

# Unit 1: Numbers and Operations

(Place value, operations with decimals, order of operations.)

# Place Value

①

Place Value Chart  
Millions Thru Thousandths

1	Thousandths
2	Hundredths
3	Tenths
4	Ones
5	Tens
6	Hundreds
7	Thousands
8	Ten Thousands
9	Hundred Thousands
1	Millions

Decimal Point read as 'and'

Standard Form:

1,987,654.321

Expanded Form:

$$\begin{aligned} &(1,000,000) + \\ &(900,000) + \\ &(80,000) + (7,000) \\ &+ (600) + (50) + (4) \\ &+ (3 \times \frac{1}{10}) + (2 \times \frac{1}{100}) \\ &+ (1 \times \frac{1}{1000}) \end{aligned}$$

Word Form:

one million  
nine hundred  
eighty-seven  
thousand, six  
hundred fifty-  
four AND three  
hundred twenty-  
one thousandths.

# Decimals

Decimal - 3.4

Decimal point -        ↓       

0.         
↑      ↑      ↑  
tenths hundredths thousandths

→ Compare Decimals ←

Which is bigger?

Example

1. Write the numbers 43.06  
vertically (one on top 43.60  
of the other):

2. Compare the whole numbers: 43.06  
43.60

3. Compare tenths: 43.06  
43.60

4. Compare hundredths and thousandths: 43.06  
43.60

So,  $43.06 < 43.6$

# Rounding

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Example:

Round to the place indicated:

30.690

Step 1: underline the place, 30.690

Step 2: LOOK at the neighbor to the right and circle it.

30.69(0)

Step 3: Remember

Rounding Rules:

- ★ 4 or less, let it rest  
(stay the same)
- ★ 5 or more, let it soar  
(add 1)

Step 4: Anything to the left of the underlined number stays the same. Anything to the right becomes zeros!

pg 303 in Math Book

# Divisibility

RULES FOR 1, 2, 3, 5:

① all numbers

② all even numbers

Add the numbers together, if the sum is divisible by 3, so is the number. ③

⑤ All numbers ending in 5 OR 0

# Divisibility

## Rules for 6, 9, 10:

If it is divisible by 2 AND 3, it is divisible by 6.

Add the numbers together, if the sum is divisible by 9, so is the number.

All numbers ending in 0.

# Prime & Composite Numbers

A PRIME number is:

A number that has **only 2** factors: 1 and itself.

For example:

$$\begin{matrix} & 7 & \\ (7) \times & (1) & = 7 \end{matrix}$$

7 and 1 are the **only** factors for the number 7.

A COMPOSITE number is:

A number that has **more than 2** factors.

For example:

$$\begin{matrix} & 6 & \\ (6) \times & (1) & = 6 \\ (2) \times & (3) & = 6 \end{matrix}$$

The number 6 has 4 different factors!

# Prime Factorization

6

## Factor Tree Method

① Determine a multiplication fact to get the factors of the number OR use your divisibility rules!

② Circle any prime numbers.

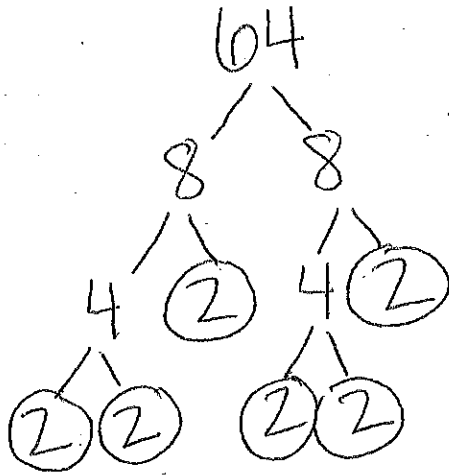
③ Continue finding factors.

④ Write all circled prime numbers least to greatest.



107

Factor 166 to



$$2 \times 2 \times 2 \times 2 \times 2 \times 2 = 164$$

# Exponents

★ repeated multiplication

- represents how many times a number (BASE) is multiplied by itself.

Any number raised to the first power is itself!

$$\begin{array}{l}
 \overset{3 \text{ (exponent)}}{5} = 5 \times 5 \times 5 \\
 \text{(Base)} \quad \quad \quad \vee \\
 \quad \quad \quad \quad \quad 25 \times 5 = 125
 \end{array}$$

$$2^4 = 16$$

Exponential  
Form

$$2^4$$

Expanded Form (Factor  
Form)

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

Word Form

TWO to the  
fourth power

Standard Form

$$16$$

# Powers of 10

numbers like:

10      100      1000

10,000

The exponent tells you the number of zeros in the answer.

