Lesson 9-1

2/9/11 Powers & Exponents (p471-475)

5^3 ← exponent: how many times you multiply the base by itself

Base → The number that is being multiplied

power: a number that is expressed using an exponent.

Write each expression using exponents.

ex: $11 \cdot 11 \cdot 11 \cdot 11$ $\boxed{11^4}$

ex: $(-4)(-4)(-k)(-k)(-k)$ $(-4)^2(-k)^3$

* Don't forget: #'s before variables.
* Negative Bases must remain in ( ).

$(-2)^4$

$(-2) \cdot (-2) \cdot (-2)(-2)$

16

-2^4

$-2 \cdot 2 \cdot 2 \cdot 2$

-16

ex: $(z-4)(z-4)$ $(z-4)^2$

* $11 = 11^1$ When no exponent is visible, it is understood to be 1

* Any number (except 0) raised to the zero power is defined as 1.

$2^0 = 1$ $q^0 = 1$ $(z-4)^0 = 1$

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evaluate each expression if $b = -4$ and $c = 3.5$

ex: $c^2 + b^2$

① Substitute for the variables

$(3.5)^2 + (-4)^2$

② solve using order of operations.

$12.25 + 16$

28.25

ex: $3(b-1)^2$

$3(-4-1)^2$

$3(-5)^2$

$3(25) = 75$

Lesson 9-2

2/10/11 Prime Factorization (p476-480)

Prime Number: a number that has exactly 2 factors... "1" and "the number itself"

ex: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29

* 1 is not a prime number because it only has one factor (not 2)

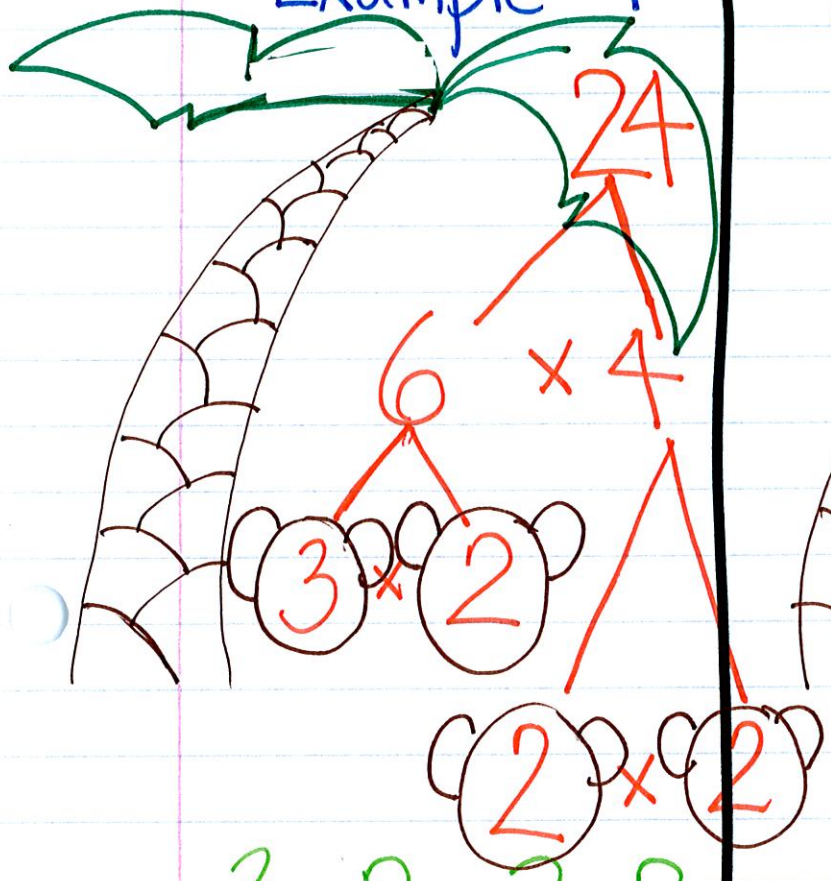
Composite Number: a number that has at least 3 factors or more

ex: 4, 6, 8, ...
1, 2, 4 ; 1, 2, 3, 6 ; 1, 2, 4, 8

Prime Factorization: When a composite number is broken down into all prime numbers

→ * Don't forget, can't use the number "1"

