# How to Solve a Problem

1. Identify the Problem
2. Make a Plan
3. Solve
4. Check for Reasonableness

# Identify the Problem

- **First.** You have to *understand* the problem.

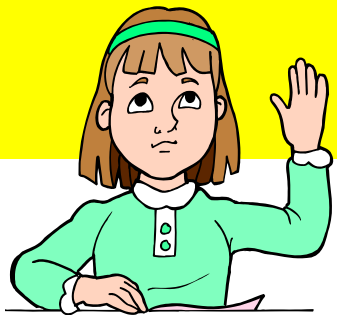
- What is the unknown?
- What are the data?
- What is the problem asking you to do?

- Draw a figure. Introduce suitable notation.

# Make a Plan

- **Second.** Find the connection between the data and the unknown.
- Have you seen the same problem in a slightly different form?
- Decide upon a problem solving strategy
  - Simpler Problem  Make a Pattern  Check and Guess
  - Draw a Picture  Act it Out  Make a List  Work Backward
- Did you use all the data? All the important ideas involved in the problem?
- Is a mathematical operation necessary? Which operation is necessary? Write a number sentence to solve.
- + joining together  - difference, comparison
- x joining equal groups  division equal separation

# Solve



- **Third**. *Carry out* your plan.
- Carrying out your plan of the solution, *check each step*.
- Can you see clearly that the step is correct?
- Can you prove that it is correct?

# Explain the Solution

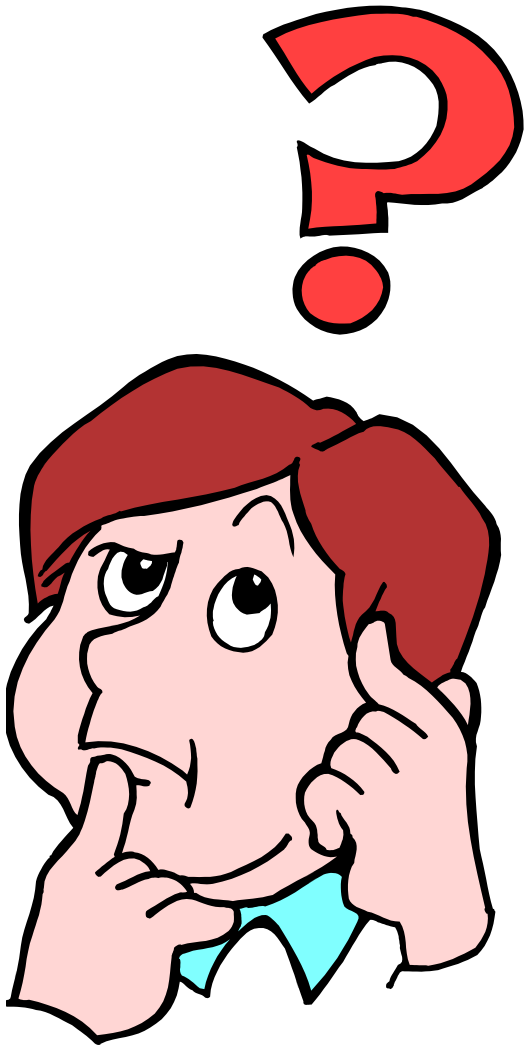
- Describe the reasons for the steps taken to get to an answer.

# Check for Reasonableness

- **Fourth.** *Look at* the answer you got.
- Can you *check the answer?*
- Can you check your line of reasoning?
- Can you get the same answer differently?
- Can you use the answer, or the method, for some other problem?

# Problem Solving Plan

– Choosing an appropriate plan to find a solution



# Simpler Problem

- When solving complex problems it maybe helpful to make the problem simpler.

This can mean reducing large numbers to smaller numbers, or reducing the number of items given in the problem.

A simpler representation can suggest operations or processes that can be used to solve more complex problems.

# Make a Pattern

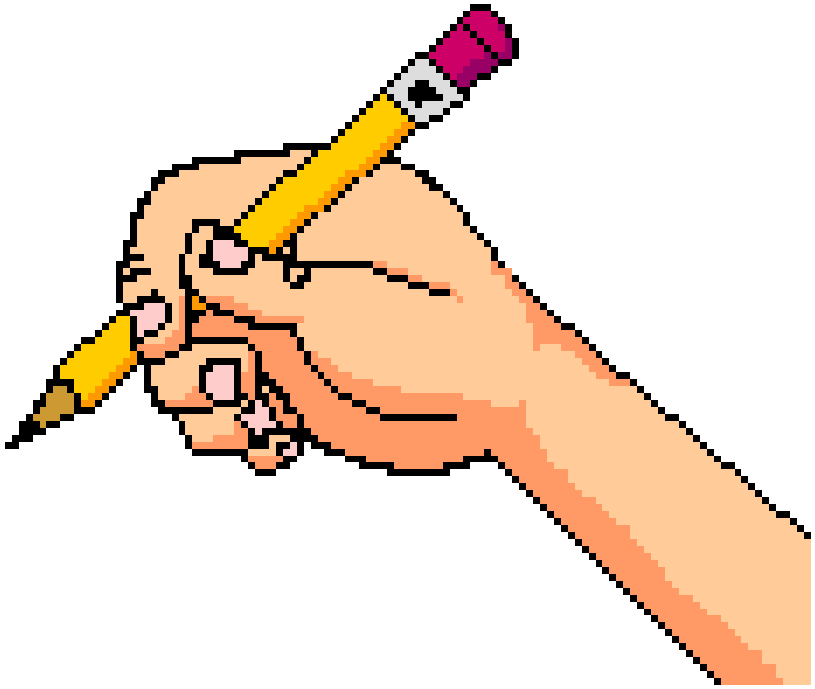
- By identifying the pattern you can predict what will come next and what will happen again and again.
- Recognizing a pattern can help extend the pattern to find a solution.
- Making a number table, a T-Chart, can reveal a pattern

# Guess and Check

- Guess the answer, test to see of if it is correct, and make another guess if the precious one was incorrect.
- In this way you come closer to a solution by making a increasingly more reasonable guess.

# Draw a Picture

- Make a picture to help you understand and plan how to use the data in the problem.



# Act It Out

Acting out a problem helps you to move objects around and visualize the data as well as see the path to the solution process.

- You can use small scraps of paper or counters to visualize relationships.

# Make an Organized List

- Recording work in an organized list makes it easy to look over what has been done and to identify important steps that still have to be completed.
- It also give a systematic way to record computations made with data or recording combinations of items.

# Work Backwards

- Make a series of computations starting with the data presented at the end of the problem and ending with the data presented at the beginning of the problem.

**Reasonableness** - deciding which answer makes the most sense

# Estimate

To find an answer that is close to the actual answer by rounding.

# Strategy

- A plan, a method or a way to solve a problem or reach an answer.

- Examples:
- Doubles plus one  5 + 6 =
- Find a pattern

# Solution

- Solution:An answer to a problem.

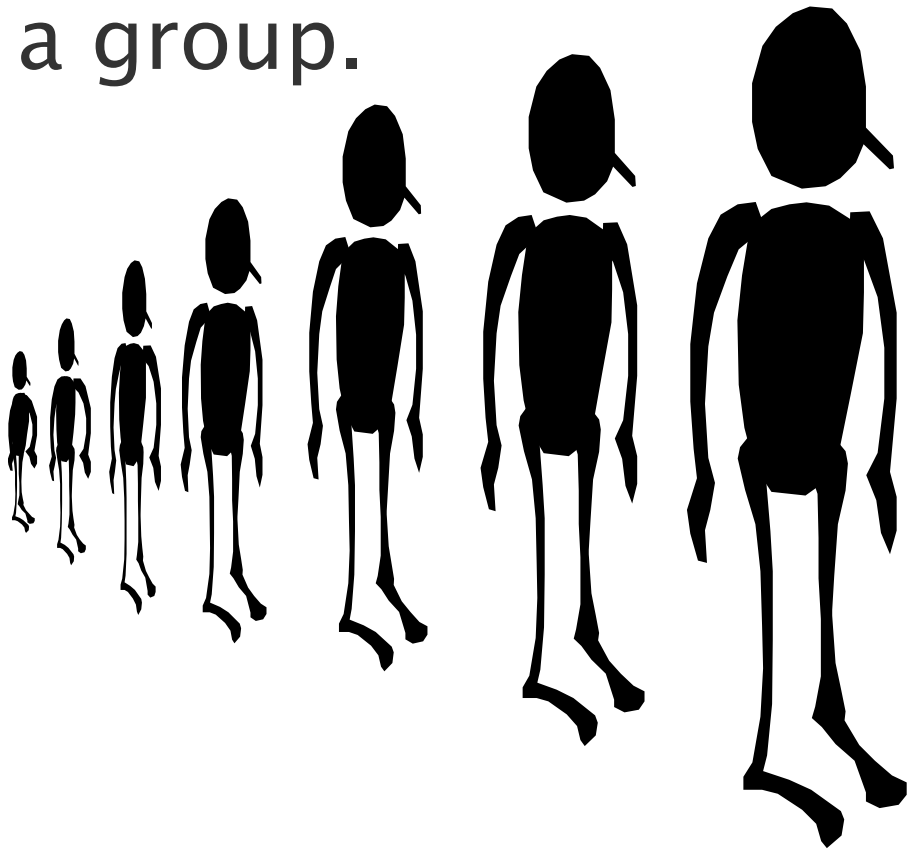
- Solve: to work out the problem.

# Justify the Solution
# Give Reasons for the Answer

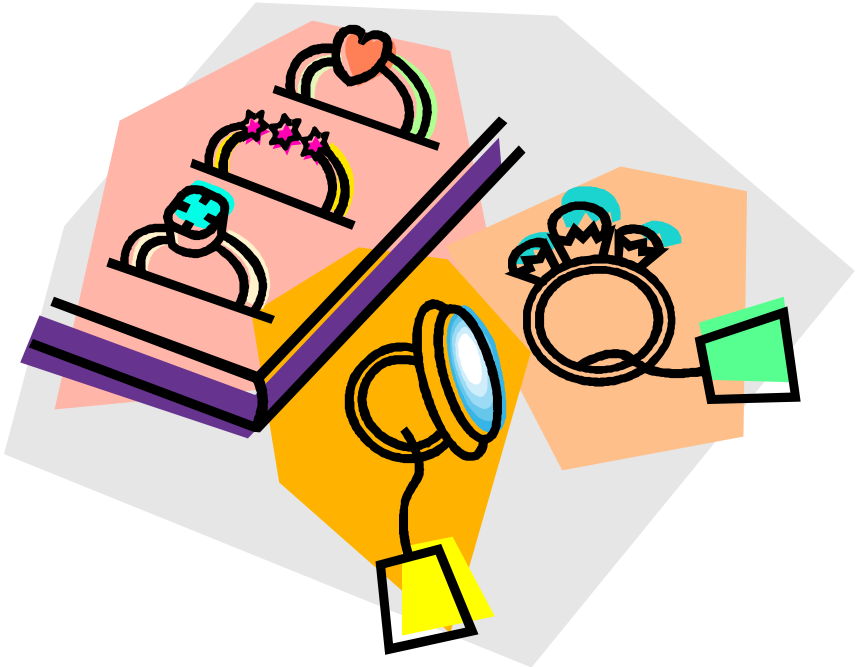
- to show satisfactory reasoning for solving the problem.

# Generalization

- A claim that something is true of all parts of a group.



**Value** - the amount something is worth



# Product

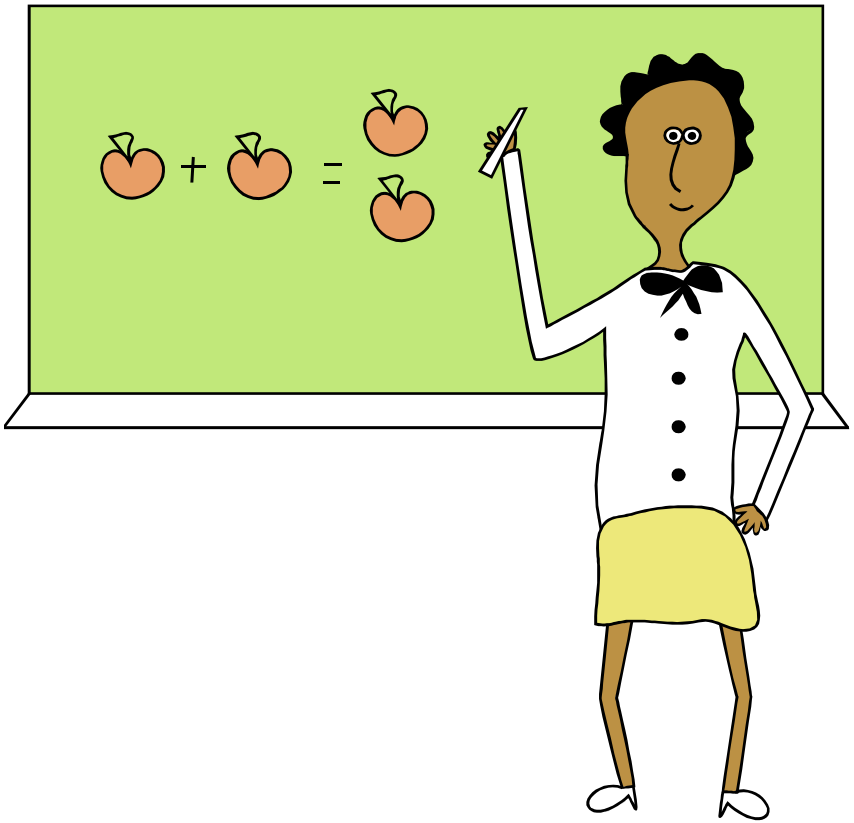
The Answer in a multiplication problem.

$$8 \times 6 = 48$$

Product

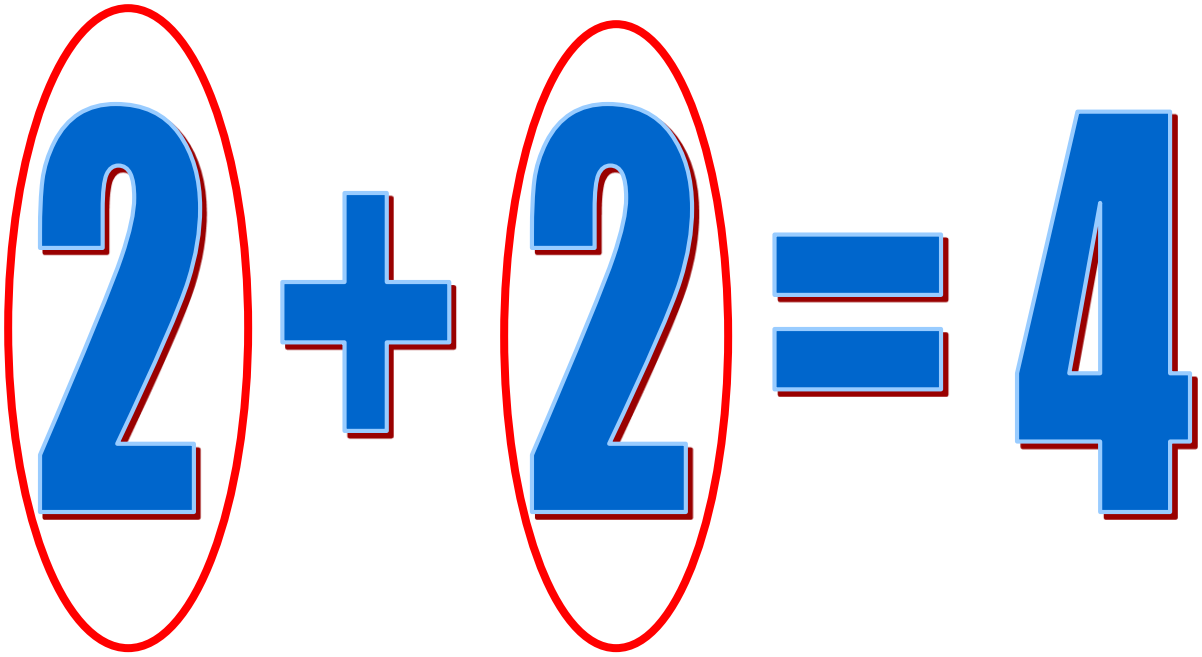
# Addition

- Joining or combining together



# Addends

The numbers that are being added or combined together




Addends

# Sum

- The total or whole amount.
- The result of adding.
- Example:

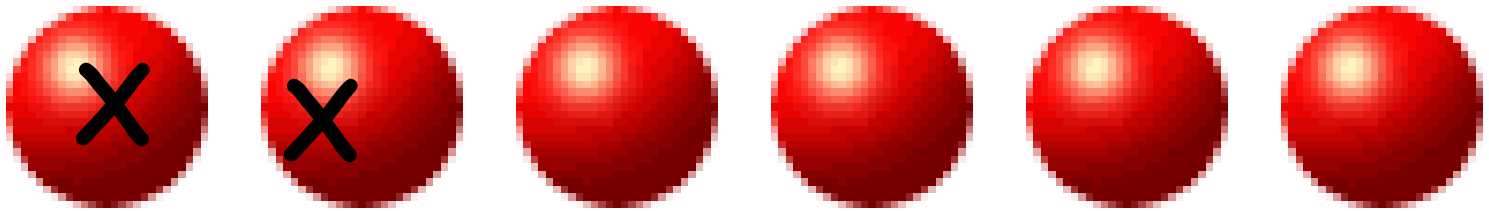
addend addend

- 6 + 4 = 10

sum

# Subtraction

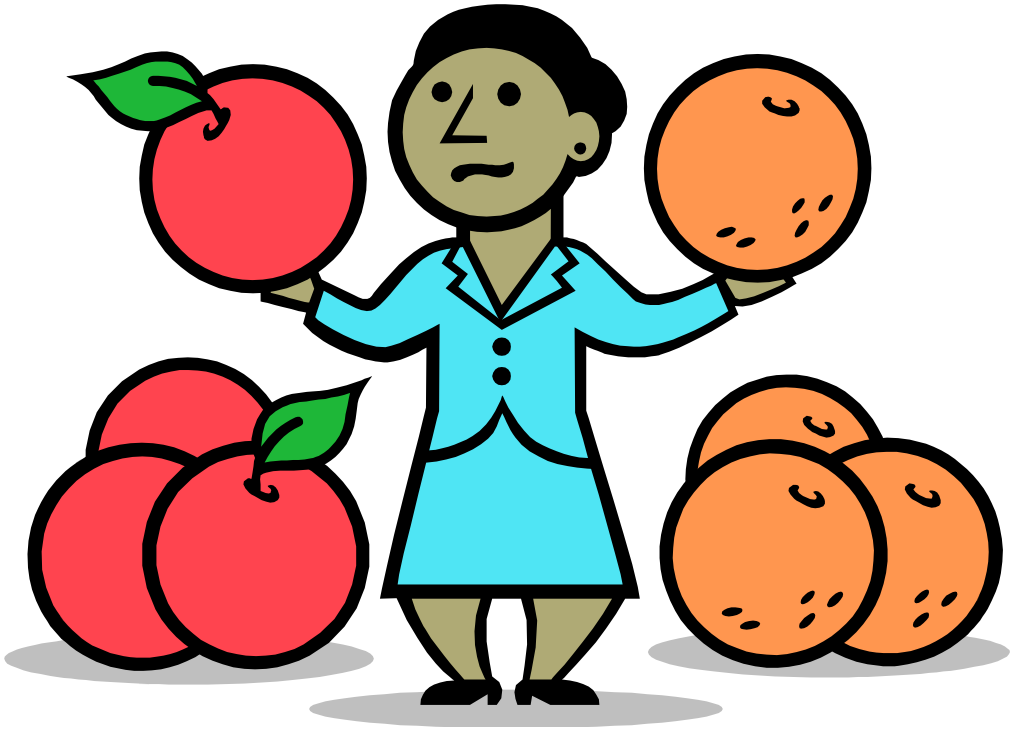
The action of taking away or comparing groups.



$$6 - 2 = 4$$

# Difference

- The amount by which one quantity is greater or less than another.



**Operation** - The four mathematical operations are addition, subtraction, multiplication, and division.

1. addition +
2. subtraction -
3. multiplication x
4. division ÷

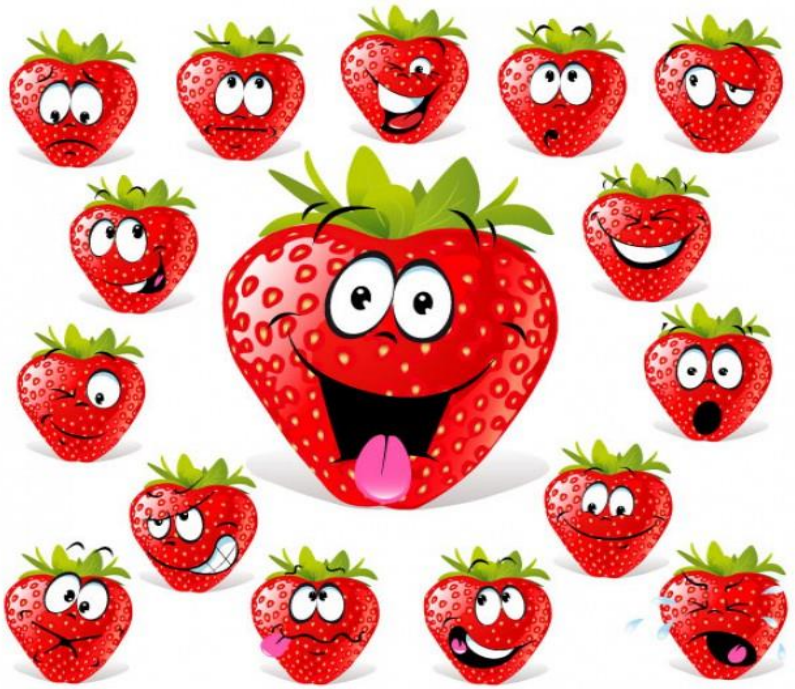
# Expression

- A mathematical phrase that combines numbers, operation signs, and sometimes variables, but doesn't have an equal sign

***Examples:***

$4 + 3$ $9 - 2$

$3 \times (2 + 6)$ $4 + n$



**Equation** – A number sentence that uses an equal sign to show that two amounts are equal. Some equations have variables

$$7+3=10$$

an **equation**

$$7+n=10$$

an equation with a variable

# Number Sentence

– An equation or a comparison

$5+6=11$ equation

$9>6$ comparison

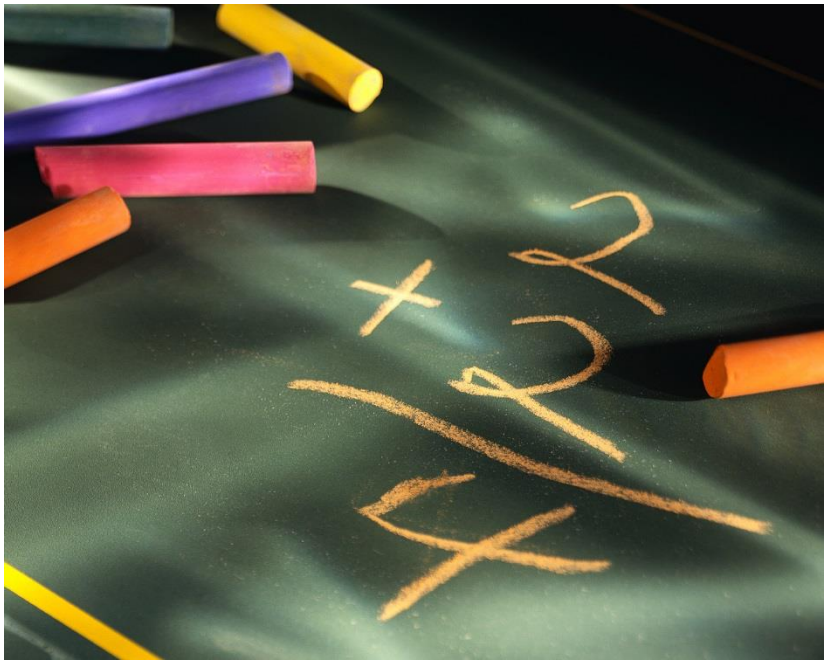
# Sum

- The total or whole amount.
- The result of adding.
- Example:

addend addend

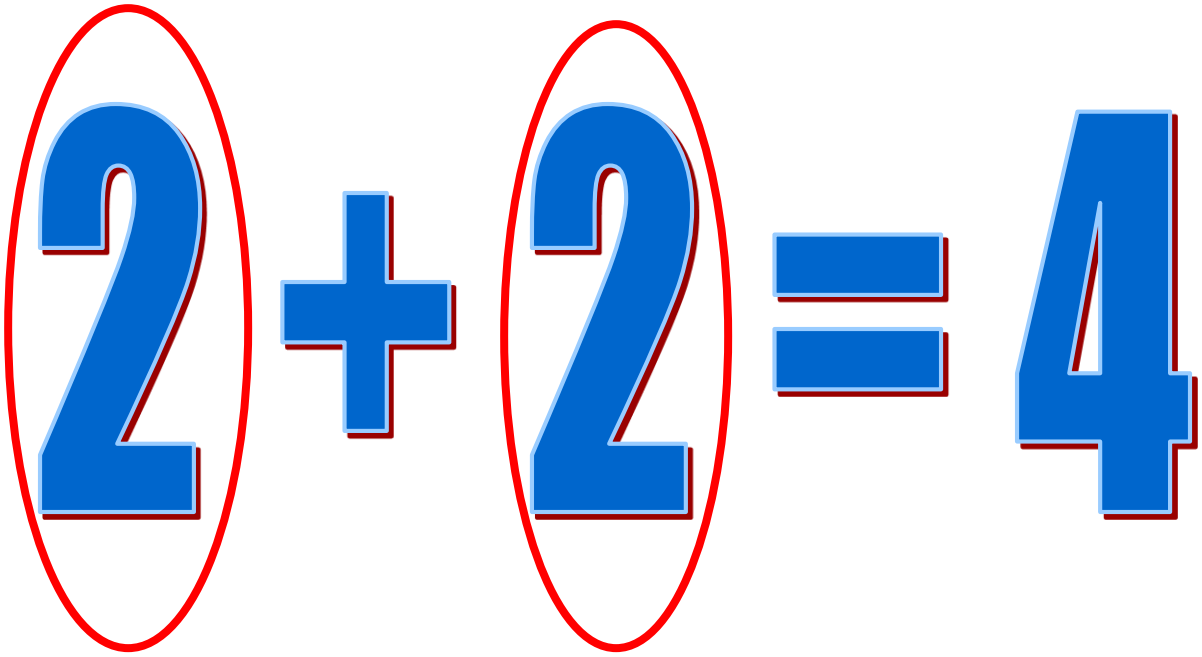
- 6 + 4 = 10

sum



# Addends

The numbers that are being added or combined together




Addends

# Difference

- The amount by which one quantity is greater or less than another.

# Factor

Any number multiplied together to find a product.

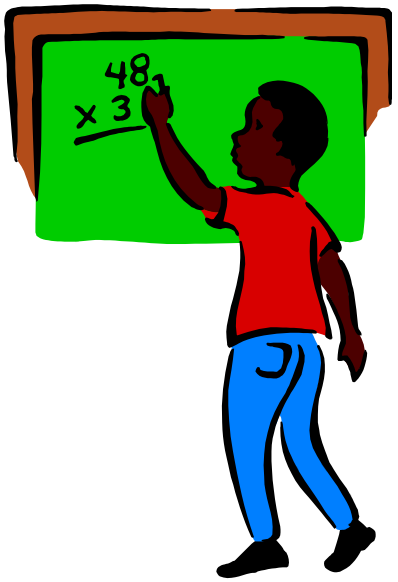
$6 \times 7$

Factor

# Product

- The result when two numbers are multiplied.
- Example: 2 X 6 = 12

product



**Divisor** - The number by which another number is being divided.

$48 \div 6$

**Divisor**

# Quotient

The Answer to a division problem.

$$48 \div 6 = 8$$

Quotient

# Place Value

- The system in which the position of a digit determines its value

| ten thousands | thousands | , | hundreds | tens | ones |
|---|---|---|---|---|---|
| 1 | 5 | , | 7 | 3 | 2 |

Which digit is in the thousands place?

# Hundreds


Which digit is in the hundreds place?

# Thousands

| | Thousands | | | Ones | | |
|---|---|---|---|---|---|---|
| | Hundreds | Tens | Ones | Hundreds | Tens | Ones |
| | 2 | 4 | 7, | 1 | 3 | 5 |

Which digit is in the thousands place?

# Millions

| Millions | | | Thousands | | | Ones | | |
|---|---|---|---|---|---|---|---|---|
| Hundreds | Tens | Ones | Hundreds | Tens | Ones | Hundreds | Tens | Ones |
| 6 | 9 | 8, | 2 | 4 | 7, | 1 | 3 | 5 |

Which digit is in the millions place?

**Whole number** - A set of natural numbers using zero; any number that is not a decimal or fraction

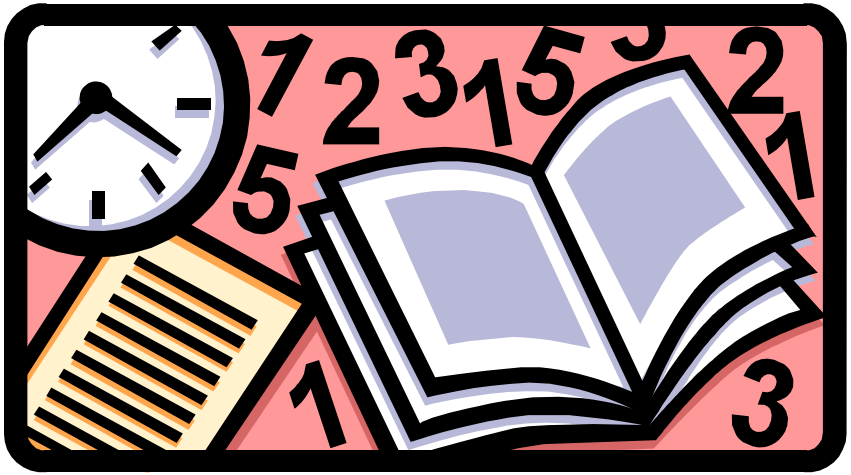
72

**Standard Form** - A way to write numbers by using digits

(the normal way)

1,365

# Written Form



- Writing numbers in words

- Example:

10 = ten

17 = seventeen

100 = one hundred

## Expanded Form

– A way to write numbers by showing the value of each digit

4,325 =

4,000+300+20+5

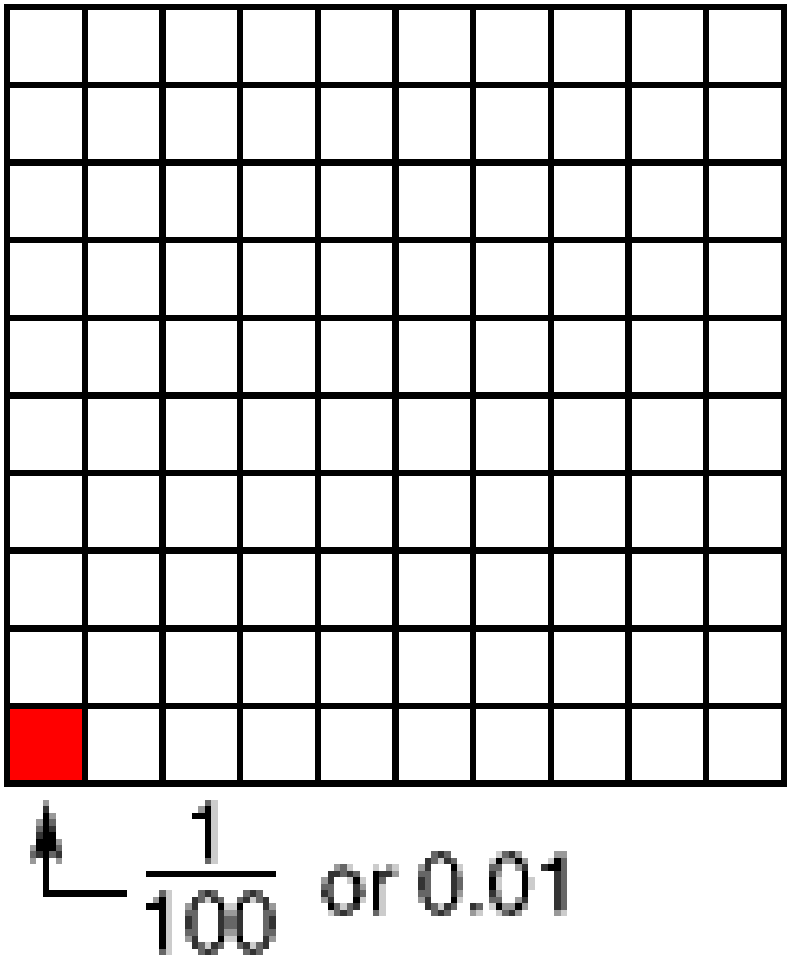
4,000
300
20
+ 5
4,325

You can tell if you did it right by stacking it and adding the numbers together.

