Fractions - Mixed Numbers

This red trapezoid is considered 1 whole

Each green triangle represents 1/3

Then, eight green triangles represent $\frac{8}{3}$.

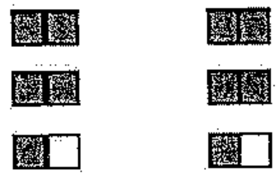
These triangles can be grouped to show that $\frac{8}{3}$ is equal to 2 and $\frac{2}{3}$.

The numerator, 8, of $\frac{8}{3}$ is greater than the denominator, 3. So, we call $\frac{8}{3}$ an **improper fraction**.

$2\frac{2}{3}$ has a whole number part, 2, and a fraction part, $\frac{2}{3}$. So, we call $2\frac{2}{3}$ a **mixed number.**

Ex. Using Pattern blocks, see if the following fractions are equivalent.

$$2\frac{1}{2} \text{ and } \frac{5}{2}$$



Yes they are equivalent because we have the same amount of wholes and parts.

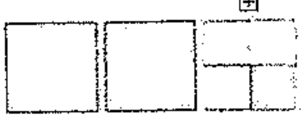
Converting between Mixed Numbers and Improper Fractions

There are 2 main ways to convert between mixed and improper fractions.

Draw a picture

To write 2 3/4 as an improper

Draw the mixed fraction using wholes (2) and parts of a whole



Draw an improper fraction by dividing each whole into quarters

So, $2\frac{3}{4}$ is the same as $\frac{11}{4}$.

Use operational and mental math

2 3/4 is equal to 11/4

To go from **mixed to improper fraction:** **2 ¾**
denominator (4) X Whole # (2) + Numerator (3) = 11
then you put that answer over parts per whole (4)
4 x 2 + 3 = 11 therefore answer is 11/4

To go from **improper to mixed fraction: 11/4**
numerator (11) ÷ denominator (4) = whole # (2)
remainder becomes numerator (3) and it goes over the number of parts per whole (4)
11 ÷ 4 = 2 r 3 therefore answer is 2 ¾

Comparing Mixed #'s and Improper Fractions

Number line

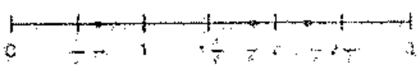
How do you compare $2\frac{1}{4}$, $\frac{2}{3}$, and $\frac{11}{6}$?

1. Use benchmarks on 1 # line:

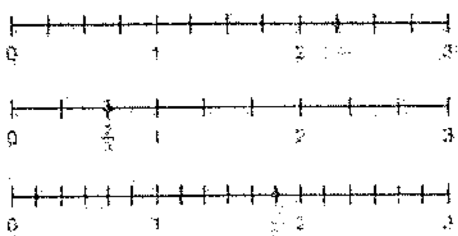
$\frac{2}{3}$ is between $\frac{1}{2}$ and 1, but closer to $\frac{1}{2}$.

$\frac{11}{6}$ is the same as $1\frac{5}{6}$. $1\frac{5}{6}$ is close to 2, but less than 2.

$2\frac{1}{4}$ is halfway between 2 and $2\frac{1}{2}$



2. Use 3 different # lines:



3. Use Equivalent Fractions

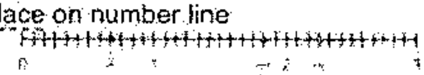
- make each #'s denominator the same then place on # line
- write 2 1/4 as an improper fraction

$$2\frac{1}{4} = \frac{4}{4} + \frac{4}{4} + \frac{1}{4} = \frac{9}{4}$$

- Since 12 is a multiple of 3,4 and 6, you write each fraction with denominator 12

$$\frac{9}{4} = \frac{27}{12} \quad \frac{2}{3} = \frac{8}{12} \quad \frac{11}{6} = \frac{22}{12}$$

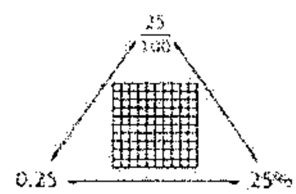
- place on number line



So, the order from least to greatest is:

