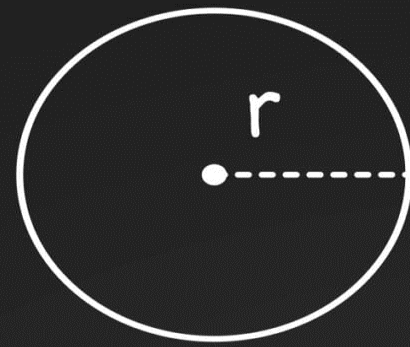


MATHS BASIC

OXFORD ACADEMY

$$\pi = (r-e)^2$$

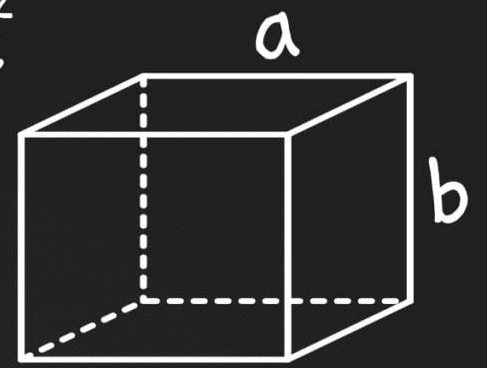
π



$$(x+y)^2 - (x-y)$$

$$E = mc^2$$

$$f(x) = ax^2 + bx + c$$



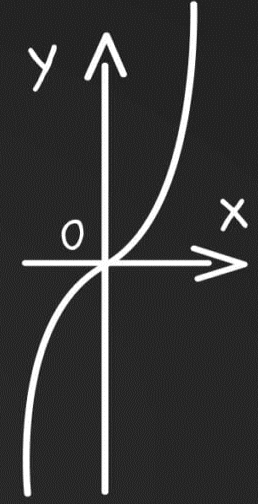
β

$$\sqrt{9}$$

$$y = 3x + 6$$

$$\sqrt{\frac{a}{b}}$$

$$\frac{1}{5} + \frac{3}{6}$$



$$\frac{2}{3} + \frac{4}{6}$$

$$X + Y = 3$$

MATH

$$Y = \cos x - \sin x$$

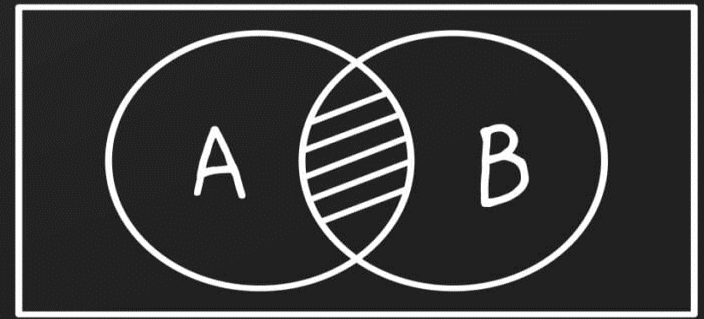
$$\sin(-a) = -\sin a$$

$$x = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

$$Y = x^2 - \frac{384}{153} = \frac{231}{231}$$

$$Me = X + B \left[\frac{\frac{n}{2} - z}{g} \right]$$

ψ



SOME FACTS

Father of Mathematics : Archimedes (pi)

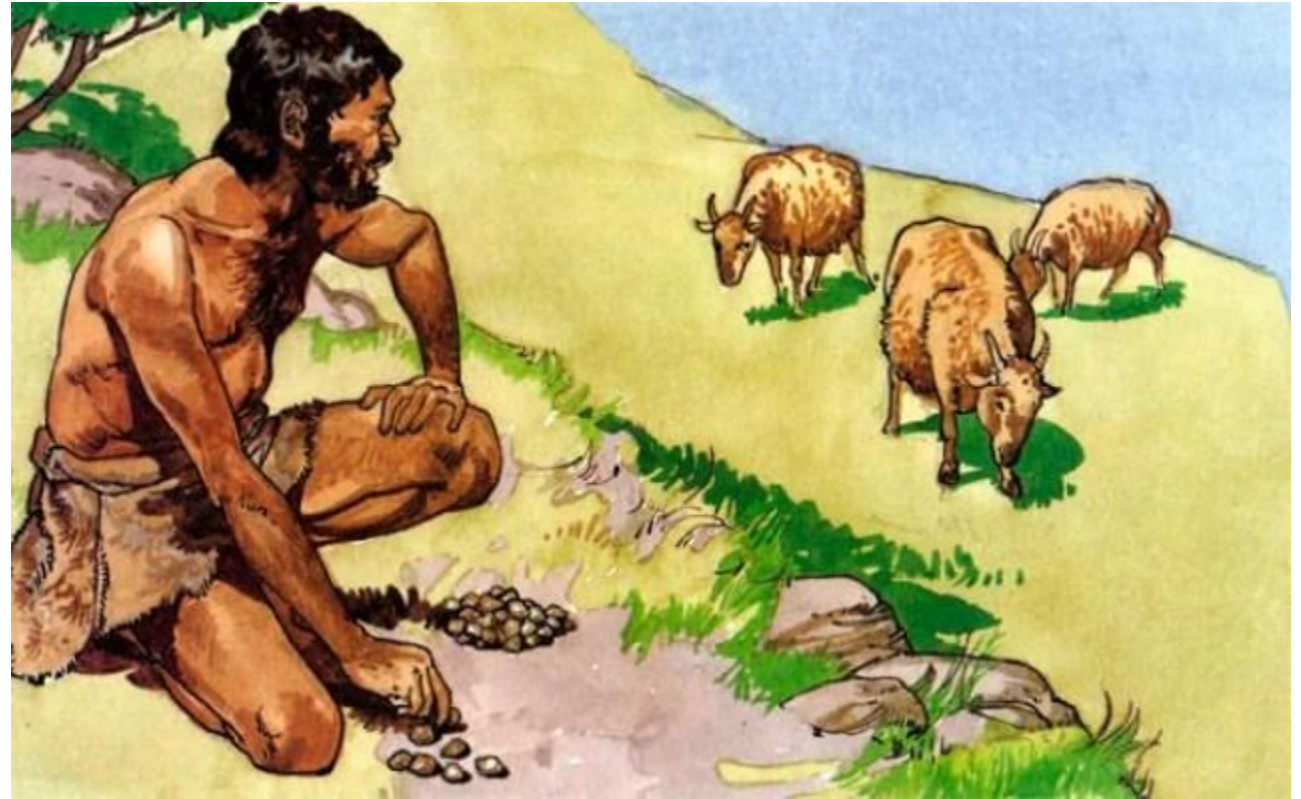
Father of Geometry : Euclid

**Father of Algebra : Muhammad ibn Musa
al-Khwarizm**

Father of Indian Mathematics : Aryabhata

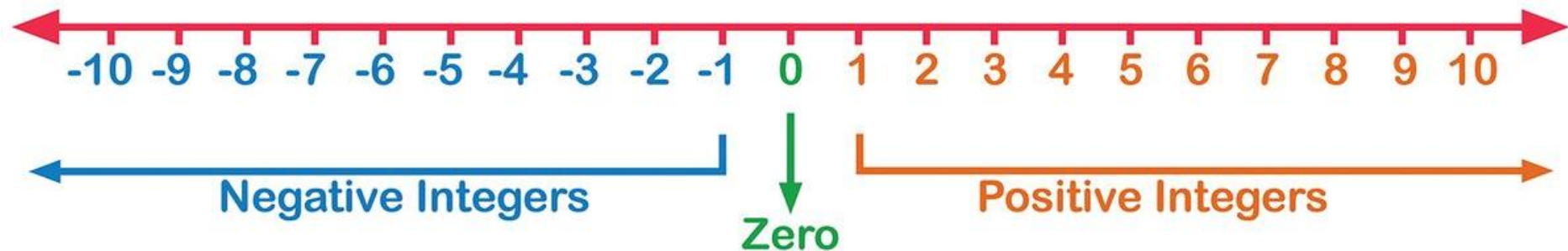


They didn't have a word for "five," but they could match five stones to five animals they had seen. By "matching" one physical object to another



NUMBERS

Number Line



OXFORD ACADEMY

TYPES OF NUMBERS

(Number System)

Natural Numbers (N)

Also known as counting numbers.