# HUNDREDTHS

- One of one hundred equal parts

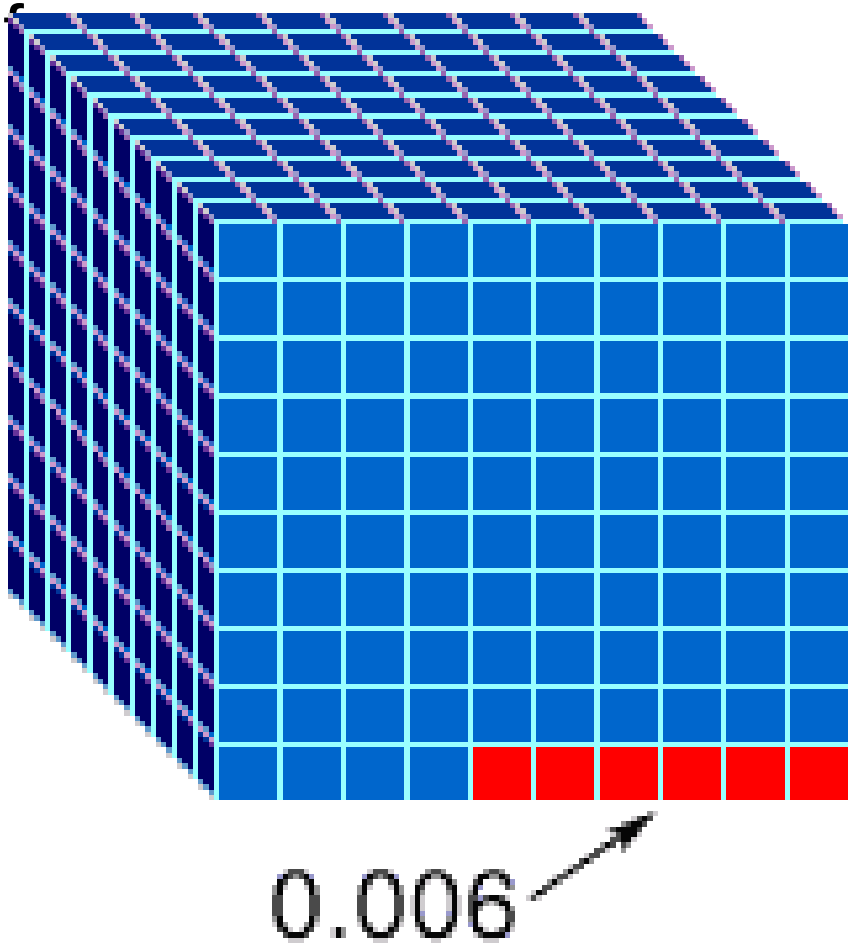
***Example:***



# Thousandths

- A decimal or fraction that names 1 part of 1,000 equal parts

***Example:***



# Equivalent Decimals

– Two or more decimals that name the same amount

$$0.5 = 0.50$$

0.5 is pronounced 5 tenths or 5/10.
0.50 is pronounced 50 hundredths or 50/100.

$$5/10 = 50/100 = 1/2$$

These fractions are equivalent; thus these decimals are equivalent

**Digit** – any one of the ten symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9 used to write numbers

| thousands | , | hundreds | tens | ones |
|---|---|---|---|---|
| 4 | , | 8 | 9 | 7 |

What digit is in the hundreds place?

# Greater than
# Less than

There are 5 adults and 1 child.

5 is greater than 1

$5 > 1$

1 is less than 5

$1 < 5$

**Whole number** - A set of natural numbers using zero; any number that is not a decimal or fraction

72

# Decimal Number

A number with one or more digits to the right of the decimal point.

5.87

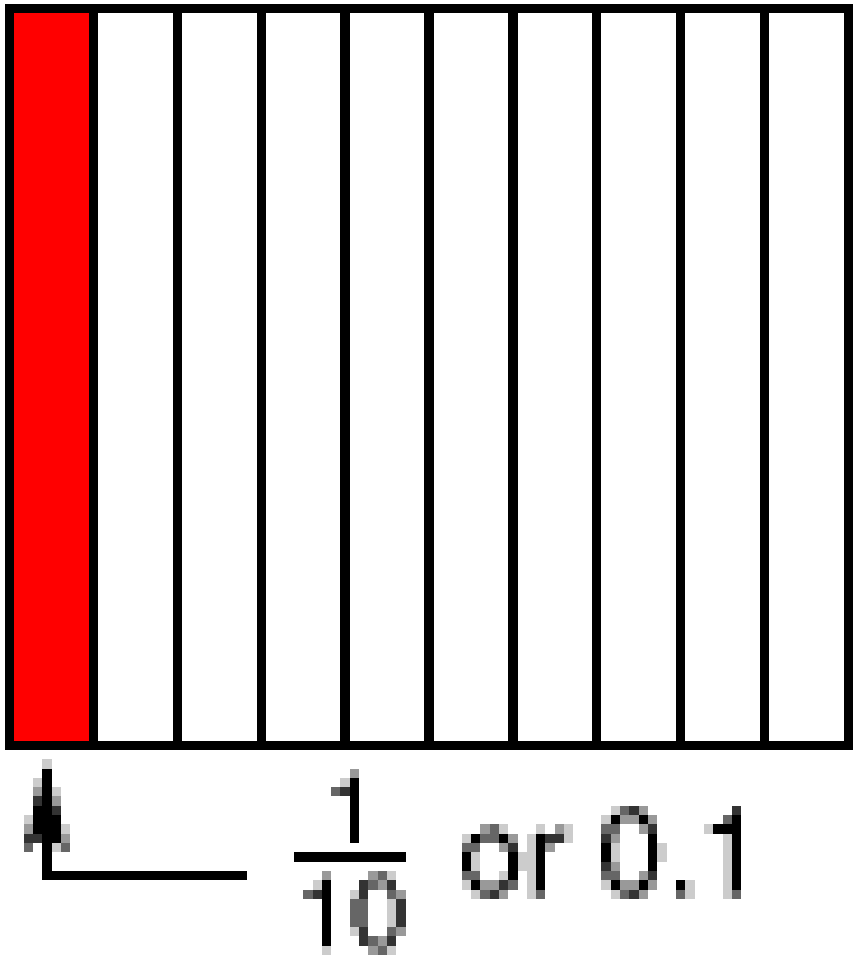
# Decimal Point

- A point between a whole number and decimal and decimal number.

# Tenth

- A decimal or fraction that names 1 part of 10 equal parts

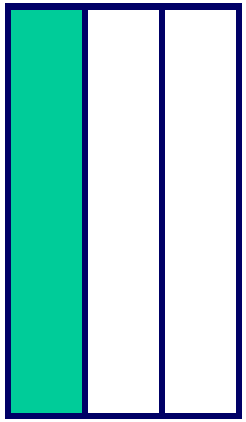
***Example:***



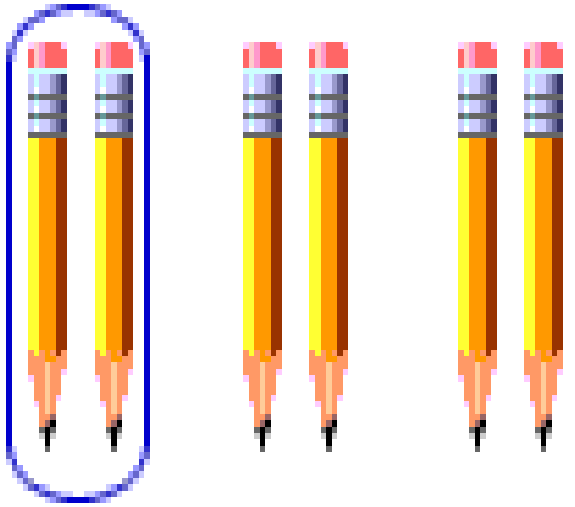
# Fraction

- A number that names a part of a whole or a part of a group

***Example:***



$\frac{1}{3}$



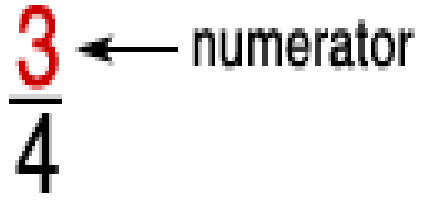
$\frac{1}{3}$

# Numerator Denominator

**Numerator**- The number above the bar

in a fraction that tells how many equal

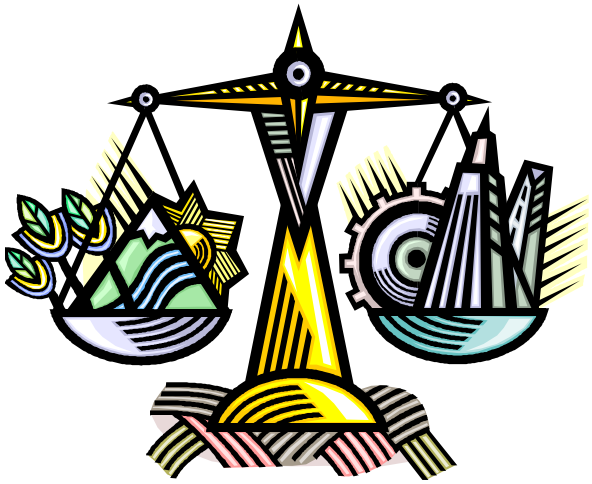
parts of the whole are being considered.





**Denominator-** The number below the bar in a fraction that tells how many equal parts are in the whole

**Equivalent** – two things with the same value or amount



Decimal and Fractional Equivalents

0.5 = .5

$.3 = \frac{3}{10}$

$\frac{75}{100} = .75$

$.004 = \frac{4}{1000}$

# Composite Numbers

A number greater than zero that has mote than two factors

4, 6, 8, 10, 12, 14, 15, 16…

*Numbers that are not prime numbers are composite numbers.*

# Round

Finding the closest ten, hundred, thousand, etc .

1<u>3</u> → 10

4<u>6</u>8 → 500

1,<u>6</u>53 → 2,000

**If the underlined digit is greater than 5, than round up…**

**If the underlined digit is less than 5, round down.**

# Estimate

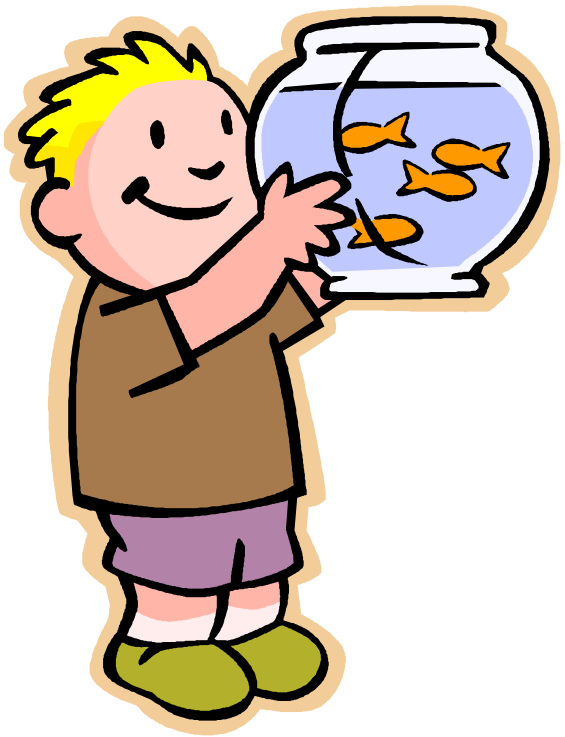
To find an answer that is close to the actual answer by rounding.

# Approximate

- Nearly exact; not perfectly accurate or correct:
- *The approximate*

*time was 10 o'clock.*

# Reasonable Solution



An answer that is not excessive or extreme.

Tom bought a new Goldfish for $1.00, fish food for $0.79, and a bowl for $3.00.

Is a reasonable answer $5.00 or $500?

**Whole number** - A set of natural numbers using zero; any number that is not a decimal or fraction

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# Associative Property of Addition

- The property that states that the way addends are grouped does not change the sum

•***Example:***

(5 + 9) + 3 = 5 + (9 + 3)
14 + 3 = 5 + 12
17 = 17

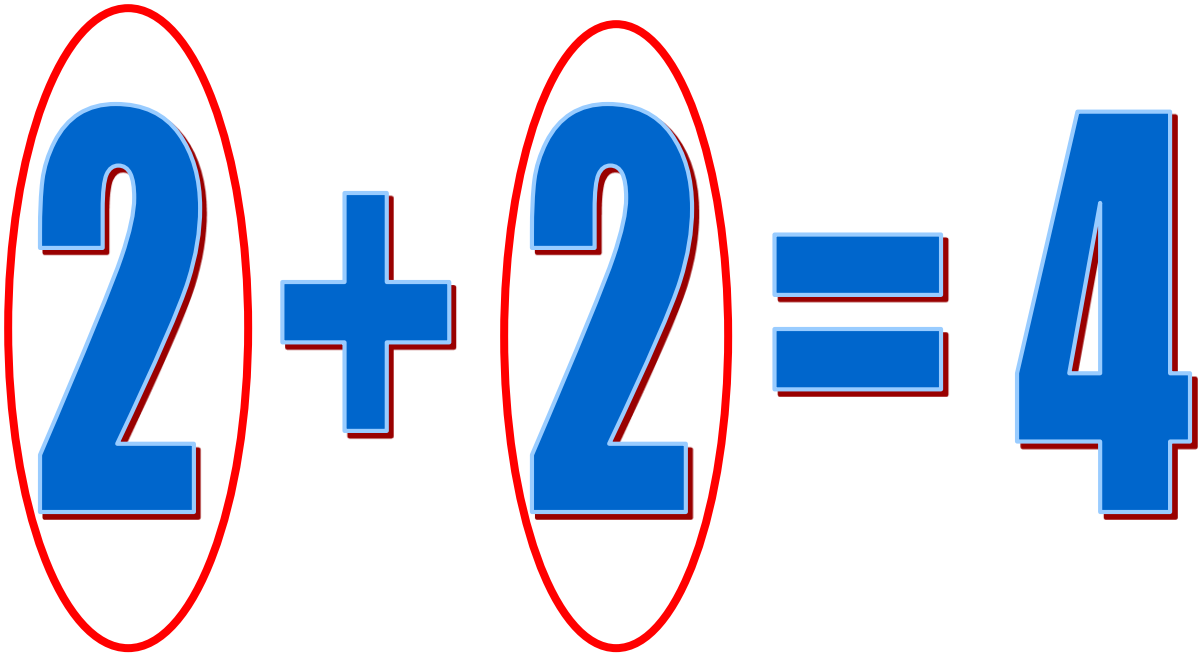
# Decimal Number

A number with one or more digits to the right of the decimal point.

5.87

# Addends

The numbers that are being added or combined together




Addends

# Sum

- The total or whole amount.
- The result of adding.
- Example:

addend addend

- 6 + 4 = 10

sum

# Difference

- The amount by which one quantity is greater or less than another.

# Inverse Operations

- Opposite operations that undo each other; addition and subtraction are inverse operations; multiplication and division are inverse operations

***Examples:***

5 + 4 = 9, so 9 – 4 = 5

3 x 4 = 12, so 12 ÷ 4 = 3

# Variable

- A letter or symbol that stands for one or more numbers

***Example:***

**4 + j =**

**variable**

**Equation** – A number sentence that uses an equal sign to show that two amounts are equal. Some equations have variables

$$7+3=10$$

an **equation**

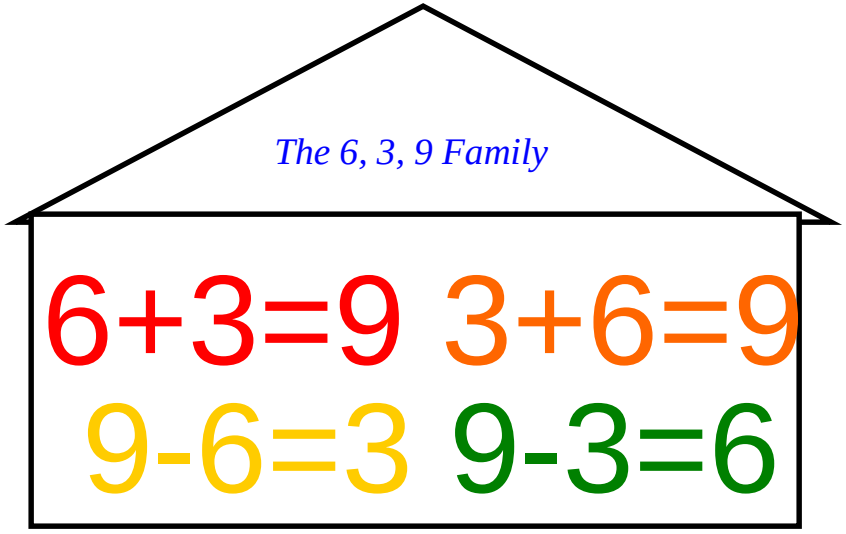
$$7+n=10$$

an equation with a variable

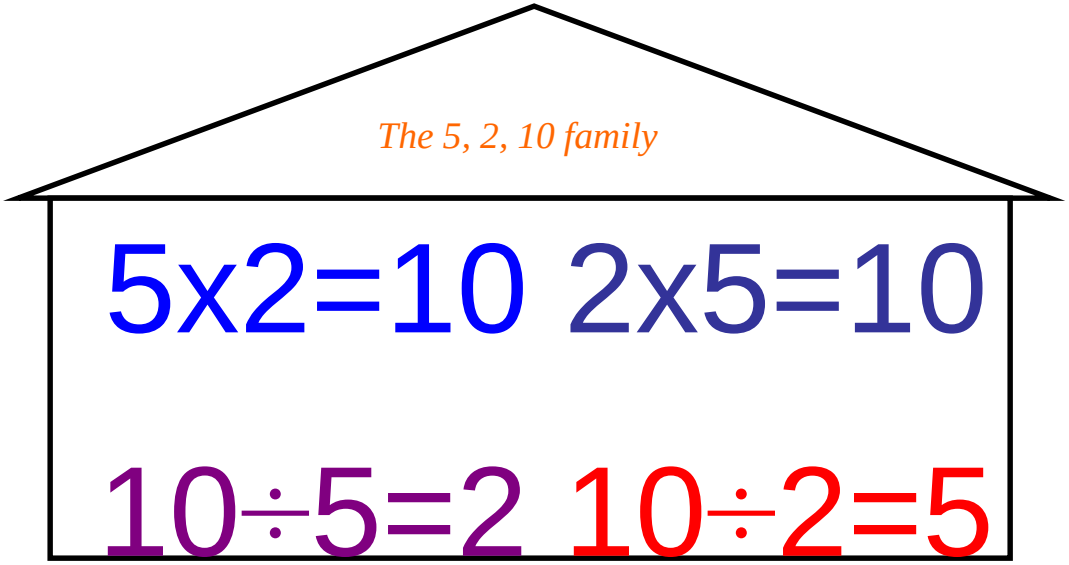
# Fact Family

– A group of facts that share the same numbers and use inverse operations

Fact Families can be addition and subtraction.



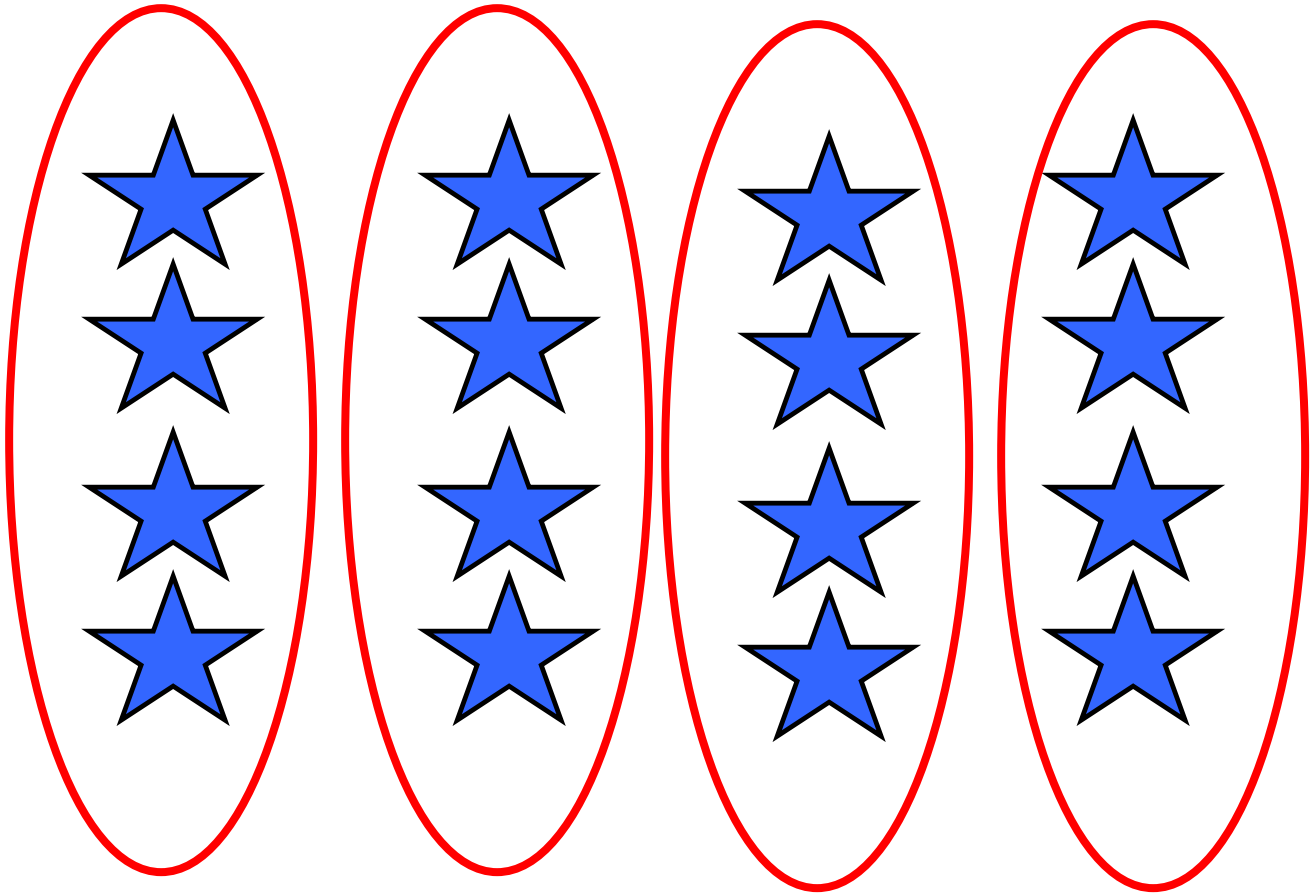
Fact families can also be multiplication and division.



# Multiplication

The process of finding the total number of items when joining equal groups.

**4 groups** each have **4 stars in each group**. There are **16 stars altogether**.



# Factor

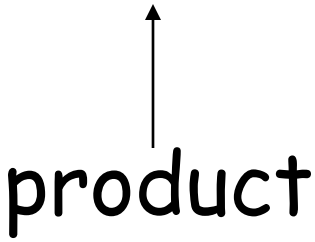
Any number multiplied together to find a product.

$6 \times 7$

Factor

# Product

- The result when two numbers are multiplied.
- Example: 2 X 6 = 12



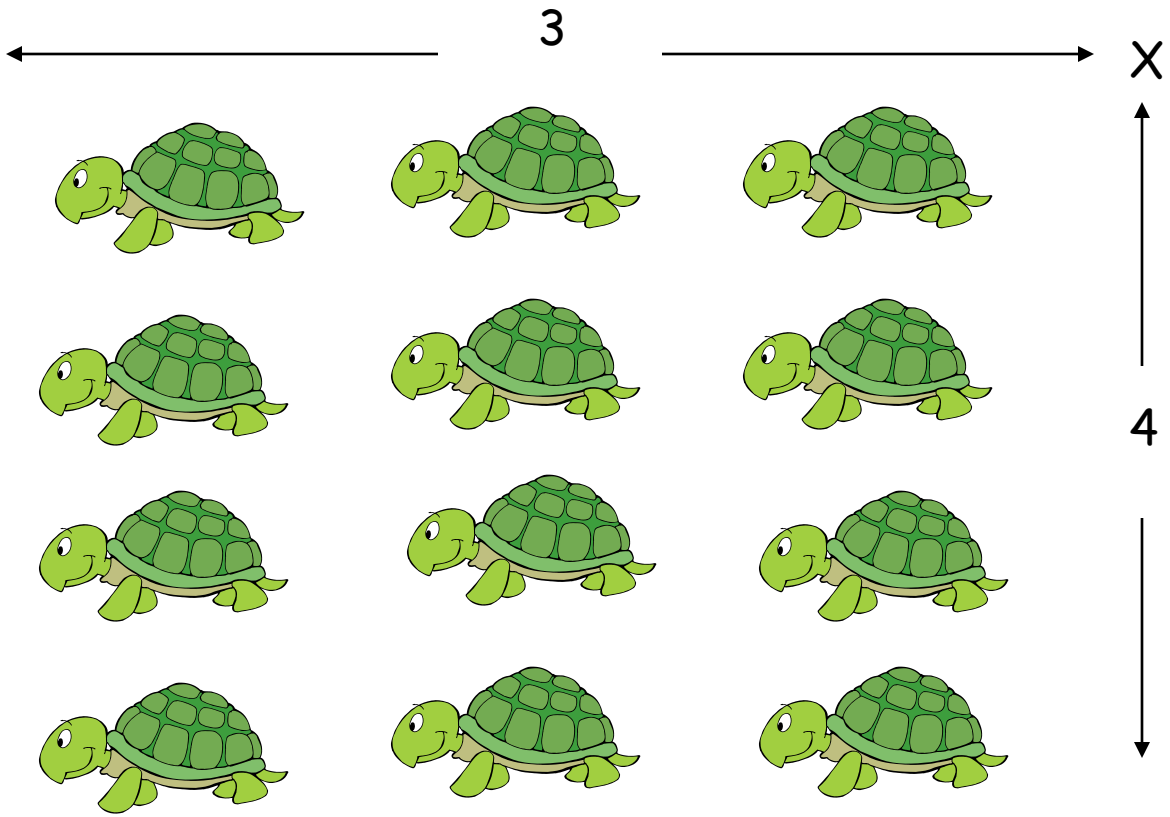
# Multiple

A number that is the product

3,6,9, and 12 are

Multiples of 3

# Array - An arrangement that shows objects in rows and columns




3x4=12

# Commutative Property of Multiplication

- The property that states that when the order of two or more factors is changed, the product is the same

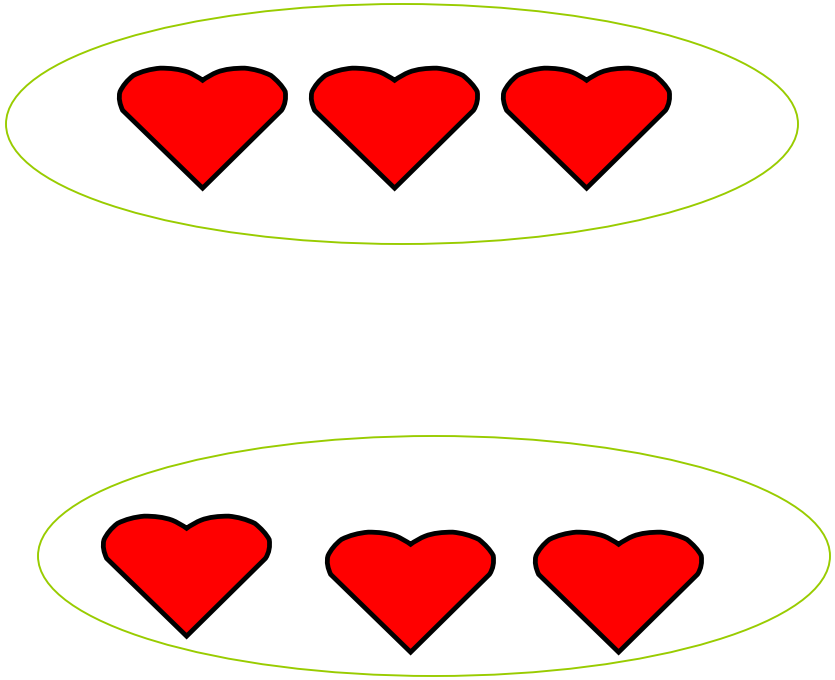
***Example:***

5 x 7 = 7 x 5

# Division

The operation of splitting a set of objects or a number into equal groups.

6 hearts divided into 2 groups equals 3 hearts in each group.



**Divisor** - The number by which another number is being divided.

$48 \div 6$

**Divisor**

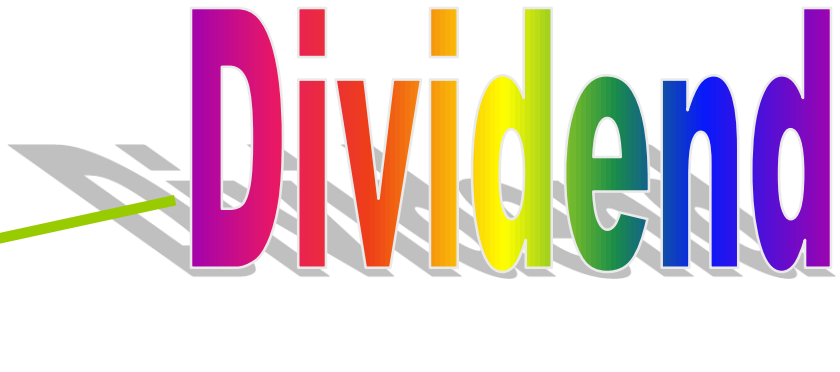
# Dividend

- The number that is to be divided in a division problem

***Example:***

35 ÷ 5 = 7

The dividend is 35.



# Quotient

The Answer to a division problem.

$$48 \div 6 = 8$$

Quotient

# Compatible Numbers

- **Numbers that are easy to compute mentally**

***Example:***

**Estimate. 528 ÷ 7**

**490 ÷ 7 = 70**

**49 and 7 are compatible.**

**560 ÷ 7 = 80**

**56 and 7 are compatible.**

# Associative Property of Multiplication

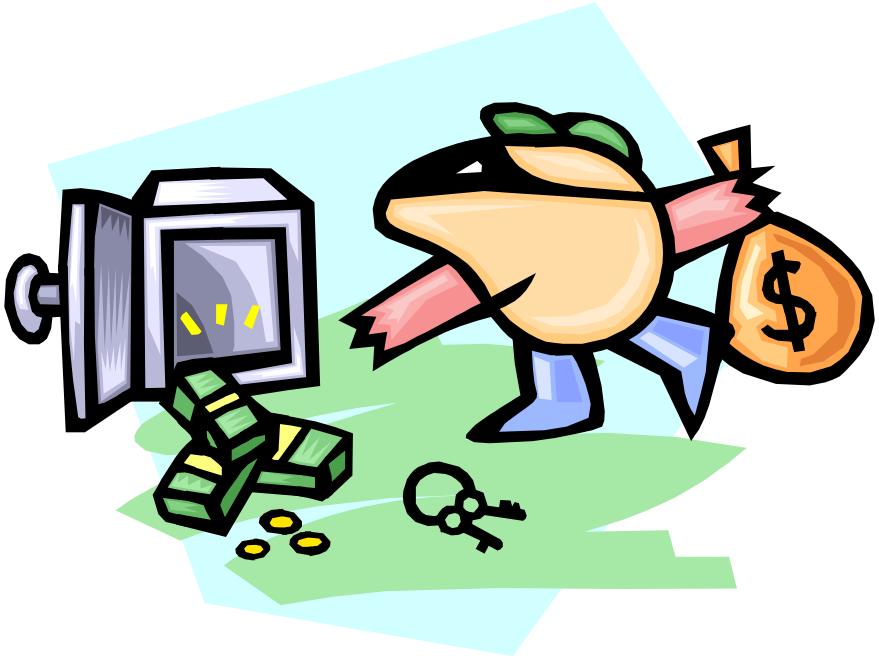
- The property that states that the way factors are grouped does not change the product

***Example:***

(2 x 3) x 4 = 2 x (3 x 4)
6 x 4 = 2 x 12
24 = 24

# Regroup

To exchange amounts of equal value to rename a number…



# Divisible

One number is divisible by another if the remainder is zero when you divide.

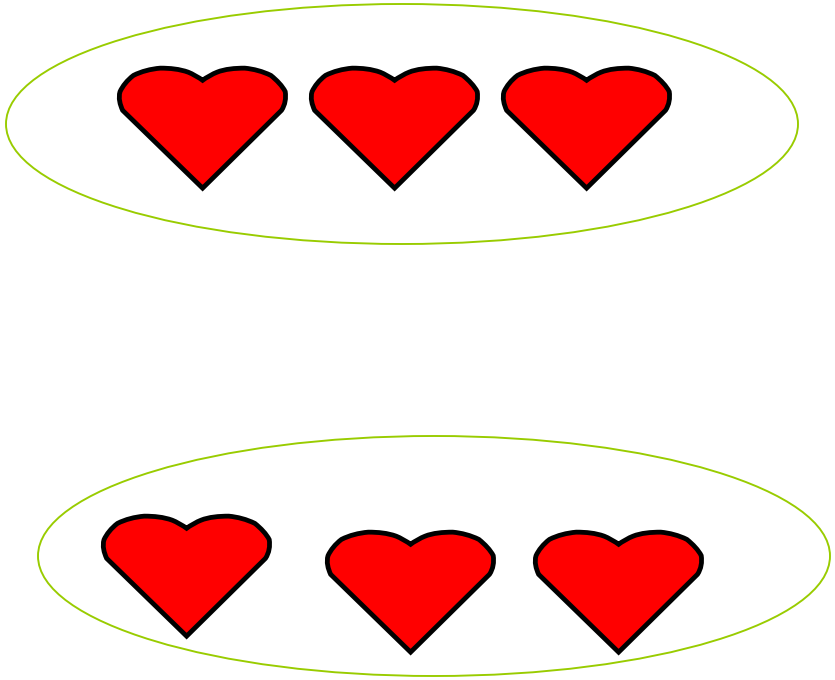
$$49 \div 7 = 7$$

49 is divisible by 7 because the remainder is 0 when you divide.

# Division

The operation of splitting a set of objects or a number into equal groups.

6 hearts divided into 2 groups equals 3 hearts in each group.



