

Numbers 2 & Concepts  
*Mathematics and Millennials – 6th*

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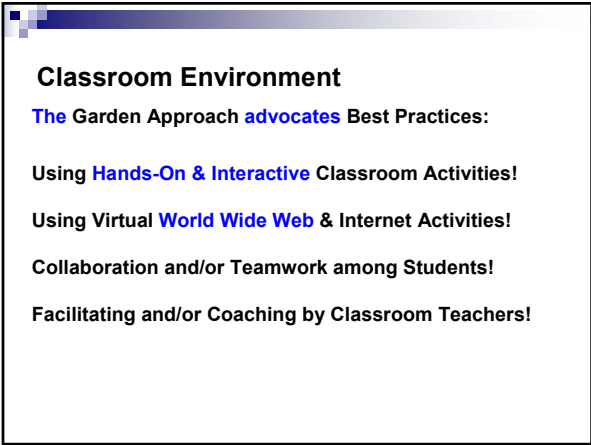
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**Classroom Environment**  
The Garden Approach **advocates** Best Practices:  
  
Using **Hands-On & Interactive** Classroom Activities!  
Using Virtual **World Wide Web** & Internet Activities!  
Collaboration and/or Teamwork among Students!  
Facilitating and/or Coaching by Classroom Teachers!

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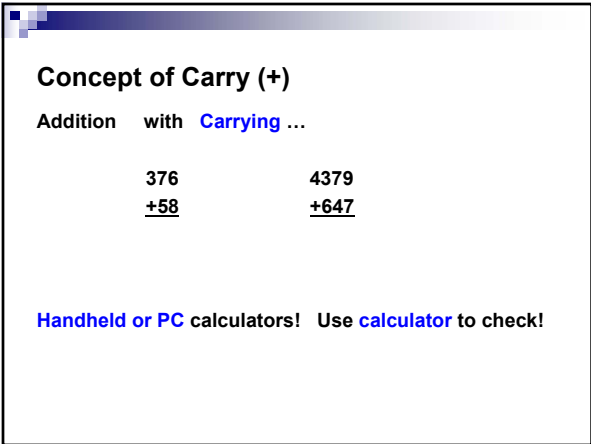
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**Concept of Carry (+)**  
Addition with **Carrying** ...

376	4379
<u>+58</u>	<u>+647</u>

**Handheld or PC** calculators! Use **calculator** to check!

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## Concept of Borrow (-)

Subtraction with **Borrowing...**

$$\begin{array}{r} 374 \\ -85 \\ \hline \end{array} \qquad \begin{array}{r} 4376 \\ -537 \\ \hline \end{array}$$

**Check** Subtraction with Addition!

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## Concept of Carry (x)

Multiplication with **( 2 ) Digit** multipliers...

$$\begin{array}{r} 413 \\ \times 25 \\ \hline \end{array} \qquad \begin{array}{r} 4526 \\ \times 13 \\ \hline \end{array}$$

**Handheld or PC** calculators! Use **calculator** to check!

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## Concept of Division with R

Division with **Remainders...**

$$\begin{array}{r} 67 \\ 7 \overline{)474} \\ \underline{-42} \\ 54 \\ \underline{-49} \\ R = 5 \text{ thus } 67 \frac{5}{7} \end{array} \qquad \begin{array}{r} 26 \\ 9 \overline{)236} \\ \underline{-18} \\ 56 \\ \underline{-54} \\ R = 2 \text{ thus } 26 \frac{2}{9} \end{array}$$

**Check** Division with Multiplication!

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## Numbers, Relations, Operations

### Numbers

Values and Ideas which are not Numerals!

### Numerals

Symbols for Values and Ideas not Numbers!

### Relations

Symbols for **Comparing Values** of Numbers!

### Operations

Computations or **procedures** with Numbers!

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## Numbers & Numerals

### Difference between Numbers and Numerals...

Numeral 3 represents ### or @@@

Numeral 3 represents a **unique value or idea**.

Numeral 5 represents \*\*\*\*\* or !!!!!