They start from 1.

Example: 1, 2, 3, 4, ...

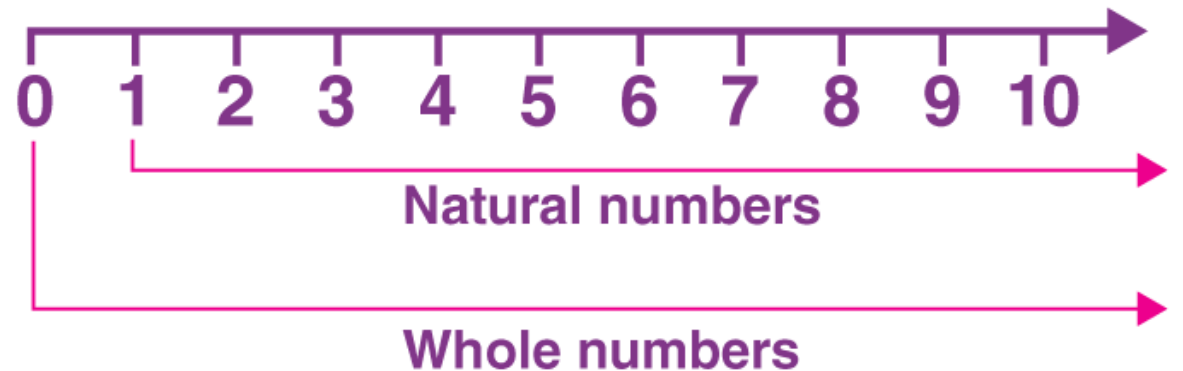
Natural Numbers



Whole Numbers (W):

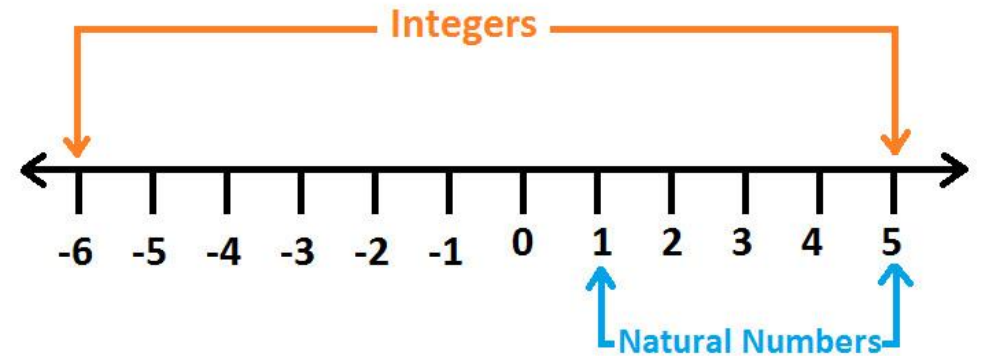
These are natural numbers including zero.

Example: 0, 1, 2, 3, ...



Integers (Z):

- These include all whole numbers and their negatives.
- They do not include fractions or decimals.
- Example: ..., -3, -2, -1, 0, 1, 2, 3, ...



Integers and Natural Numbers
difference on Number Line

Rational Numbers (Q)

Numbers that can be written as a fraction (p/q) (where q is not zero).

Example: $1/2$, 0.75 , 5 (since it can be $5/1$).

$\frac{1}{2}$

$\frac{1}{3}$

$\frac{1}{4}$

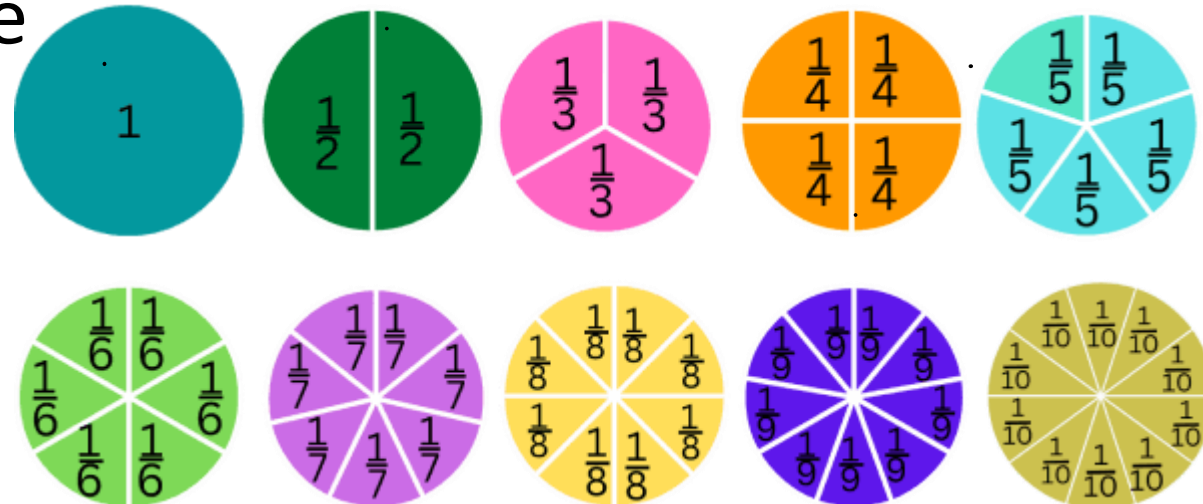
$\frac{1}{5}$

$\frac{1}{6}$

$\frac{1}{7}$

$\frac{1}{8}$

$\frac{1}{9}$



Irrational Numbers

Numbers that cannot be expressed as a simple fraction.

Their decimals go on forever without repeating a pattern.

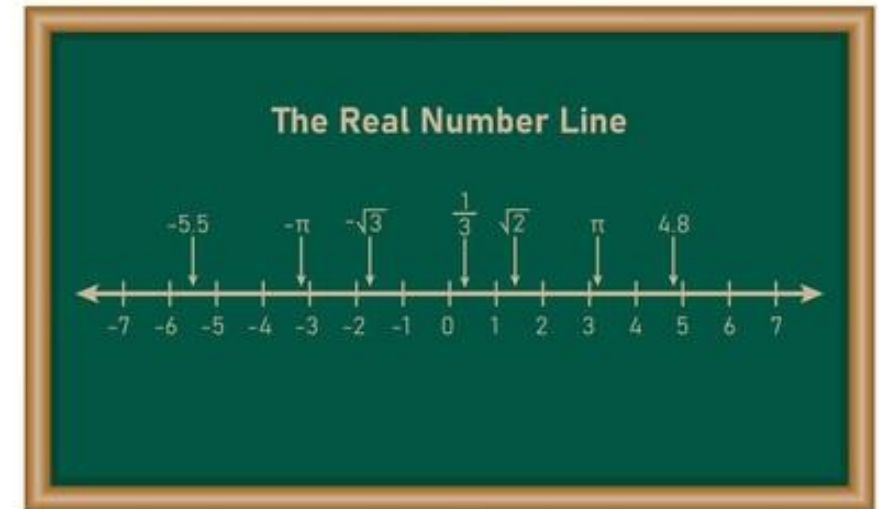
Example: pi (Pi)

| RATIONAL NUMBERS | IRRATIONAL NUMBERS |
|------------------|--------------------|
| $\frac{1}{2}$ | π |
| -4 | $\sqrt{2}$ |
| 3.75 | 0.101001... |
| $\sqrt{9}$ | |

Real Numbers (R)

The set of all rational and irrational numbers.