Example #1

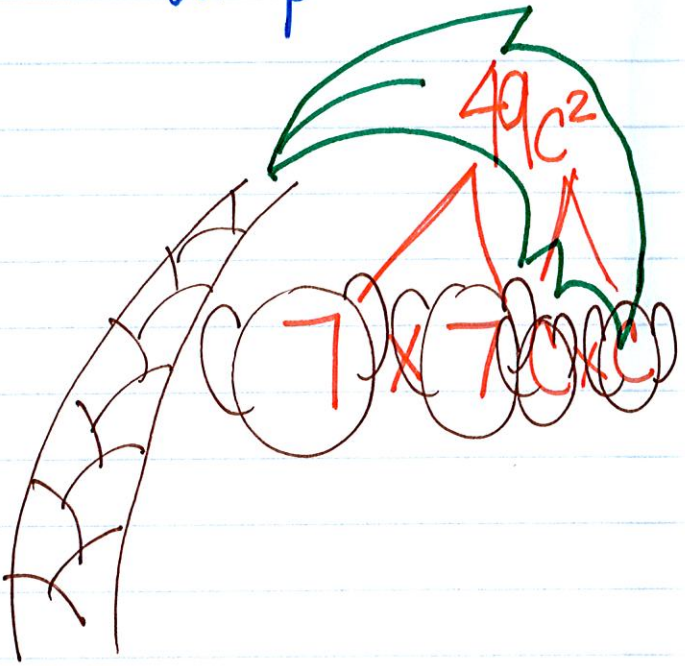


$3 \times 2 \times 2 \times 2$

$\boxed{2^3 \times 3}$

↳ The answer must be written in order from least to greatest

Example #2



$7 \cdot 7 \cdot c \cdot c$

Lesson 9-3 (p 481-485)

2/11/11 Multiplying & Dividing Monomials

Monomial: an expression that is a number, a variable, or a product of numbers and/or variables

ex: 27 a $2 \cdot 3$ $a \cdot b$ $27a$

$4^3 \cdot 4^5$

$4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 = 4^8$

Product of powers property: if two powers have the same base and they are being multiplied, you can add the exponents

ex: $6 \cdot 6^{11} = 6^{12}$

ex: $2x^3 \cdot 8x^4 = 2 \cdot 8 \cdot x^3 \cdot x^4 = 16x^7$

$$\frac{3^5}{3^2} = 3^{5-2} = 3^3$$

Quotient of Powers Property:
If two powers have the same base and they are being divided, you can subtract the exponents.

ex: $\frac{8^{14}}{8^5} = 8^9$

$\frac{3^5}{2^7} = \frac{243}{128} = \#$

can not subtract these exponents because the bases are different.

ex: $(-1.5)^8 \div (-1.5)^3 = (-1.5)^5$

ex: $\frac{c^7}{c^2} = c^5$

Lesson 9-4

2/14/11 Negative Exponents (p 486-491)

Exponential Form	Standard Form
10^3 ... $10 \cdot 10 \cdot 10$	1,000
10^2	100
10^1	10
10^0	1
10^{-1}	.1 or $\frac{1}{10^1}$
10^{-2}	$\frac{1}{100}$
10^{-3} → 10^3 →	$\frac{1}{1,000}$

Write each expression using a positive exponent.

ex: $\frac{2^{-3}}{1} = \boxed{\frac{1}{2^{+3}}}$

* when a power is dropped into the denominator, the charge of the exponent changes.

ex: $(-5)^{-2} = \frac{1}{(-5)^2}$

ex: $5z^{-4} = \boxed{\frac{5}{z^4}}$ ... $5\left(\frac{1}{z^4}\right)$

Write each fraction as an expression using a negative exponent

ex: $\frac{1}{(-5)^2} = (-5)^{-2}$

ex: $\frac{1}{39^1} = 39^{-1}$

ex: $\frac{1}{169} = \frac{1}{13^2} = 13^{-2}$

Lesson 9-5

2/16/11 Scientific Notation (p 493-498)

Show pollen video til 1:38

Scientific Notation: a number multiplied by a power of 10.

↳ greater than or equal to 1 and less than 10 ($1 \leq x < 10$)

ex: 4.6×10^3

*Why use it? Show vast distance video until 1:52

↳ to make really big numbers or really small numbers easier to write.

Standard Form: number without exponents.

ex: 4,600 8 .032

Express each number in scientific notation:

ex: $350 = 3.5 \times 10^2$

ex: $4,000,000 = 4 \times 10^6$

ex: $0.0685 = \frac{6.85}{10^2} = 6.85 \times 10^{-2}$

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*The exponent tells you the number of places to move the decimal.

negative exponents are for decimal answers

positive exponents are for whole numbers.

Express each number in standard form:

ex: $3.5 \times 10^3 = 3,500$

ex: $6.85 \times 10^{-2} = 0.0685$

ex: $1.3 \times 10^{-3} = 0.0013$

Lesson 9-6

2/21/11 Powers of Monomials (p499-503)

ex: $(18^2)^3$

$18^2 \cdot 18^2 \cdot 18^2$

$18 \cdot 18 \cdot 18 \cdot 18 \cdot 18 \cdot 18 = 18^6$

Power of a power property:

$$(a^m)^n = a^{mn}$$

ex) $(w^3)^4 = w^{12}$

ex) $(x^{-2})^4 = x^{-8}$ or $\frac{1}{x^8}$

ex) $(-103^4)^{12} = (-103)^{48}$

ex) $(7L^8)^2 = 7^2 L^{16}$ $\boxed{49L^{16}}$

* With an algebraic expression, evaluate the coefficient

ex) $(-3^1 b^5 c^{-7})^5 = (-3)^5 b^{25} c^{-35} =$

$= -243 b^{25} c^{-35}$

or

$$\frac{-243 b^{25}}{c^{35}}$$