Example:  $10^3 = 10 \times 10 \times 10 = 1,000$

$10^6 = 1,000,000$

# Adding and Subtracting Decimals

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Step 1: Line up the decimal points vertically:

$$\begin{array}{r} 7.12 \\ + 4.259 \\ \hline \end{array}$$

Step 2: Add zeros to empty spaces:

$$\begin{array}{r} 7.120 \\ + 4.259 \\ \hline \end{array}$$

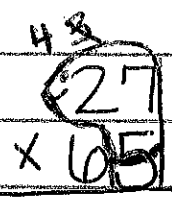
Step 3: Start adding (or subtracting) from right to left:

$$\begin{array}{r} 7.120 \\ + 4.259 \\ \hline 11.379 \end{array}$$

Step 4: Bring down the decimal!

★ Pg 335 / 301 in Math Book ★  
Add / subtract

# 2x2 Multiplication



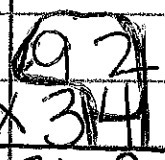
Turtlehead Method:

$$\begin{array}{r}
 135 \\
 + 1620 \\
 \hline
 1755
 \end{array}$$

1. Draw the turtle's head.

2. Multiply the numbers in his neck and head.

$$5 \times 7, 5 \times 2$$



$$\begin{array}{r}
 368 \\
 + 2760 \\
 \hline
 3128
 \end{array}$$

3. Cross out the number in the neck. (draw a necklace)

4. Cross out the number carried (if there is one).

5. Lay an egg (zero).

6. Multiply the  $6 \times 7$  and  $6 \times 2$ .

7. ADD!

# Multiplying Decimals

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1. Ignore the decimal.

2. Multiply.

3. Once you have your answer, go back and count the numbers behind the decimal.

4. Move that many places in your answer from right to left.

Example:

$$\begin{array}{r} 4 \\ 6.5 \\ \times 8 \\ \hline 52.0 \end{array}$$

← one number behind decimal. =

← one move left

# Order of Operations

Operations are:  $( )$ ,  $1^2$ ,  
 $\times$ ,  $\div$ ,  $+$ ,  $-$

Operations tell us what to do with the numbers.

When there are more than 2 numbers and more than 1 operation, you must follow an order:

P	parentheses, brackets, braces
E	exponents
M	multiply
D	divide
A	addition
S	subtraction

left to right

left to right



# Order of Operations

## Order of Operations

( ) Parenthesis

$x^2$  Exponents

\* Multiply

÷ Divide

+ Add

- Subtract

In order from  
left to right.  
→

In order from  
left to right.  
→

## Order of Operations Examples

$$1. \quad \begin{array}{c} (5+4) - 1 = \\ \downarrow \quad \downarrow \\ 9 - 1 = 8 \end{array}$$

$$2. \quad \begin{array}{c} 5^2 - 10 = \\ \downarrow \quad \downarrow \\ 25 - 10 = 15 \end{array}$$

$$3. \quad \begin{array}{c} 5 \div 5 \times 3 = \\ \downarrow \quad \downarrow \\ 1 \times 3 = 3 \end{array}$$

$$4. \quad \begin{array}{c} 10 + 4 - 2 + 1 = \\ \downarrow \quad \downarrow \quad \downarrow \\ 14 - 2 + 1 \\ \downarrow \quad \downarrow \\ 12 + 1 = 13 \end{array}$$

# Long Division

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**divisor** - a number divided into another number.

**dividend** - a number that is divided by another number.

**quotient** - the number that results from the division of one number by another. <THE ANSWER>

**remainder** - the amount leftover when a number cannot be divided exactly by another number.

## STEPS:

**D**  $\div$  divide (dirty)  
**M**  $\times$  multiply (monkeys)  
**S** - subtract (smell)  
**B**  $\downarrow$  bring down (bad)

long division examples:

1.

$$\begin{array}{r} 05 \text{ r}1 \\ 5 \overline{)26} \\ \underline{-0} \phantom{0} \\ 26 \\ \underline{-25} \\ 1 \end{array}$$

2.  $256 \div 3$

$$\begin{array}{r} 085 \text{ r}1 \\ 3 \overline{)256} \\ \underline{-0} \phantom{0} \\ 25 \\ \underline{-24} \\ 16 \\ \underline{-15} \\ 1 \end{array}$$

# Dividing Decimals

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→ If a decimal is in the house...

$$\begin{array}{r} 1.6 \\ 4 \overline{) 6.4} \end{array} \quad 6.4 \div 4 = 1.6$$

Raise it to the roof!

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→ If a decimal is on the side...

$$1.2 \overline{) 3.6}$$

Let it slide to the right. Do the same inside!

\* If there is a remainder, add zeros to the dividend.