


Numbers 1 & Computation
Mathematics and Millennials – 6th




Operational Terms

Addition: Combining two quantities or values!
Addend + Addend = Sum

Subtraction: Taking away a quantity from another!
Minuend – Subtrahend = Difference

Multiplication: Repeated Addition or (x) = of.
Factor x Factor = Product

Division: Repeated Subtraction or (/) = groups.
Dividend / Divisor = Quotient



Explanations: WNs

Addition: **Numerals & Numbers**
 $3 + 2 = \text{*** combine with **} = \text{*****}$

Subtraction: **Symbols & Ideas**
 $5 - 2 = \text{***** take away **} = \text{***}$

Multiplication: **Repeated Addition**
 $4 \times 3 = 4 + 4 + 4 = \underline{12}$ I want 3 of 4s!

Division: **Repeated Subtraction**
 $6 / 3 = -3 -3 = \underline{2}$ R = 0 How many groups?

Operations: WNs

$613 + 25 = ?$ $613 + 25 = \underline{\quad}$ Line up Digits!

$485 - 32 = ?$ $485 - 32 = \underline{\quad}$ Line up Digits!

$5 \times 7 = ?$ $5 \times 7 = \underline{\quad}$ Single Digits!

$36 \div 4 = ?$ $4 \overline{)36} = \underline{\quad}$ Change Positions!

Explanations: Fractions

$2/7 + 3/7 = ?$ $2/7 + 3/7 = \underline{\quad}$ Add Ts not Bs?
 $7/9 - 5/9 = ?$ $7/9 - 5/9 = \underline{\quad}$ Subtract Ts not Bs?

$4/5 \times 2/3 = ?$ $4/5 \times 2/3 = \underline{\quad}$ Now: $4/5 = 12/15$
OK! $2/3$ of $2/15 + 2/15 + 2/15 + 2/15 + 2/15 + 2/15 = 8/15$

$2/3 \div 5/7 = ? = 2/3 \times 7/5 = \underline{\quad}$ Designed for Success!
OK! $2/3 \div 5/7 = 2/3 \times (7/5) = 5/7 \times (7/5) = 2/3 \times 7/5 = 14/15$

Operations: Fractions

$2/9 + 3/9 = ?$ $2/9 + 3/9 = \underline{\quad}$ Think Pieces of Pie!

$5/7 - 3/7 = ?$ $5/7 - 3/7 = \underline{\quad}$ Think Fraction Bars!

$5/7 \times 3/4 = ?$ $5/7 \times 3/4 = \underline{\quad}$ Multiply Ts & Bs!

$3/4 \div 8/9 = ?$ $3/4 \times 9/8 = \underline{\quad}$ Invert 2nd & Multiply!

Explanations: MNs - 1

Proper Fraction: Numerator **less than** Denominator:
 $N < D$ $\frac{3}{4}$

Improper Fraction: Numerator **more than** Denominator:
 $N > D$ $\frac{5}{2}$

Mixed Number: Whole Number **and** Proper Fraction:
 $3 \frac{4}{5}$ or $7 \frac{8}{9}$

Explanations: MNs - 2

Change IF to MN: Divide Denominator **into** Numerator.

$$\frac{9}{4} = \underline{\quad} \quad \frac{8}{5} = \underline{\quad} \quad \frac{7}{2} = \underline{\quad}$$

Change MN to IF: Multiply D x W **then** Add Numerator.

$$4 \frac{1}{2} = \underline{\quad} \quad 1 \frac{2}{3} = \underline{\quad} \quad 3 \frac{3}{4} = \underline{\quad}$$

Operations: MNs

$$4 \frac{3}{8} + 2 \frac{4}{8} = \underline{\quad} \quad \text{Add Numbers then Fractions!}$$

$$7 \frac{4}{5} - 4 \frac{3}{5} = \underline{\quad} \quad \text{Subtract Numbers then Fractions!}$$

$$1 \frac{1}{2} \times 1 \frac{1}{4} = ? \quad \frac{3}{2} \times \frac{5}{4} = \underline{\quad} = \underline{\quad}$$

Change to IFs then **Multiply Ts** and **Bs** then **Reduce!**

$$1 \frac{2}{3} \div 1 \frac{3}{4} = ? \quad \frac{5}{3} \div \frac{7}{4} = \frac{5}{3} \times \frac{4}{7} = \underline{\quad}$$

Change to IFs then **Invert!** **Multiply Ts & Bs!** **Reduce!**

Explanations: Decimals

Special Fractions with Denominators: 10, 100 ...

Therefore: $.3 = 3/10$ $.57 = 57/100$ $.9 = 9/10$

Decimal Operations explained with Fractions!

$$.3 + .4 = 3/10 + 4/10 = 7/10 = .7$$

$$.5 - .2 = 5/10 - 2/10 = 3/10 = .3$$

$$.4 \times .2 = 4/10 \times 2/10 = 8/100 \text{ or } .08$$

$$.6 \div .3 = 6/10 \div 3/10 = 6/10 \times 10/3 = 60/30 = 2$$

Operations: Decimals

$$.5 + .4 = 5/10 + 4/10 = 9/10 \text{ or } .9$$

Building on previous knowledge!

$$.7 - .4 = 7/10 - 4/10 = 3/10 \text{ or } .3$$

Building on previous knowledge!

$$.3 \times .4 = 3/10 \times 4/10 = 12/100 \text{ or } .12$$

Change, Multiply Ts & Bs, Reduce!

$$.6 \div .2 = 6/10 \div 2/10 = 6/10 \times 10/2 = 60/20 = 3$$

Change, Invert, Ts x Bs, Reduce!