Basically, any number you can find on a standard number line.



Even Numbers:

Divisible by 2 (e.g., 2, 4, 6, 8).

Odd Numbers:

Not divisible by 2 (e.g., 1, 3, 5, 7).

Even numbers

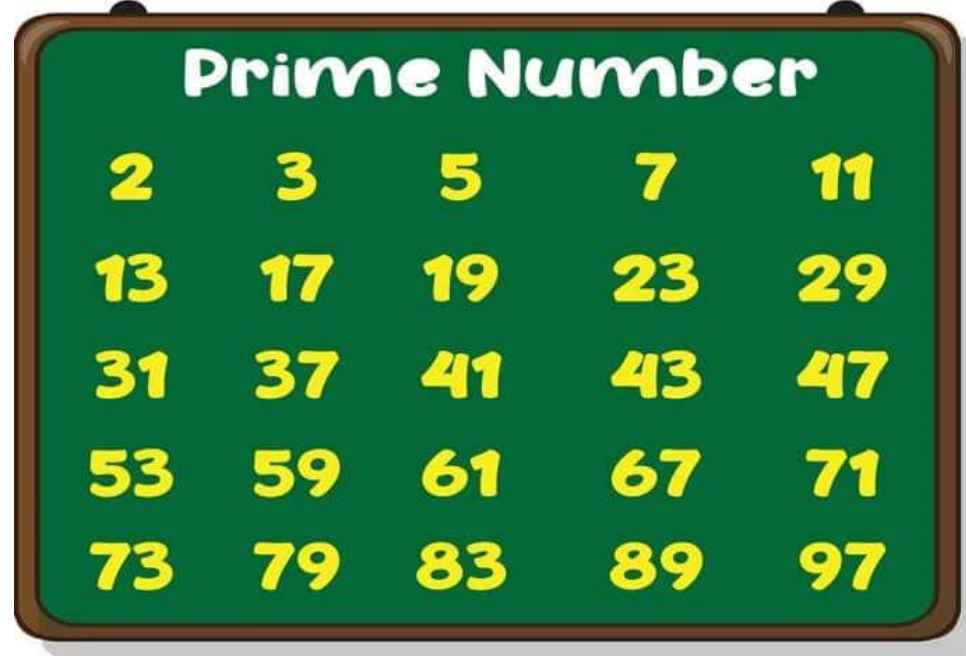
2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, etc., are all even numbers.

Odd numbers

1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, etc., are all odd numbers.

Prime Numbers:

Numbers greater than 1 that have only two factors: 1 and themselves (e.g., 2, 3, 5, 7).



| Prime Number | | | | |
|--------------|----|----|----|----|
| 2 | 3 | 5 | 7 | 11 |
| 13 | 17 | 19 | 23 | 29 |
| 31 | 37 | 41 | 43 | 47 |
| 53 | 59 | 61 | 67 | 71 |
| 73 | 79 | 83 | 89 | 97 |

Composite Numbers

Composite Numbers are positive integers greater than 1 that have more than two factors.

In simpler terms, a composite number is any number that can be divided exactly by numbers other than 1 and itself.

They are the opposite of Prime Numbers.

Composite Numbers 1 To 100

4, 6, 8, 9, 10, 12, 14, 15,
16, 18, 20, 21, 22, 24, 25,
26, 27, 28, 30, 32, 33, 34,

Example : 6 - It can be divided by 1, 2, 3, and 6.

Since it has 4 factors, it is a Composite Number.

Multiplication Table

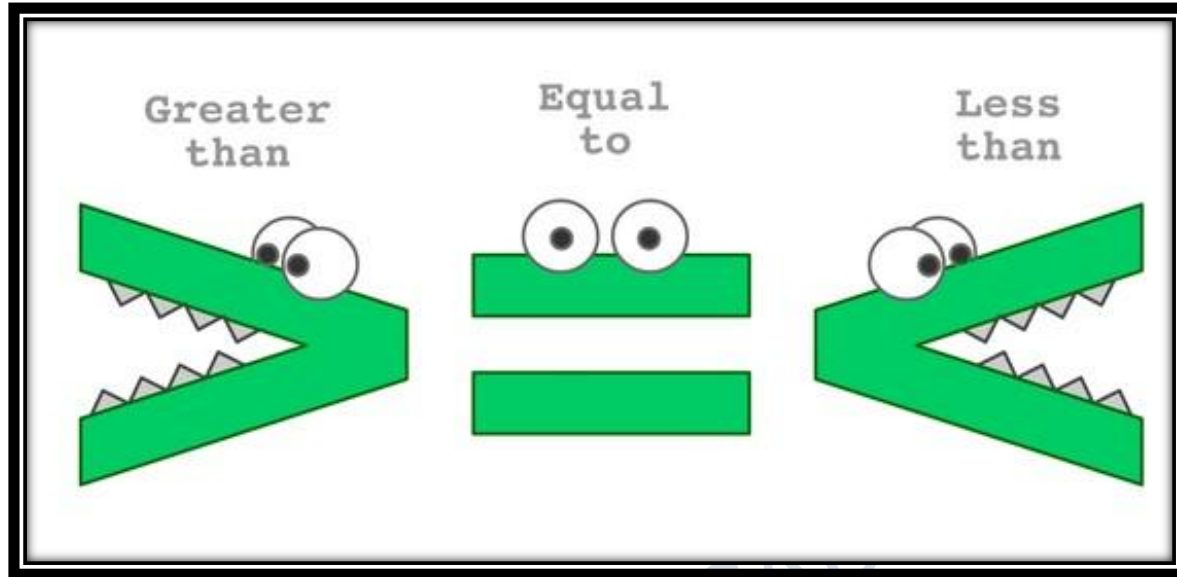
| | | | | |
|--|--|--|--|---|
| 1 $1 \times 1 = 1$ $1 \times 2 = 2$ $1 \times 3 = 3$ $1 \times 4 = 4$ $1 \times 5 = 5$ $1 \times 6 = 6$ $1 \times 7 = 7$ $1 \times 8 = 8$ $1 \times 9 = 9$ $1 \times 10 = 10$ | 2 $2 \times 1 = 2$ $2 \times 2 = 4$ $2 \times 3 = 6$ $2 \times 4 = 8$ $2 \times 5 = 10$ $2 \times 6 = 12$ $2 \times 7 = 14$ $2 \times 8 = 16$ $2 \times 9 = 18$ $2 \times 10 = 20$ | 3 $3 \times 1 = 3$ $3 \times 2 = 6$ $3 \times 3 = 9$ $3 \times 4 = 12$ $3 \times 5 = 15$ $3 \times 6 = 18$ $3 \times 7 = 21$ $3 \times 8 = 24$ $3 \times 9 = 27$ $3 \times 10 = 30$ | 4 $4 \times 1 = 4$ $4 \times 2 = 8$ $4 \times 3 = 12$ $4 \times 4 = 16$ $4 \times 5 = 20$ $4 \times 6 = 24$ $4 \times 7 = 28$ $4 \times 8 = 32$ $4 \times 9 = 36$ $4 \times 10 = 40$ | 5 $5 \times 1 = 5$ $5 \times 2 = 10$ $5 \times 3 = 15$ $5 \times 4 = 20$ $5 \times 5 = 25$ $5 \times 6 = 30$ $5 \times 7 = 35$ $5 \times 8 = 40$ $5 \times 9 = 45$ $5 \times 10 = 50$ |
| 6 $6 \times 1 = 6$ $6 \times 2 = 12$ $6 \times 3 = 18$ $6 \times 4 = 24$ $6 \times 5 = 30$ $6 \times 6 = 36$ $6 \times 7 = 42$ $6 \times 8 = 48$ $6 \times 9 = 54$ $6 \times 10 = 60$ | 7 $7 \times 1 = 7$ $7 \times 2 = 14$ $7 \times 3 = 21$ $7 \times 4 = 28$ $7 \times 5 = 35$ $7 \times 6 = 42$ $7 \times 7 = 49$ $7 \times 8 = 56$ $7 \times 9 = 63$ $7 \times 10 = 70$ | 8 $8 \times 1 = 8$ $8 \times 2 = 16$ $8 \times 3 = 24$ $8 \times 4 = 32$ $8 \times 5 = 40$ $8 \times 6 = 48$ $8 \times 7 = 56$ $8 \times 8 = 64$ $8 \times 9 = 72$ $8 \times 10 = 80$ | 9 $9 \times 1 = 9$ $9 \times 2 = 18$ $9 \times 3 = 27$ $9 \times 4 = 36$ $9 \times 5 = 45$ $9 \times 6 = 54$ $9 \times 7 = 63$ $9 \times 8 = 72$ $9 \times 9 = 81$ $9 \times 10 = 90$ | 10 $10 \times 1 = 10$ $10 \times 2 = 20$ $10 \times 3 = 30$ $10 \times 4 = 40$ $10 \times 5 = 50$ $10 \times 6 = 60$ $10 \times 7 = 70$ $10 \times 8 = 80$ $10 \times 9 = 90$ $10 \times 10 = 100$ |

