



Understanding Numbers

• Whole Numbers "positive" only examples: 0, 1, 2, 3, 4, ...

• Integers: positive or negative whole #'s examples: ..., -33, -17, -5, -1, 0, 1, 3, 9, 15, ...

• Rational Numbers: #'s that can be written as a fraction, a decimal or repeating decimal

Examples: $\frac{7}{8}$, $-\frac{4}{5}$, $\frac{1}{3}$ or $0.\overline{333}$..., 0.25, $0.\overline{3}$

• Irrational Numbers: #'s that cannot be written as a fraction or repeating decimal (never ending)

Examples: $\pi \Rightarrow 3.14159$..., $\sqrt{2} \Rightarrow 1.41421$...

• Prime Numbers: # with only 2 factors; 1 & itself.

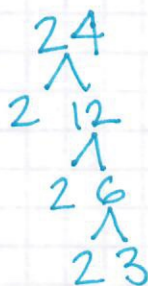
Examples: $\frac{2}{1, 2}$, $\frac{3}{1, 3}$, $\frac{5}{1, 5}$, $\frac{7}{1, 7}$, $\frac{11}{1, 11}$, $\frac{13}{1, 13}$, $\frac{17}{1, 17}$, ...

• Composite Numbers: #'s with more than 2 factors (i.e. can be made by combining other #'s)

GCF:



Examples:



so 24 is made from

$2 \times 2 \times 2 \times 3$ 4 Factors

Greatest Common Factor (GCF) is the largest factor common b/w 2 #'s

Operations

- Addition (+) → Sum
- Subtraction (-) → Difference
- Multiplication (\times , $5\times$, \cdot , $(3)(4)$) → Product
- Division (\div , $\frac{3}{4}$, $3/4$, $7/121$) → Quotient
- Square Roots ($\sqrt{24}$) → a # which produces a specified quantity when multiplied by itself
- Exponents/Powers (3^4)
Repeated multiplication
 $3^4 = 3 \times 3 \times 3 \times 3$
Common Powers
 $\square^2 = \text{Squared (Area)}$ Think
 $\square^3 = \text{Cubed (Volume)}$ Think
ex: $\sqrt{9} = 3$
 $3 \times 3 = 9$

Note: Squareroot undoes squaring and vice versa

$$4^2 = 16, \sqrt{16} = 4, \sqrt{4^2} = 4$$

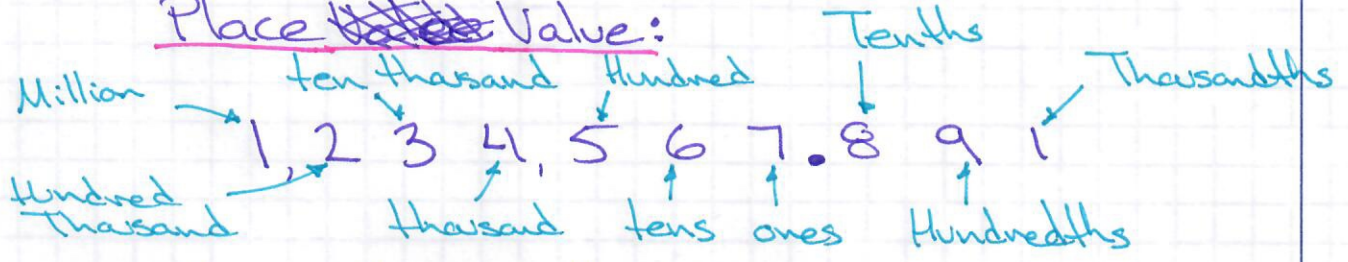
Inequalities

- Equal too (=)
- Not Equal too (\neq)
- Greater than ($>$)
- Greater than or equal too (\geq)
- Less than ($<$)
- Less than or Equal too (\leq)

Decimals : Percents : Fractions

* All used to represent parts of wholes

Place Value:



- * Convert a # into a % you $\times 100\%$
- * Convert a % into a # you $\div 100\%$

Example: $\frac{7}{8} = 0.875 \xrightarrow{\times 100\%} 87.5\%$

$47\% \xrightarrow{\div 100} 0.47 = \frac{47}{100}$

Rules for Operations with Fractions

* Adding : Subtracting : you MUST have a common denominator (i.e. same denominator)

Recall Numerator
Denominator

example: $\frac{3}{4} + \frac{1}{6}$

multiples of
4 = 4, 8, 12, 16, ...
6 = 6, 12, 18
change to 12

Mixed Numbers:

$3\frac{2}{7}$
↑ whole ↑ part

$= \frac{3 \times 3}{4 \times 3} + \frac{1}{6} \left(\frac{x2}{x2} \right)$

Improper fraction
 $\frac{23}{7}$ ← larger than D

$= \frac{9}{12} + \frac{2}{12} = \frac{9+2}{12} = \frac{11}{12}$

Example: $3\frac{1}{2} - 1\frac{1}{4}$
you should switch ex. $\frac{3}{7}$
mixed # to an improper fraction
 $N > D$

$\cdot 2 \times \frac{7}{2} - \frac{5}{4} = \frac{14}{4} - \frac{5}{4} = \frac{9}{4} \Rightarrow \underline{\underline{2\frac{1}{4}}}$

★ **Multiplying:** multiply Numerator to Numerator
Denominator to Denominator
(i.e. straight across)

Example: $\frac{5}{6} \times \frac{3}{4} = \frac{5 \times 3}{6 \times 4} = \frac{15}{24} \Rightarrow \frac{5}{8}$

$\begin{array}{r} 15 \\ 3 \overline{) 15} \\ \underline{15} \\ 0 \end{array}$
 $\begin{array}{r} 24 \\ 2 \overline{) 24} \\ \underline{24} \\ 0 \end{array}$

reduced to lowest terms (use factors) $\Rightarrow \frac{3 \times 5}{2 \times 2 \times 2 \times 3} = \frac{5}{8}$

Example: Mixed #'s \Rightarrow convert into an improper fraction 1st!

$2\frac{10}{5} \times 4\frac{17}{4} \Rightarrow \frac{13}{5} \times \frac{17}{4} = \frac{13 \times 17}{5 \times 4} = \frac{221}{20} = 11\frac{1}{20}$

★ **Dividing:** flip the 2nd term (i.e. reciprocal) and change the \div into \times

Example: $\frac{3}{8} \div \frac{2}{4}$ Flip

$= \frac{3}{8} \times \frac{4}{2}$

do multiplication as normal.

* can reduce if here if possible

$= \frac{3}{2} \times \frac{1}{2} = \frac{3}{4}$

Example: Mixed #'s same as multiplication change into an improper fraction 1st

$1\frac{3}{5} \div 2\frac{5}{6} \Rightarrow \frac{8}{5} \div \frac{17}{6} = \frac{8}{5} \times \frac{6}{17} = \frac{8 \times 6}{5 \times 17} = \frac{48}{85}$