**Divisor** - The number by which another number is being divided.

$48 \div 6$

**Divisor**

# Quotient

The Answer to a division problem.

$$48 \div 6 = 8$$

Quotient

**Remainder** - The amount left over when you find a quotient

**Prime number** - a whole number greater than zero hat has exactly two different factors, 1 and itself

Some of the prime numbers are:
2, 3, 5, 7, 11, and 13

Don't forget that 2 is a prime number!

# Composite Number

A whole number having more than two factors

***Example :***

| Composite Numbers | | Not Composite Numbers | |
|---|---|---|---|
| Number | Factors | Number | Factors |
| 4 | 1, 2, 4 | 1 | 1 |
| 6 | 1, 2, 3, 6 | 2 | 1, 2 |
| 8 | 1, 2, 4, 8 | 3 | 1, 3 |
| 9 | 1, 3, 9 | 5 | 1, 5 |

# Factor Pair

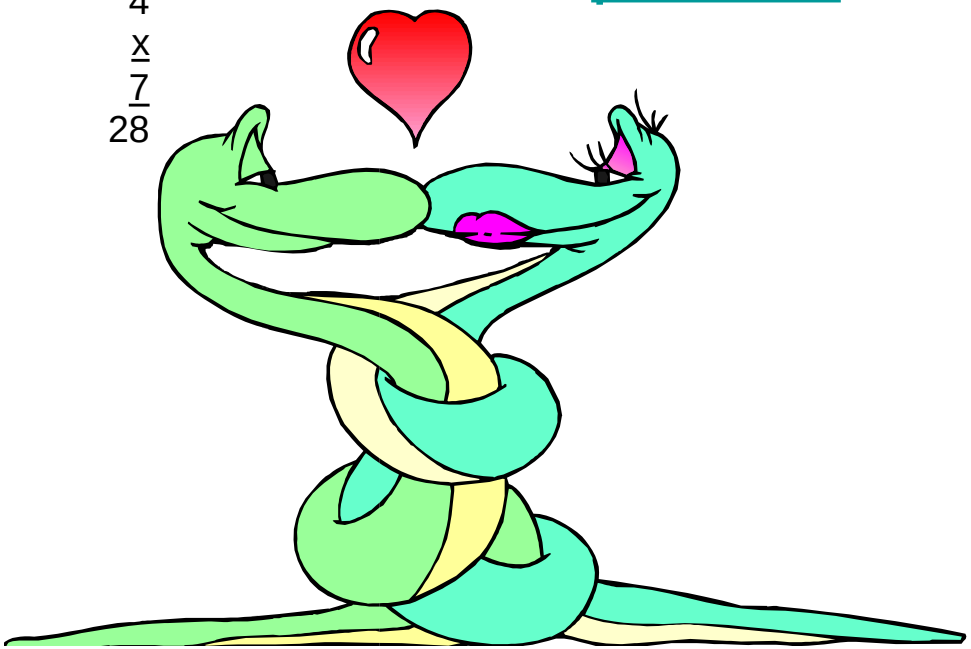
- A number that is multiplied by another number to find a product

***Example:***

The factors are 4 and 7.

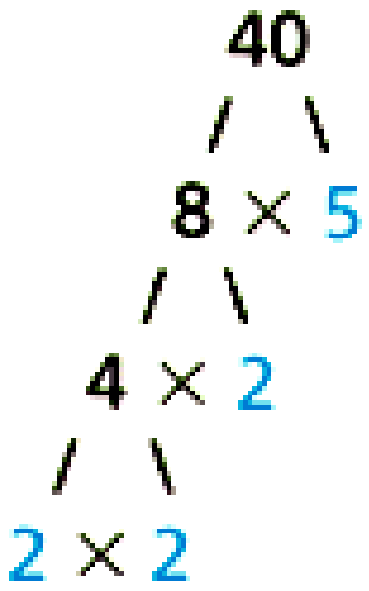
$4 \times 7 = 28$

$$\begin{array}{r} 4 \\ \times\ 7 \\ \hline 28 \end{array}$$



# Prime Factorization

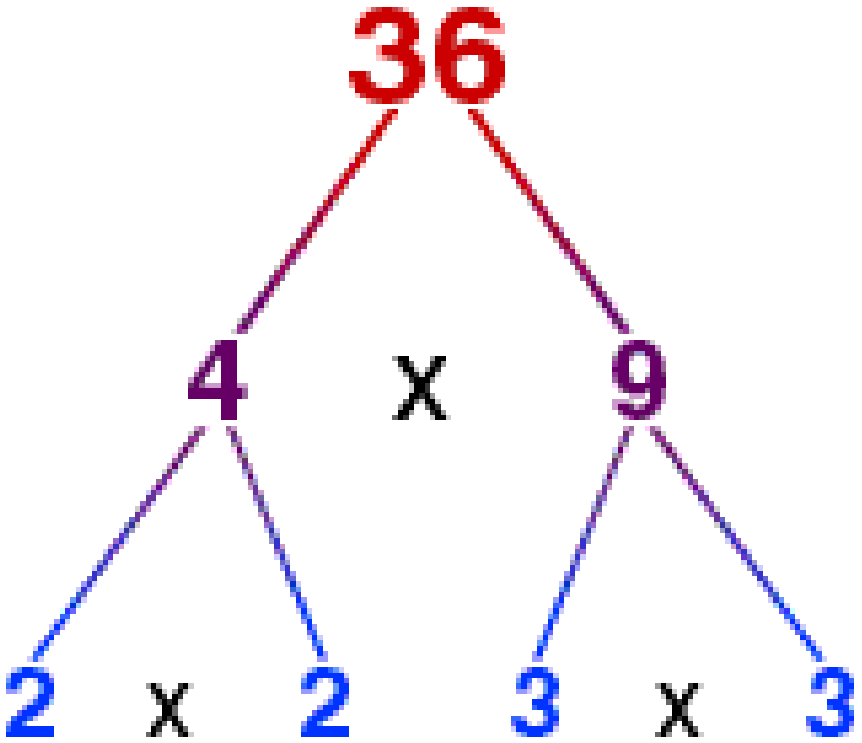
**What is the prime factorization of 40?**




So, $40 = 2 \times 2 \times 2 \times 5$.

- number written as the product of all its prime factors

# Factor Tree




- A diagram that shows the prime factors of a number

# Factor

Any number multiplied together to find a product.

$6 \times 7$

Factor

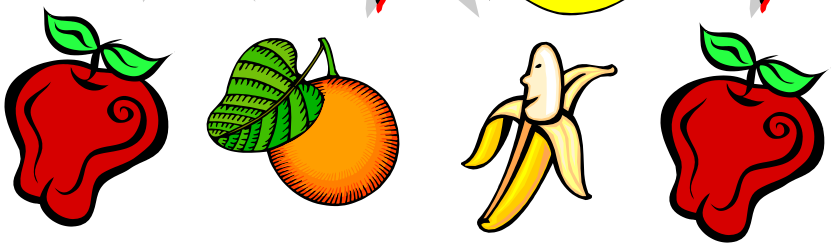
**Pattern** - The repetition of numbers or objects; list of numbers that follow a rule

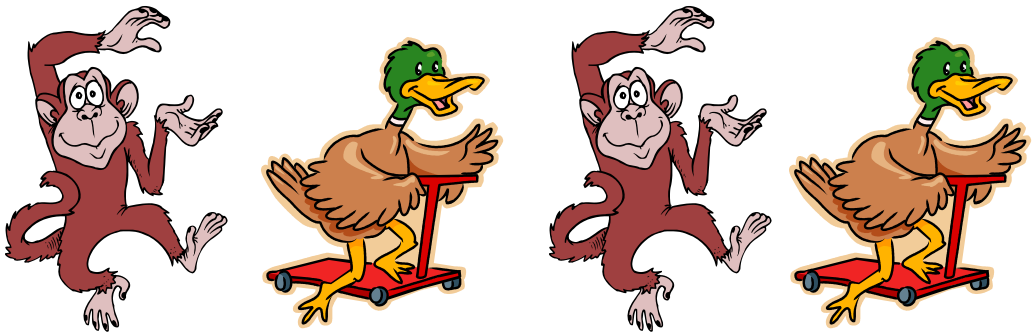
3, 6, 9, 12, ___, 18

What comes next in the pattern?

**Extend** – to make longer, stretch out, prolong

*Can you extend these patterns?*





# Paired Numbers
# Relationship in the Pattern

- numbers that have a direct relationship with each other

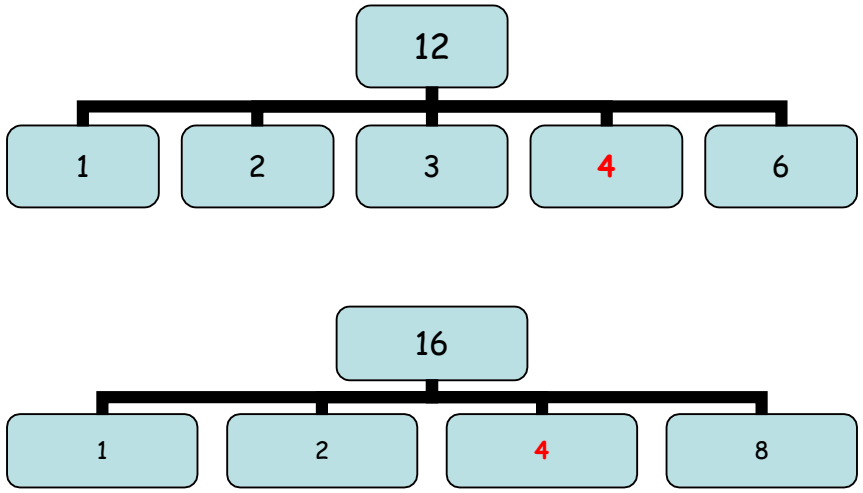
# Wheels on a bicycle

| Number of bicycles | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Number of wheels | 2 | 4 | 6 | ? |

How many wheels are on 4 bicycles?

# Common Factor

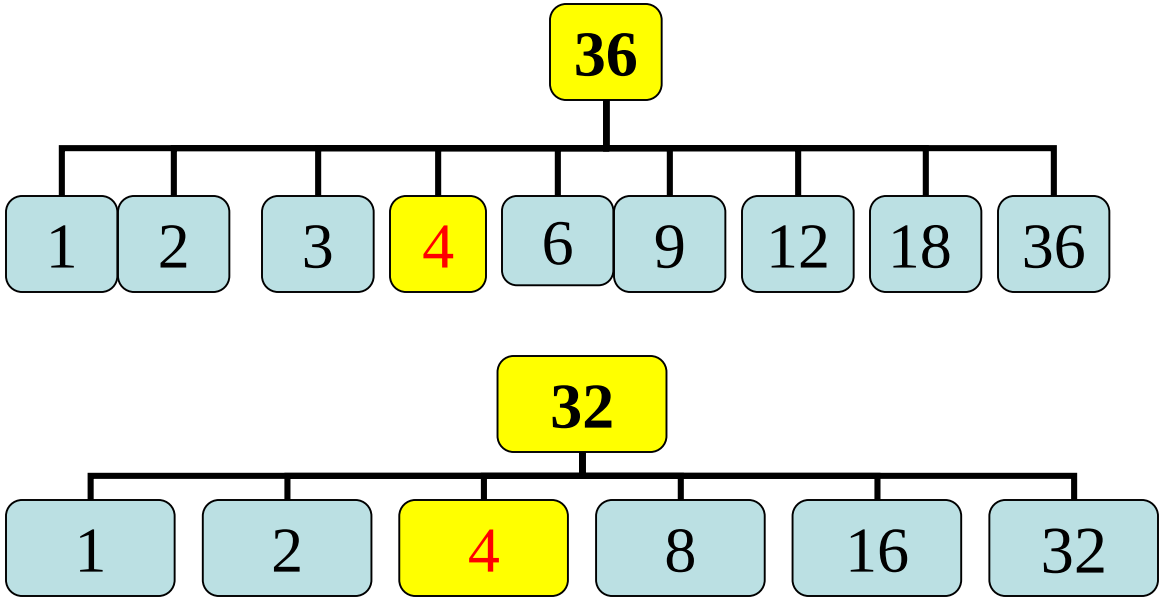
A number that is a factor of two or more numbers




4 is a common factor of 12 and 16. What are two other common factors?

# Greatest Common Factor-

The greatest number that is a factor of every number in a set of numbers

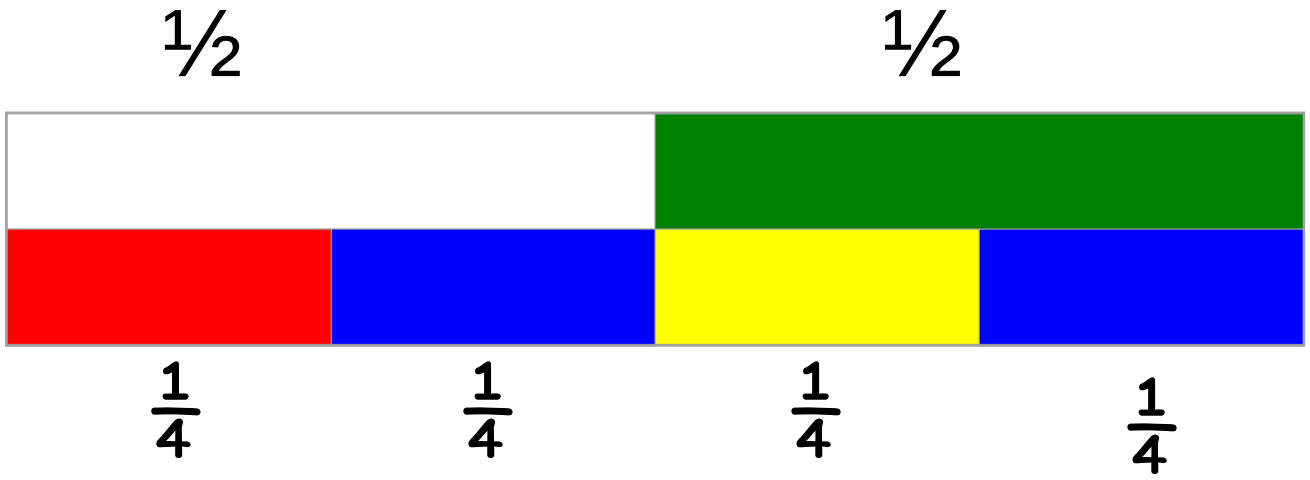



The greatest common factor of **36** and **32** is **4**.

# Common Denominator

- Fractions with the same denominator

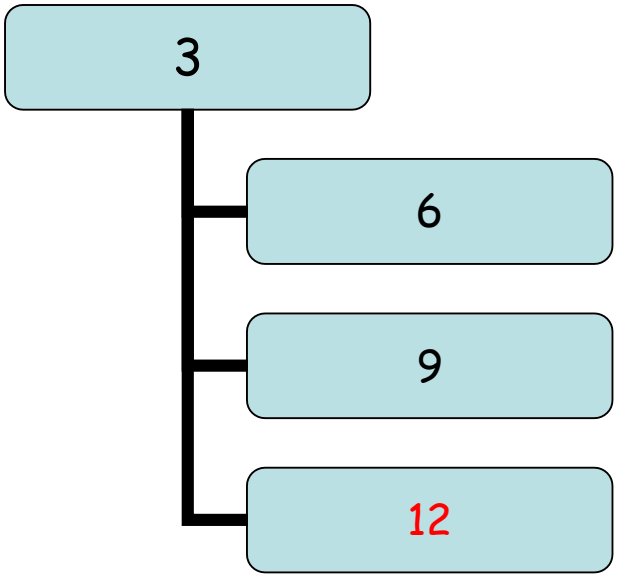
**Equivalent Fractions** – two fractions with the same value or amount

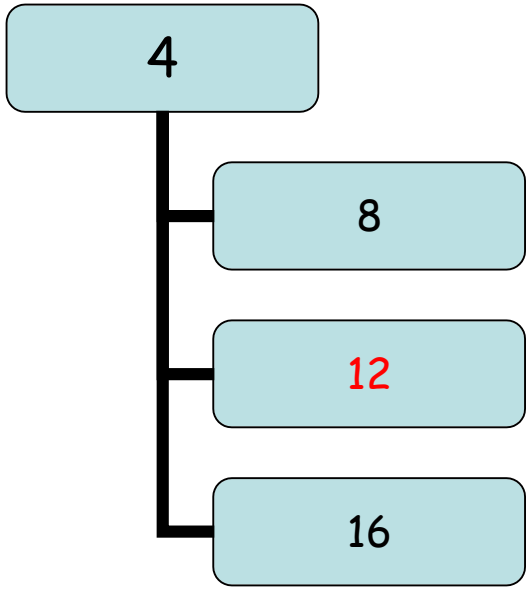



2/4 and 1/2 are equals.

# Common Multiple

A number that is a multiple of two or more numbers




12 is a common multiple of 3 and 4.

# Least Common Multiple -

The smallest common multiple of a set of two or more numbers

What is the least common multiple for the numbers 9 and 7?

Multiples of 9

9, 18, 27, 36, 45, 54, 63

Multiples of 7

7, 14, 21, 28, 35, 42, 49, 56, 63

# Least Common Denominator-

The least common multiple of the denominators of two or more fractions

$$\frac{3}{8} \bigcirc \frac{4}{6}$$

Multiples of 8 =
8,16,24,32,40,48
Multiples of 6 = 6,12,18,24

24 is the least common denominator.

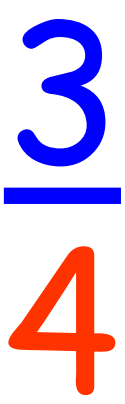
$$\frac{9}{24} = 3x \quad \frac{3}{8} \bigcirc \frac{4}{6} \quad x4 = \frac{16}{24}$$

# Simplest Form
# Reduced Form

- A fraction whose numerator and denominator have no other common factors other than one

$$\frac{5}{6}$$

This fraction is in its simplest form.

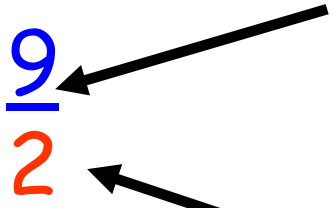



Numerator - The number above the bar in a fraction that tells how many equal parts of the whole are being considered

Denominator - The number below the bar in a fraction that tells how many equal parts are in the whole

# Improper Fraction

- A fraction in which the numerator is greater than the denominator.




Numerator - The number above the bar in a fraction that tells how many equal parts of the whole are being considered

Denominator - The number below the bar in a fraction that tells how many equal parts are in the whole

# Mixed Number

- A number represented by a whole number and a fraction.

$3\frac{1}{2}$

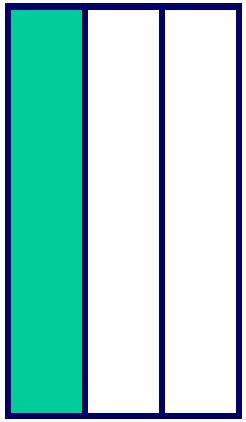
**Whole number** - A set of natural numbers using zero; any number that is not a decimal or fraction

72

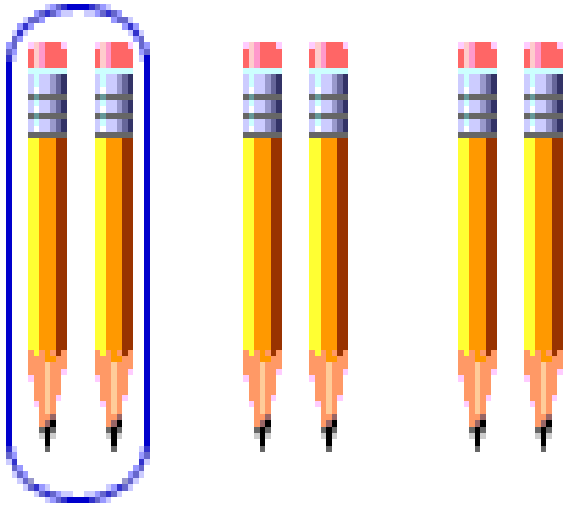
# Fractional Number

- A number that names a part of a whole or a part of a group

***Example:***

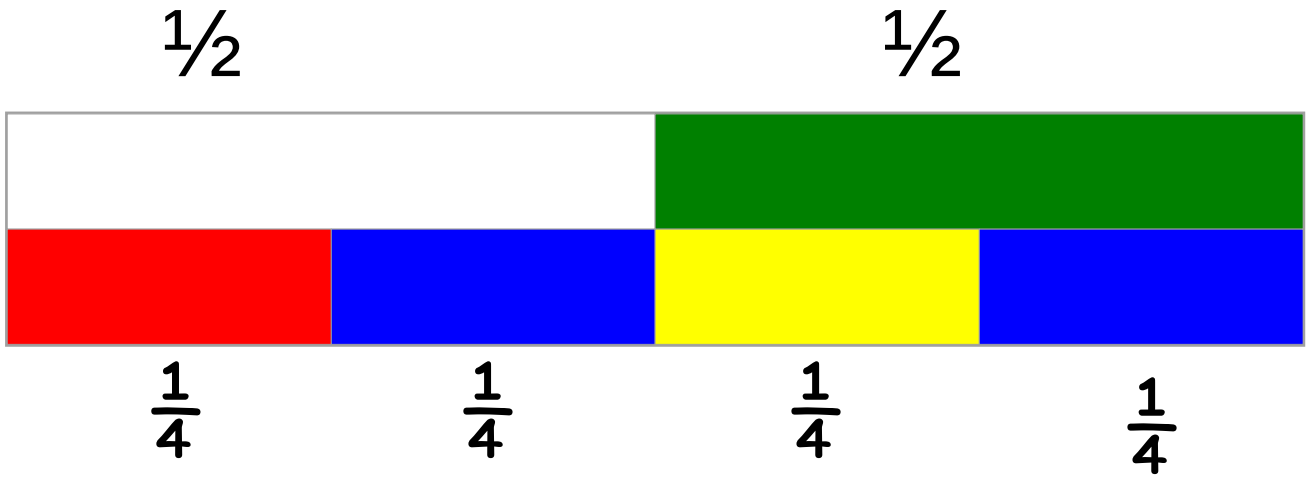


$\frac{1}{3}$



$\frac{1}{3}$

**Equivalent Fractions** – two fractions with the same value or amount



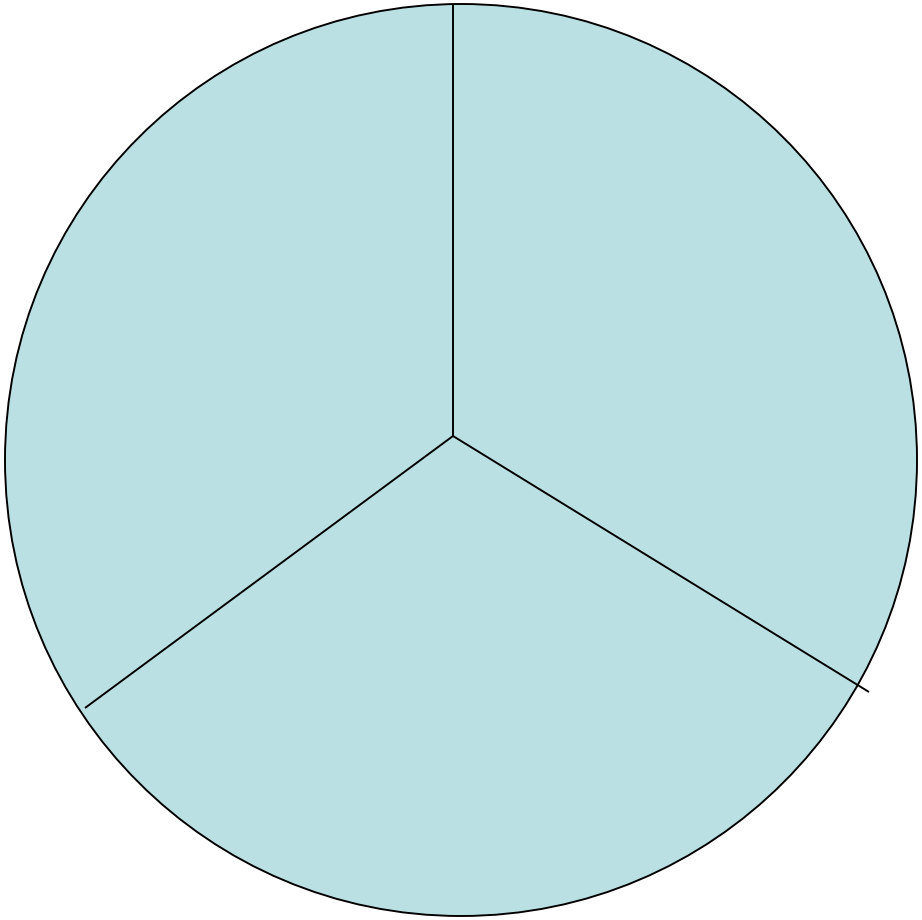

2/4 and 1/2 are equals.

# Half

- 2 equal parts of a whole.

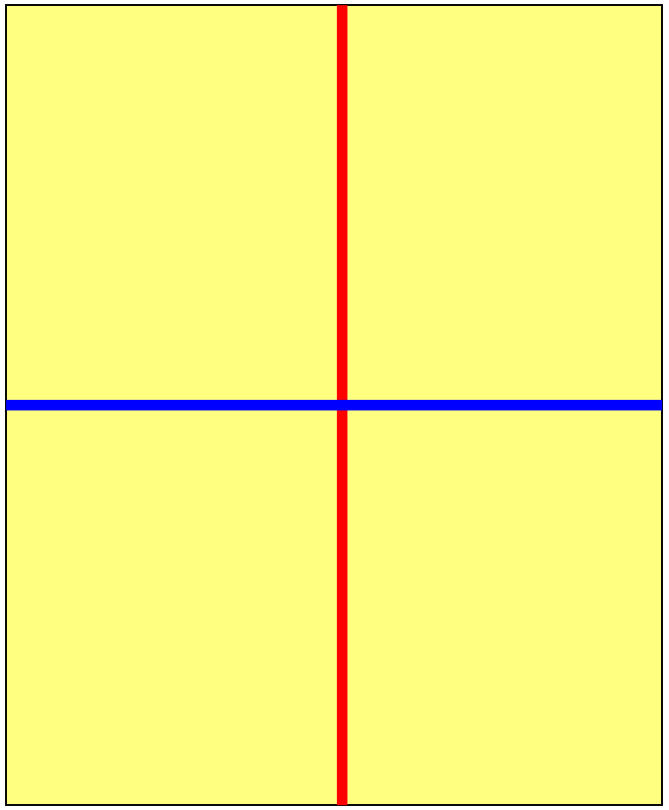
# Third

- 3 equal parts of a whole.



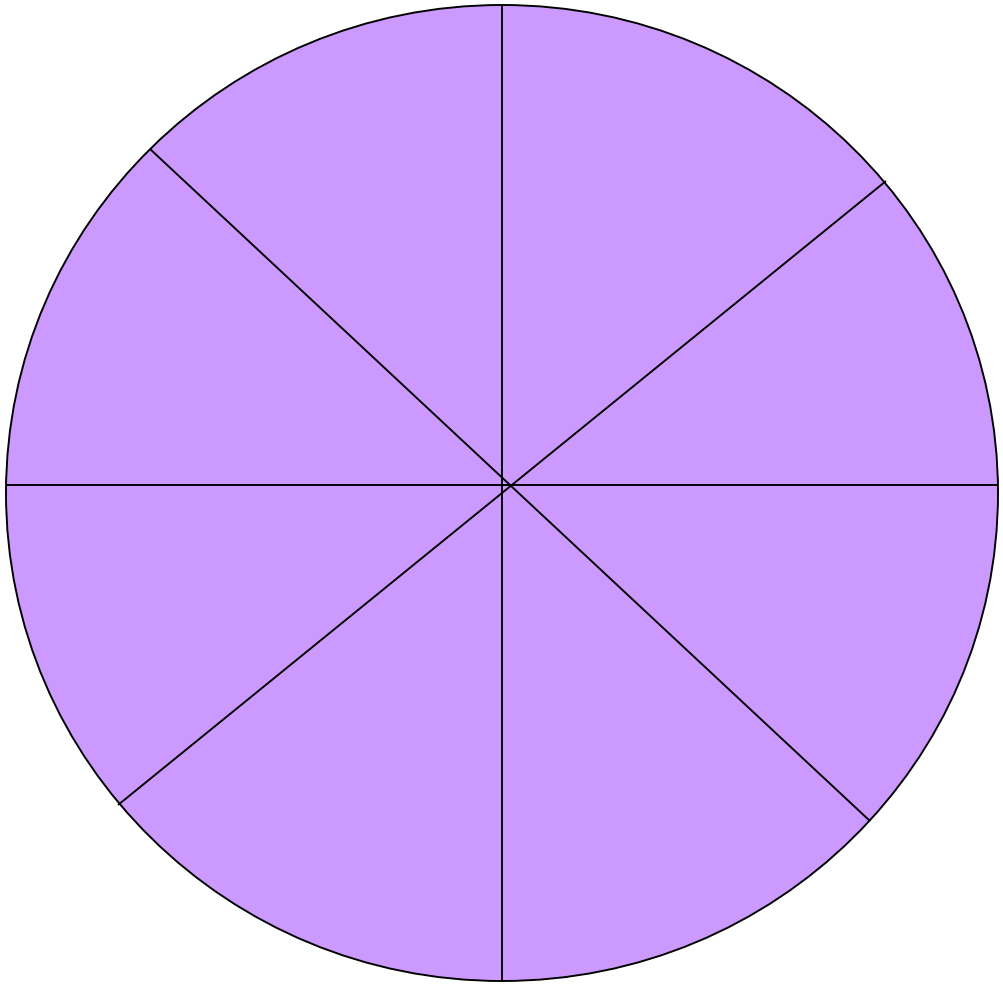
# Fourth

- 4 equal parts of a whole



# Sixth

- 6 equal parts of a whole.



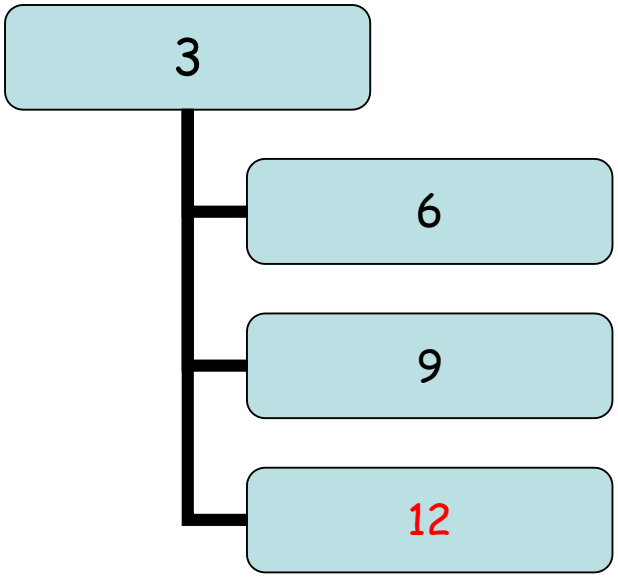
# Common Denominator

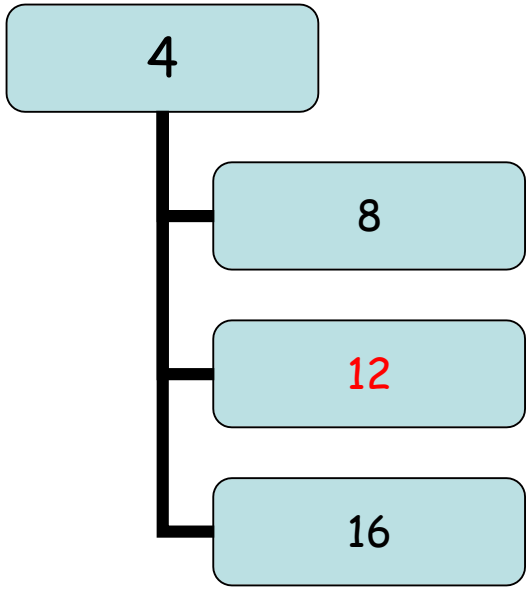
- Fractions with the same denominator

$$\frac{2}{5} \quad \frac{4}{5} \quad \frac{1}{5} \quad \frac{8}{5}$$

# Common Multiple

A number that is a multiple of two or more numbers




12 is a common multiple of 3 and 4.

# Least Common Multiple -

The smallest common multiple of a set of two or more numbers

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Multiples of 9

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7, 14, 21, 28, 35, 42, 49, 56, 63

# Least Common Denominator-

The least common multiple of the denominators of two or more fractions

# Simplest Form
# Reduced Form

- A fraction whose numerator and denominator have no other common factors other than one

$$\frac{5}{6}$$

This fraction is in its simplest form.

# Numerator
# Denominator

**Numerator**- The number above the bar

in a fraction that tells how many equal

parts of the whole are being considered.

$$\frac{3}{4} \leftarrow \text{numerator}$$

$$\frac{3}{4} \leftarrow \text{denominator}$$

**Denominator-** The number below the bar in a fraction that tells how many equal parts are in the whole

# Simplest Form
# Reduced Form

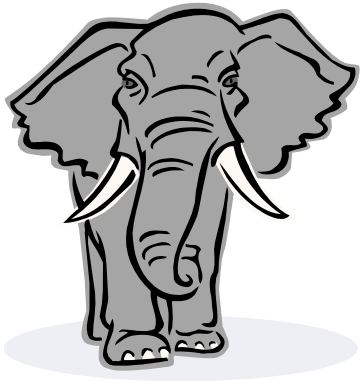
- A fraction whose numerator and denominator have no other common factors other than one

$$\frac{5}{6}$$

This fraction is in its simplest form.

