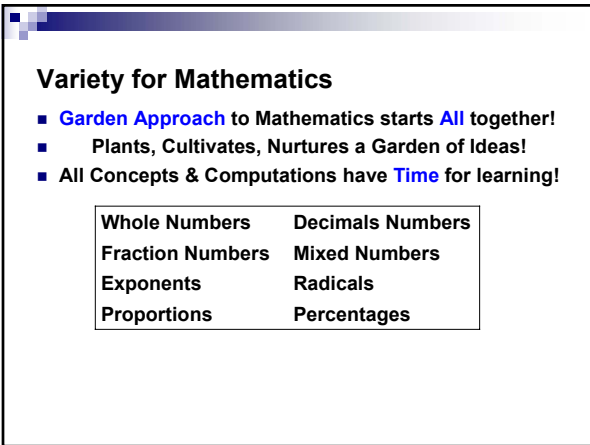


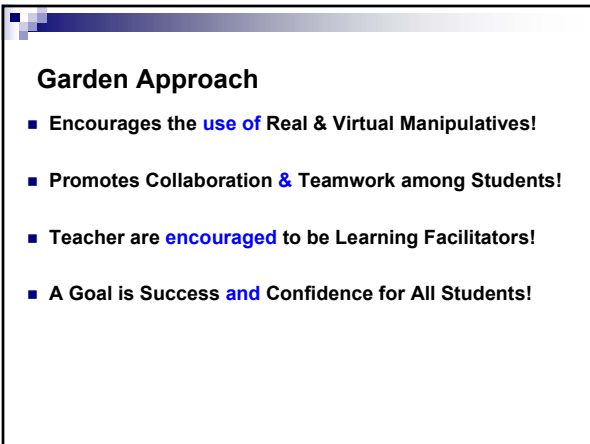
Numbers 3 & Computation
Mathematics and Millennials – 6th



Variety for Mathematics

- **Garden Approach** to Mathematics starts **All** together!
- Plants, Cultivates, Nurtures a Garden of Ideas!
- All Concepts & Computations have **Time** for learning!

Whole Numbers	Decimals Numbers
Fraction Numbers	Mixed Numbers
Exponents	Radicals
Proportions	Percentages



Garden Approach

- Encourages the **use of** Real & Virtual Manipulatives!
- Promotes Collaboration & Teamwork among Students!
- Teacher are **encouraged** to be Learning Facilitators!
- A Goal is Success **and** Confidence for All Students!

Concepts & Computations

- Activities use **existing** Traditional Textbook!
- Students Search for Definitions & Examples!
- Learn to Read, Write, Talk about Math!
- **Work in Teams!** **Teachers Facilitate!**
- **Students Check Answers** to Computations!
- Teams **collaborate** to help with corrections!
- Many Activities! Multi-Levels! Multi-Tasks!
- **Engage, Explore, Explain, Extend, Evaluate!**

Whole Numbers - 1

- Addition: Putting together two quantities or values
 $3 + 2 = \text{*** putting together **} = \text{*****}$
- Subtraction: Taking away a quantity from a quantity
 $6 - 3 = \text{***** taking away ***} = \text{***}$
- Multiplication: Repeated Addition
 $8 \times 3 = 8 + 8 + 8 = 24$ | **want 3 (of) 8s!**
- Division: Repeated Subtraction
 $7 / 2 = -2 -2 -2 = 3$ R = 1 Answer = **3 1/2 !**
- How many **groups** of 2 in 7? **How many left?**

Whole Numbers - 2

- $752 + 309 = ?$ $752 + 309 = 1061$ Needs Carry!
- $316 - 254 = ?$ $316 - 254 = 62$ Needs Borrow!
- $423 \times 27 = ?$ $23 \times 47 = 11,421$ Many Digits!
- $358 / 15 = ?$ $15 \overline{) 358} = 23 \frac{13}{25}$ Mixed Number!
- Division result shows **answer** as Mixed Number!
- Display in Horizontal Fashion **then** students arrange!
- Promote Mental Math **and** use Calculator to Check!

Fraction Numbers - 1

- **Addition:** (Common Denominator & Combine)
 $2/3 + 3/5 = 2/3(5/5) + 4/5(3/3) = 10/15 + 12/15 = 22/15 = 1 \ 7/15$
- **Subtraction:** (Common Denominator & Subtract)
 $7/8 - 2/3 = 7/8(3/3) - 2/3(8/8) = 21/24 - 16/24 = 5/24$
- **Multiplication:** (Multiply Tops & Bottoms)
 $2/5 \times 3/4 = \underline{\quad}$ $2/5$ of $3/4 = 6/20 = 3/10$ ($2/5 = 8/20$)!
I want $3/4$ of $2/20 + 2/20 + 2/20 + 2/20 = 6/20 = 3/10$ Reduce!
- **Division:** (Invert 2nd Fraction & Multiply.)
 $3/5 \div 2/3 = \underline{\quad}$ $3/5 \div 2/3 = 3/5 \times 3/2 = 9/10$ Reduce?
 $3/5 \div 2/3 = 3/5 \times (3/2) \div 2/3 \times (3/2) = 3/5 \times 3/2 = 9/10$

