Chapter 1
Number Properties

- Words use in mathematics
- Exponent notation
- Factors of positive integers
- Multiples of postive integers
- Order of operations

Words in Mathematics

- Students will be able to define basic words used in the study of mathematics
- Students will be able to use definitions to help them solve math problems

HW: Lesson 1A worksheet

Words in Mathematics

- Sum
- Difference
- Product
- Quotient
- Multiple
- Factors
- Exponent
- Dividend
- Divisor
- Undefined

Sums and Differences

To find the [ ] of two or more numbers, we add them.

To find the [ ] of two numbers, we subtract the smaller fror the larger.

When adding or subtracting [ ] (0), the number remains unchanged.

When adding several numbers, you don't have to add them in the given order. Sometimes it's easier to rearrange them.

Products and Quotients

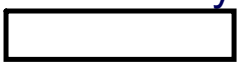
The word _____ is used to describe the result of a multiplication.

The word _____ is used to describe the result of a division.

Multiplying by one (1) does not change the value of a number.

Multiplying by zero (0) produces zero.

Division by zero (0) is meaningless. We say the result is



Like addition, the order in which numbers are multiplied does not change the resultant number.

1 Find:

a. the sum of 4, 28 and 16

b. the difference between 37 and 82

c. the sum of the first 12 positive whole numbers

d. by how much 407 exceeds 239.

2. a. What number must be increased by 249 to get 752?

b. What number must be decreased by 385 to get 2691?

3. Jose received $285 in wages whereas Juan received $312. How much more did Juan receive Jose?

4. Emma's horse float has mass 406 kg. Her two horses weigh 517 kg and 561 kg. If Emma's car is allowed to tow 1500 kg, is she allowed to transport both horses at the same time?

5. To help buy an apartment, Ageneta borrowed $26,200 from her parents. She has already paid them back amounts of $515, $872 and $664. How much does Agneta still owe her parents?

6. Find:
   a. the product of 19 and 23
   b. the quotient of 1008 and 36
   c. the product of the first 6 positive whole numbers.

7. How many $3 buckets of chips must I sell to earn $246?

8. My orchard contains 8 rows of 12 apple trees. If each tree produces 400 fruit, how many apples can I harvest?

9. How many laps of a 400 m track does an athlete need to complete in a 10,000 m race?

10. An apartment complex has 6 buildings, each 28 storeys high, and on each storey there are 5 apartments.
    a. How many apartments are there in total?

    b. Each apartment owners has to pay $3400 per year to maintain the buildings. What is the total annual budget for maintenance?

11. A cargo plane can carry 115 tonnes. How many plane loads are needed to transport 7245 tonnes of supplies?

Exponent Notation

- Students will be able to evaluate numbers that are in exponential form
- Students will be able to rewrite natural numbers in factored form and exponent form
- Students will be able to determine the sign of the result when raising a negative base by a power

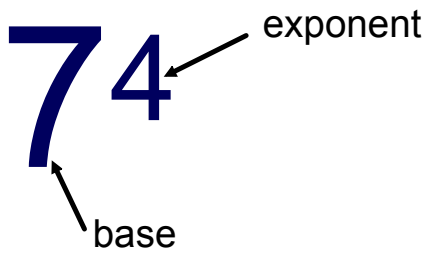
HW: Lesson 2A worksheet

A convenient way to write a product of idential factors is to use exponential or index notation.

For example, 32 can be written as 2 x 2 x 2 x 2 x 2

There are five identical factors, each 2, so we can write this as 2^5

Another example is:



Natural number	*Factorised form*	*Exponent form*	*Spoken form*
2	2	2^1	two
4	2×2	2^2	two squared
8	$2 \times 2 \times 2$	2^3	two cubed
16	$2 \times 2 \times 2 \times 2$	2^4	two to the fourth
32	$2 \times 2 \times 2 \times 2 \times 2$	2^5	two to the fifth

Any non-zero number raised to the power zero is equal to 1.

$$a^0 = 1, \ a \neq 0$$

0^0 is undefined.