# Capacity – The amount a container can hold.

**Mass** - the amount of matter in an object.

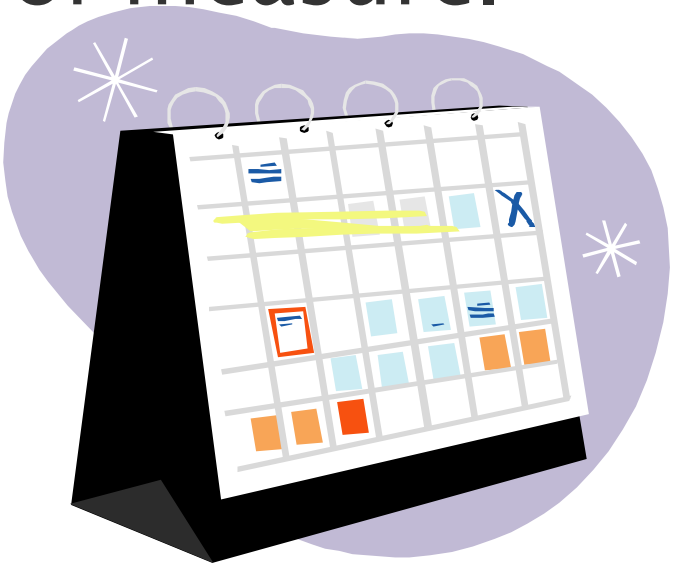


An elephant has a lot of mass.

A leaf has very little mass.

# Conversion
# Equivalent Measure

- The act of changing a unit of measure into an equivalent value using a different unit of measure.
- EXAMPLE:
- 7 Days = 1 Week



- 21 Days = 3 Weeks

# Metric System

- The Metric system is a decimal system of units based on

- the **meter** which measures length,

  millimeter/centimeter/decimeter/decameter/hectometer/Kilometer

- the **gram** which measures mass
  milligram/gram/Kilogram

- and the **liter** which measures capacity
  milliliter/Liter

# Length - Metric

- **millimeter (mm)**
- A metric unit for measuring length and distance
  1,000 millimeters = 1 meter

- **centimeter (cm)**
- A metric unit for measuring length and distance
- 100 centimeters = 1 meter

- **meter (m)**
- A metric unit for measuring length and distance
  1 meter = 100 centimeters

# Mass - Metric

**milligram**
A metric unit for measuring mass
1,000 milligrams = 1 gram

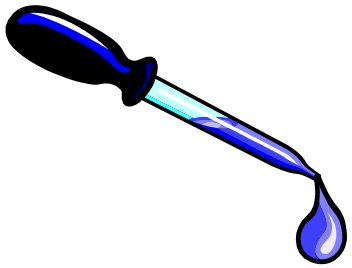
**gram (g)**
A metric unit for measuring mass
1,000 milligrams = 1 gram

**kilogram (kg)**
A metric unit for measuring mass
1,000 grams = 1 kilogram

# Capacity - Metric

**milliliter (mL)**

**A metric unit for measuring capacity**
**1,000 milliliters = 1 liter**



**liter (L)**

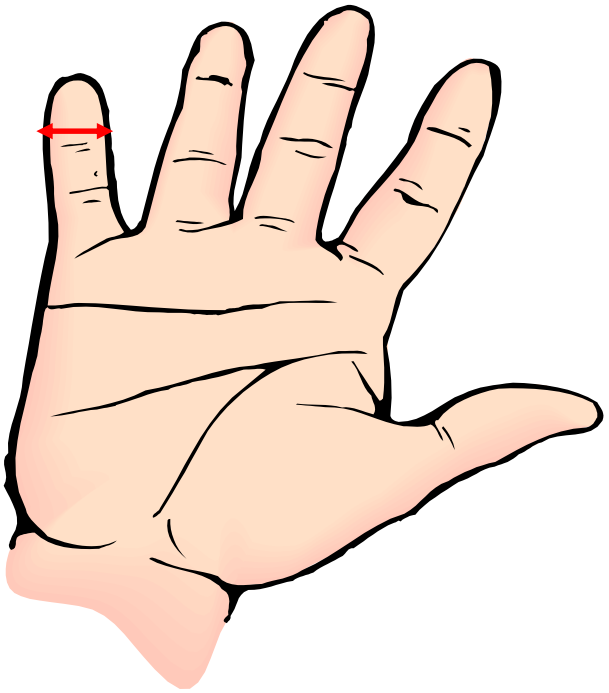
A metric unit for measuring capacity
1 liter = 1,000 milliliters

# Millimeter

- About the width of a piece of poster board

# Centimeter - A metric unit of length

Your pinky is about one centimeter wide.

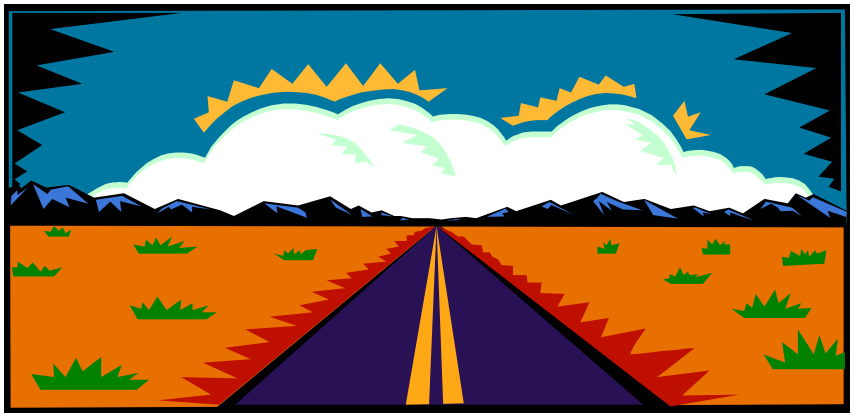


The Palm

# Meter

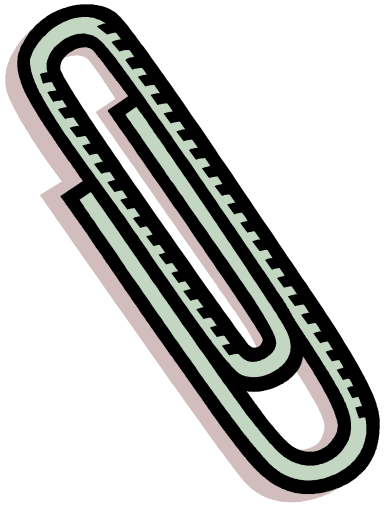
- About the length of a baseball bat.

# Kilometer



- Long distances are measured in Kilometers.

# Gram



A paperclip weighs about

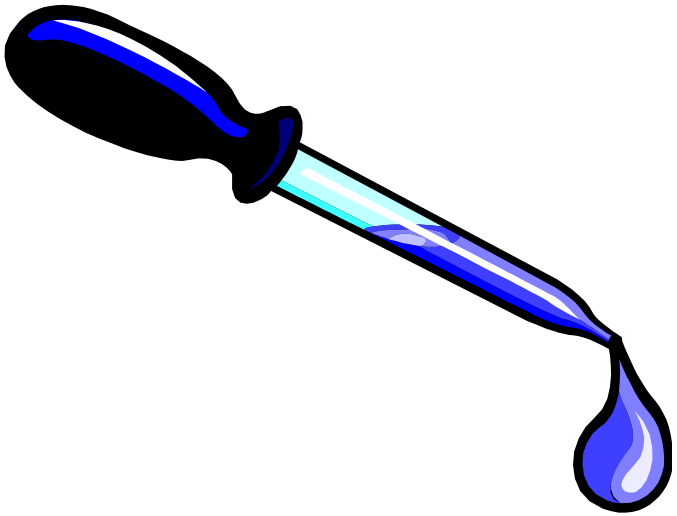
1 gram.

The abbreviation for gram is g.

# Kilogram

- The lady's barbell weighs about 2 Kilograms.

# Milliliter



A milliliter is about
one drop of water.
The abbreviation for milliliter is mL.

**A milliliter is one cubic centimeter.**

# Liter

- I poured milk from the liter container over my cereal.

# Customary English System

- Units of length are measured in

  inch/ feet/ yard/ mile


- Units of mass are measured in

  ounce/ pound/ ton

- Capacity is measured in

  ounce/ cup/ pint/ quart/ gallon

# Customary Measure - Length

The following are customary units for measuring length or distance

**inch (in.)**

12 inches = 1 foot

**foot (ft)**

1 foot = 12 inches

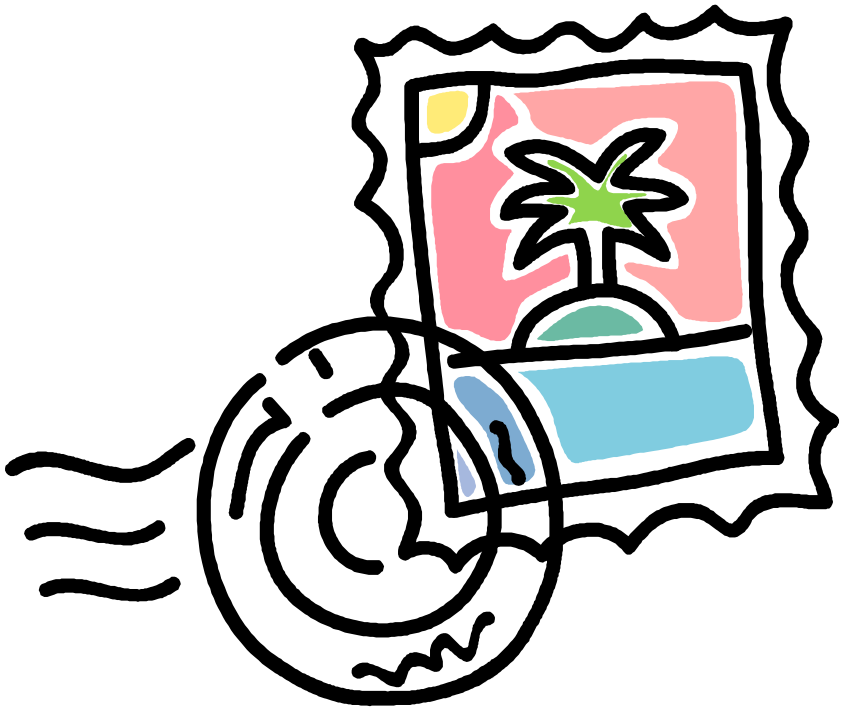
**yard (yd)**

1 yard (yd) = 3 feet, or 36 inches

**mile (mi)**

1 mile (mi) = 1,760 yards, or 5,280 feet

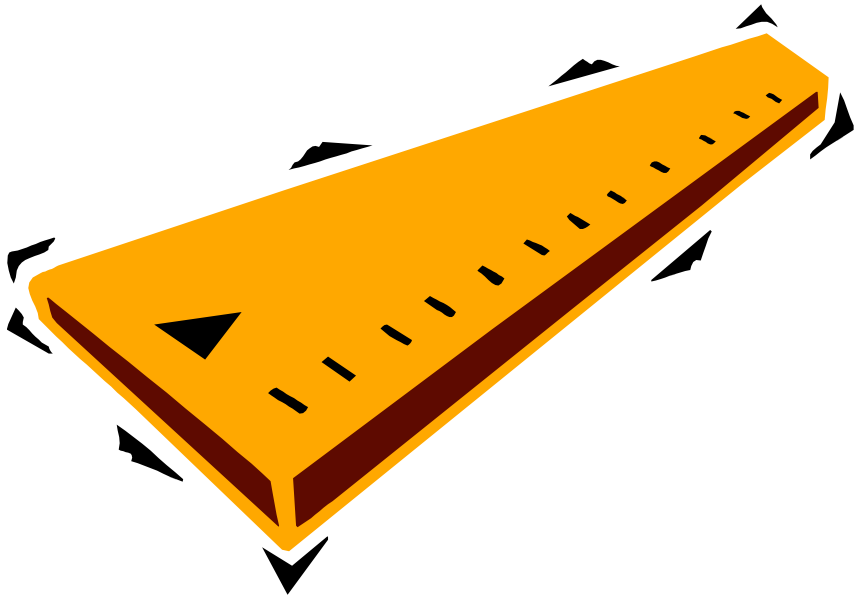
# Inch



- The width of a postage stamp is about 1 inch.

# Foot

- A 12 inch ruler is 1 foot long.



# Yard

- The width of a door is about 1 yard.

# Mile

- Long distances are measured in miles.

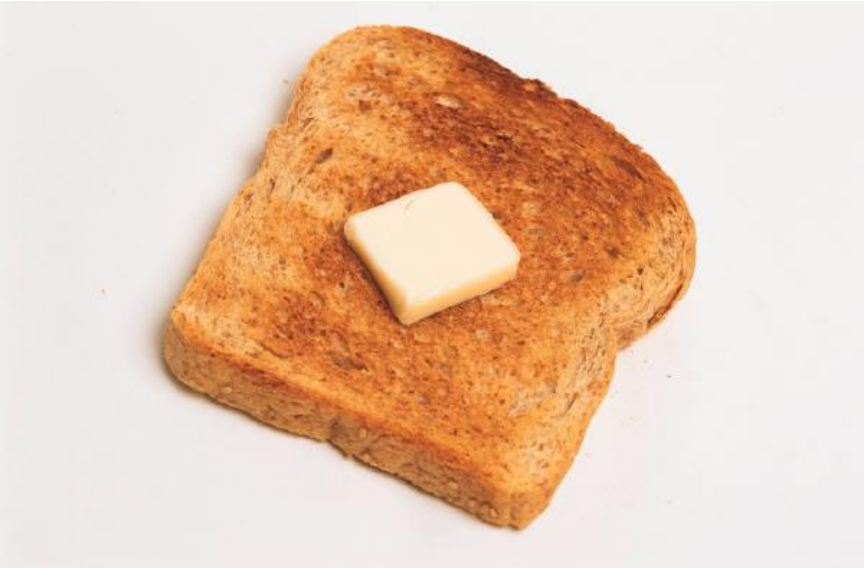
# Customary Measure - Mass/Weight

The following are customary units for measuring Mass/weight

1 pound (lb) = 16 ounces (oz)

1 ton (T) = 2,000 pounds

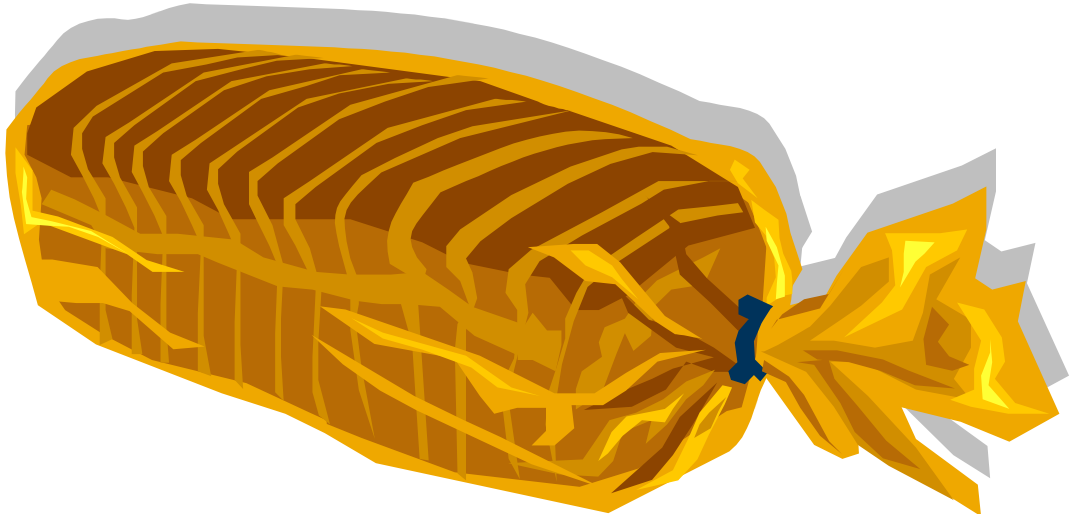
# Mass- Ounce



One slice of bread weighs about 1 ounce.

The abbreviation for ounce is oz.

# Mass - Pound



A loaf of bread weighs about 1 pound.

The abbreviation for pound is lb.

16 ounces equal 1 pound.

# Mass- Ton

A bread truck weighs about 1 ton.

The abbreviation for ton is T.

2,000 pounds equal 1 ton.

# Customary Measure - Capacity

The following are customary units for measuring capacity

| | |
|---|---|
| 1 cup (c) | = 8 fluid ounces (fl oz) |
| 1 pint (pt) | = 2 cups |
| 1 quart (qt) | = 2 pints |
| 1 gallon (gal) | = 4 quarts |

# Capacity - Cup


A milk carton from the cafeteria holds about 1 cup.

The abbreviation for cup is c.

A cup holds 8 fluid ounces.

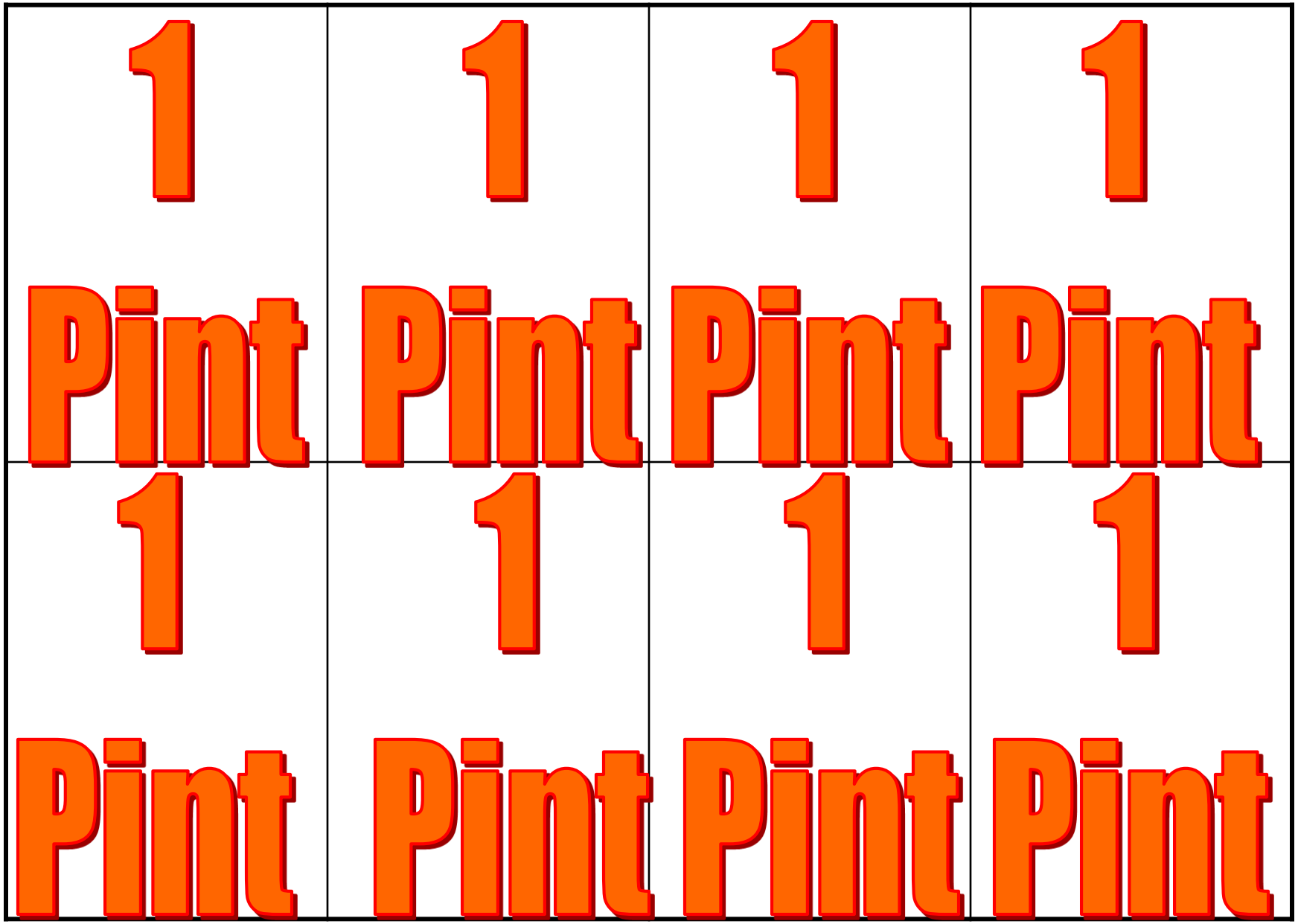
| | | | |
|---|---|---|---|
| 1 Cup | 1 Cup | 1 Cup | 1 Cup |
| 1 Cup | 1 Cup | 1 Cup | 1 Cup |
| 1 Cup | 1 Cup | 1 Cup | 1 Cup |
| 1 Cup | 1 Cup | 1 Cup | 1 Cup |

# Capacity - Pint

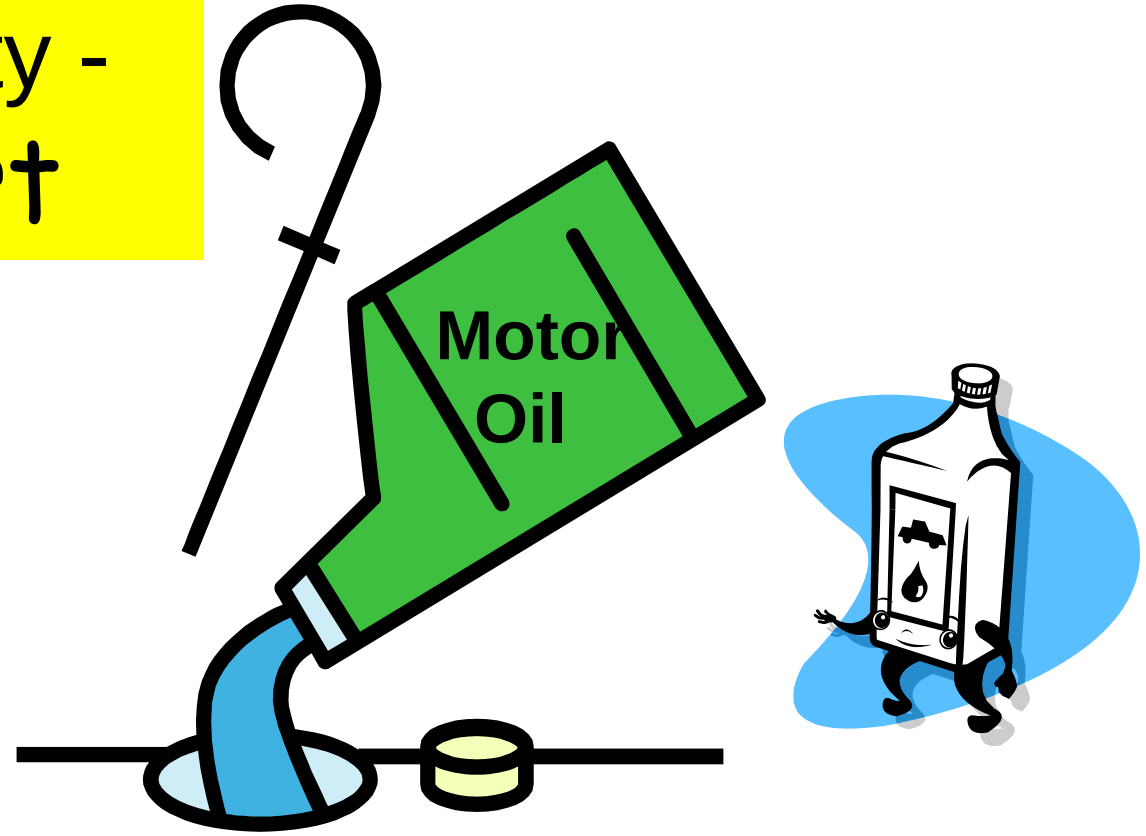
A 16 ounce bottle of water holds one pint.

The abbreviation for pint is pt.

2 cups equal 1 pint.


1 Pint
1 Pint
1 Pint
1 Pint
1 Pint
1 Pint
1 Pint
1 Pint

# Capacity - Quart




Motor oil for cars comes in 1 quart containers

The abbreviation for quart is qt.

2 pints equal 1 quart.

One Quart

One Quart

One Quart

One Quart

# Capacity - Gallon

Milk comes in 1 gallon containers.

The abbreviation for gallon is gal.

4 quarts equal 1 gallon.

**Formula** – A rule that is written as an equation

Width
4

Length
2

To find the area of the rectangle, multiply the length by the width.

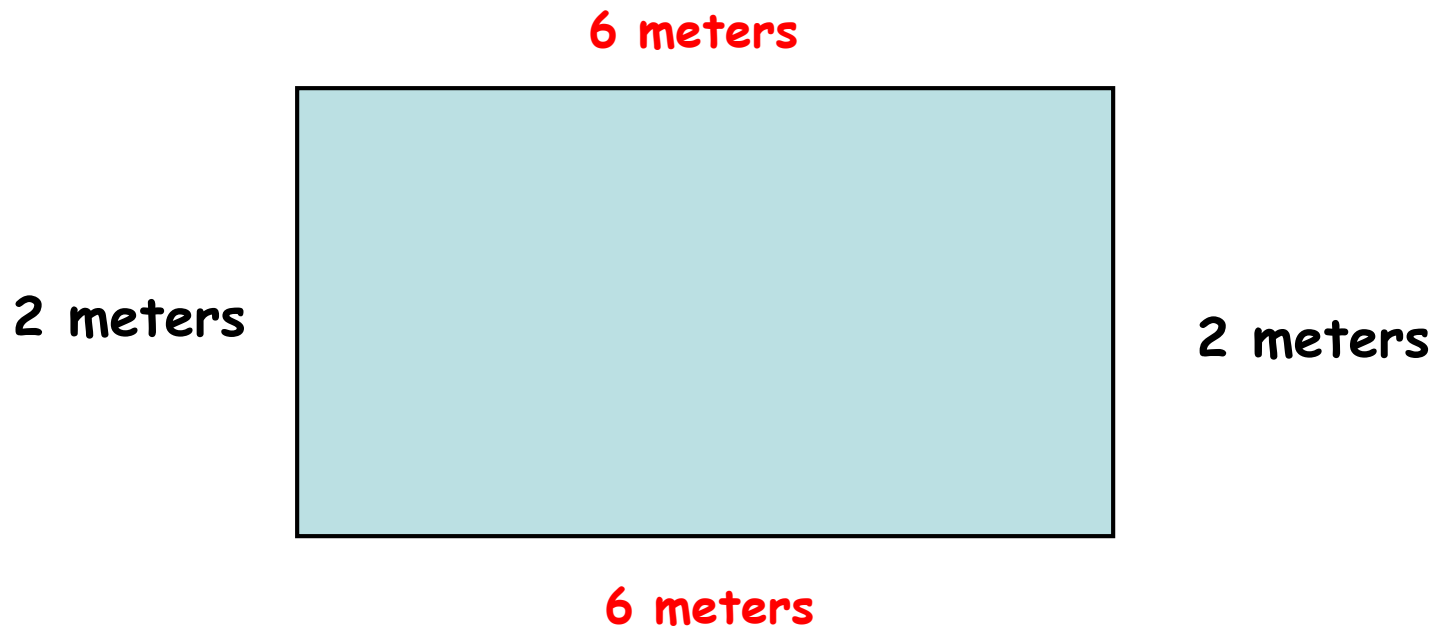
The **formula** for area is length x width.

What is the area of the rectangle?

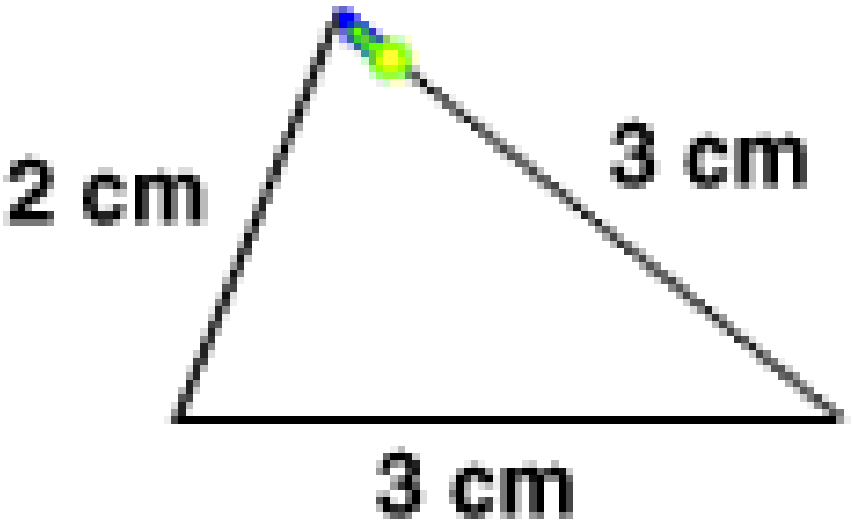
# Perimeter

- The distance around a figure

  2 + 6 + 2 + 6 = 16 meters



# Perimeter




- The distance around a figure

***Example:***

2 cm + 3 cm + 3 cm = 8 cm
The perimeter of this figure is 8 centimeters.

**Formula** – A rule that is written as an equation

Width
4

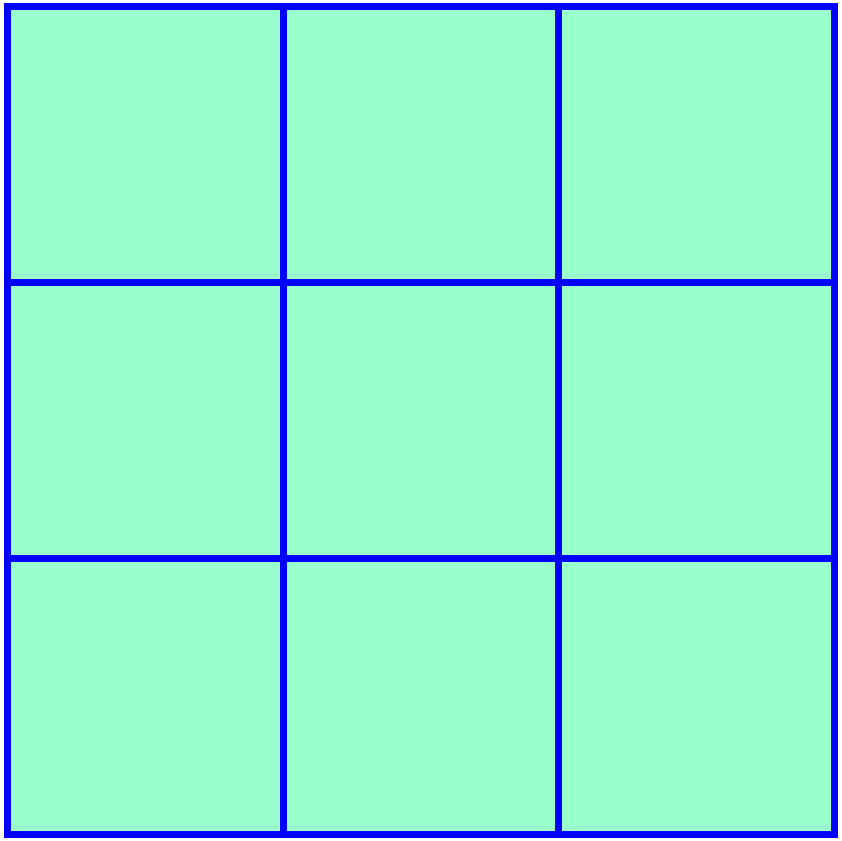
Length
2

To find the area of the rectangle, multiply the length by the width.

The **formula** for area is length x width.

What is the area of the rectangle?

# Area – Square Units



- The number of square units needed to cover a surface

***Example:***

The area is 9 square units.

**Formula** – A rule that is written as an equation

Width
4

Length
2

To find the area of the rectangle, multiply the length by the width.

The **formula** for area is length x width.

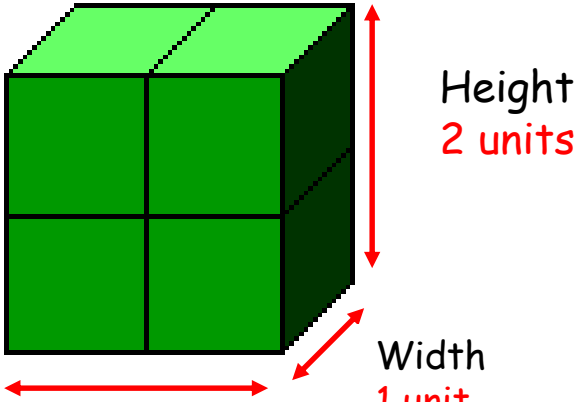
What is the area of the rectangle?

# Cubic Unit

– A unit such as a cubic centimeter or cubic inch used to measure volume

*Length x Width x Height*

2 x 1 x 2 = 4 units$^3$

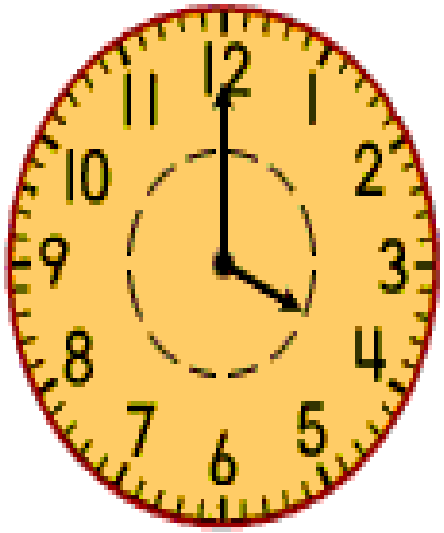



The volume of the block is 4 cubic units.

