{(8\cdot10^6)(5\cdot10^2)}{2\cdot10^2}$ $\frac{4.0\times10^9}{2\cdot10^2}$ $\boxed{2\times10^7}$

3 $(4.5\times10^8)+(3\times10^7)=\boxed{4.8\times108}$

9.27.18

$x\cdot x\cdot x\cdot x = \boxed{x^4}$

$x+x+x+x = \boxed{4x}$

10.1.18

$75mm\left(\frac{1m}{1000mm}\right)\left(\frac{1hm}{100m}\right)$ 7.5×10^{-4} hm

0.00075 hm

10.2.18

$\frac{8x^5}{4x^2} = 2x^3$ $32 = \sqrt{32}^2 = 2^5$

$243 = 3^5$

243 → 81, 3

81 → 9, 9

9 → 3, 3; 9 → 3, 3

10.8.18

$(2\frac{3}{5})^{-3} = \frac{13^{-3}}{5^{-3}} = \frac{5^3}{13^3} = \frac{125}{2197}$

$(4\frac{2}{3})^{-2} = \frac{14^{-2}}{3^{-2}} = \frac{3^2}{14^2} = \frac{9}{196} = 0.046$

10.9.18

$3.2m \times 300m = \boxed{960m^2}$

$\frac{|1000-960|}{960} = \boxed{4.2\%\ error}$

1.4 kg ± 0.5 kg range = 0.9 - 1.9

68 kg ± 0.5 kg range = 67.5 - 68.5

40 m 39.5 - 40.5

75 m 74.5 - 75.5

$\boxed{2942.75 - 3057.75\ m^2}$