Fraction Numbers - 2

- $3/4 + 3/5 = \underline{\quad}$ Common Denominator & Combine!
 $3/4(5/5) + 3/5(4/4) = 15/20 + 12/20 = 27/20 = 1 \ 7/20$
- $7/8 - 1/3 = \underline{\quad}$ Common Denominator & Subtract!
 $7/8(3/3) - 1/3(8/8) = 21/24 - 8/24 = 13/24$ Reduce!
- $4/5 \times 3/8 = \underline{\quad}$ Multiply Tops & Bottoms!
 $4/5 \times 3/8 = 12/40 = (12/4) \div (40/4) = 3/10$ Reduce!
- $2/3 \div 4/7 = \underline{\quad}$ Invert 2nd Fraction & Multiply
 $2/3 \div 4/7 = 2/3 \times 7/4 = 14/12 = 1 \ 2/12 = 1 \ 1/6$ Reduce!

Mixed Numbers - 1

- **Proper Fraction**
Numerator less than Denominator $N < D$ Exp: $3/5$
- **Improper Fraction**
Numerator more than Denominator $N > D$ Exp: $9/7$
- **Mixed Number:**
Whole Number and Proper Fraction Exp: $2 \ 4/5$
- **Change Improper Fraction to Mixed Fraction:**
 $7/5 = 1 \ 2/5$ $7/4 = 1 \ 3/4$ $7/3 = 2 \ 1/3$
- **Change Mixed Fraction to Improper Fraction:**
 $1 \ 3/5 = 8/5$ $3 \ 2/3 = 11/3$ $2 \ 1/4 = 9/4$

Mixed Numbers - 2

- $2 \frac{1}{3} + 3 \frac{1}{4} = \underline{\quad}$ Add Numbers **then** Fractions!
 $2 \frac{1}{3}(\frac{4}{4}) + 3 \frac{1}{4}(\frac{3}{3}) = 2 \frac{4}{12} + 3 \frac{3}{12} = 5 \frac{7}{12}$
- $5 \frac{5}{8} - 2 \frac{1}{3} = \underline{\quad}$ Subtract Whole **then** Fractions!
 $5 \frac{5}{8}(\frac{3}{3}) - 2 \frac{1}{3}(\frac{8}{8}) = 5 \frac{15}{24} - 2 \frac{8}{24} = 3 \frac{7}{24}$
- $1 \frac{1}{2} \times 1 \frac{2}{3} = \underline{\quad}$ Change! (Multiply Ts x Bs)
 $1 \frac{1}{2} \times 1 \frac{2}{3} = \frac{3}{2} \times \frac{5}{3} = \frac{15}{6} = 2 \frac{3}{6} = 2 \frac{1}{2}$ Reduce!
- $3 \frac{1}{2} \div 2 \frac{1}{3} = \underline{\quad}$ Change! (Invert & Multiply)
 $\frac{7}{2} \div \frac{7}{3} = \frac{7}{2} \times \frac{3}{7} = \frac{21}{14} = 1 \frac{7}{14} = 1 \frac{1}{2}$ Reduce!

Decimal Numbers - 1

- $4.25 + .07 = 4.32$ Carry is needed!
 Think Money! Calculators **check** Math!
- $2.05 - .73 = 1.32$ Borrow is needed!
 Think Money! Calculators **check** Math!
- $.06 \times 2.8 = .168$ Why might answer small?
 Think Fractions! Calculators **check** Math!
- $.032 \div .4 = .08$ Why might answer larger?
 Think Fractions! Calculators **check** Math!

Decimal Numbers - 2

- $3.62 + 5.49 = \underline{\quad}$ Carry is needed!
■ $3.62 + 5.49 = 9.11$
- $5.08 - 2.60 = \underline{\quad}$ Borrow is needed!
■ $5.08 - 2.60 = 2.48$
- $5.4 \times .16 = \underline{\quad}$ Multiply then Point!
■ $5.4 \times .16 = .864$
- $1.8 \div .06 = \underline{\quad}$ Multiply then Divide!
■ $6 \overline{) 180} = 30$
- Use a Calculator to **check** Math!