$\frac{8}{12}, \frac{22}{12}, \frac{27}{12}$ or $\frac{2}{3}, \frac{11}{6}, \frac{9}{4}$ or $\frac{2}{3}, \frac{11}{6}, 2\frac{1}{4}$

Relating Fractions, Decimals and Percents

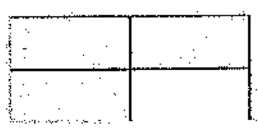


Fractions, decimals, and percents are 3 ways to describe parts of one whole
- All 3 can be written as each other

Percent means "out of 100" so we need to write equivalent fractions that are "out of 100"

1 Whole = 100%

Ex 1. What percent of this shape is Shaded Green?



$\frac{3}{4}$ of the shape is shaded.

$$\frac{3}{4} = \frac{75}{100} = 75\%$$

75% of the shape is shaded.

$\frac{75}{100}$ is the same as 0.75. So 0.75 of the shape is shaded.

Ex. 2 What percent of this set of counters are yellow?

$\frac{6}{12}$ of the counters are yellow.

$\frac{6}{12} = \frac{1}{2}$

And, $\frac{1}{2} = 0.50 = 50\%$

50% of the counters are yellow.

Compare Fractions

UNLIKE DENOMINATORS

1. Find a common denominator by multiplying the denominators.

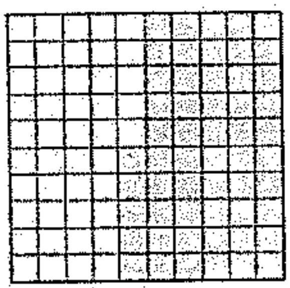
$$\frac{15}{20} = \frac{3}{4} \quad \frac{4}{5} = \frac{16}{20}$$

2. Find the numerators by multiplying diagonally upwards.
3. Compare the new numerators.

SHORTCUT: Skip step 1, multiply diagonally and compare.

Exploring Percent

Percent is always out of 100. 45/100 is equal to 45%
We can represent percent with a hundreds grid.
Percent is another name for hundredths



There are 4 ways to describe the green part of the grid:

1. Comparing green squares to total # of Squares
   45 out of 100 squares are green
2. Fraction 45/100 of the grid is green
3. Decimal 0.45 of the grid is green
4. Percent 45% of the grid is green

- A percent is a special ratio that compares a # to 100

- 45% means 45 out of 100 or 45 per hundred

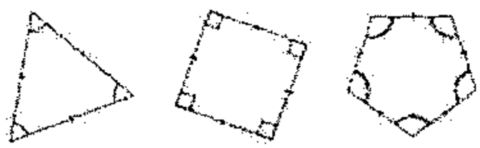
We can describe the blue part of the grid in the same 4 ways:

1. 55 out of 100 blue squares
2. 55/100 of the grid is blue
3. 0.55 of the grid is blue
4. 55% of the grid is blue

Polygons

- a 2D closed shape with straight line segments; each side meets at a vertex

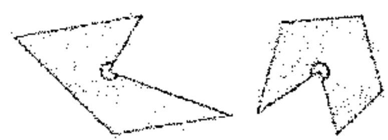
Regular Polygons have all sides the same length and angles are all the same
- has lines of symmetry



Irregular Polygons have different sides lengths and angles

Convex Polygon has all angles less than 180

Concave Polygon has at least one angle greater than 180



Multiples

- skip counting; going up by the same number
- ex 2, 4, 6, 8, 10

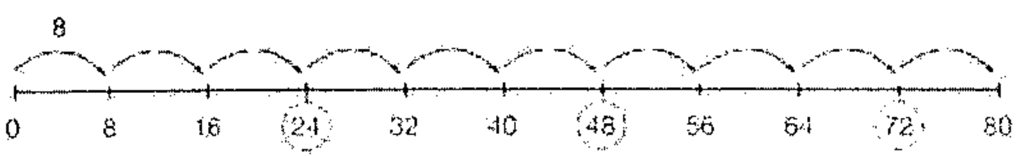
Common Multiples

- a # that is a multiple of 2 or more #'s
- ex. 2: 2, 4, 6, 8 ,10,
  3, 3, 6, 9, 12, 15