Square Table 1 to 20

| | |
|--------------|--------------|
| $1^2 = 1$ | $11^2 = 121$ |
| $2^2 = 4$ | $12^2 = 144$ |
| $3^2 = 9$ | $13^2 = 169$ |
| $4^2 = 16$ | $14^2 = 196$ |
| $5^2 = 25$ | $15^2 = 225$ |
| $6^2 = 36$ | $16^2 = 256$ |
| $7^2 = 49$ | $17^2 = 289$ |
| $8^2 = 64$ | $18^2 = 324$ |
| $9^2 = 81$ | $19^2 = 361$ |
| $10^2 = 100$ | $20^2 = 400$ |

Cube Table

| | |
|---------------|---------------|
| $1^3 = 1$ | $11^3 = 1331$ |
| $2^3 = 8$ | $12^3 = 1728$ |
| $3^3 = 27$ | $13^3 = 2197$ |
| $4^3 = 64$ | $14^3 = 2744$ |
| $5^3 = 125$ | $15^3 = 3375$ |
| $6^3 = 216$ | $16^3 = 4096$ |
| $7^3 = 343$ | $17^3 = 4913$ |
| $8^3 = 512$ | $18^3 = 5832$ |
| $9^3 = 729$ | $19^3 = 6859$ |
| $10^3 = 1000$ | $20^3 = 8000$ |



$$10 > 5$$

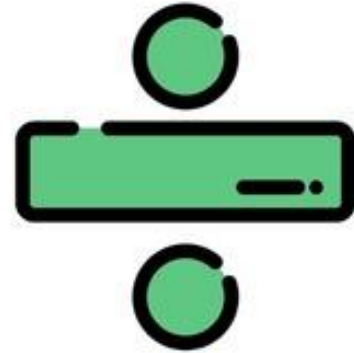
$$20 < 25$$

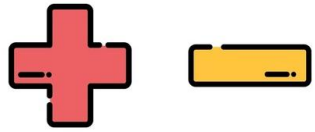
$$12 = 12$$

$$8.5 > 6.1$$

$$-5 < 2$$

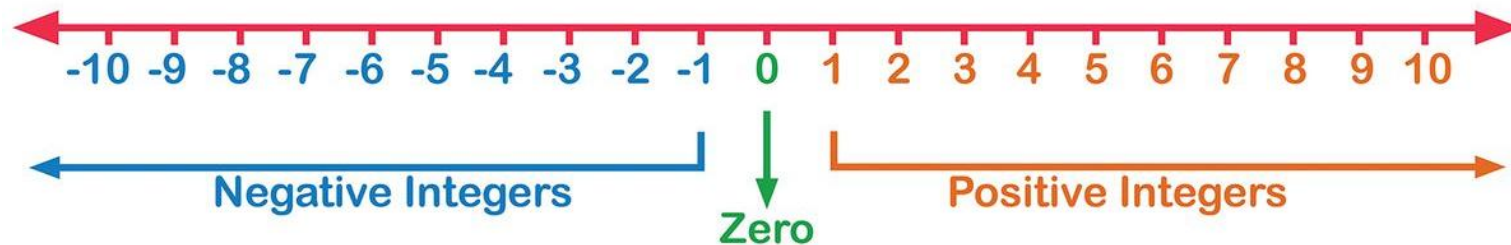
$$7 > -10$$

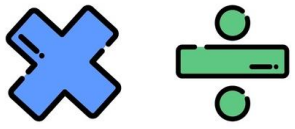




Addition and Subtraction

- $5-3 = 2$
- $3-5 = -2$
- $-3+5 = 2$
- $6-3 = 3$
- $3-6 = -3$
- $-3+6 = 3$
- $4+5 = 9$
- $-3-5 = -8$
- $-11-10 = -21$
- $7+2 = 9$
- $-5-2 = -7$
- $4-20 = -16$