Negative Bases

A negative base raised to an odd power results in a [ ] value

$(-2)^5 = -2 \times -2 \times -2 \times -2 \times -2 =$

A negative base raised to an even power results in a [ ] value

$(-3)^4 = -3 \times -3 \times -3 \times -3 =$

1. Write in exponent form:

a. $2 \times 3 \times 3$

b. $3 \times 3 \times 7 \times 7$

c. $3 \times 3 \times 7 \times 5 \times 7 \times 3$

2. Convert each product into natural form:

a. $2 \times 5 \times 7$

b. $2^4 \times 3 \times 5^2$

c. 2×3^2

d. $2^3 \times 4 \times 5^2$

3. Determine if the result is positive or negative.

a. $(-2)^3$

b. $(-5)^6$

c. $(-1)^{14}$

d. $-(-3)^5$

e. $-(-2)^4$

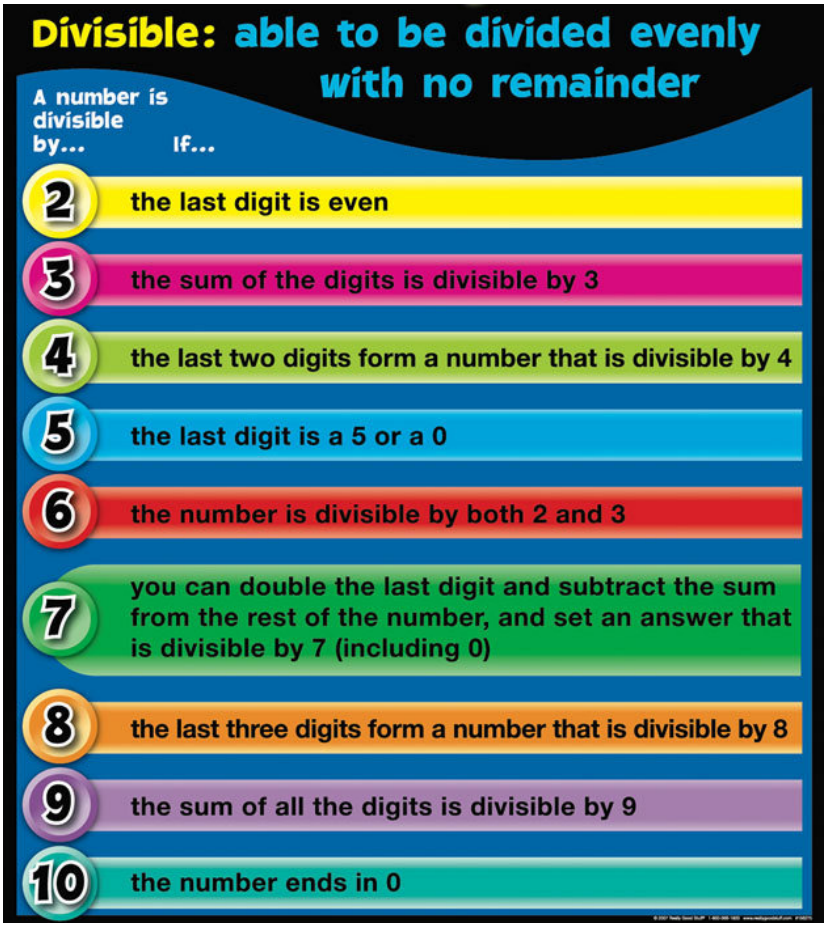
f. -6^2

Factors of Positive Integers

- Students will be able to determine if a number is a factor of a given integer
- Students will be able to list factor pairs of an integer
- Students will be able to determine if a number is prime or composite
- Students will be able to determine the HCF of a pair of integers

HW: Lesson 3A worksheet

Divisibiliy



Which #s are factors of

840

Factor Pairs

When you rewrite a number as a product of factors, we say it is [ ].

16...

...can be factorised in a few different ways

After you have all the ways you can factorise a number written, a complete list of factors for that number has been made

1, 2, 4, 8,16

What is the largest factor, other than itself, for each of the following:

18

126

Primes & Composites

A [ ] number is a natural number which has exactly two different factors.

A [ ] number is a natural number which has more than two factors.

Fundamental Theorem of Arithmetic...

Every composite number can be written as the product of prime factors exactly one way (ignoring order) in exponential form.

12

Use Factor Trees to help rewrite an integer in...

...Exponential Form

346

Highest

Common

Factor

The highest common factor of two integers can be found by first expressing the integers into a product of prime factors.

18 24

1. List all the factors of the following numbers and then mark them as prime or composite.

   a. 16 b. 23 c. 60

   d. 28 e. 22 f. 108

2. What's the largest factor other than itself for each of the following.

   a. 18 b. 88 c. 126

3. List all the prime numbers less than 60.

4. How many prime numbers are even? List them.

5. Show that the following numbers are composite.
   a. 14 b. 32

6. Express each of the following numbers as a product of prime factors.
   a. 28 b. 40 c. 32

7. Find the HCF of:
   a. 8 and 12 b. 9 and 15 c. 27 and 36

Multiples of Positive Integers

- Students will be able to determine if a number is a multiple of a given integer
- Students will be able to list multiples of a given integer
- Students will be able to determine the LCM of a pair of integers

HW: Lesson 4A worksheet

Multiples

The _____ of any whole number have that number as a factor.

The number 40 is a multiple of both 5 and 10, so we say that it's a _____

The _____ of two or more numbers is the smallest number which is a multiple of each of those numbers.