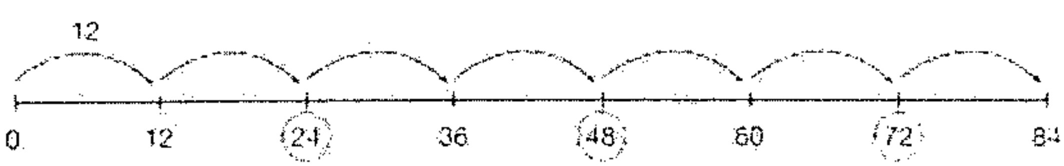
6 is a common multiple of 2 & 3

You can use number lines to find the multiples of 8 and 12.

To find the multiples of 8, start at 0 and skip count by 8.



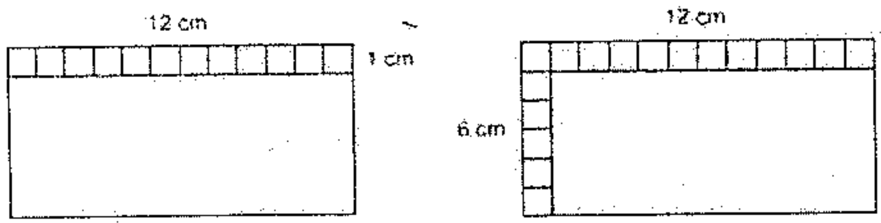
To find the multiples of 12, start at 0 and skip count by 12.



Area

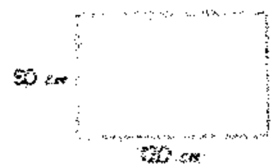
- the total # of **squares** in a polygon (2D); To calculate the area of a rectangle, you should always draw a sketch then:
1. measure the length and width of a rectangle and label each side
2. multiple the length by the width...
3. Rule can be in the form of a **Formula A = L x W**

   A = Area, L = Length W = Width



A = L x W
= 12 x 6
= 72 cm

Example: Jessica build a dog crate for his dog. The floor of the crate is a rectangle. The dimensions of the floor are 80 cm by 120 cm. What is the area of the floor?



A = L x W
= 120 x 80
= 9600 cm

Volume

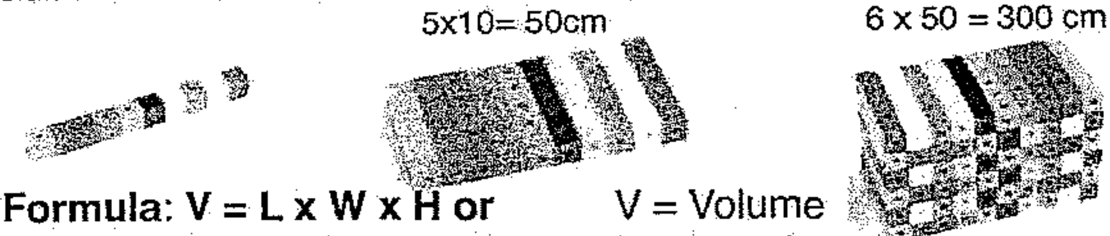
- the amount of **cubes** inside an object; the capacity of a 3D shape

A rectangular prism is 10 cm long, 5 cm wide and 6 cm high

The length is 10cm
(1 row of 10 cubes)
Volume of 1 row=10cm

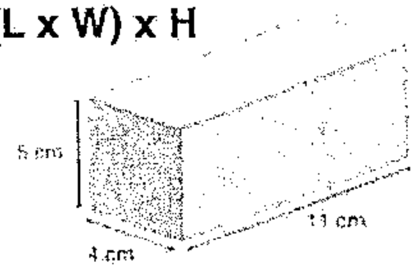
Width is 5cm
(5 rows of 10 cubes)
Volume of 1 layer
5x10= 50cm