Multiplication and Division

- $3 \times 3 = 9$

- $-3 \times -3 = 9$

- $-3 \times 3 = -9$

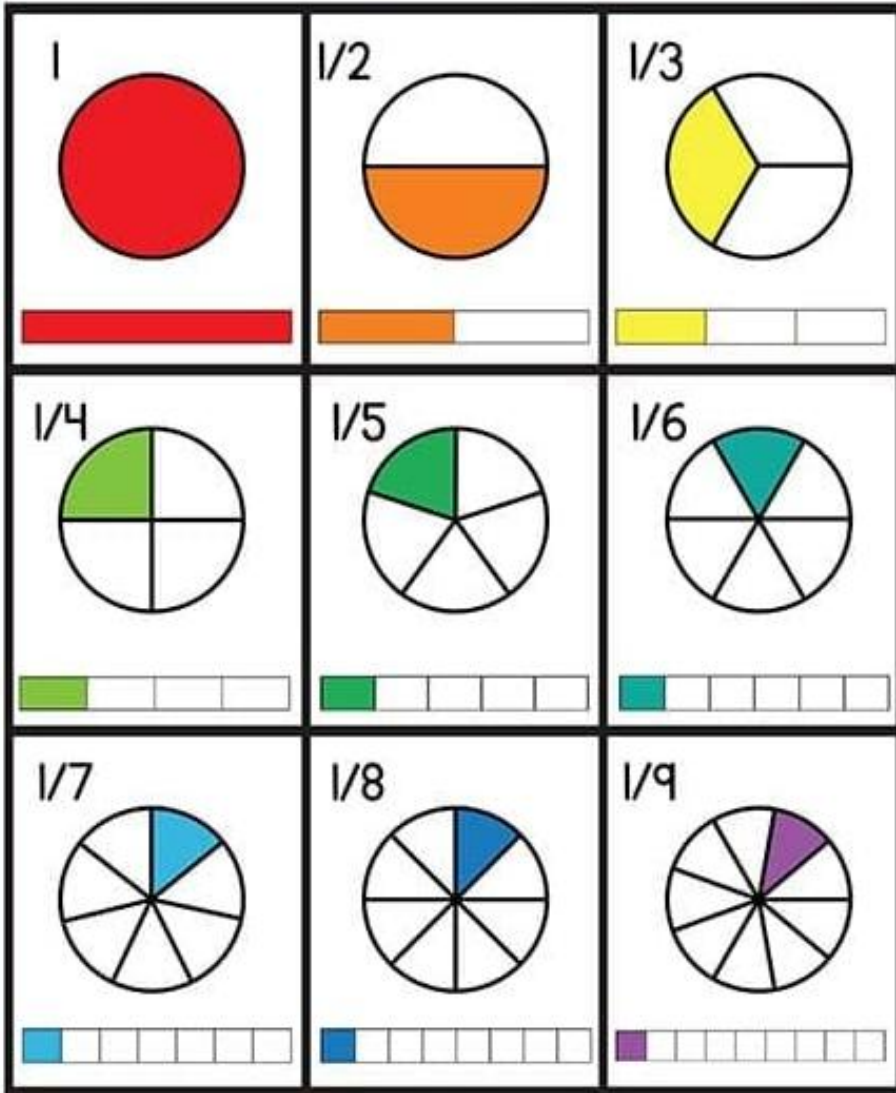
- $3 \div 3 = 1$

- $-3 \div -3 = 1$

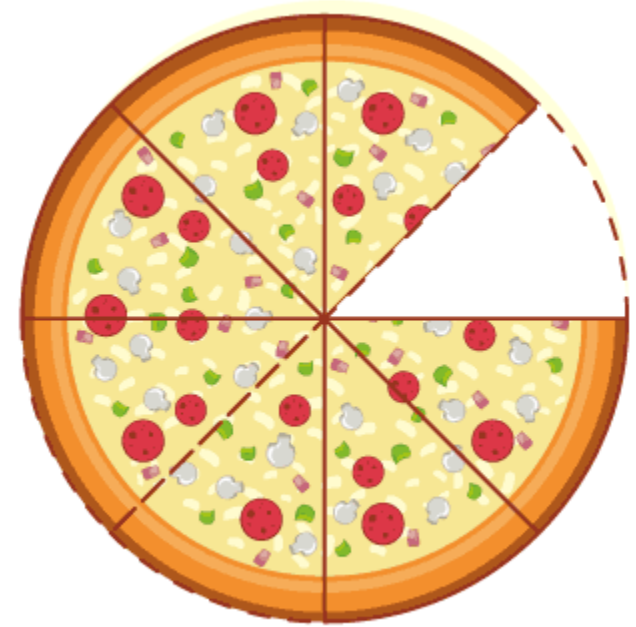
- $-3 \div 3 = -1$

OXFORD ACADEMY

FRACTIONS

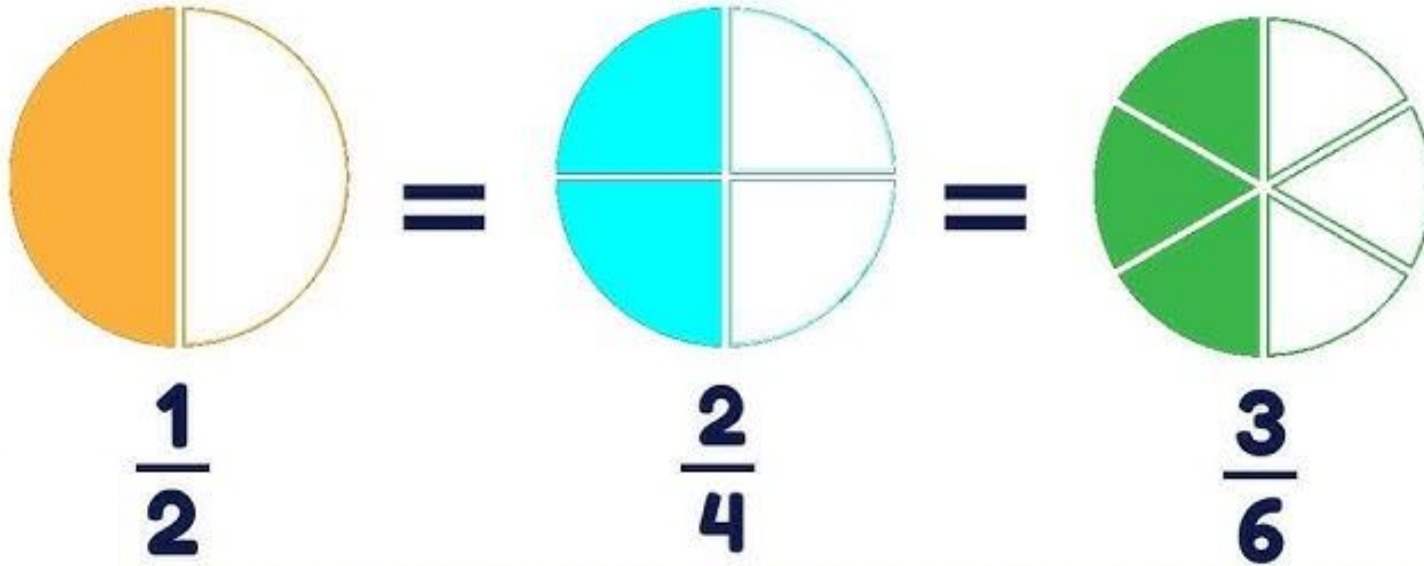


$$\frac{1}{8}$$



A **fraction** is a numerical value that represents **part of a whole**

Equivalent Fractions



Equivalent fractions are fractions that have different numerators and denominators but represent the **exact same value**.

Least Common Multiple (LCM)

LCM is the smallest positive number that is exactly divisible by two or more specific numbers.

For example, the multiples of 4 and 6 are 12, 24, 36, and so on.

The smallest common one is 12, so that's the LCM.

Example : - Imagine two traffic lights: one changes color every 30 seconds, and the other changes every 45 seconds.

To find out when both lights will turn green at the exact same time, we use LCM .

The LCM of 30 and 45 is 90. Therefore, after 90 seconds, both lights will turn green together again.

Highest Common Factor (HCF)

HCF is the largest number that divides two or more specific numbers exactly, with no remainder.

If you list the factors of 12, you get 1, 2, 3, 4, 6, and 12.

For 18, they're 1, 2, 3, 6, 9, and 18.

The largest common one is 6, so that's the HCF.