Numeral 5 represents a **distinct value or idea**.

### Roman Numerals were an important Number System!

Numeral **IV** = #### Numeral **XV** = 15

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## Relations

**Demonstrates** relative value of **Numerals** or **Numbers**!

**Equality:**             $3 = 3$     or     $### = ###$

**Less than:**            $2 < 3$     or     $@@ < @@@$

**More than:**            $4 > 3$     or     $!!!! > !!!$

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## Operations

Computations or Procedures with Numbers:

**Addition:**  $3 + 2 = **$  combine  $** = *****$

**Subtraction:**  $5 - 3 = *****$  deduct  $** = **$

**Multiplication:**  $4 \times 3 = 4+4+4$  Repeated Addition

**Division:**  $6 / 3 = -3 -3$  Repeated Subtraction

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## Properties

The Properties of Mathematics:

Closure, Commutative, Associative,  
Identity, Inverse, Distributive.

Properties of Mathematics are principles or rules  
which regulate Mathematics structure.

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## Property - Closure

Closure Property

Operate on 2 numbers in a set and result is in the set.

Is the answer in the set?  $2 + 4 = 6$

Is the answer in the set?  $2 - 4 = \_ ?$

Is the answer in the set?  $2 \times 4 = 8$

Is the answer in the set?  $2 / 6 = \_ ?$

Which number set and operation appear closed?

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## Properties - Commutative

### Commutative Property

**Order** is changed but result remains the same.

Does **order** change value?  $3 + 6 = 6 + 3$

Does **order** change value?  $7 - 5 = 5 - 7 ?$

Does **order** change value?  $2 \times 3 = 3 \times 2$

Does **order** change value?  $7 / 9 = 9 / 7 ?$

Which **operations** might be Commutative (Order)?

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## Properties - Associative

### Associative Property

**Grouping** does not change value.

Operation allow **grouping**?  $2 + (3 + 4) = (2 + 3) + 4$

Operation allow **grouping**?  $(7 - 3) - 2 = 7 - (3 - 2) ?$

Operation allow **grouping**?  $4 \times (3 \times 5) = (4 \times 3) \times 5$

Operation allow **grouping**?  $(6 / 3) / 9 = 6 / (3 / 9) ?$

Which **operations** might be Associative (Group)?

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## Properties - Identity

### Identity Property

A **Special Number** that does not change another!

Is 0 the Identity for Addition?  $2 + 0 = 2$

Is 0 the Identity for Subtraction?  $3 - 0 = \_ ?$

Is 1 the Identity for Multiplication?  $4 \times 1 = 4$

Is 1 the Identity for Division?  $6 / 1 = \_ ?$

Which operation seems to have an Identity?

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## Properties - Inverse

Inverse Property

**Unique Number** which results in the Identity Number.

Are these numbers inverses?  $(+2) + (-2) = 0$

Are these numbers inverses?  $(+3) - (-3) = \underline{\quad}$  ?

Are these numbers inverses?  $(4) \times (1/4) = 1$

Are these numbers inverses?  $(5) \div (1/5) = \underline{\quad}$  ?

Which **operation** appear to have inverses?

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## Properties - Distributive

Distributive Property

Can an operation be dispersed over another operation?

**Is (x) over (+) Distributive?**

$2 \times (3 + 4) = (2 \times 3) + (2 \times 4)$     $2 \times (7) = (6) + (8)$     $14 = 14$

**Is (/) over (+) Distributive?**

$3 / (3 + 6) = (3/3) + (3/6)$     $(3/3) + (6/3) = (1) + (1/2)$     $1 + 2 = 1 \ 1/2$

What **operations** appear to be Distributive?

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## Rounding

**Rounding** uses a number line as a **graphical reference!**

**N < Mid: Rd Dn**   6 ----- 6.5 ----- 7   **N > Mid: Rd Up**

If N = Middle **then** Rd Up to next highest number?