Height is 6cm
(6 layers of 50 cubes)
Volume of 6 layers
6 x 50 = 300 cm



Formula: V = L x W x H or
V = Area of base x H
= (L x W) x H

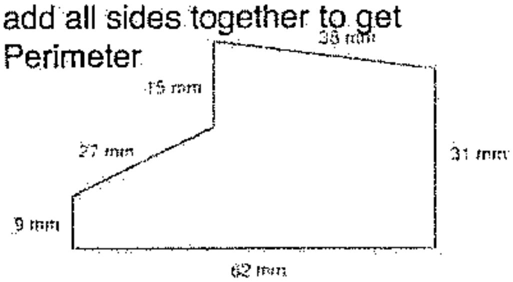
V = Volume
L = Length
W = Width, H = Height



V = L x W x H
= 11 x 4 x 5
= 220 cm

Perimeter

- total distance around a polygon;
- add all sides together to get Perimeter

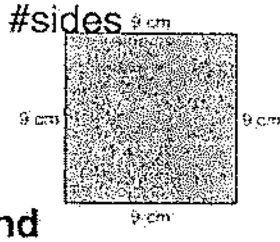


Perimeter = 38 + 31 + 62 + 9 + 27 + 15
= 182
The perimeter of this hexagon is 182 mm.

Perimeter of regular polygons

1. Square: P= L x #sides

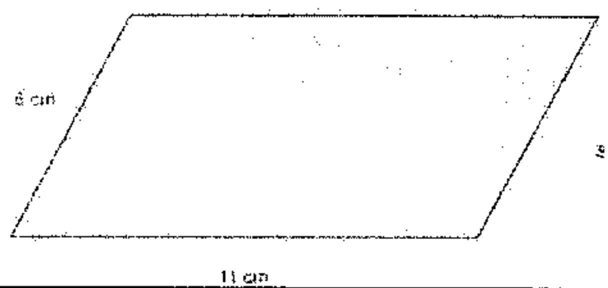
P= L x 4
= 9 x 4



Legend

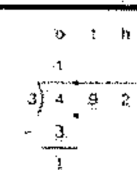
L = length W = Width S = Sides

2. Parallelogram: P = 2 x (L + w) or
P = 2 x L + 2 x W

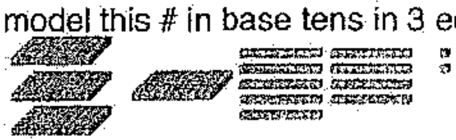


P= 2 x (L+W)
= 2 x (11 + 6)
= 2 x 17
= 34 cm

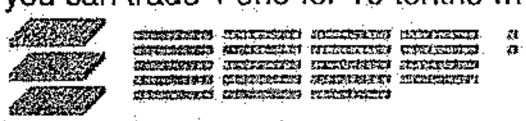
Dividing Decimals by a Whole Number

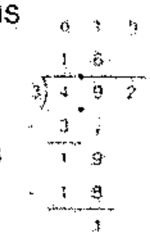


Use Base Ten blocks to divide 4.92 ÷ 3
- model this # in base tens in 3 equal rows (b/c you are dividing by 3)

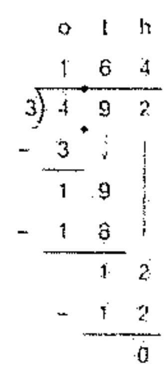


- each row has 1 one, with 1 one, 0 tenths, & 2 hundredths left over
- you can trade 1 one for 10 tenths which makes 19 tenths

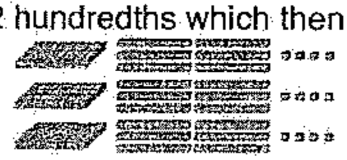




- arrange the 19 tenths among 3 groups. Each group has 1 one & 6 tenths, with 1 tenth & 2 hundredths left over.



- trade 1 tenth for 10 hundredths = 12 hundredths which then you share equally in 3 groups.
- each group has 4 hundredths.
- answer is 1.64



Experimental Probability

Experimental Probability is the likelihood that something will happen based on the results of an experiment.

$$\text{Experimental probability} = \frac{\text{Number of times an outcome occurs}}{\text{Number of times the experiment is conducted}}$$

Jenny and Morningstar put coloured cubes into a bag. They used 4 blue, 2 red, 2 green, and 2 yellow cubes. A cube is picked from the bag at random. The theoretical probability that a blue cube is picked is $\frac{4}{10}$, or $\frac{2}{5}$.