Suppose you have 18 apples and 24 oranges. You want to arrange them into groups with an equal number of fruits in each, without any leftovers.

To find the maximum number of such groups (or the largest common divisor), we use HCF .

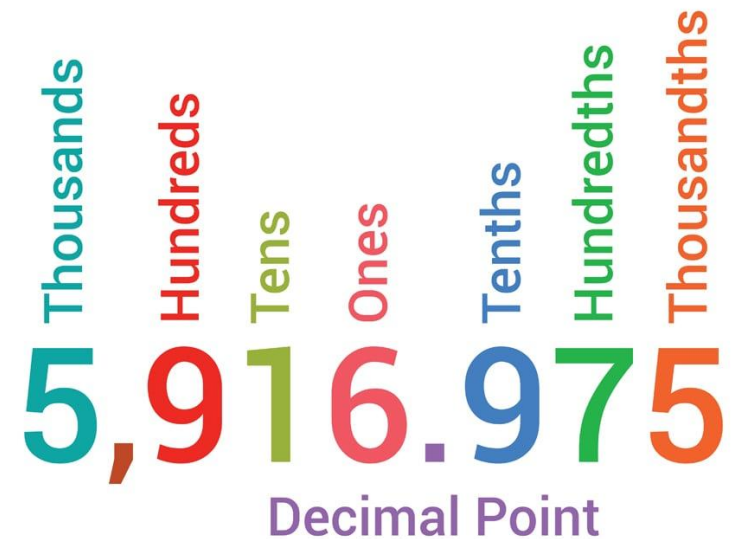
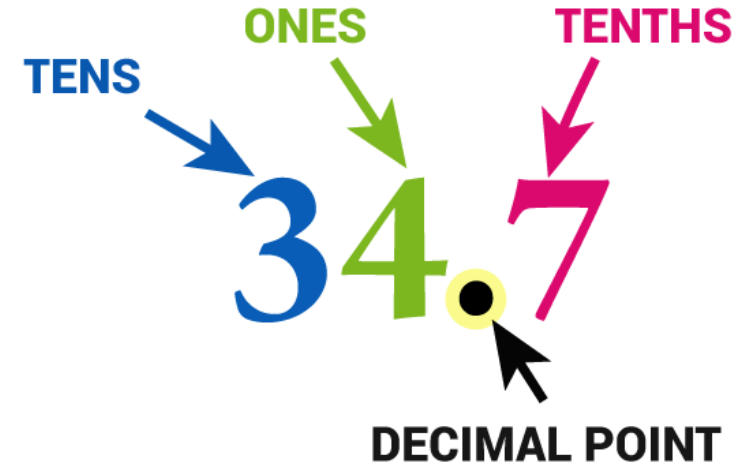
The HCF of 18 and 24 is 6. This means you can divide them equally into 6 groups.

Decimals

Decimal Math

$$\begin{array}{r} 14.6 \\ + 3.89 \\ \hline 18.49 \end{array} \quad \begin{array}{r} 38.004 \\ - 12.769 \\ \hline 25.235 \end{array} \quad \begin{array}{r} 13.86 \\ \times 3.9 \\ \hline 54.054 \end{array}$$

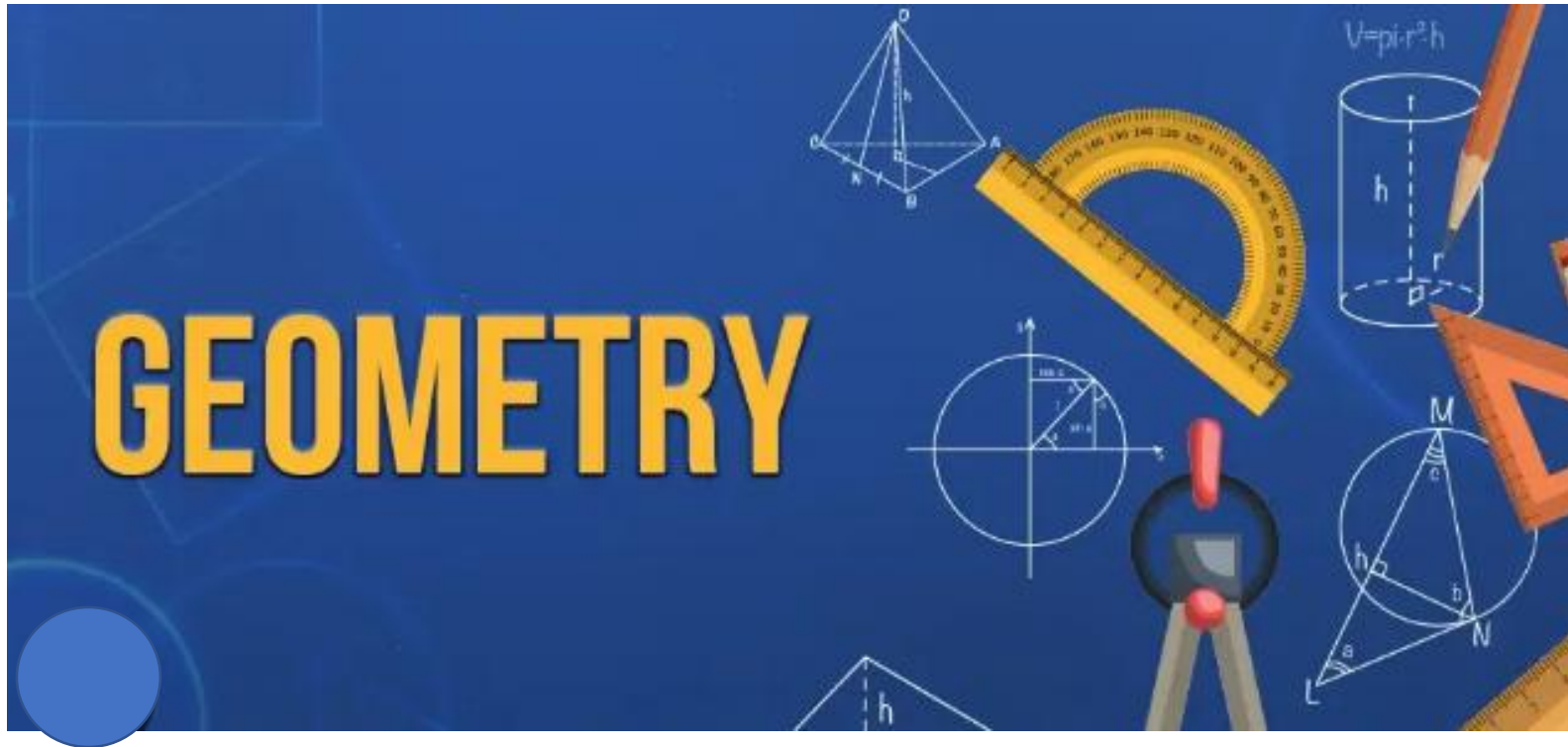
Decimals are numbers that use a **decimal point** to separate a whole number part from a fractional part



Fractions and Decimals

Fractions and Decimals are two different ways of writing the same value

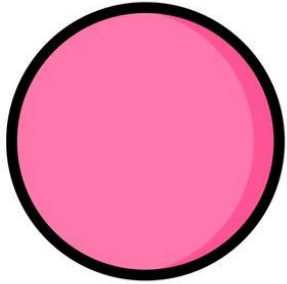
| | | | |
|-----|---------------|------------------|------|
| 75% | $\frac{3}{4}$ | $\frac{75}{100}$ | 0.75 |
| 50% | $\frac{1}{2}$ | $\frac{50}{100}$ | 0.50 |
| 25% | $\frac{1}{4}$ | $\frac{25}{100}$ | 0.25 |



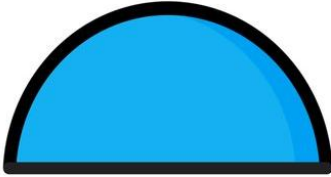
Geometry is the branch of mathematics that focuses on the **sizes, shapes, positions, and dimensions** of things.