*To find volume, multiply length, width, and height.*

- ***Analog clock***
  - A device for measuring time by moving hands around a circle for showing hours, minutes, and sometimes seconds

  ***Example:***





**Digital clock**
A devise for measuring time by displaying digits in hours and minutes.

# Duration – Elapsed Time

- The amount of time that passes from the start of an activity to the end of that activity

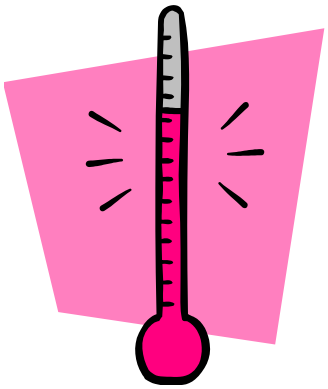
***Example:***
Franklin started school at 8:00 AM and left school at 2:00.

# A.M. P.M.

A.M. – the period from midnight to noon, esp. the period of daylight prior to noon

P.M. – the period between noon and midnight.

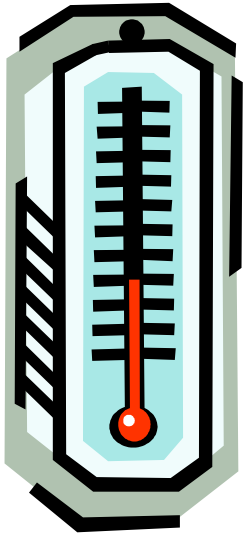
# Celsius – Metric measurement of temperature



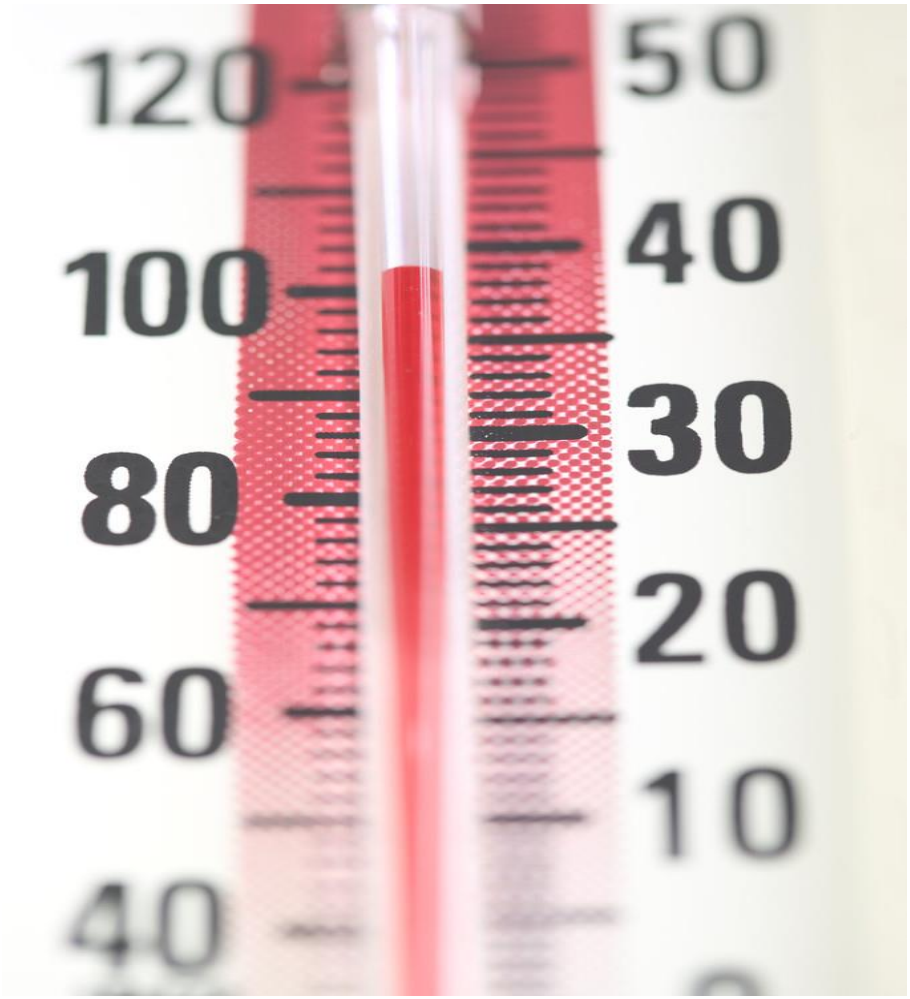
Water boils at 100°Celsius.
Water freezes at 0°Celsius.
Room temperature is 20°Celsius

The abbreviation for Celsius is °C.

Fahrenheit – customary unit of temperature

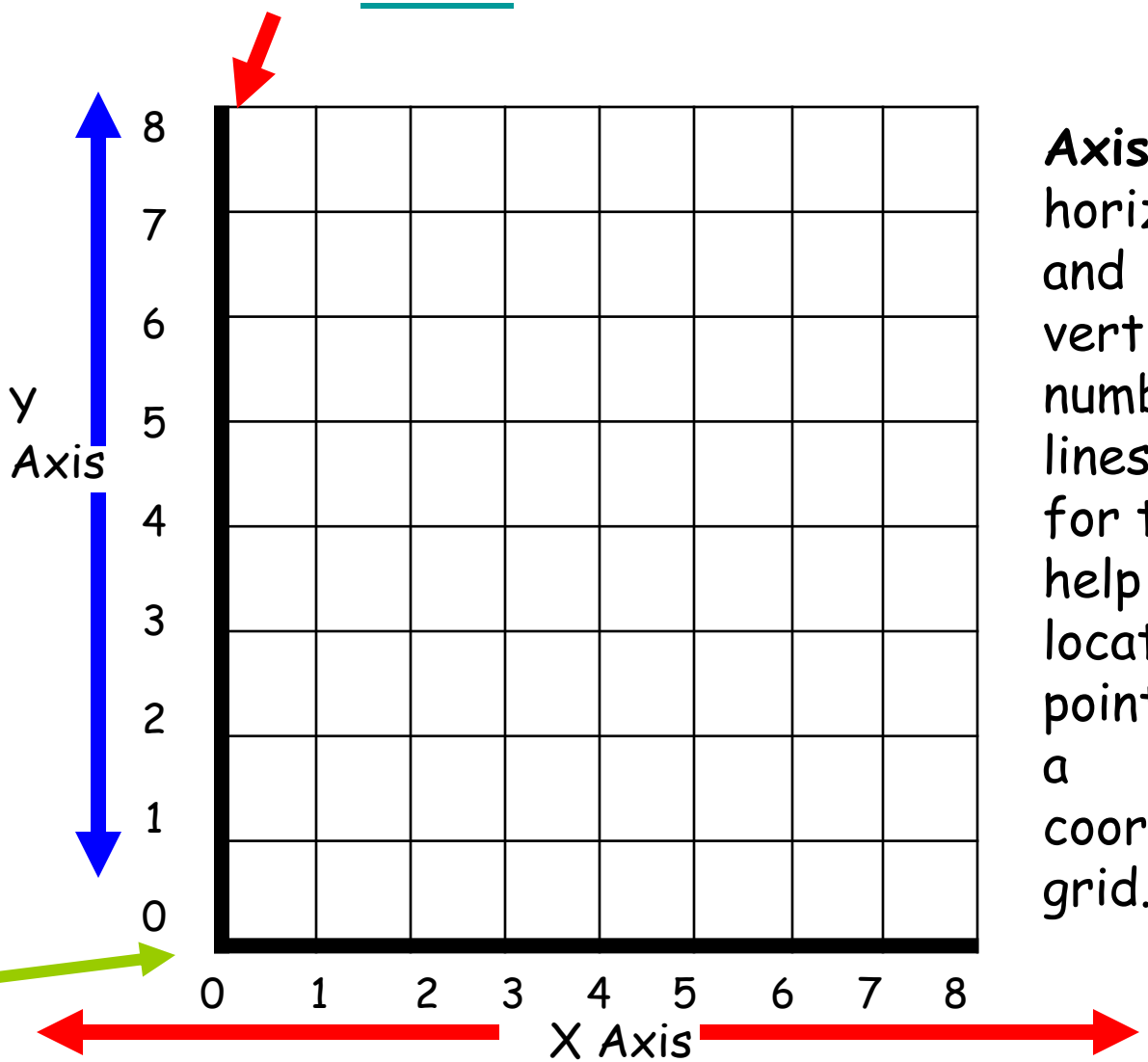


# Degrees




A unit division of a temperature scale.

**Coordinate Grid-** A plane formed by two intersecting and perpendicular number lines called axes

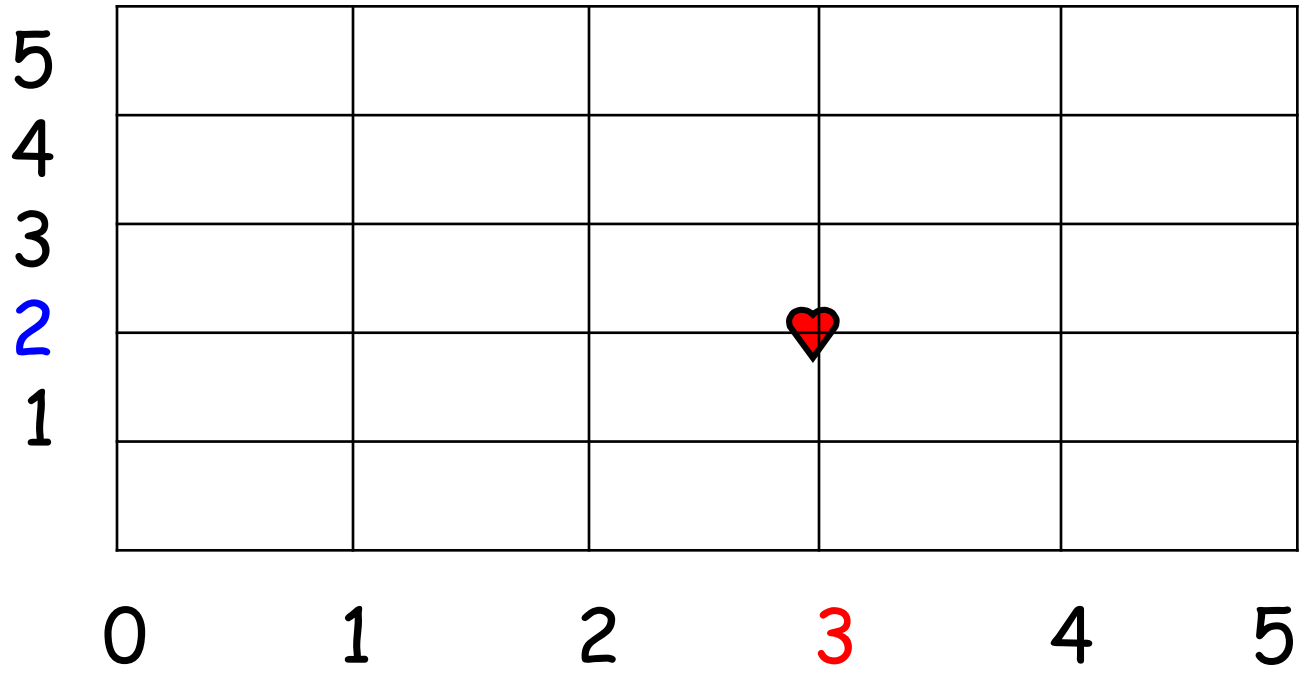



The point where the *x*-axis and the *y*-axis in the coordinate plane intersect,

Origin (0, 0)

**Axis** – horizontal and vertical number lines used for to help locate points on a coordinate grid.

**Ordered Pair** - A pair of numbers used to locate a point on a grid.




The location of the heart is (3,2).

# T- Chart

- A chart used to organize information.

| Pairs of Shoes | Number of Shoes |
|---|---|
| 1 | 2 |
| 2 | 4 |
| 3 | 6 |

# Table

Railroad Club Membership

| Year | Number of Members |
|---|---|
| 1997 | 20 |
| 1998 | 15 |
| 1999 | 17 |
| 2000 | 25 |

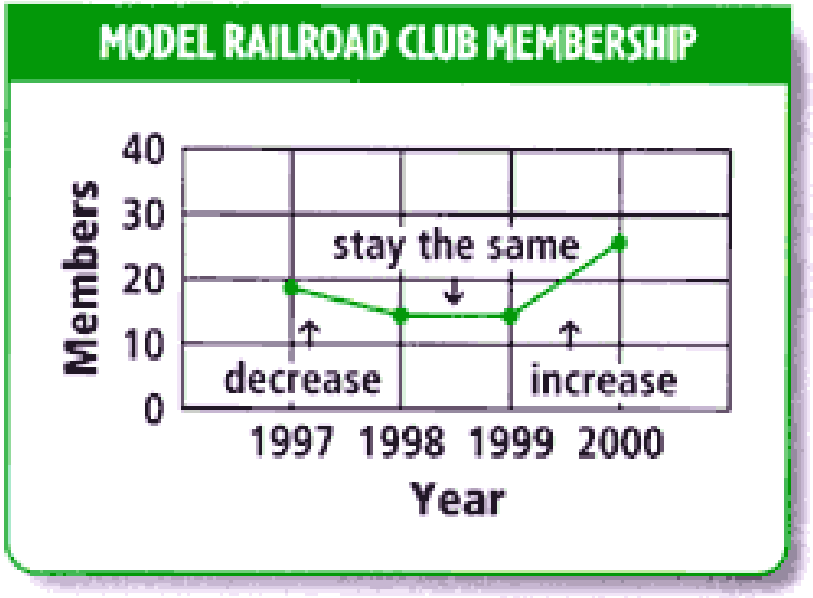
An orderly arrangement of data, especially one in which the data are arranged in columns and rows in an essentially rectangular form.

# Line graph

– a graph used to show change over time with points connected by line segments

**Trend** -On a graph, areas where the data increase, decrease, or stay the same over time

## Line Graph

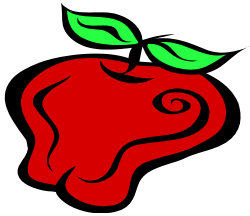


**Median** – The middle number when numbers are arranged from least to greatest

4, 8, 13, 19, 25

In this set of numbers, 13 is the median.

**Mode** – the number that appears most frequently in a set of numbers



Ages of the children in class

10, 10, 11, 10, 10, 12, 9, 11, 10,
10, 10, 11, 11, 10, 10, 11, 12, 11

What is the **mode**?

**Range** – the difference between the greatest and least numbers in a set of numbers

The range between 36 and 22 is 14.

$$\begin{array}{r} 36 \\ -22 \\ \hline 14 \end{array}$$

**Frequency** – The number of times a value occurs in a set of data

## Data Sheet

| Student Name | Number of Children in Home |
|---|---|
| Libby | 1 |
| Faith | 3 |
| Jacob | 3 |
| Chelsea | 2 |
| Margaret | 3 |

3 is the **frequency** of the number 3 in the datasheet.

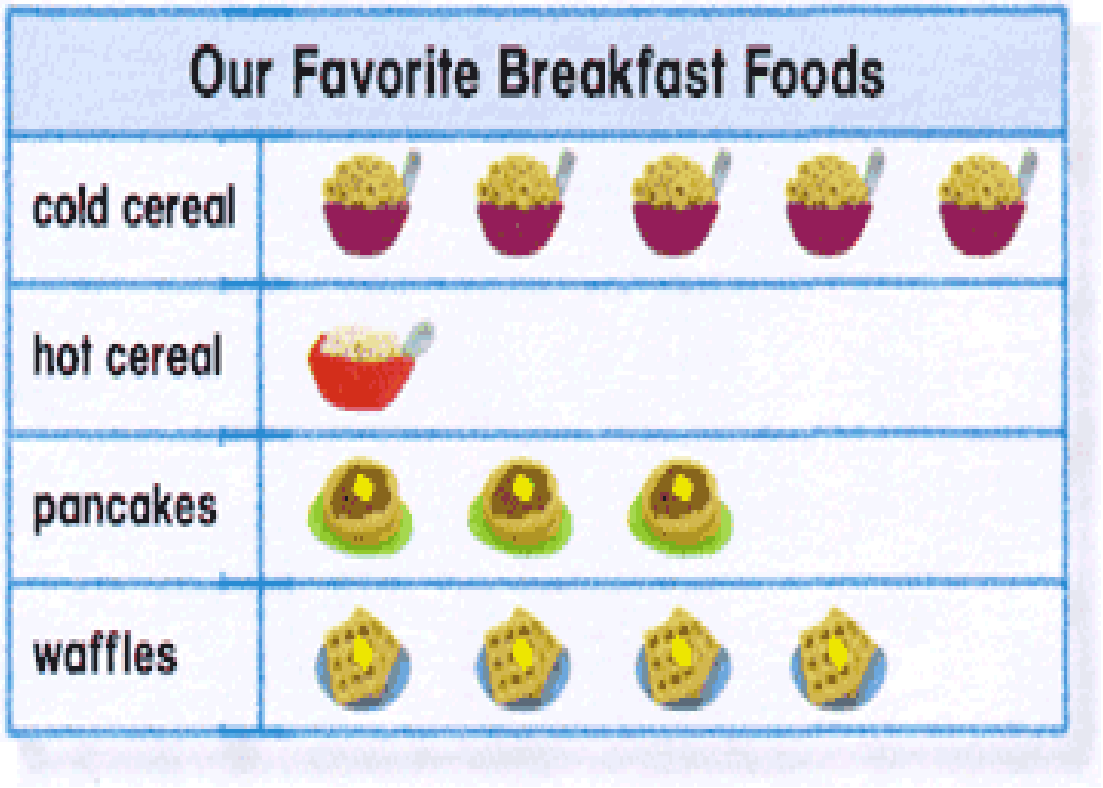
# Draw Conclusions

- If you draw a conclusion that something has happened, you do not see, hear, feel, smell, or taste the actual event.
- But from what you know, it makes sense to think that it has happened.

I could tell from the way the boy was holding the cone he would drop his ice cream.

# Generalize

To make a statement that usually is appropriate in most situations.

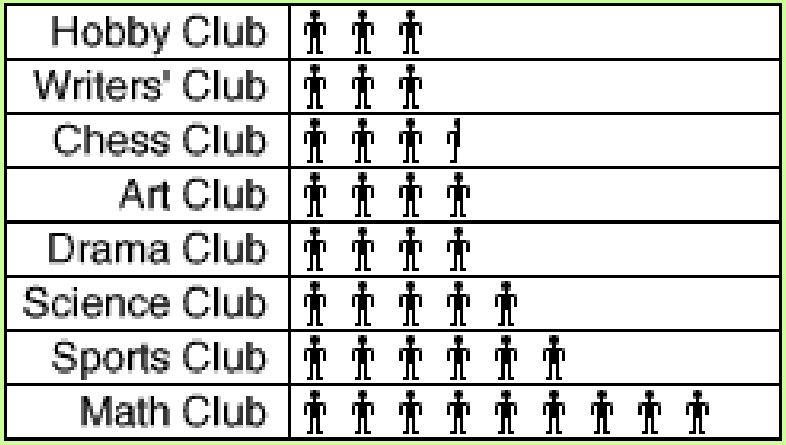



From the data, I could tell most kids in our class do not like hot cereal.

# Interpret

To explain the meaning of the information being asked for.

**AFTER-SCHOOL CLUB MEMBERSHIP**



| | |
|---|---|
| Hobby Club | 3 |
| Writers' Club | 3 |
| Chess Club | 3¼ |
| Art Club | 4 |
| Drama Club | 4 |
| Science Club | 5 |
| Sports Club | 6 |
| Math Club | 8 |

Key: Each stands for 4 members.

It seems that the Math Club is the most popular of the after-school clubs.

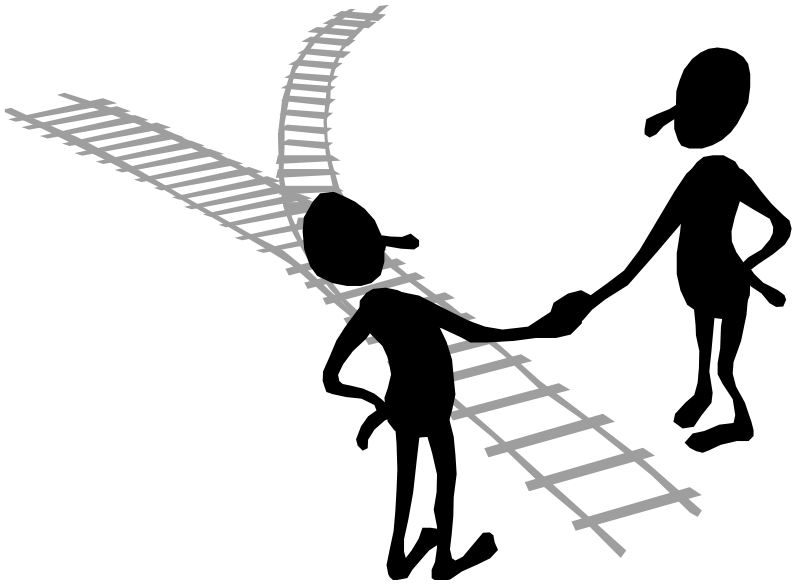
# Generalize

To make a statement that usually is appropriate in most situations.

**The desert is always dry.**

# Relationship

The situation or fact of being related; connected or associated.

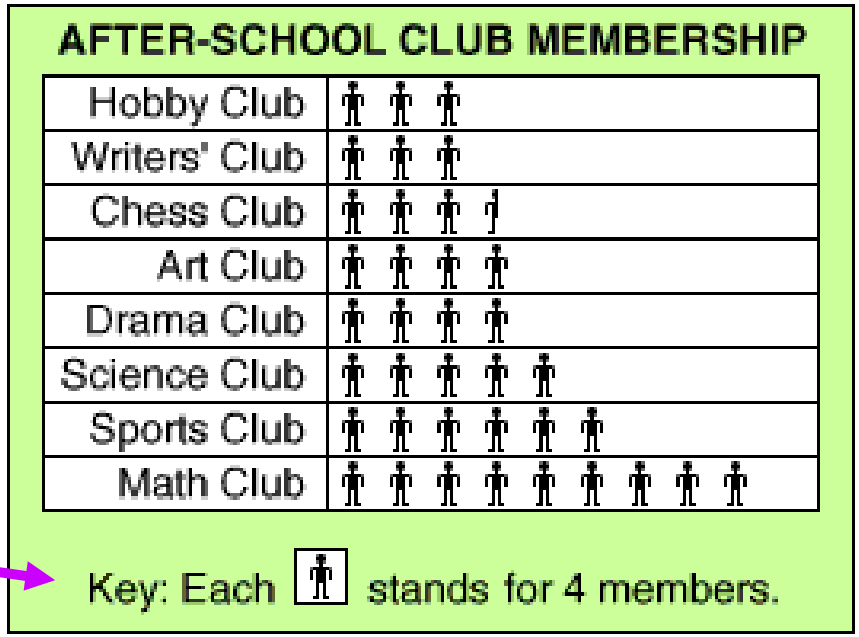


**Data**

– Information collected about people or things

# Key

- An explanation of a symbol.



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**Railroad Club Membership**

| Year | Number of Members |
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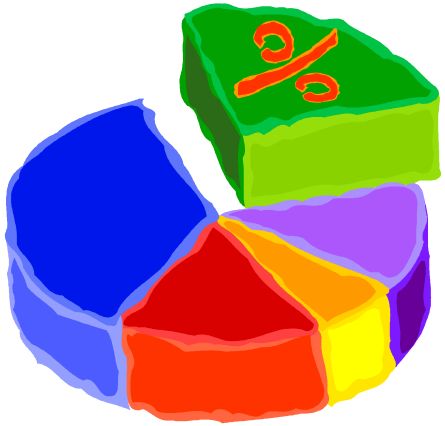
An orderly arrangement of data, especially one in which the data are arranged in columns and rows in an essentially rectangular form.

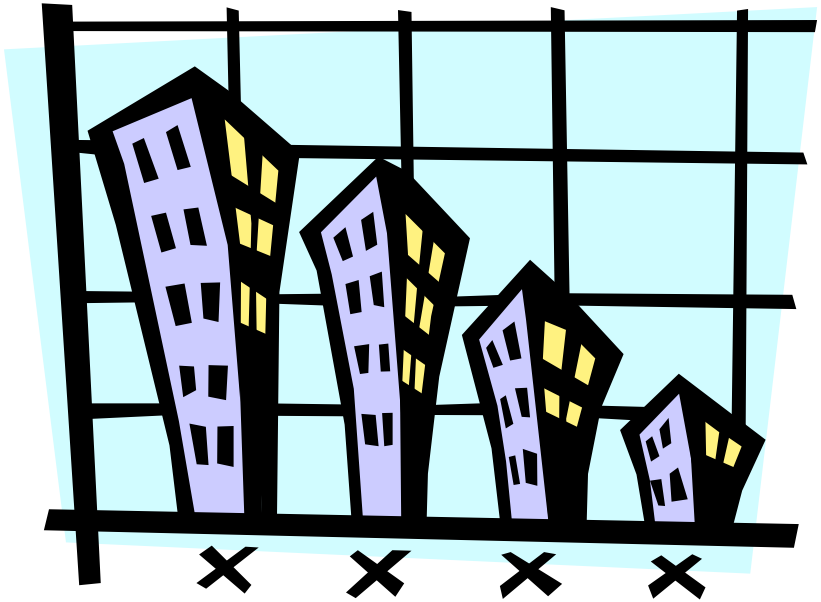
# Graphs

– A picture of data or information you have collected


Line Graph




Pie Graph

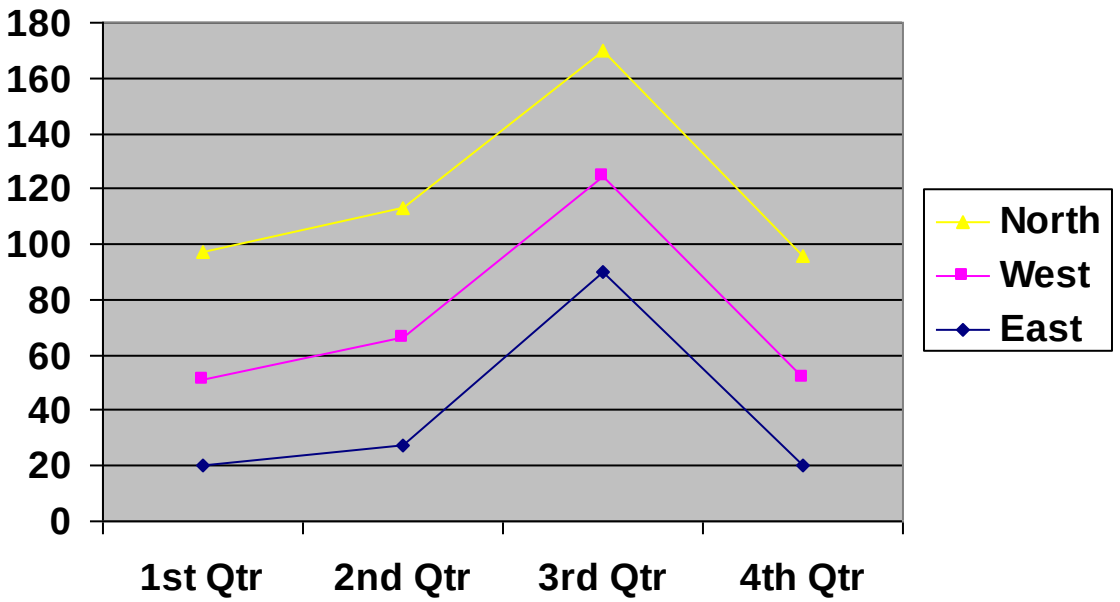


Bar Graph

# Line graph

- a graph used to show change over time with points connected by line segments

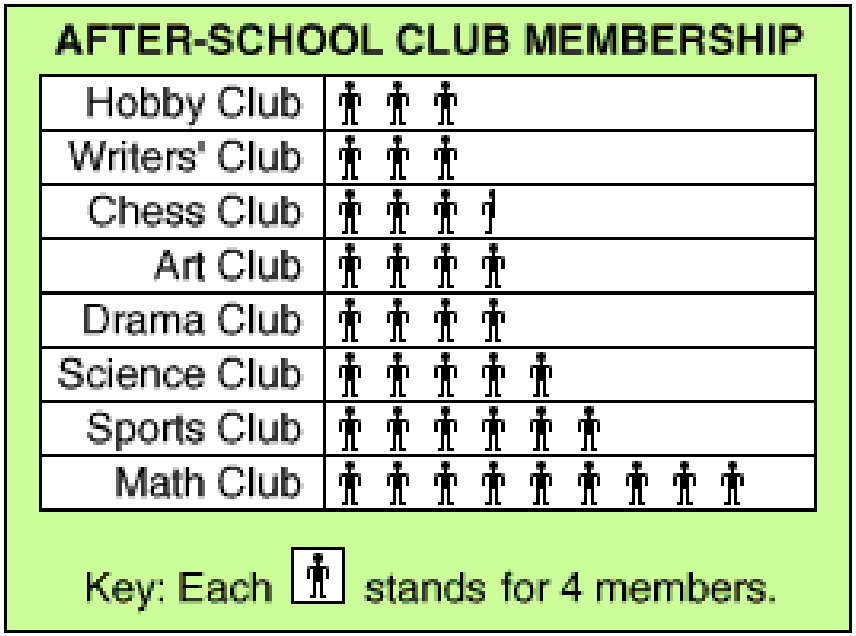
## Line Graph



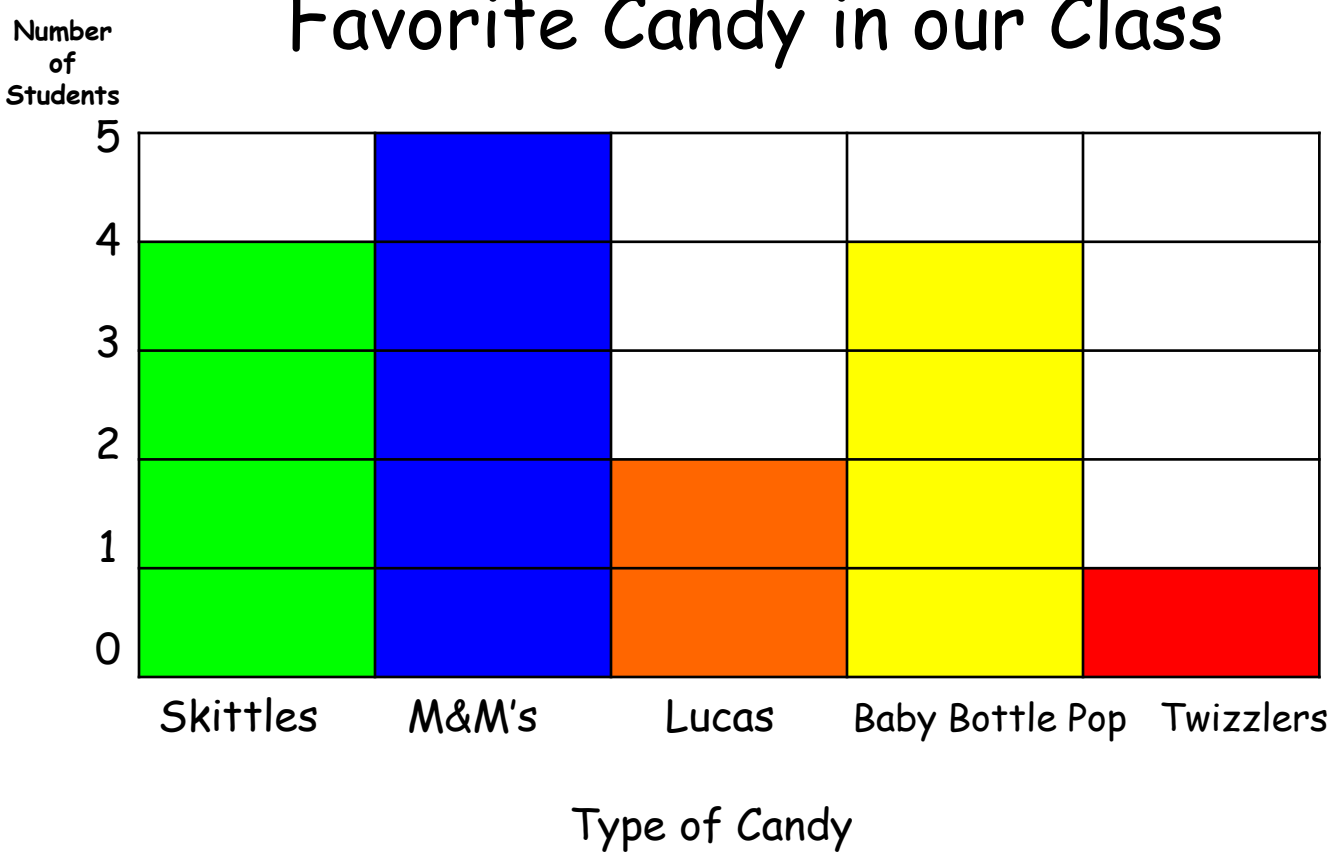
# Pictograph

- **pictograph**
- A graph that displays countable data with symbols or pictures

***Example:***



# Bar Graph – A way to show information that uses bars to represent data

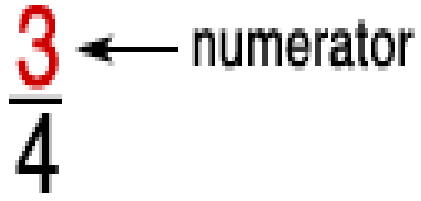


# Numerator Denominator

**Numerator**- The number above the bar

in a fraction that tells how many equal

parts of the whole are being considered.