The experiment is done 10 times.

Here are the results of one experiment.

Colour	Blue	Red	Green	Yellow
Number of Times	6	1	1	2

So, the experimental probability of picking a blue cube is $\frac{6}{10}$, or $\frac{3}{5}$. This is different from the theoretical probability.

Theoretical Probability

Theoretical Probability is the likelihood that something will happen. We find it using the following equation:

$$\text{Theoretical probability} = \frac{\text{Number of favourable outcomes}}{\text{Number of possible outcomes}}$$

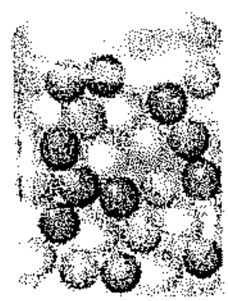
Example: the chances of rolling a "4" with a die

Number of ways it can happen: 1 (there is only 1 face with a "4" on it)

Total number of outcomes: 6 (there are 6 faces altogether)

So the probability = $\frac{1}{6}$

Probability is usually written in a fraction. It looks like a fraction but you have to remember that it isn't the exact same. You read a **probability fraction** as "something **out of** something."
Example: The probability of rolling a 4 with a die is "one out of six"



The jar to the right has 5 blue marbles, 6 red, 7 green and 7 white. A student chooses a marble at random.

What is the theoretical probability of picking a green marble? Each marble has an equal chance of being picked. There are 7 green marbles, so there are 7 favourable outcomes.
The total number of marbles is: $5 + 6 + 7 + 7 = 25$

The theoretical probability of picking a green marble is $\frac{7}{25}$.

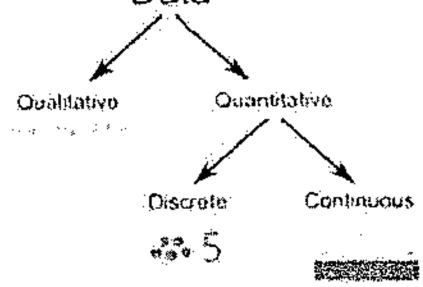
Data Analysis

What is Data? - Data is a collection of facts. Can be numbers, words, measurements, observations or even descriptions of things.

There are **2 types of Data**. Data can be either…

1. **Qualitative Data** - is descriptive information (describes something)
2. **Quantitative Data** - is number information. There are 2 types of Quantitative (number) Data
   - **2.a. Discrete Data** - can only contain certain values (ex. like whole numbers)
   - **2.b. Continuous Data** - can contain any value (within a range)

Discrete Data is Counted
Continuous Data is Measured



Example: What do we know about Arrow the Dog?

Qualitative:

- He is brown and black
- He has long hair
- He has lots of energy

Quantitative:

- Discrete:
  - He has 4 legs
  - He has 2 brothers
- Continuous:
  - He weighs 25.5 kg
  - He is 565 mm tall

Exploring Triangles

An **equilateral triangle** has 3 equal sides.

- all 3 angles are 60
- 3 lines of **symmetry**
- also known as an **acute** triangle; All angles less than 90

A **scalene triangle** has no equal sides.

We ol
to sh

- all angles different
- no lines of symmetry

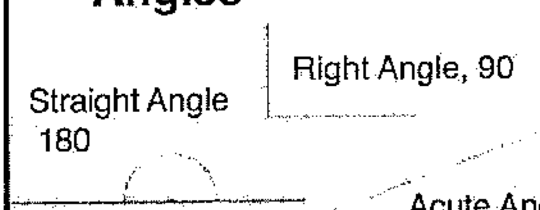
An **isosceles triangle** has 2 equal sides.