Geometric Shapes

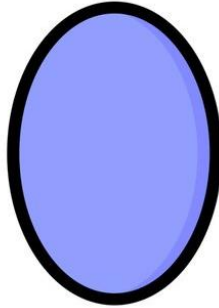
Circle



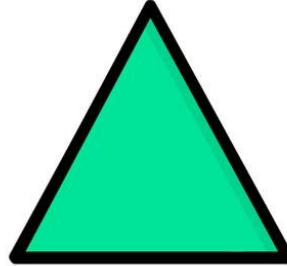
Semicircle



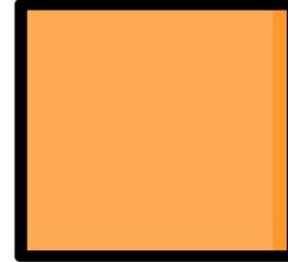
Oval



Triangle



Square



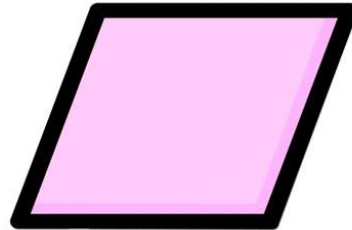
Rectangle



Parallelogram



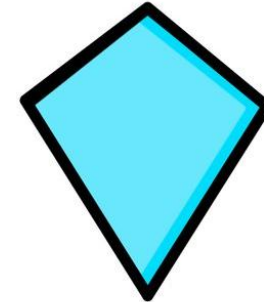
Rhombus



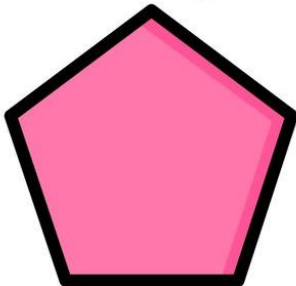
Trapezoid



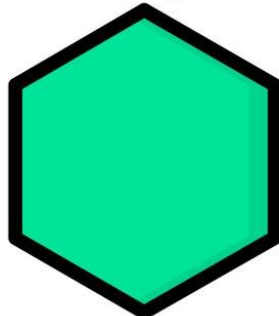
Kite



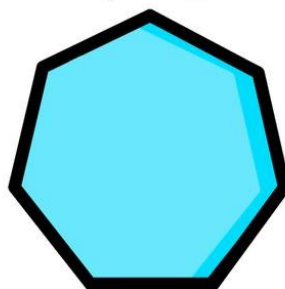
Pentagon



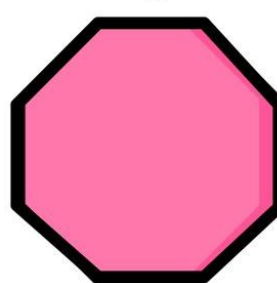
Hexagon



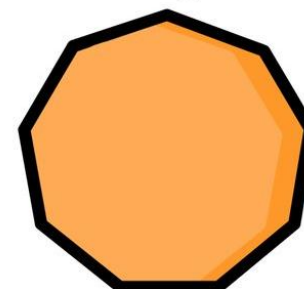
Heptagon



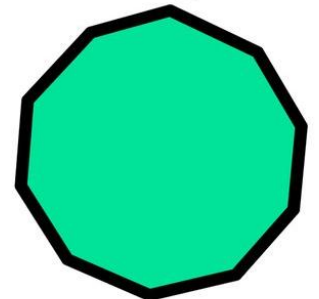
Octagon



Nonagon



Decagon



Angle based on their degree



RIGHT ANGLE
measure exactly
90 degrees

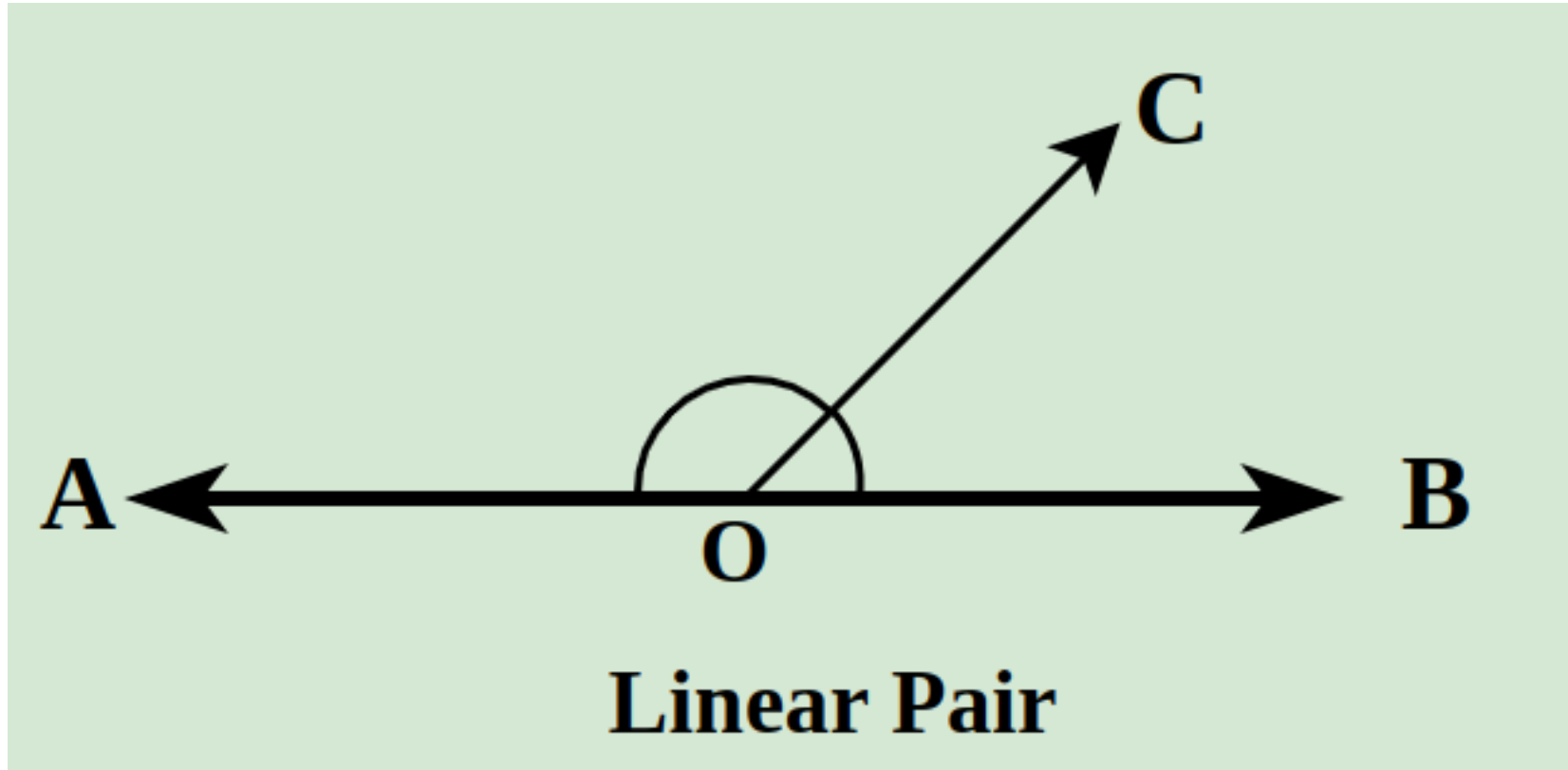


ACUTE ANGLE
angle measure
less than 90 degrees



OBTUSE ANGLE
measure more than
90 degrees

Linear Pair



Two adjacent angles on a straight line that add up to 180°

TRIANGLES

It is a **polygon** with **three sides**, **three vertices** (corners), and **three angles**.