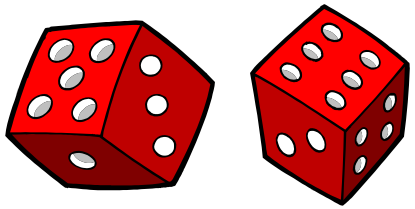


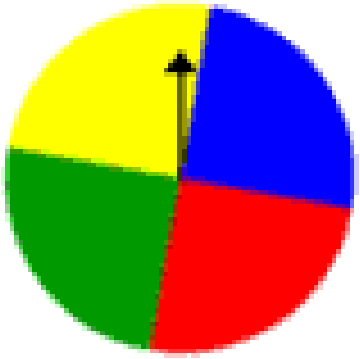


**Denominator-** The number below the bar in a fraction that tells how many equal parts are in the whole

Event - An activity that takes place


**Probability** - The chance a given event will occur.





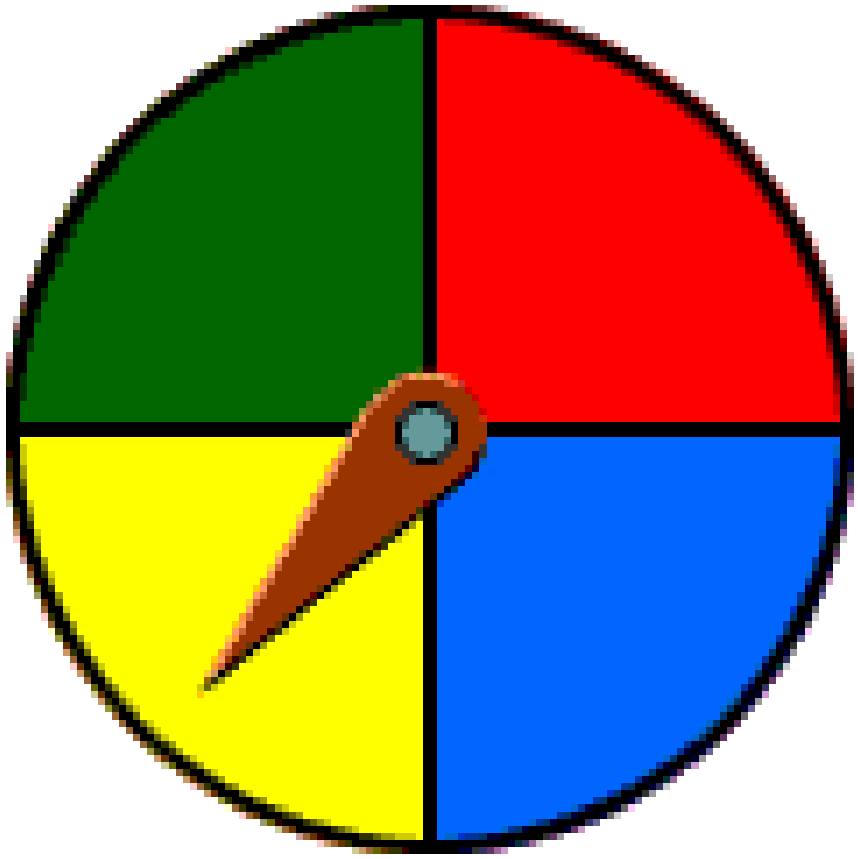
# Probability

- **probability**
  - The likelihood that an event will happen

$$\text{Probability of an event} = \frac{\text{number of favorable outcomes}}{\text{total number of possible outcomes}}$$

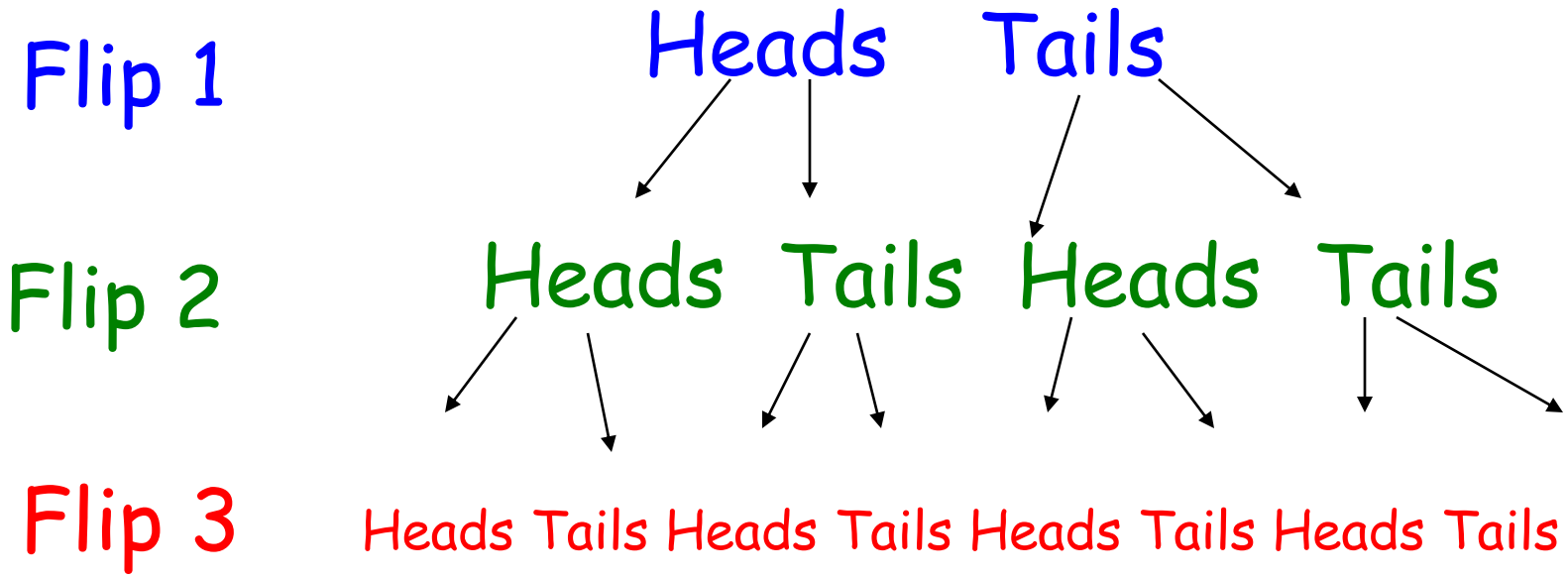
***Example:***

Probability of red = $\frac{1}{4}$



**Outcomes** – possible results of an experiment


If you flip a coin three times, your possible outcomes would be…


Flip 1
Heads
Tails
Flip 2
Heads
Tails
Heads
Tails
Flip 3
Heads Tails Heads Tails Heads Tails Heads Tails

**Favorable outcome** – In probability, the outcome you are interested in measuring. It is not necessarily the most likely outcome.

The lady had a 1 out of a million chance of winning the lottery. Her favorable outcome was small.

# Tree Diagram

- **tree diagram**
- An organized list that shows all possible outcomes for an event

***Example:***


So, there are 6 possible outcomes.

**Data** – Information collected about people or things

# Data Sheet

## *Favorite Candy in our Class*

| Student Name | Skittles | M&Ms | Lucas | Baby Bottle pop | Twizzlers |
|---|---|---|---|---|---|
| Jason | | | | x | |
| Alex | | | x | | |
| Lucero | | | | x | |
| Maykel | x | | | | |
| Aaron | | | | | x |
| Zihurabet | x | | | | |
| Ashely | | x | | | |
| Jeimy | | x | | | |
| Syliva | | | x | | |
| Juana | | | | x | |
| Ovidio | | x | | | |
| Jessica | | | | | |
| Hugo | x | | | | |
| Anna | | x | | | |
| Willie | x | | | | |
| Andrea | | x | | | |
| Libby | | | | x | |

**Survey** - The process of asking a group of people the same question

***Getting to Know You Survey***

1**What is your favorite color?**

2**How old are you?**

3**What is your lucky number?**

4**What is your favorite subject?**

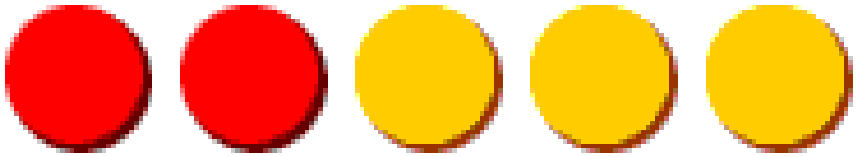
**Predict** – to state what one believes will happen with the information given

**Possible** - A given event might, could occur

It is possible that it might rain this week.

# More Likely

- The likelihood that an event will occur more often than it will not occur.

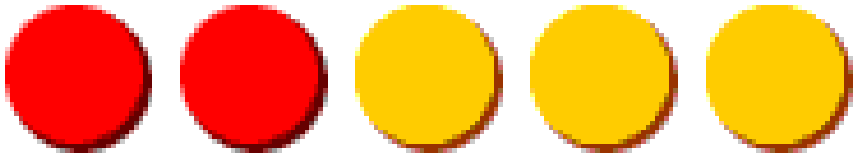


- Example:
  - It is more likely to select a yellow counter than a red counter.

# Least Likely

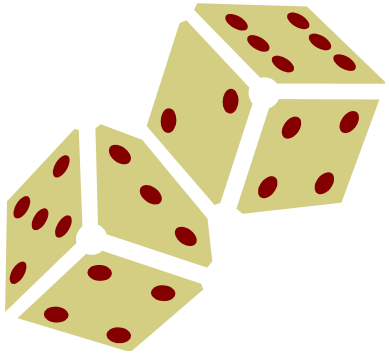
- The likelihood that an event will not occur as often.

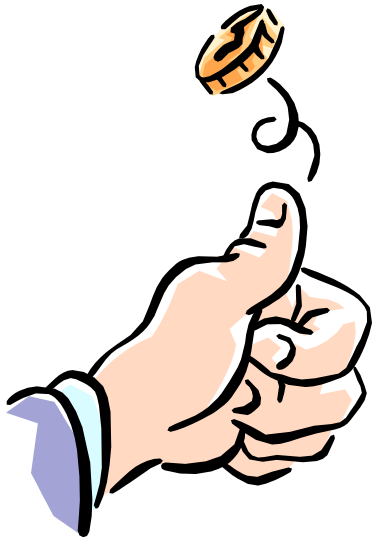
- Example:
  - The chances of selecting a red counter are less likely than selecting a yellow counter.



# Fairness

- When one outcome is not more likely to happen than another



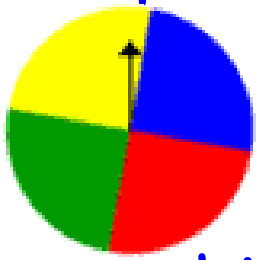


# Equally Likely

– When the outcomes of an experiment have the same chance of happening


Heads Tails

When you flip a coin, it is equally likely that it will land on heads or tails.

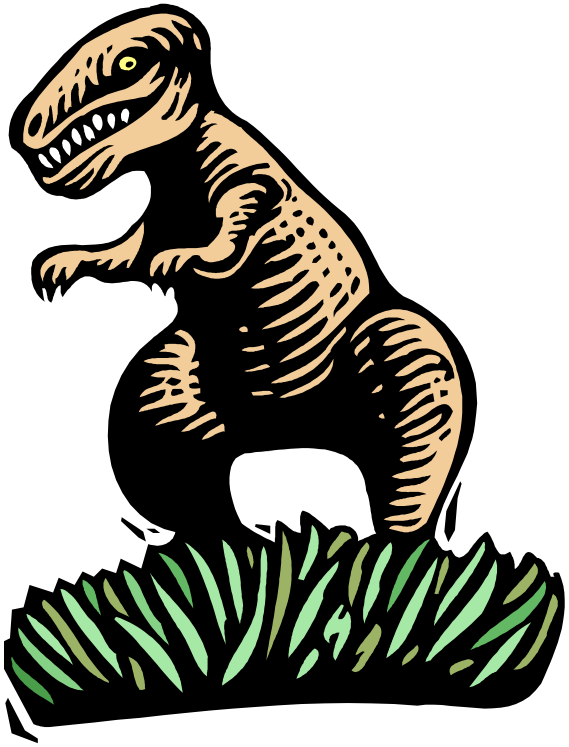


When you spin the arrow on this spinner, it is equally likely that the arrow will land on yellow, blue, red, or green.

# Certainty – A given event will occur

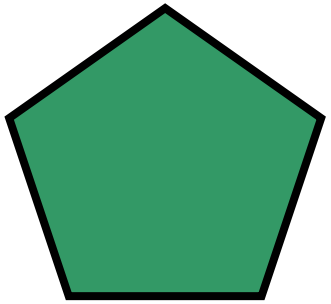
If you throw a ball into the air, it will come back down.

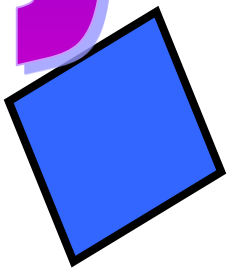
**Impossible** – Certainty that a given event will not happen

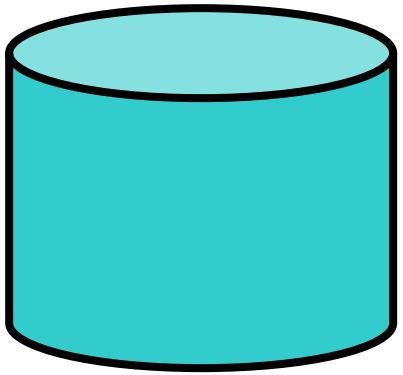


A dinosaur will not walk through the door of our classroom.

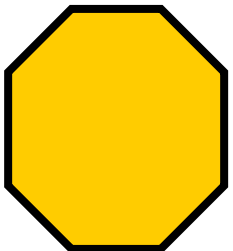
# Geometry

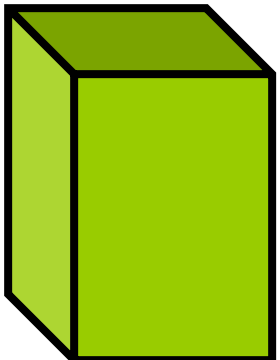


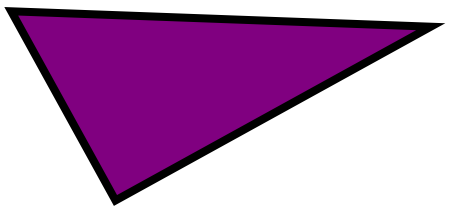




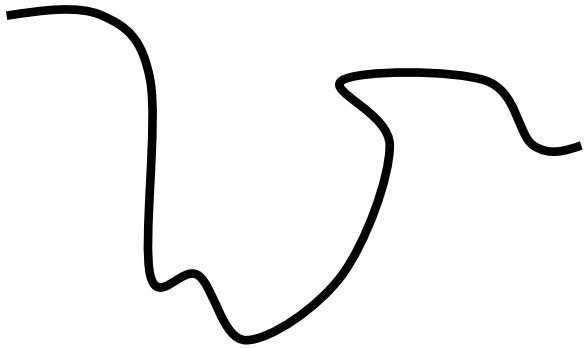
The strand of math that deals with measurement and comparing figures, both plane and solid .



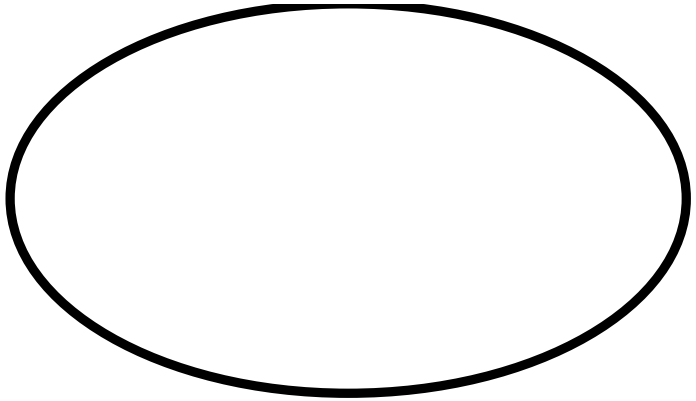




Open Figure



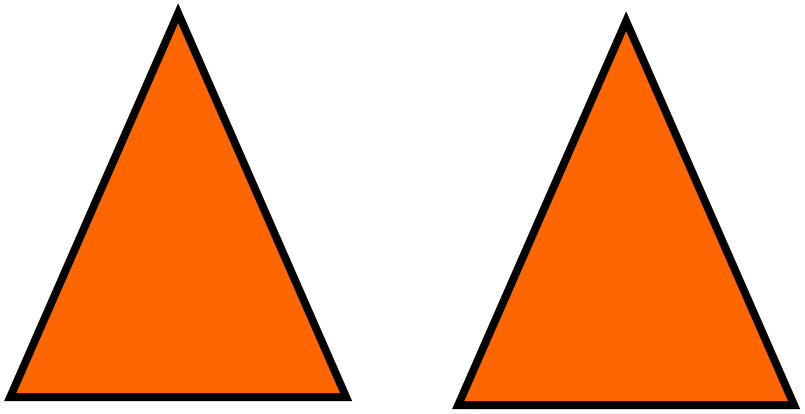
Closed Figure



# Attributes

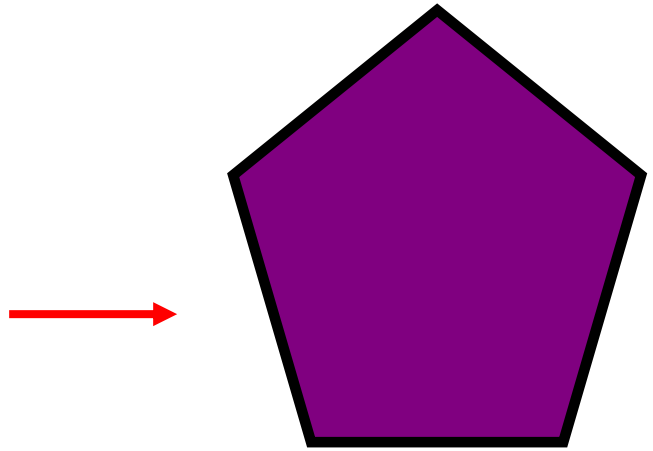
A quality that is characteristic of someone or something.

**Congruent** – figures that have exactly the same size and same shape

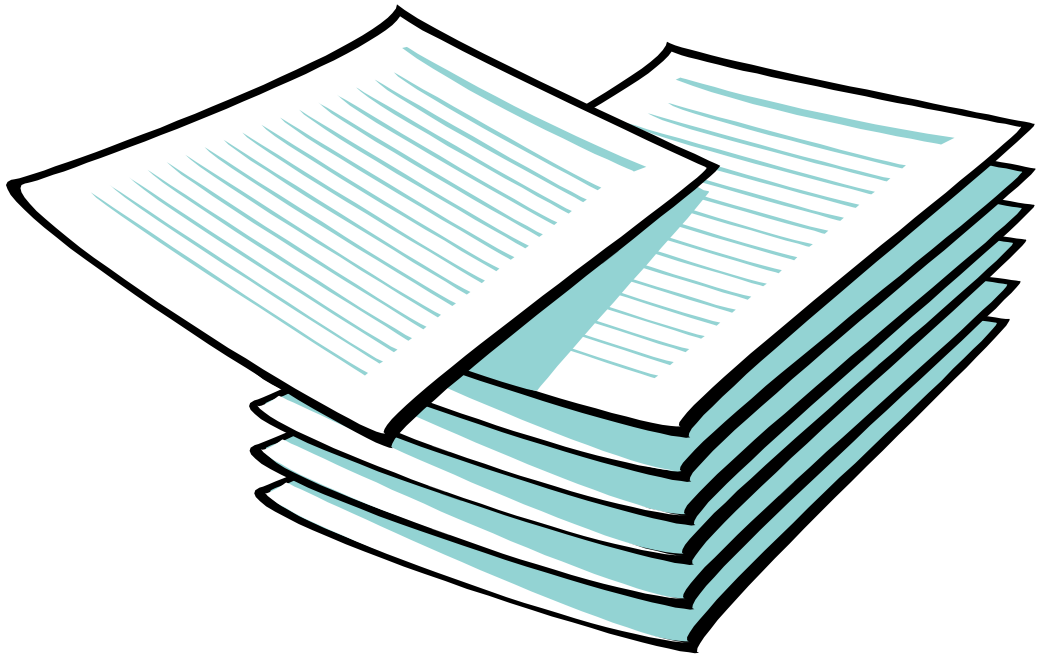


**Side** - any of the line segments that form a polygon

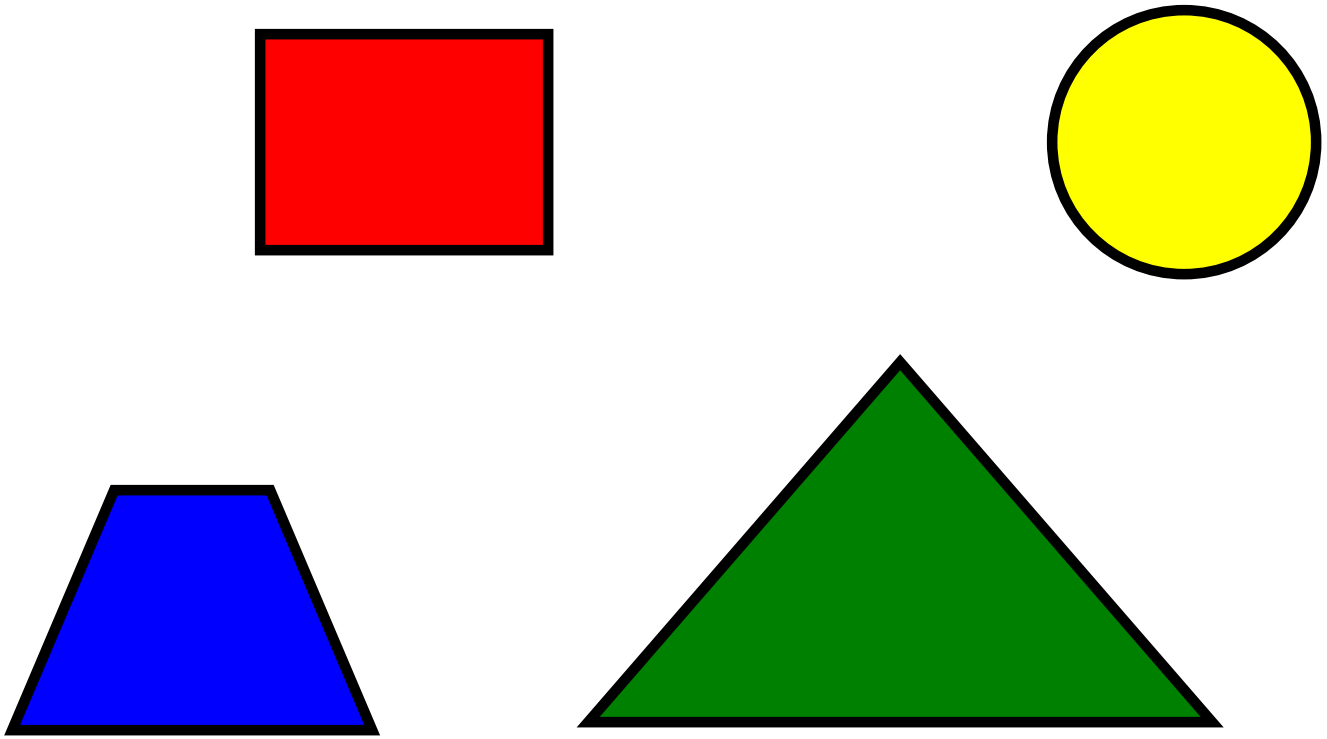
Side



**Plane** - A flat surface that goes on forever in all directions

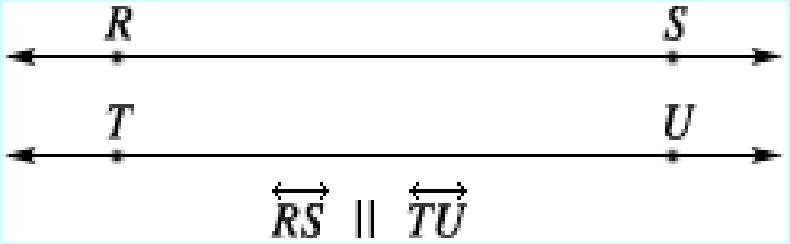


**Plane Figure** - Any two-dimensional figure



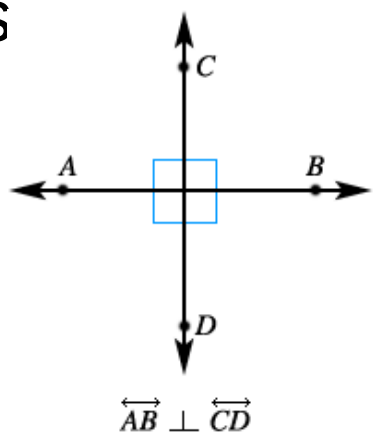
# Lines

- **Parallel lines**
- Lines in a plane that never intersect (cross)
  *Example:*




**Perpendicular lines**
Two lines that intersect (cross) to form four right angles

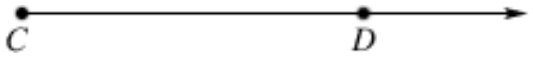
*Example:*



# Ray

- A part of a line, with one endpoint, that continues without end in one direction

***Example:***



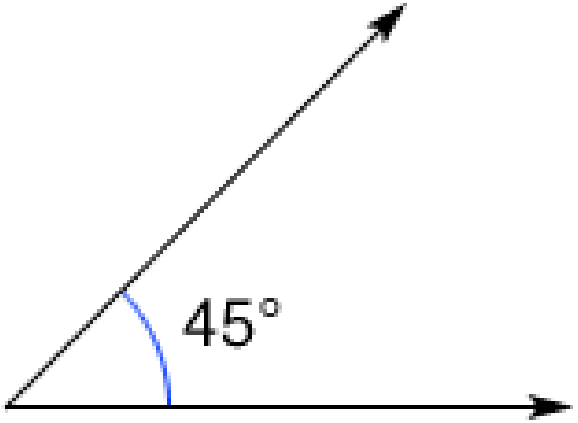

ray *CD*

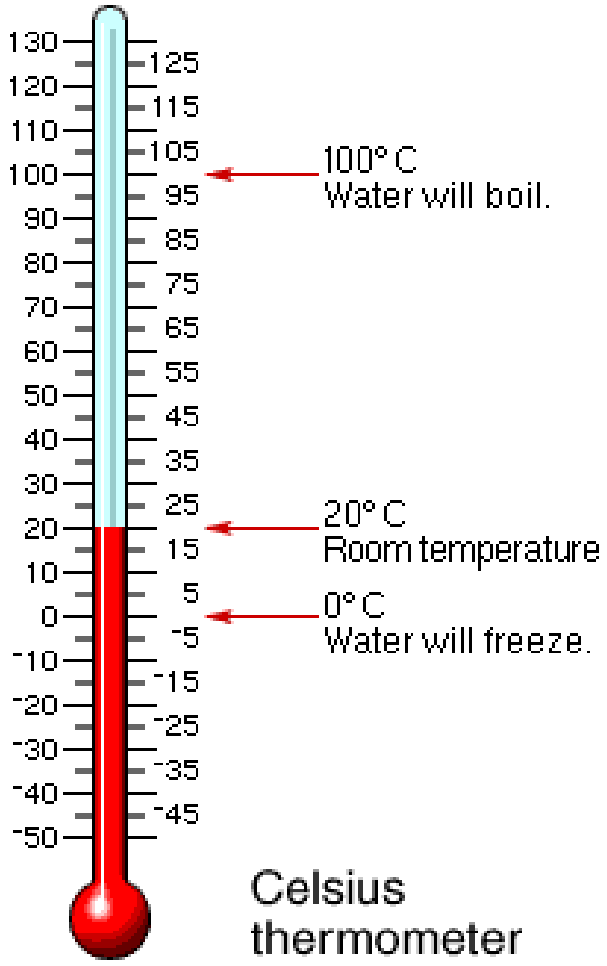
# Degrees

**Degree (°)**

- A unit for measuring angles and temperature

***Example:***



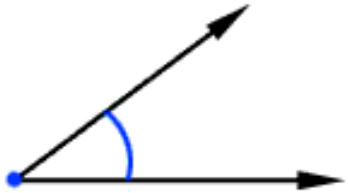



# Angles A figure formed by two rays that have a common endpoint

**Acute angle**

An angle that has a measure less than a right angle (less than 90°)

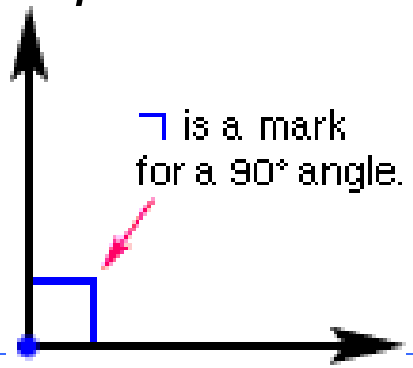
E*xample:*



**Right angle**

An angle formed by perpendicular lines, line segments, or rays and with a measure of 90°

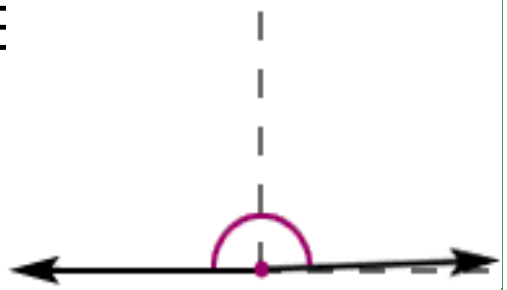
*Example:*



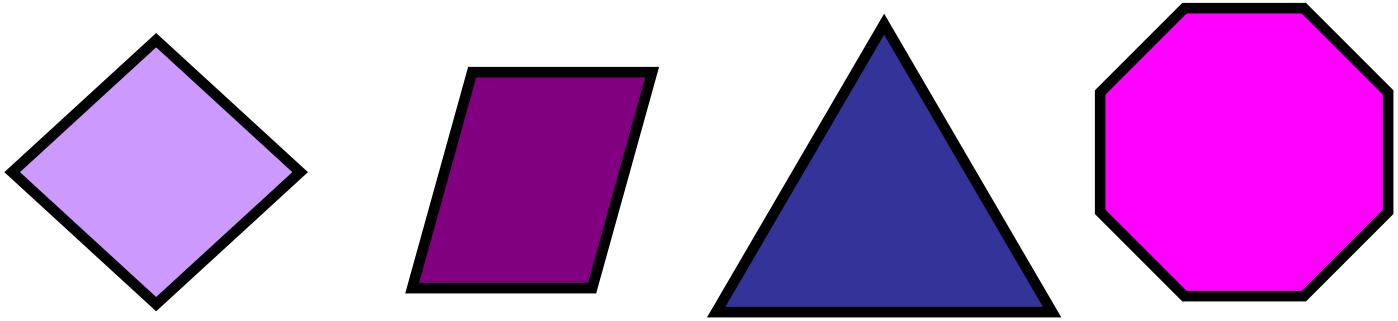

**Obtuse angle**

An angle whose measure is greater than 90° and less than 180°

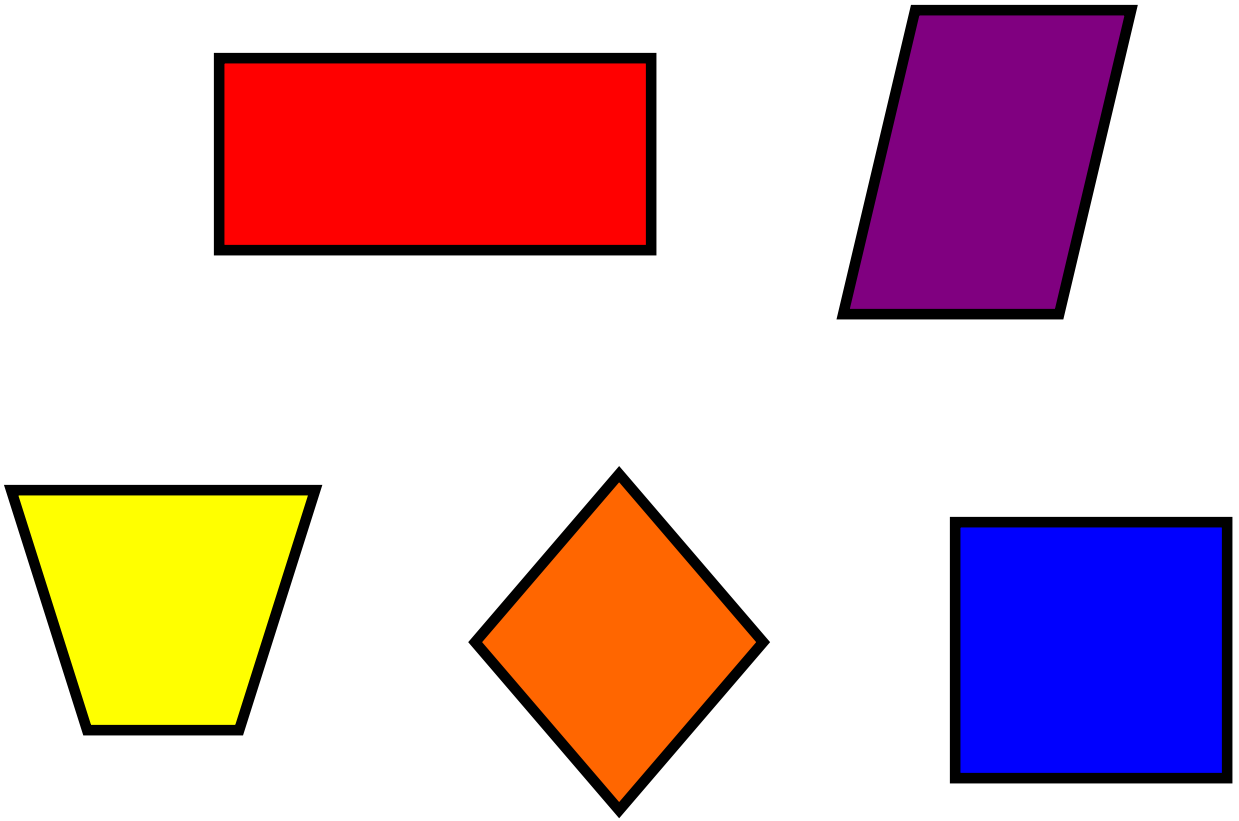
*E*



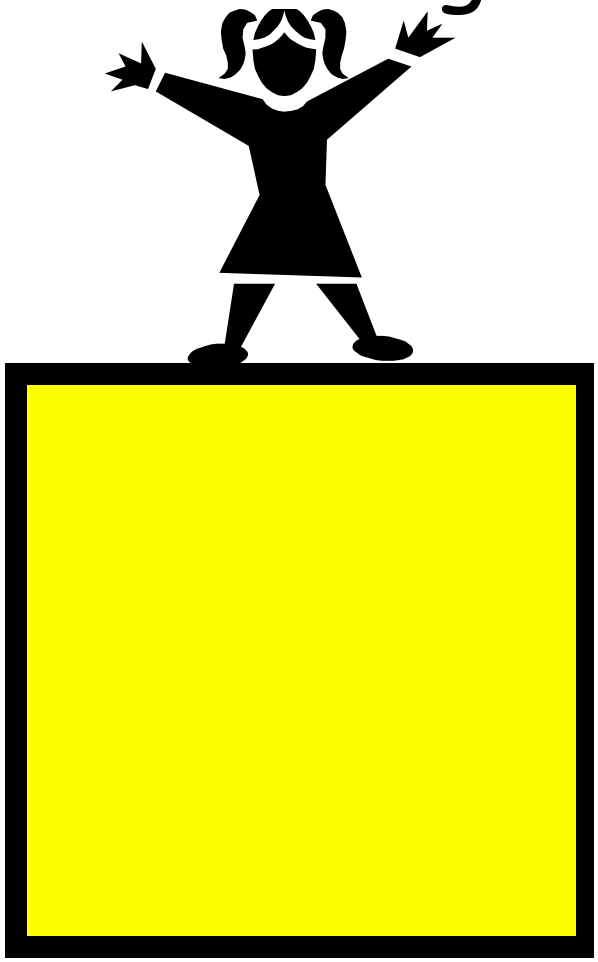
**Polygon** – a closed plane figure with straight sides