- 2 angles the same
- 2 lines of symmetry

Obtuse Triangle
- one angle is greater than 180

Right Triangle
- one angle is 90

Angles



Right Angle, 90

Straight Angle
180

Acute Angle
- less than 90

Obtuse Angle
- greater than 90
- less than 180

Reflex Angle
- greater than 180
- less than 360

Numbers All Around Us - Place Value

Millions Period			Thousands Period			Units Period		
Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
		3	1	5	9	1	1	9
		3 000 000	100 000	50 000	9000	100	10	9

three *million* one hundred fifty-nine *thousand* one hundred nineteen

- standard form: 3 159 119

expanded form: 3 000 000 + 100 000 + 50 000 + 9000 + 100 + 10 + 9

number-word form: 3 million 159 thousand 119

Estimation Strategies

- estimate then find answer using the following methods:

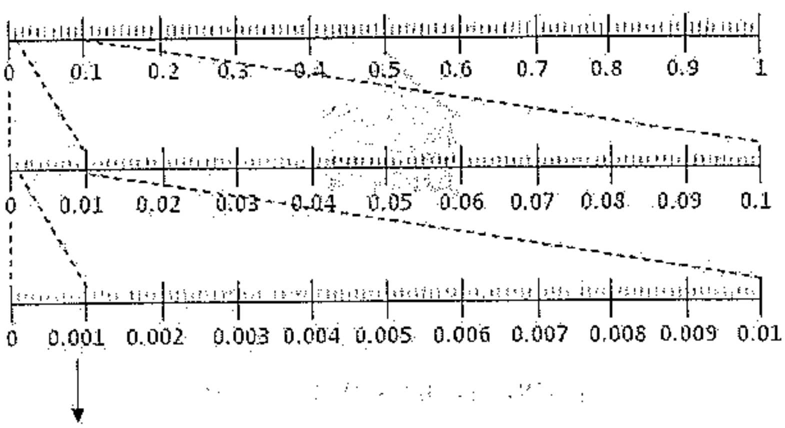
Front end rounding ex. 341 front end is 300

rounding: ex 341 round to 100th = 300

ex. 278 x 469 estimate 300 x 500 = 150,000 actual 130,382

II. Understanding Thousandths

Divide 1 whole into 1000 equal parts.



$\frac{1}{1000}$ or 0.001 or 1 thousandth

In the *fraction form*, each part has a value equal to $\frac{1}{1000}$ or 1 thousandth.

Order of Operations

- Do the operations in brackets.
- Multiply and divide, in order, from left to right.
- Then add and subtract, in order, from left to right.

$16 - 14 \div 2$

$16 - 14 \div 2$

$= 16 - 7$

$= 9$

$7 \times (4 + 8)$

$7 \times (4 + 8)$

$= 7 \times 12$

$= 84$

$18 - 10 + 6$

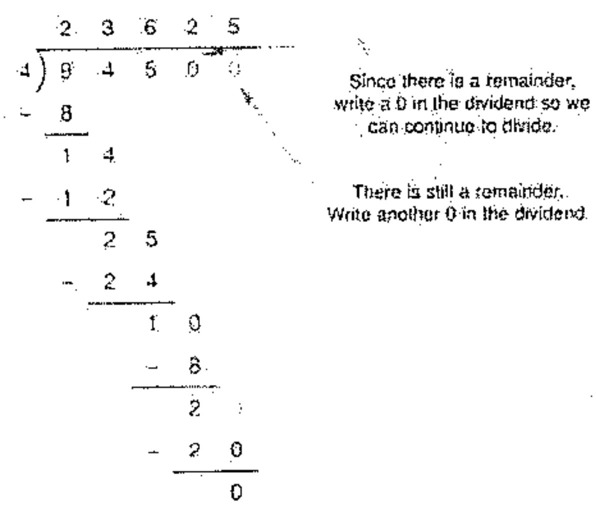
$18 - 10 + 6$

$= 8 + 6$

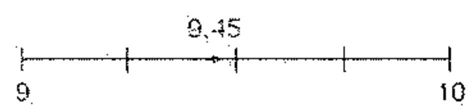
$= 14$

Dividing Decimals

Long Division - divide as you do with whole numbers then estimate decimal point. The closest whole-# benchmark to 9.45 is 9.



$(9 \div 4 = 2.25)$



Therefore, the answer should be close to 2.25

Check your answers by multiplying the quotient with the divisor
$2.3625 \times 4 = 9.45$