1. Find the first six multiples of:
   a. 4 b. 5 c. 7

2. Given the numbers from 1 to 40.
   a. put a circle around the multiples of 3
   b. put a square around the multiples of 5
   c. List the common multiples of 3 and 5 that are less than 40

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

3. Find the lowest common multiple of the following sets:

a. 2 and 5

b. 3 and 7

c. 4 and 5

d. 6, 9 and 12

Order of Operations

- Students will be able to use order of operations to evaluate expressions

HW: Lesson 5A worksheet

Rules for Order of Operations

Please | Excuse | My Dear | Aunt Sally

- Parenthesis
- Exponents
- Multiplication/Division...in order from left to right
- Addition/Subtraction...in order from left to right

Evaluate:

$35 - 10 \div 2 \times 5 + 3$

$2 \times [3 \times (6 - 4)] + 7$

$5 + [13 - (8 \div 4)^3]$

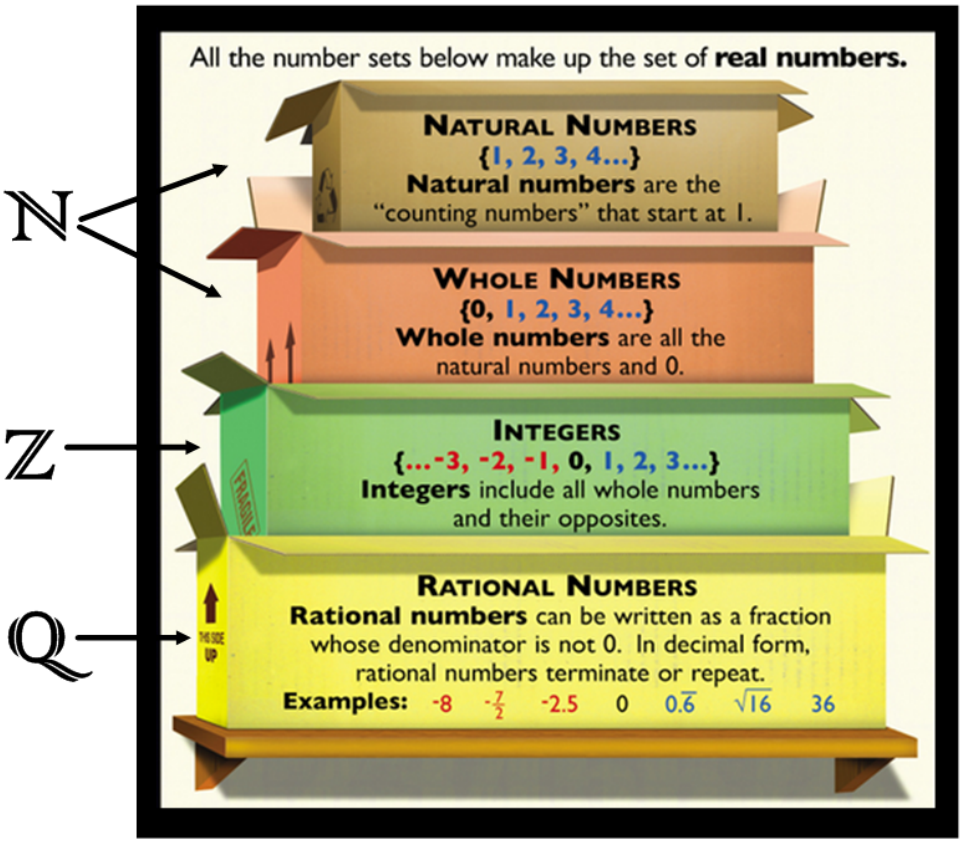
$$\frac{11 - 6}{4 \times 5}$$

$$\frac{6 \times (7 - 2)}{3 + 2}$$

Special Number Sets

- Students will be able to determine what number sets an integer belongs to

HW: Lesson 6A worksheet



*Putting a plus sign in front of the set symbol indicates only positive numbers from that set, i.e. + $\mathbb{N}$

Rewriting decimals and repeating decimals in fraction form

1.37

0.414141...

1. Explain why -5, 3, and 0.72 are all rational numbers.

2. Indicate which number sets each belongs to

	$\mathbb{Q}$	$\mathbb{Q}^+$	$\mathbb{Z}$	$\mathbb{Z}^+$	$\mathbb{N}$
3					
-2					
1.5					
0					
$-\frac{1}{2}$					
$\sqrt{5}$					
$1.\overline{32}$					

3. Explain why 9/2 does not belong to the set of integers.

4. Explain why 4/0 is not a rational number.

5. Show how the following are rational numbers by rewriting them.

a. 0.35

b. 1.27

c. 0.141414...