Round to nearest **Thousand**: 8,659 Therefore: 9,000

Round to nearest **Million**: 3,472,891 Thus: 3,000,000

Round to nearest **Hundred**: 450 **Therefore**: 500

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## Estimating

**Estimating** uses Rounding for quick prediction!  
Use Mental Math for checking results!

**Estimate:**  $689 \times 4,359$

Round & Multiply to estimate: 2,800,000

**Estimate:**  $6,213 \times 4,857$

Round & Multiply to estimate: 30,000,000

**Round! Multiply digits! How many Zeros?**

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## Scientific Notation - 1

**Scientific Notation & Large Numbers:**

**A number between 1 and 10 (x) a power of ten!** Large Numbers Scientific Notation

5,730  $5.7 \times 10^3$

918,500  $9.2 \times 10^5$

654,000,000  $6.5 \times 10^8$

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## Scientific Notation - 2

**Scientific Notation & Small Numbers:**

**A number between 1 and 10 (x) a power of ten!** Small Numbers Scientific Notation

.0045  $4.5 \times 10^{-3}$

.000218  $2.2 \times 10^{-4}$

.000000372  $3.72 \times 10^{-7}$

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## Least Common Denominator

An LCD is divisible by two smaller numbers.

**Smallest mutual number** for two given numbers.

Given  $3/4$  &  $2/5$ : **Determine** LCD to **Add or Subtract!**

$$4 = \{ \quad \quad \quad \}$$

$$5 = \{ \quad \quad \quad \}$$

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## Higher Exponents

Examples of **Higher** Exponents or Powers!

$$5^3 = 125 \quad \text{since} \quad 5 \times 5 \times 5 = 125$$

$$4^3 = 64 \quad \text{since} \quad 4 \times 4 \times 4 = 64$$

$$2^3 = 8 \quad \text{since} \quad 2 \times 2 \times 2 = 8$$

**Pattern or Sequence:**

$$1^3 \quad 2^3 \quad 3^3 \quad 4^3 \quad 5^3 \quad 6^3 \quad 7^3 \quad 8^3 \quad 9^3 \quad 10^3, \text{ etc...}$$

$$1, \quad 8, \quad 27, \quad 64, \quad 125, \quad 216, \quad 343, \quad 512, \quad 729, \quad 1000, \text{ etc...}$$

What calculator **button** yields exponents?

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## Larger Radicals

Examples of **Larger** Radicals or Square Roots!

$$\sqrt{256} = 16 \quad \text{since} \quad 16 \times 16 = 256$$

$$\sqrt{196} = 14 \quad \text{since} \quad 14 \times 14 = 196$$

$$\sqrt{169} = 13 \quad \text{since} \quad 13 \times 13 = 169$$

**Pattern or Sequence:**

$$\sqrt{121}, \sqrt{144}, \sqrt{169}, \sqrt{196}, \sqrt{225}, \sqrt{256}, \sqrt{289}, \sqrt{324}, \sqrt{361}, \sqrt{400} \dots$$

$$11, \quad 12, \quad 13, \quad 14, \quad 15, \quad 16, \quad 17, \quad 18, \quad 19, \quad 20$$

What **calculator** button finds Square Roots?

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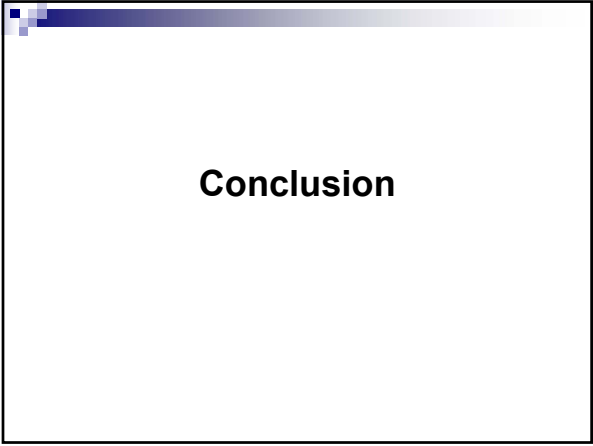
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