Operations: Decimals

$$3.02 + 5.40 = \underline{\quad} \quad \text{Think money! Line up decimals!}$$

$$7.89 - 3.06 = \underline{\quad} \quad \text{Think money! Line up decimals!}$$

$$.4 \times .8 = \underline{\quad} \quad \text{Multiply Numbers! Determine Point!}$$

Think Fractions with 10s!

$$.6 \div .3 = \underline{\quad} \quad \text{Multiply Numbers! Divide for Result!}$$

Think Fractions with 10s!

Explanations: Exponents

Special Multiplication: **Base, Exponent, Result!**

An Exponent is a **small number**, top right on a number!

Patterns & sequences help to understand:

$$B^E = N: \quad 7^3 = 343 \quad 7^2 = 49 \quad 7^1 = 7 \quad 7^0 = 1 \dots$$

$$B^E = N: \quad 6^3 = 216 \quad 6^2 = 36 \quad 6^1 = 6 \quad 6^0 = 1 \dots$$

Explanations: Exponents

Special Exponents: 1 & 0 are critical for future **Algebra!**

Any number to a power of 0 equals **One!** $5^0 = 1$

Any number to a power of 1 equals **Number!** $9^1 = 9$

Scientific Notation is a **Real World** use of Exponents!

Operations: Exponents

$$6^2 + 8^0 = ? \quad 36 + 1 = \underline{\quad} \quad \text{Change to **Values** then Add!}$$

$$4^2 - 9^1 = ? \quad 16 - 9 = \underline{\quad} \quad \text{Change **then** Subtract!}$$

$$5^0 \times 7^2 = ? \quad 1 \times 49 = \underline{\quad} \quad \text{Change **then** Multiply!}$$

$$6^2 / 3^1 = ? \quad 36 / 3 = \underline{\quad} \quad \text{Change **then** Divide!}$$

Explanations: Radicals

Special Division! **Symbol, Number, Result!**

A **Radical Symbol** ($\sqrt{\quad}$) in front of a **Special Number!**

Pattern: $\sqrt{1}$ $\sqrt{4}$ $\sqrt{9}$ $\sqrt{16}$ $\sqrt{25}$ $\sqrt{36}$ $\sqrt{49}$ $\sqrt{64}$ $\sqrt{81}$...

Sequence: 1, 2, 3, 4, 5, 6, 7, 8, 9

Operations: Radicals

$\sqrt{81} + \sqrt{4} = \underline{\quad}$ $9 + 2 = \underline{\quad}$ Change to **Values** then Add!

$\sqrt{49} - \sqrt{25} = \underline{\quad}$ $7 - 5 = \underline{\quad}$ Change then Subtract!

$\sqrt{36} \times \sqrt{9} = \underline{\quad}$ $6 \times 3 = \underline{\quad}$ Change then Multiply!

$\sqrt{64} / \sqrt{16} = \underline{\quad}$ $8 / 4 = \underline{\quad}$ Change then Divide!

Explanations: Proportions

A **Ratio** compares **two Numbers!**

2 : 3 2 to 3 2 / 3

A **Proportion** is two equal **Ratios!**

2 : 3 = 4 : 6 2 to 3 = 4 to 6 2 / 3 = 4 / 6

Outside Numbers : 2 & 6 **Inside Numbers:** 3 & 4

Outside called **Extremes!** Inside called **Means!**

Explanations: Proportions

The **Law of Proportions** states:

Product of Extremes **equals** Product of Means

$$2 : 3 = 4 : 6$$

$$4 \text{ to } 5 = 8 \text{ to } 10$$

$$3 / 4 = 6 / 8$$

What if a number was missing?

Solutions: Proportions

$$3 : 6 = W : 8 \quad 24 = 6W \quad W = \underline{\quad} \quad \text{Check!}$$

$$X / 3 = 6 / 9 \quad 9X = 18 \quad X = \underline{\quad} \quad \text{Check!}$$

$$2 : 3 = 4 : Y \quad 2Y = 12 \quad Y = \underline{\quad} \quad \text{Check!}$$

$$6 / Z = 4 / 6 \quad 36 = 4Z \quad Z = \underline{\quad} \quad \text{Check!}$$

Explanations: Percentages

A Percent is a **Special Ratio!** 30% of 40 is 12

Change Percent Statement to Proportion for Solution!

First Ratio: % means 100 30% = 30 to 100

Second Ratio from **Of & Is** Numbers! 12 to 40

Of means Outside! **Is** means Inside!

30% of 40 is 12 Equal Statements 30 to 100 = 12 to 40

Explanations: Percentages

Proportions must obey **The Law of Proportions!**

Percent Statements can be changed to **Proportions!**

Based on **previous knowledge** of Proportions,

Percent Statements can be solved in a **similar manner!**

Solutions: Percentages

25% of 20 is W Change to Proportion & Solve!

25 to 100 = **W** to 20 $500 = 100W$ $W = \underline{\quad}$ **Check!**

X% of 4 is 2 Change to Proportion & Solve!

X to 100 = 2 to 4 $4X = 200$ $X = \underline{\quad}$ **Check!**

Solutions: Percentages

150% of Y is 9 Change to Proportion & Solve!

150 / 100 = 9 / **Y** $150Y = 900$ $Y = \underline{\quad}$ **Check!**

Z% of 8 is 6 Change to Proportion & Solve!

Z : 100 = 6 : 8 $8Z = 600$ $Z = \underline{\quad}$ **Check!**