Exponent Numbers - 1

- Special Multiplication! **Base, Exponent, Result!**
- Exponent is a **small** number on top right of base!
- **Unique & Special Exponents!**
 - $N^0 = 1$ Examples: $3/5^0 = 1$ $.04^0 = 1$
 - $N^1 = N$ Examples: $4/7^1 = 4/7$ $.8^1 = .8$
- **Patterns & Sequences** assist in understanding!
- $B^E = N$: $5^3 = 125$ $5^2 = 25$ $5^1 = 5$ $5^0 = 1 \dots$

Exponent Numbers - 2

- $7^0 + 5^3 = \underline{\quad}$ $1 + 125 = \underline{\quad}$ $5^3 = 5 \times 5 \times 5 = 125$
- $8^2 - 2^1 = \underline{\quad}$ $64 - 2 = \underline{\quad}$ **Change to Values !!!**
- $3^0 \times 2^3 = \underline{\quad}$ $1 \times 8 = 1$ $2^3 = 2 \times 2 \times 2 = 8$
- $4^1 / 6^2 = \underline{\quad}$ $4 / 36 = 1 / 9$ **Only the Values !!!**

Radical Numbers - 1

- Special Division: **Symbol, Number, Result!**
- Symbol denotes divisor **and** quotient are the same!
- The square root of $\sqrt{49} = 7$ since $7 \times 7 = 49$
- **Patterns & Sequences help with understanding!**
- $\sqrt{1} = 1$, $\sqrt{4} = 2$, $\sqrt{9} = 3$, $\sqrt{16} = 4$, $\sqrt{25} = 5$, $\sqrt{36} = 6 \dots$
- **Special Square Roots (Radicals):**
 - $\sqrt{144} = 12$ since $12 \times 12 = 144$ $\sqrt{.04} = .2$ Why?
 - $\sqrt{289} = 17$ since $17 \times 17 = 289$ $\sqrt{1/9} = 1/3$ Why?

Radical Numbers - 2

- $\sqrt{169} + \sqrt{9} = \underline{\hspace{2cm}}$ **Calculator: $\sqrt{169} = 13 \times 13$**
 $13 + 3 = \underline{\hspace{2cm}}$
- $\sqrt{81} - \sqrt{4} = \underline{\hspace{2cm}}$ **Change to a Value!**
 $9 - 2 = \underline{\hspace{2cm}}$
- $\sqrt{361} \times \sqrt{16} = \underline{\hspace{2cm}}$ **Calculator: $\sqrt{361} = 19 \times 19$**
 $19 \times 4 = \underline{\hspace{2cm}}$
- $\sqrt{36} / \sqrt{8} = \underline{\hspace{2cm}}$ **Combine only Values!**
 $6 / 2 = \underline{\hspace{2cm}}$

Proportions - 1

- A **Ratio** compares 2 numbers!
- A **Proportion** is 2 equal ratios!
- $2 : 3 = 4 : 6$ $2 / 3 = 4 / 6$ 2 to 3 = 4 to 6
- **Outside parts: 2 & 6** **Inside parts: 3 & 4**
- **Outside called (Extremes)** **Inside called (Means)**
- **The Product of Extremes = The Product of Means**
 - $(.2) : (.3) = (.4) : (.6)$ Is this a proportion?
 - $(1/2) : (1/4) = (1/3) : (1/6)$ Is this a proportion?

Proportions - 2

- | | |
|---------------------|---------------------|
| $3 / 2 = W / 5$ | $3 / Y = 5 / 7$ |
| $15 = 2 W$ | $21 = 5 Y$ |
| What times 2 = 15? | What times 5 = 21? |
| $W = 7 \frac{1}{2}$ | $Y = 4 \frac{1}{5}$ |
| $X : 3 = 10 : 15$ | $6 / 3 = 8 / Z$ |
| $15 X = 30$ | $6 Z = 24$ |
| What times 15 = 30? | What times 6 = 24? |
| $X = 2$ | $Z = 4$ |

Percentages - 1

- **A Percent is a Special Ratio!**
 - A Percent Statement: 15% of 40 is 6
 - A Proportion Statement: $15 : 100 = 6 : 40$
- **Percent to Ratio & Numbers to Ratio!**
 - Since (%) means per 100 then $15\% = 15$ to 100
 - (Is) on Inside & (Of) on Outside then 6 to 40

Apply the Law of Proportions!

Percentages - 2

- | | |
|---|---|
| ■ 35% of 60 is R | ■ 180% of T is 36 |
| 35 to 100 = R to 60 | 180 to 100 = 36 to T |
| 1800 = 100 R | 180 T = 3600 |
| R = 18 | T = 20 |
| ■ S% of 18 is 12 | ■ $33\frac{1}{3}\%$ of 24 is U |
| S : 100 = 12 : 18 | $33\frac{1}{3} : 100 = U : 24$ |
| 18 S = 1200 | 800 = 100 U |
| S = 66 $\frac{2}{3}\%$ | 8 = U |
| .6666... = $\frac{2}{3}$ = 66 $\frac{2}{3}\%$ | $33\frac{1}{3}\% = \frac{1}{3} = .333...$ |

Conclusion