# Quadrilateral - a four sided polygon

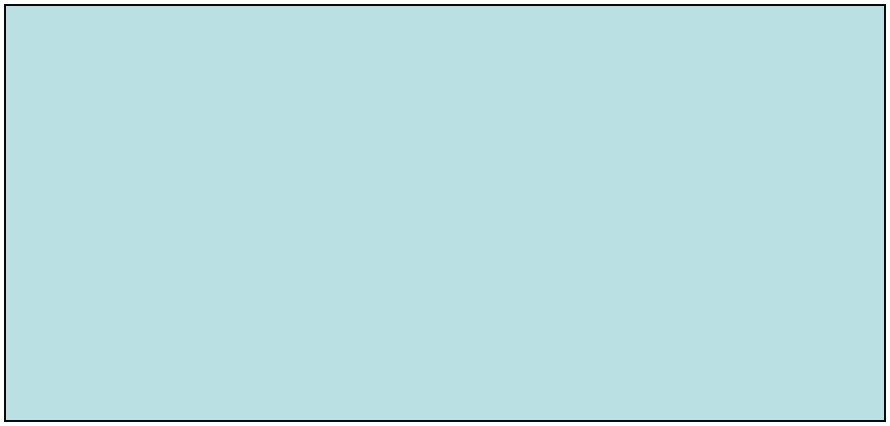


**Square** - A plane figure with four sides that are the same length and four right angles

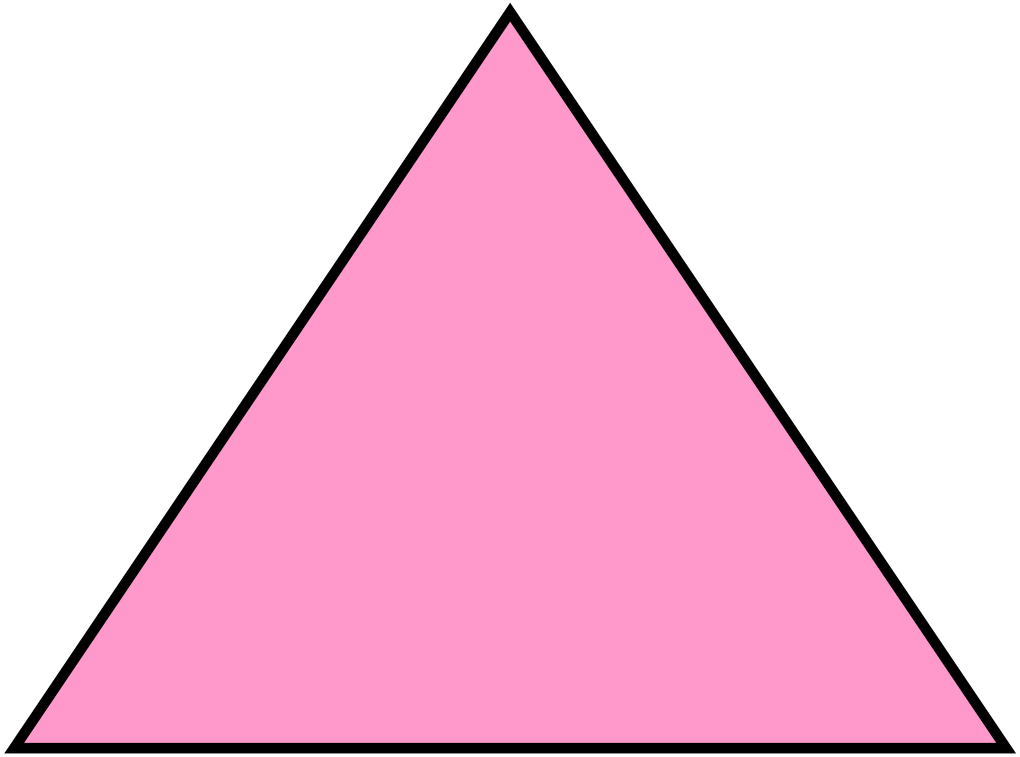


# Rectangle

- A parallelogram with four right angles

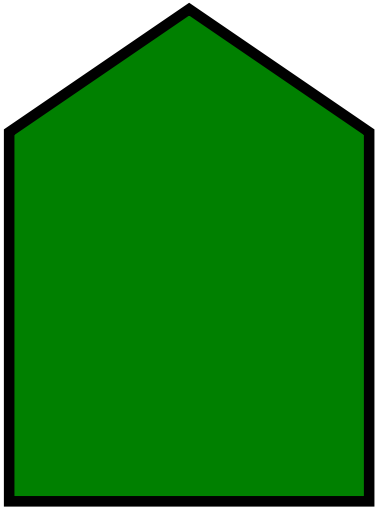


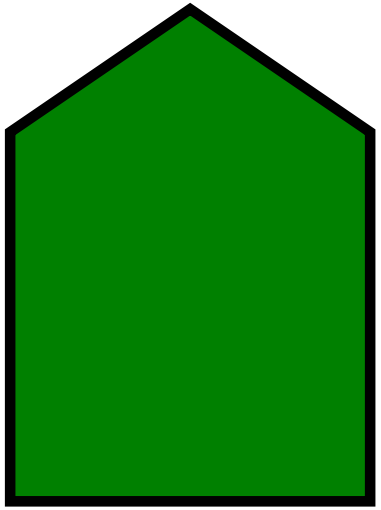
**Triangle** – A plane figure with three straight sides



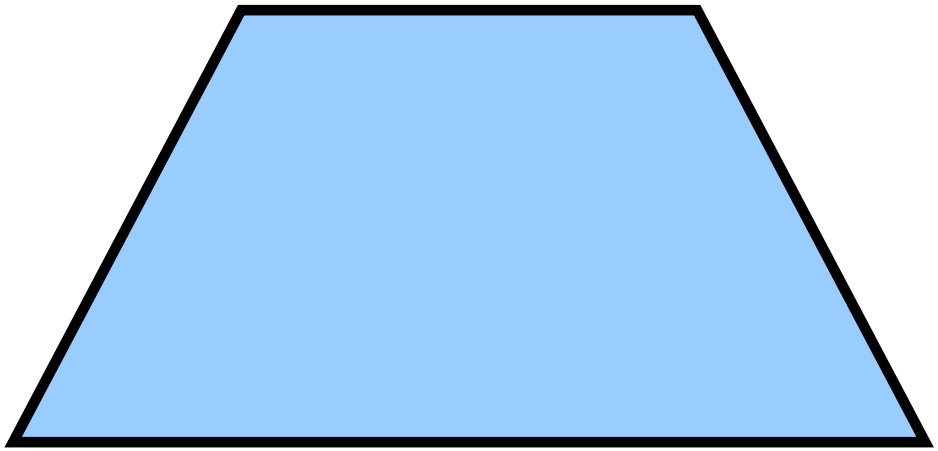
# Pentagon

- a five-sided polygon

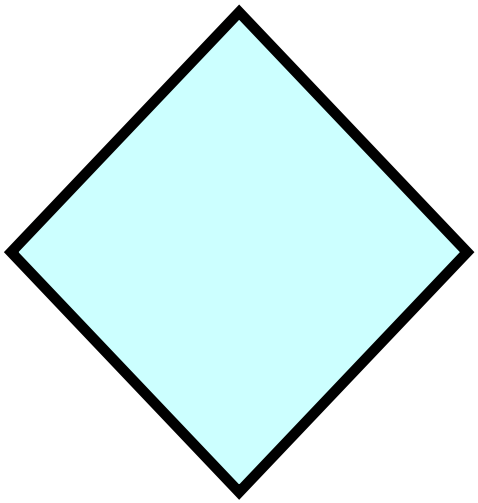




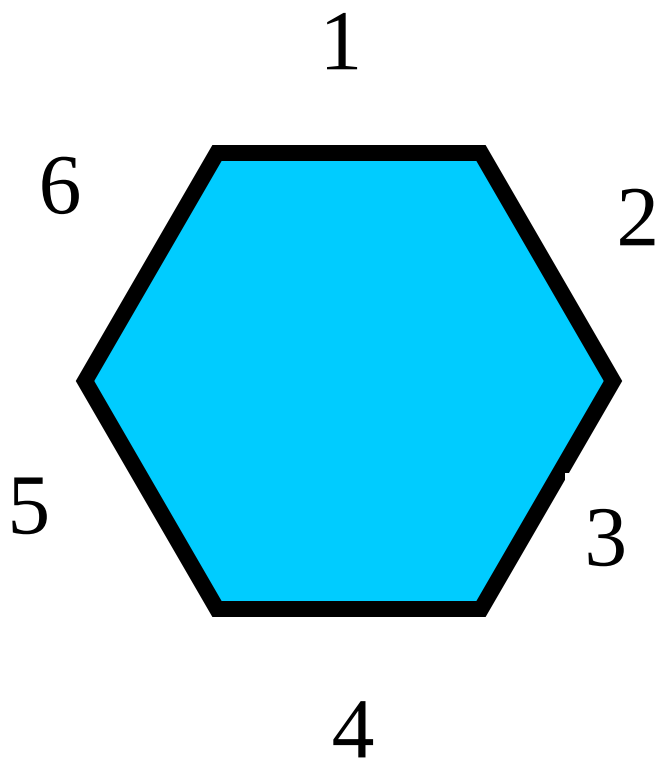
**Trapezoid** - a quadrilateral with only one pair of parallel sides



**Rhombus** – a parallelogram whose four sides are congruent and opposite angles are congruent

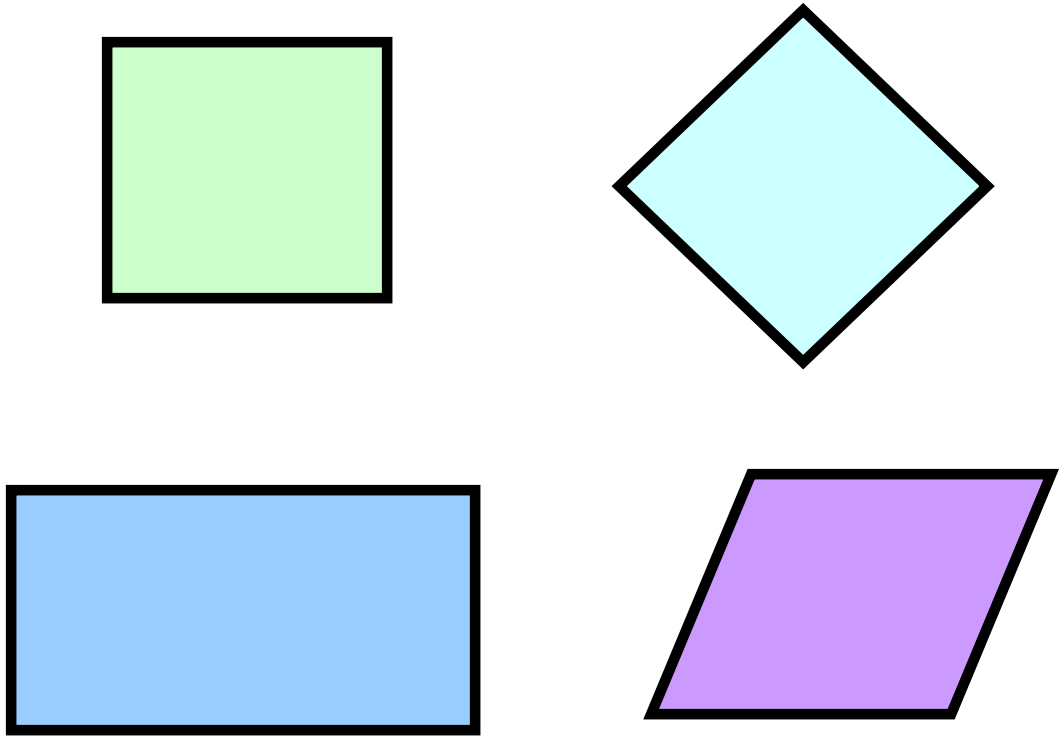


Hexagon – a six sided polygon

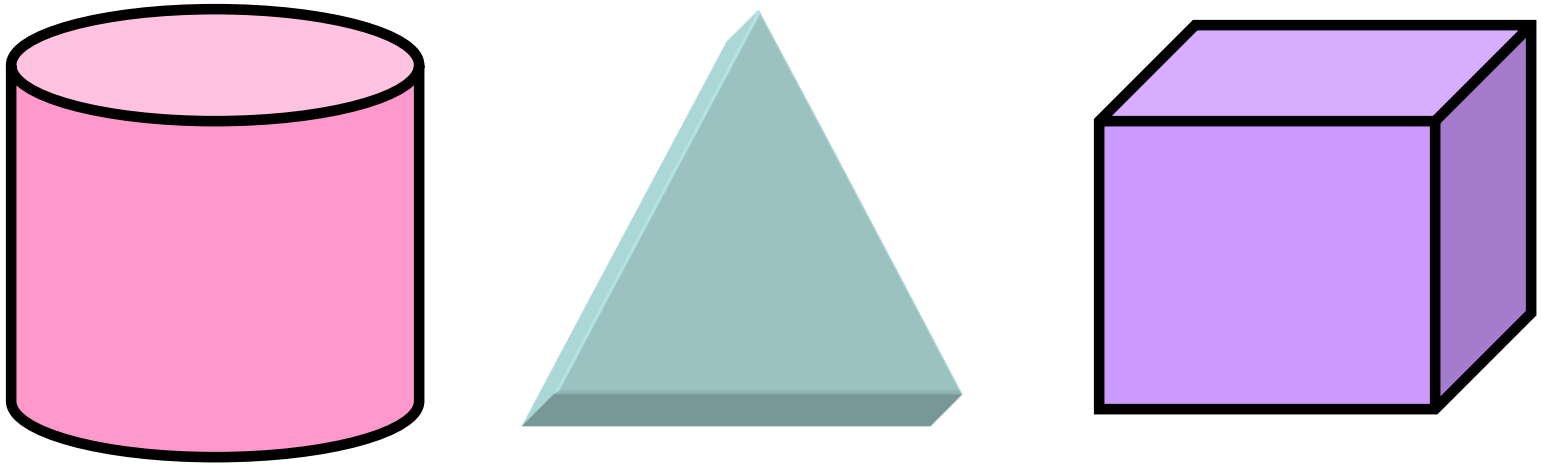


Octagon – An eight-sided polygon

**Parallelogram** - any four sided polygon with two pairs of parallel lines



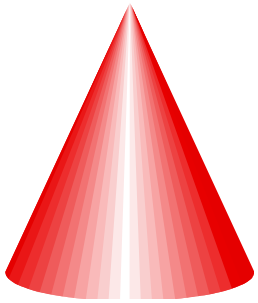
**Solid figure** - A figure with 3 dimensions; not flat

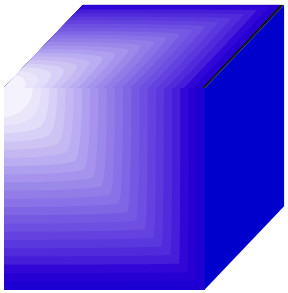


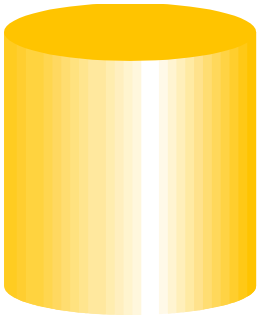
# Three Dimensional

- having length, width, height, and volume

# Three-Dimensional Figures

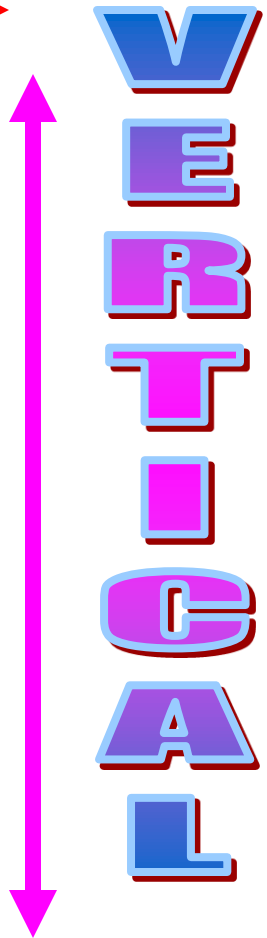




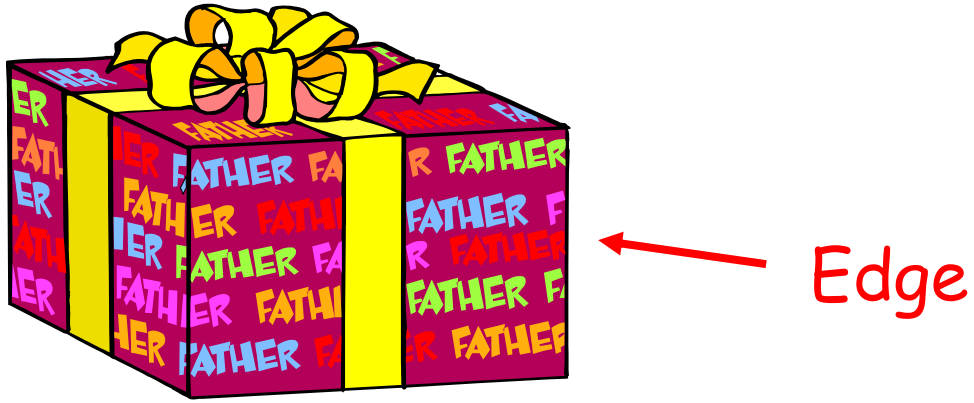


**Horizontal** – the direction from left to right

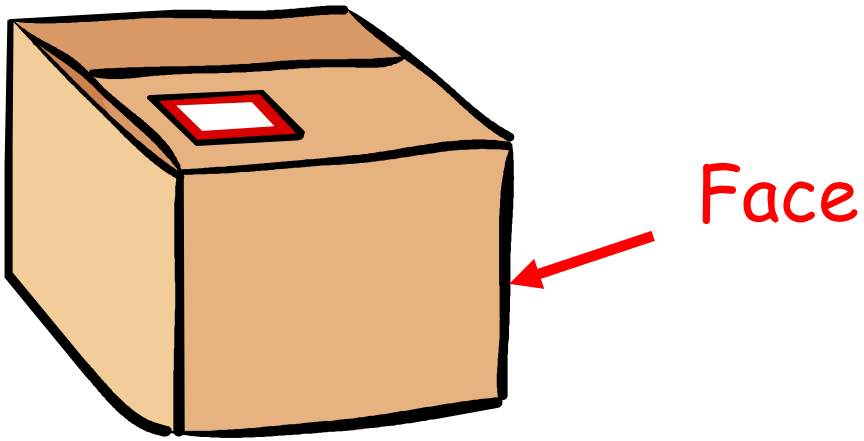

**Vertical** – The direction from top to bottom



**Edge** – A place where two or more sides meet on a geometric solid

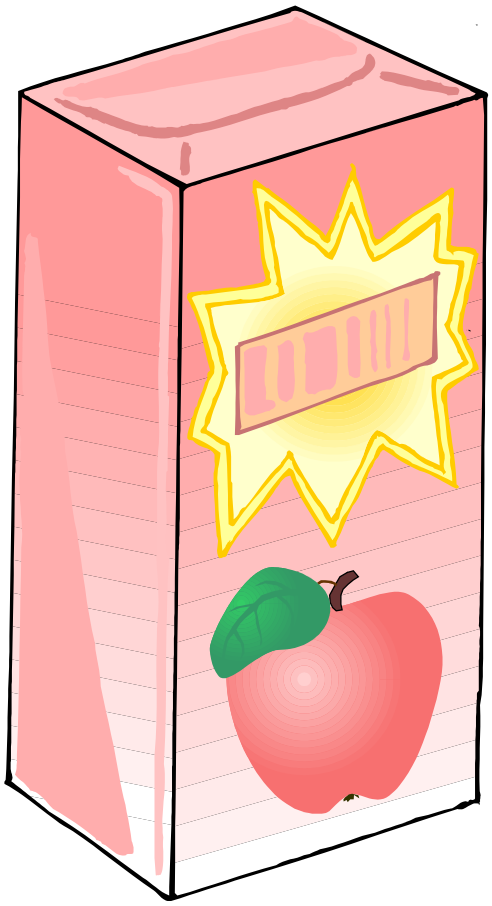


**Face** - A flat side on a geometric solid

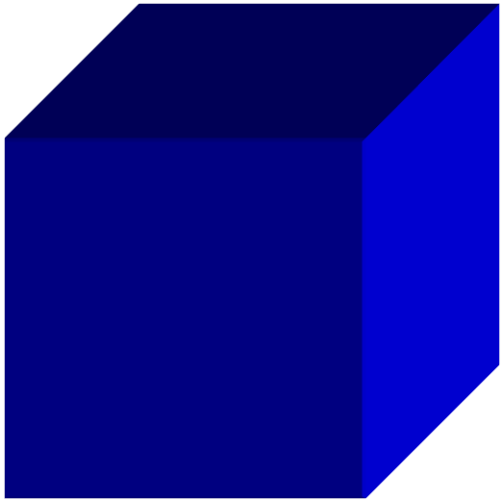


**Vertex** - a corner; a place where three or more sides meet in a geometric solid

# Vertices - more than one corner

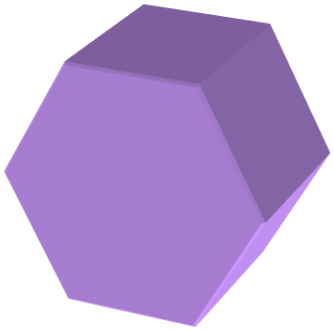


Cube – A solid figure with six congruent square faces



**Prism** - A 3-dimensional figure that has two congruent and parallel faces that are polygons. The rest of the faces are parallelograms

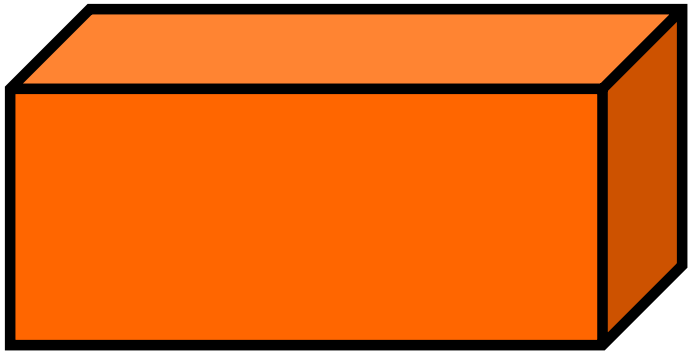
rectangular prism



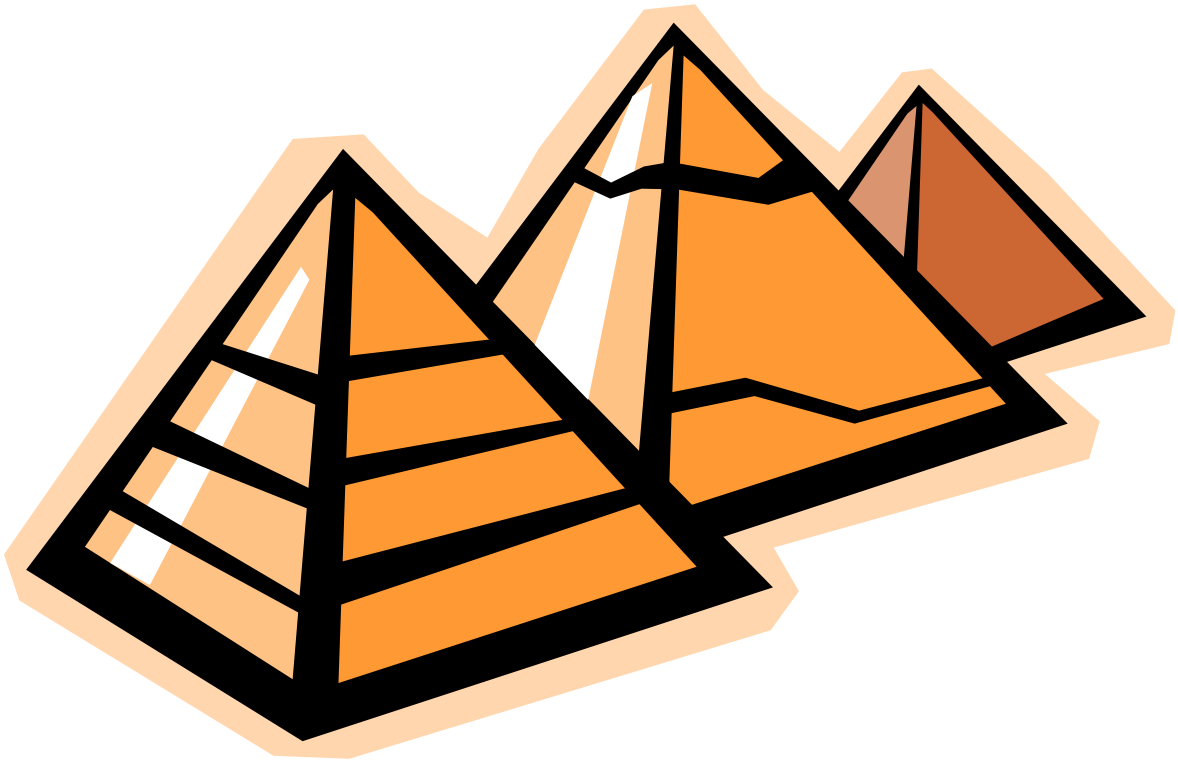
Hexagonal prism

# Rectangular Prism

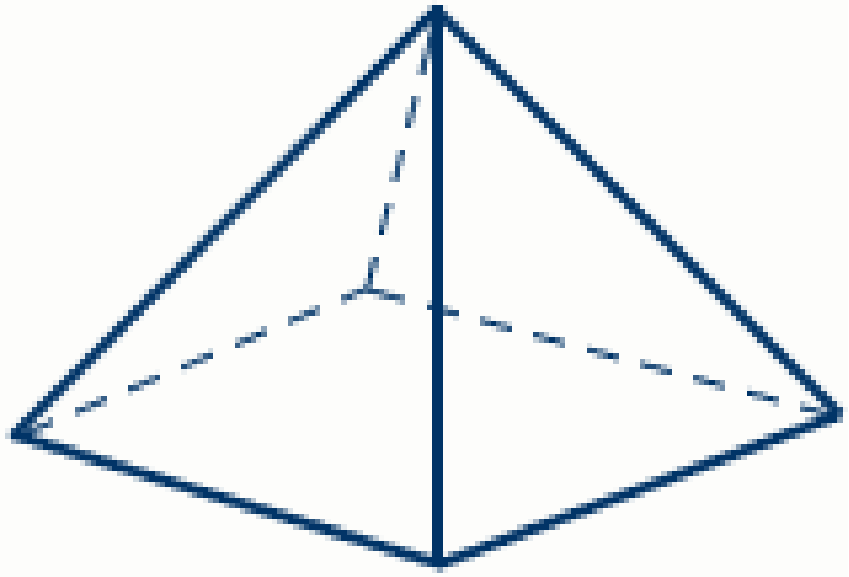
- A solid figure in which all six faces are rectangles



**Pyramid** – a polyhedron whose base is a polygon whose other faces are triangles that share a common vertex



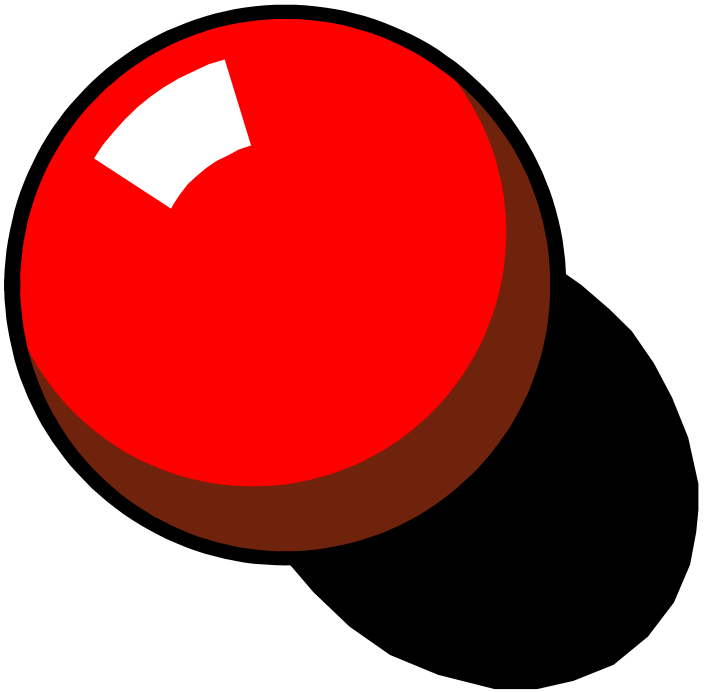
# Square Pyramid



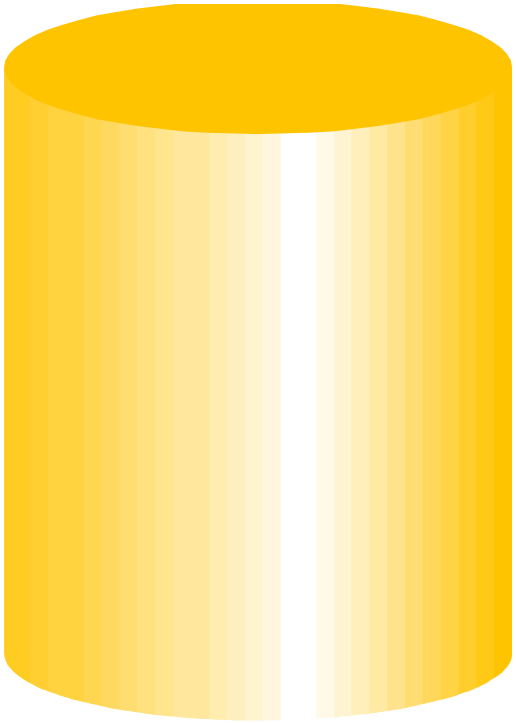
- **square pyramid**
- A pyramid with a square base and four triangular faces

***Example:***

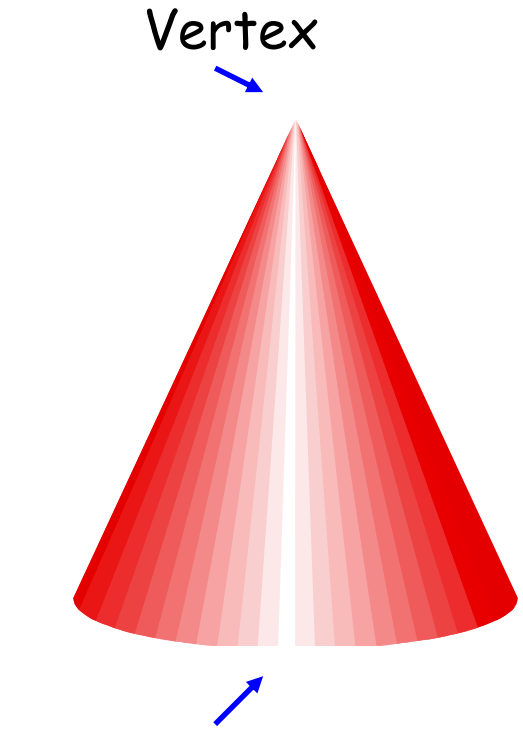
**Sphere** - any round object whose curved surface is the same distance to the center as all of its points



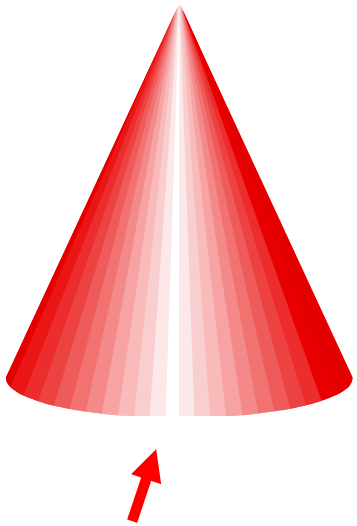
**Cylinder** – A solid figure with two circular bases that are parallel and congruent



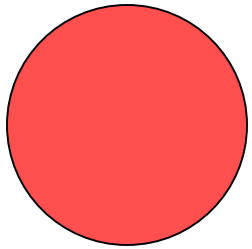
**Cone** – a solid figure with one curved surface, one circular base, and one vertex



# Base - A special face of a solid figure



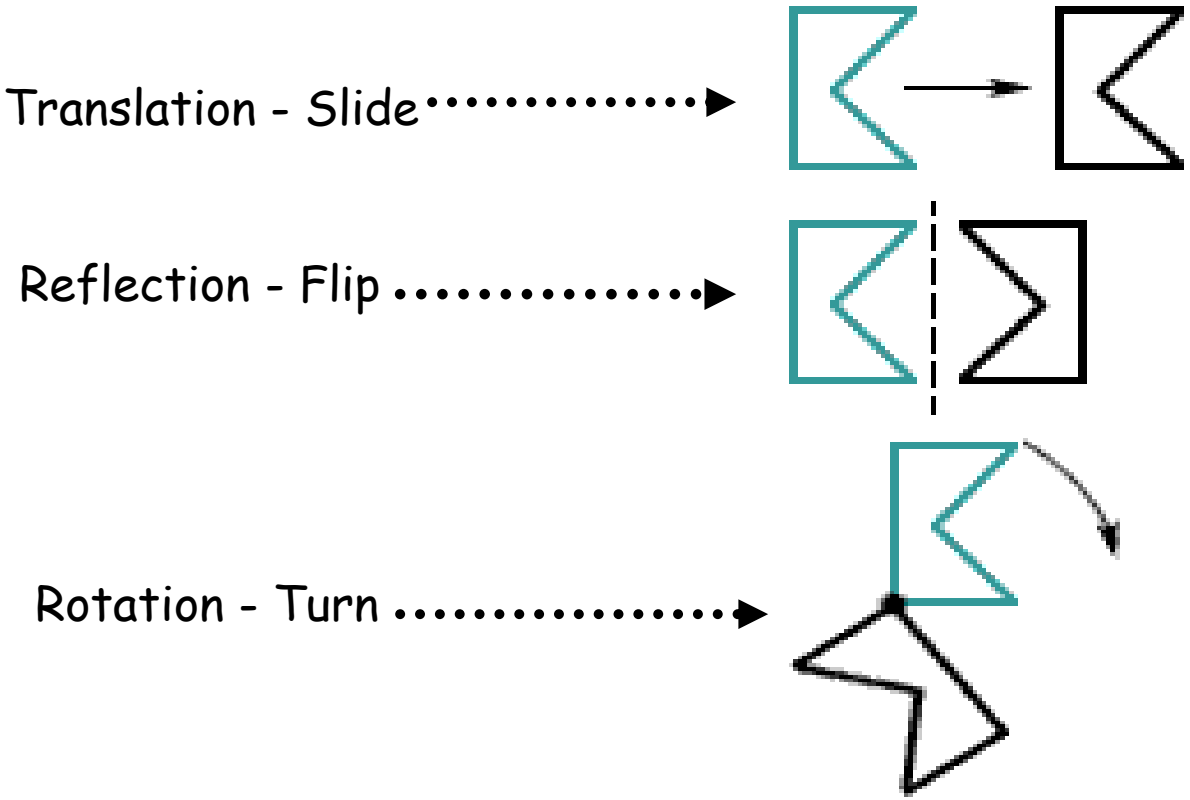
Base



The base of a cone is a circle.

# Transformation

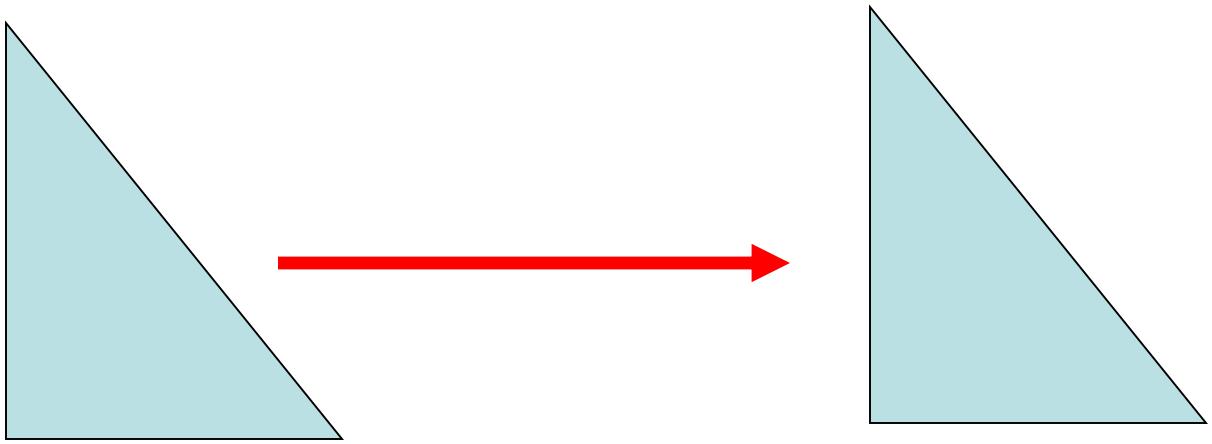
- **Transformation -**The movement of a figure by a translation, reflection,or rotation



# Translation - Slide

- **Translation (slide)**
- A movement of a figure along a straight line

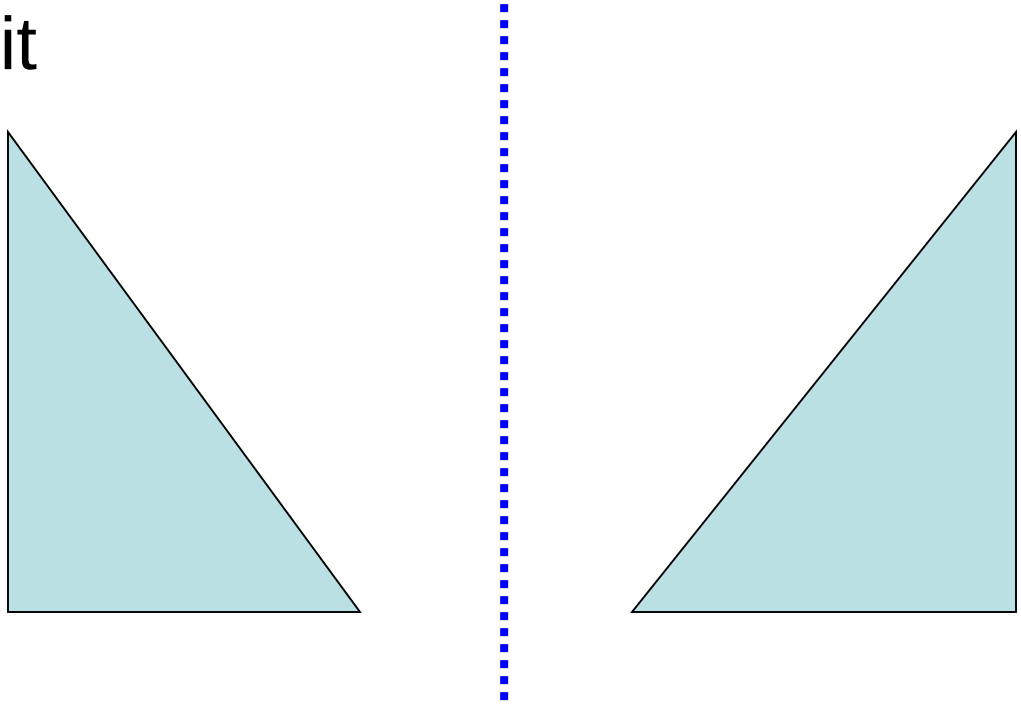
***Example:***



# Reflection - Flip

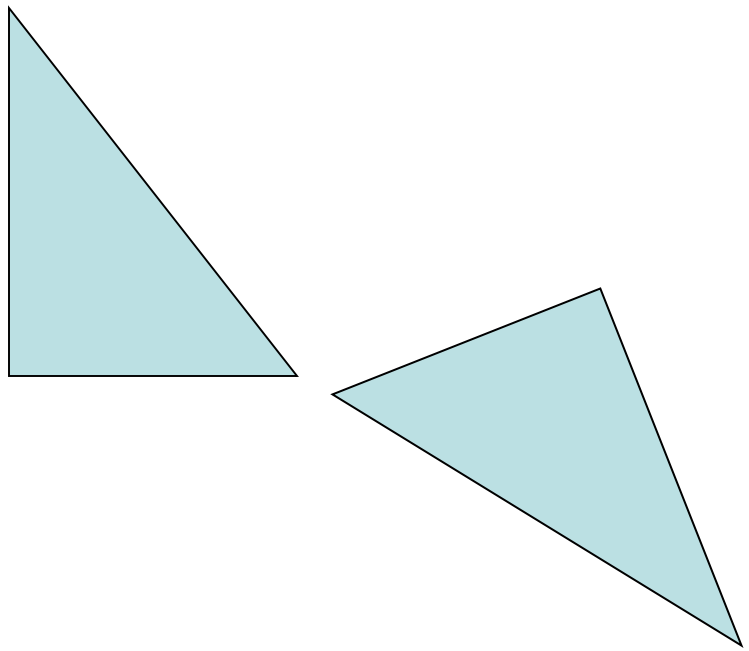
- **Reflection (flip)**
- A movement of a figure to a new position by flipping it over a line

***Example:***

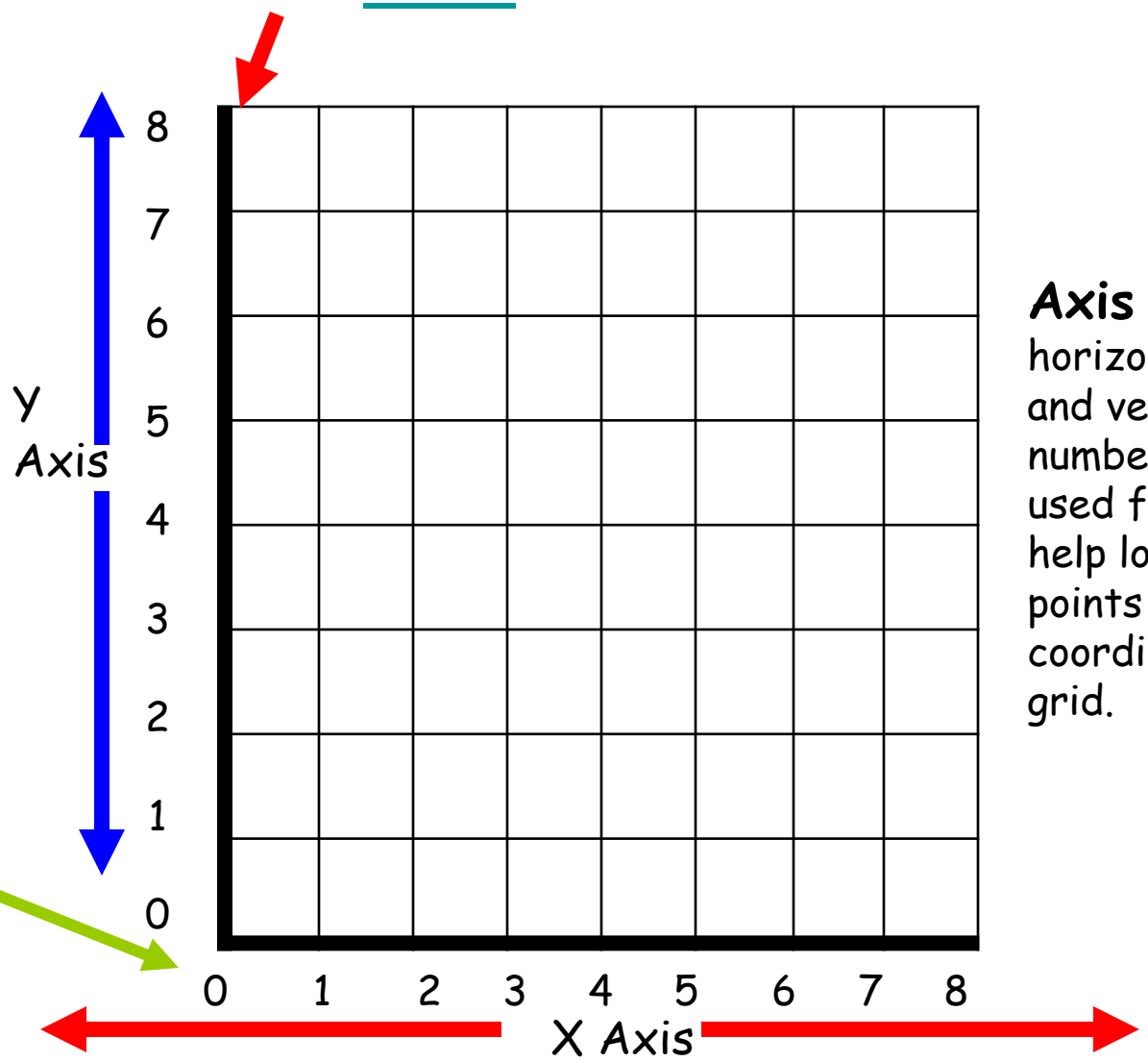


# Rotation - Turn

**Rotation (turn)**
A movement of a figure by turning it around a fixed point



**Coordinate Grid-** A plane formed by two intersecting and perpendicular number lines called axes



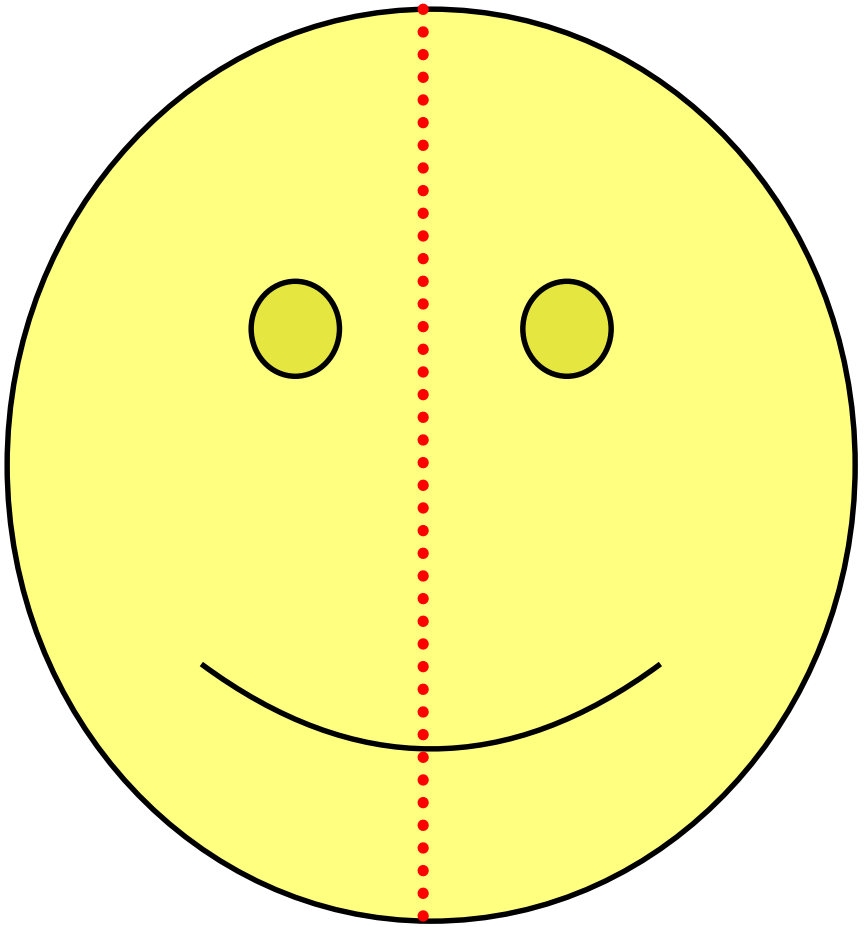

The point where the *x*-axis and the *y*-axis in the coordinate plane intersect, (0, 0)

**Axis** – horizontal and vertical number lines used for to help locate points on a coordinate grid.

# Line of Symmetry

- **Line symmetry**

  A figure has line symmetry if a line can separate the figure into two congruent parts

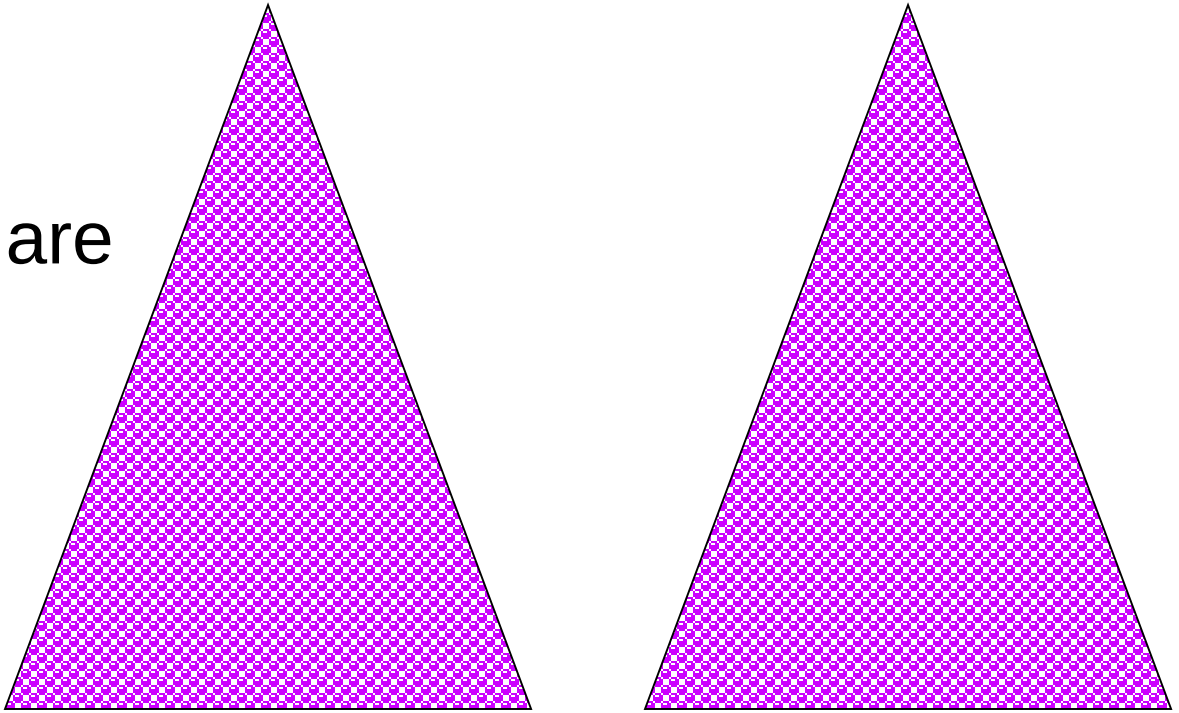


# Congruent

- Having the same size and shape

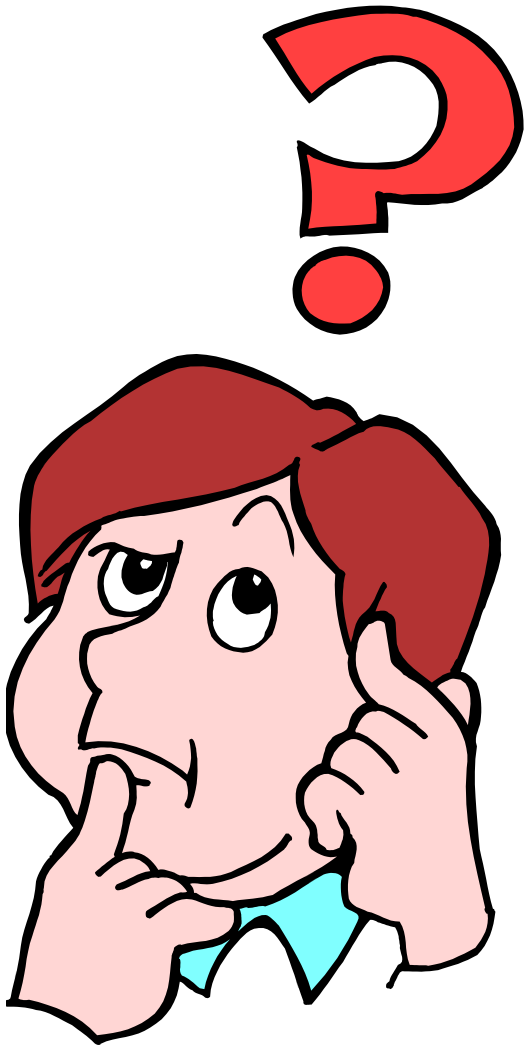
***Example:***

The triangles are congruent.



# Problem Solving

- Choosing an appropriate plan to find a solution



**Reasonableness** - deciding which answer makes the most sense

# Estimate

To find an answer that is close to the actual answer by rounding.

# Strategy

- A plan, a method or a way to solve a problem or reach an answer.

- Examples:
- Doubles plus one  5 + 6 =
- Find a pattern

# Simpler Problem

- When solving complex problems it maybe helpful to make the problem simpler.

This can mean reducing large numbers to smaller numbers, or reducing the number of items given in the problem.

A simpler representation can suggest operations or processes that can be used to solve more complex problems.

# Make a Pattern

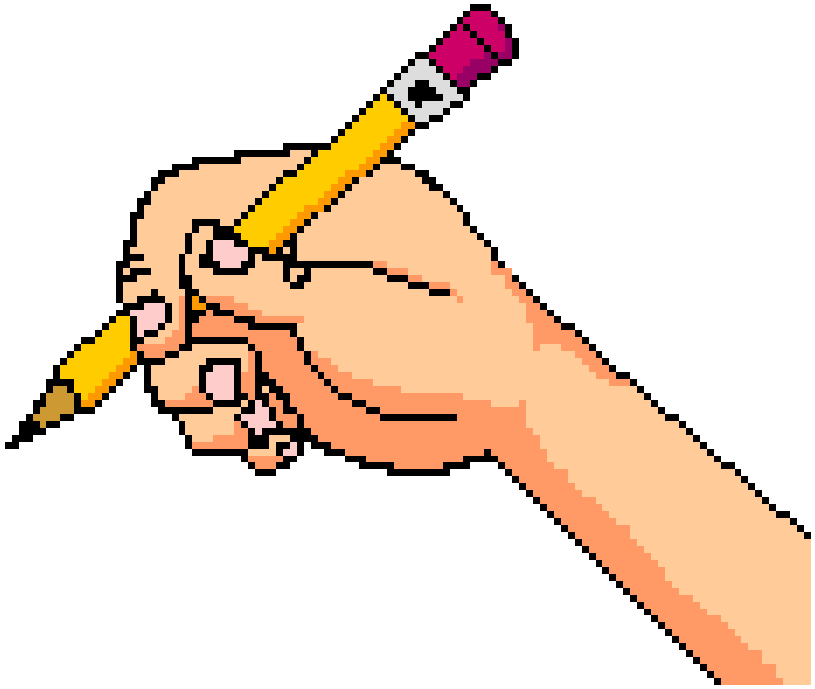
- By identifying the pattern you can predict what will come next and what will happen again and again.
- Recognizing a pattern can help extend the pattern to find a solution.
- Making a number table, a T-Chart, can reveal a pattern

# Guess and Check

- Guess the answer, test to see of if it is correct, and make another guess if the precious one was incorrect.
- In this way you come closer to a solution by making a increasingly more reasonable guess.

# Draw a Picture

- Make a picture to help you understand and maneuver the data in the problem.



# Act It Out

Acting out a problem helps you to move objects around and visualize the data as well as see the path to the solution process.

- You can use small scraps of paper or counters to visualize relationships.

# Make an Organized List

- Recording work in an organized list makes it easy to look over what has been done and to identify important steps that still have to be completed.
- It also give a systematic way to record computations made with data or recording combinations of items.

# Work Backwards

- Make a series of computations starting with the data presented at the end of the problem and ending with the data presented at the beginning of the problem.

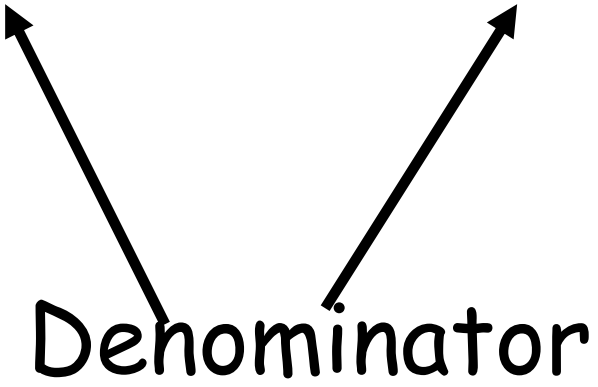
# Solution

- Solution:An answer to a problem.

- Solve: to work out the problem.

# Unlike Denominators

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



# Numerator
# Denominator

**Numerator**- The number above the bar

in a fraction that tells how many equal

parts of the whole are being considered.

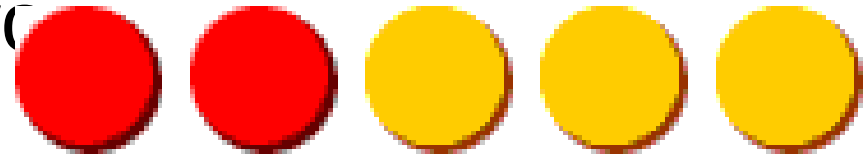
$$\frac{3}{4} \leftarrow \text{numerator}$$

$$\frac{3}{4} \leftarrow \text{denominator}$$

**Denominator-** The number below the bar in a fraction that tells how many equal parts are in the whole

# Ratio

The comparison of two numbers by division



| Compare | Ratio | Type of Ratio |
|---|---|---|
| Red counters to all counters | 2 to 5 2/5 2:5 | Part to whole |
| All counters to red counters | 5 to 2 5/2 5:2 | Whole to part |
| Red counters to yellow counters | 2 to 3 2/3 2:3 | Part to part |

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# Denominator

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# Percent

- The ratio of a number to 100; percent means

  "per hundred."

  ***Example:***

  40% of the squares are shaded.

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# Decimal Number

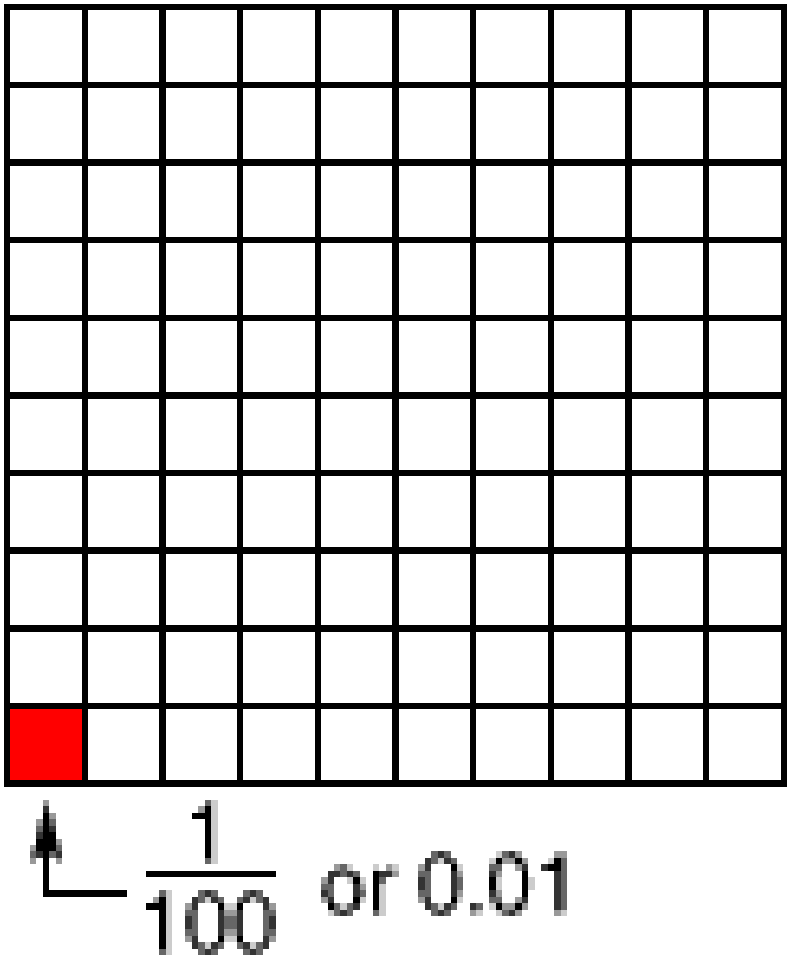
A number with one or more digits to the right of the decimal point.

5.87

# HUNDREDTHS

- One of one hundred equal parts

***Example:***



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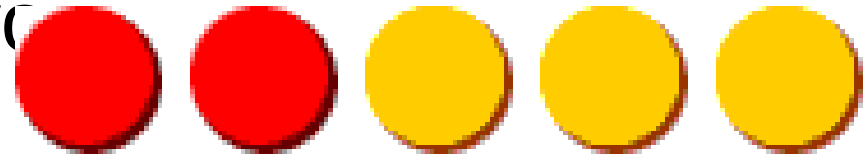

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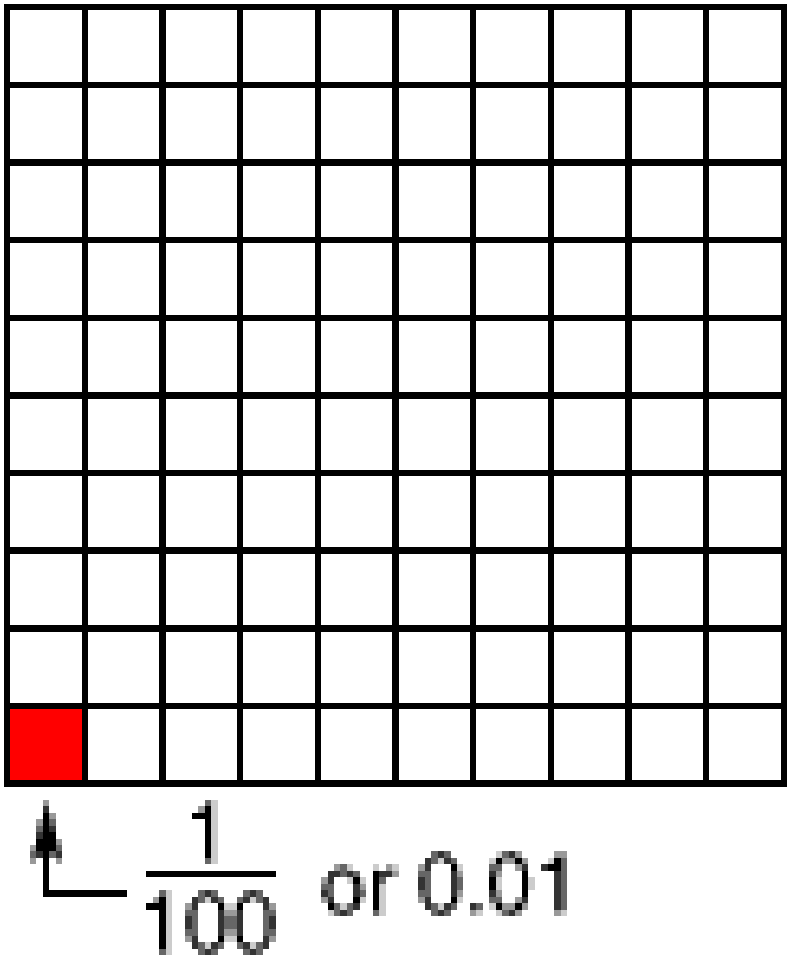
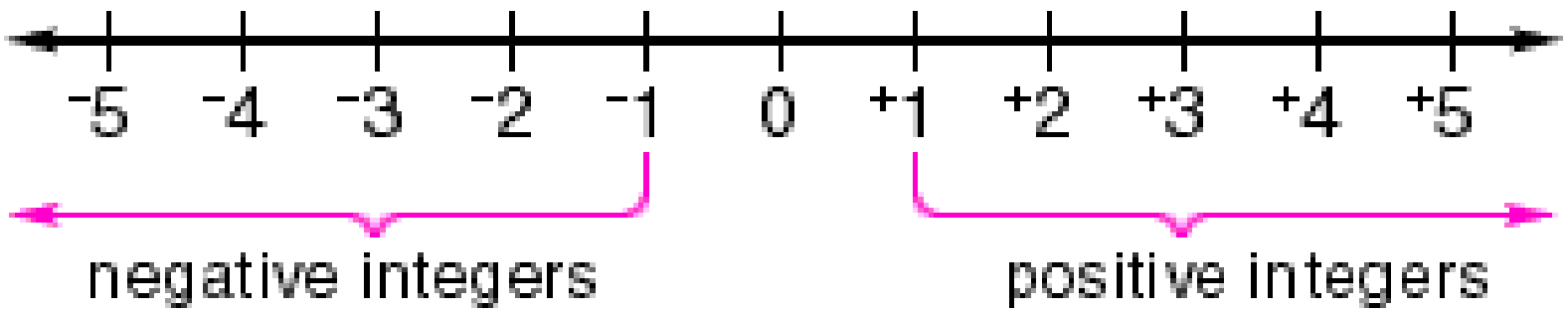


# Integers

The set of whole numbers and their opposites

***Example:***



**Whole number** - A set of natural numbers using zero; any number that is not a decimal or fraction

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