Equilateral
All three sides
are equal



Isosceles
Two sides
are equal



Scalene
No sides are
equal



Acute
All angles acute



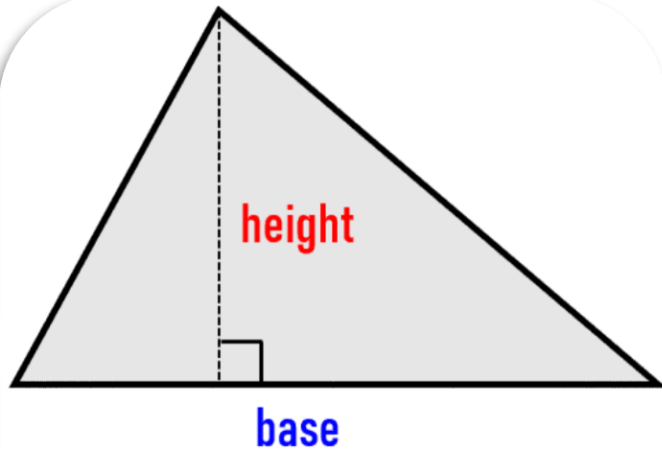
Right
One right angle



Obtuse
One obtuse angle

The sum of the three interior angles of a triangle is always exactly **180°**.

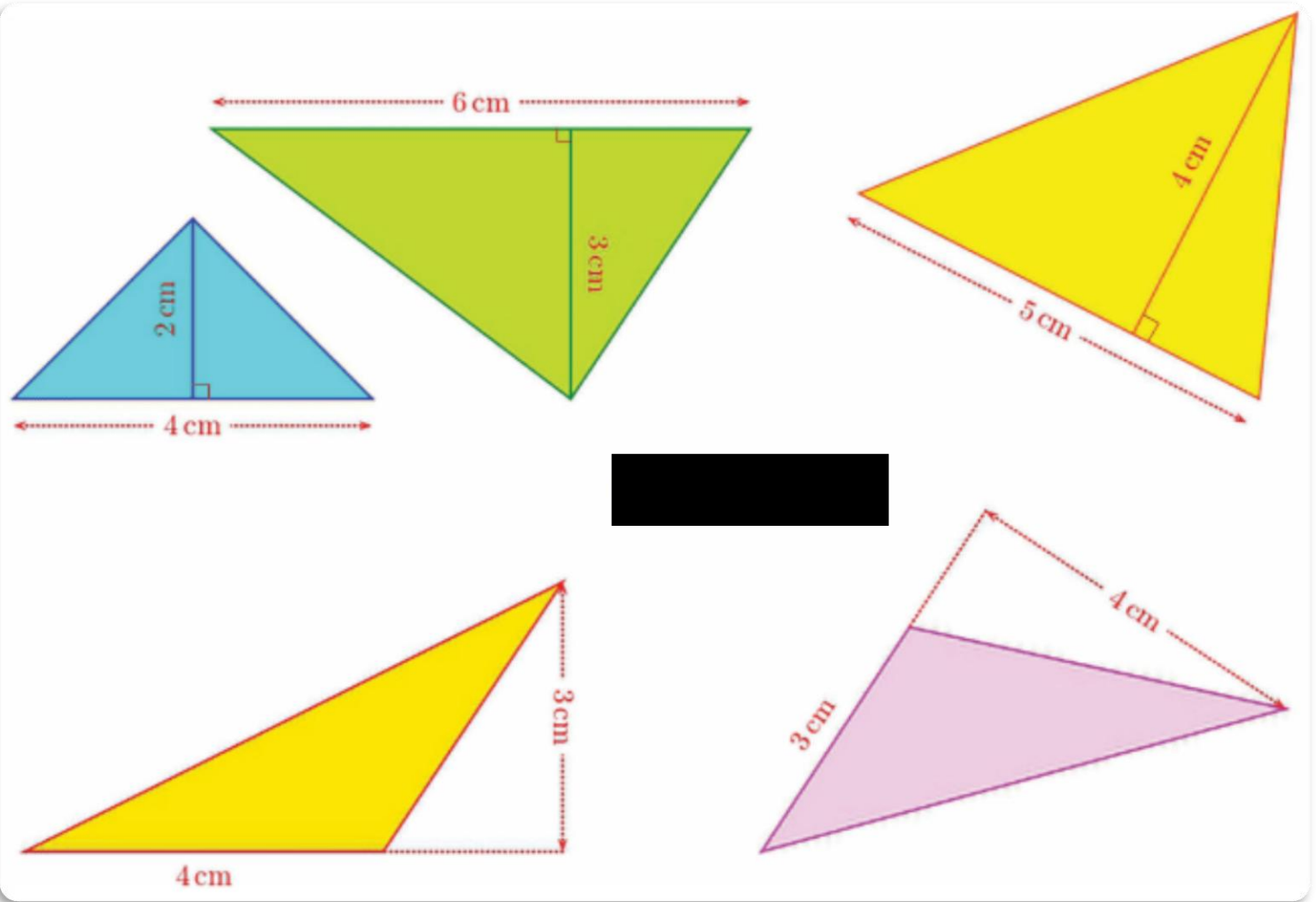
AREA OF A TRIANGLE



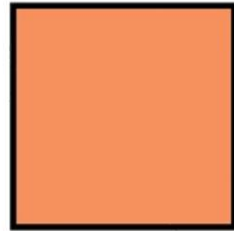
$$A = \frac{1}{2}bh$$

b = base

h = height



QUADRILATERALS



Square



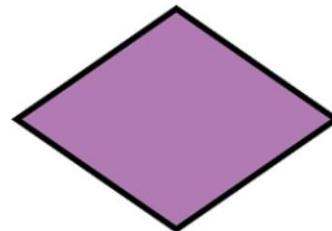
Rectangle



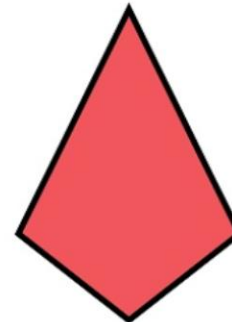
Parallelogram



Trapezoid



Rhombus



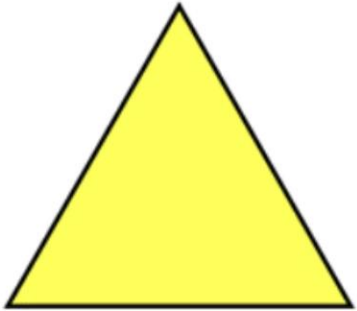
Kite

AREA OF QUADRILATERALS

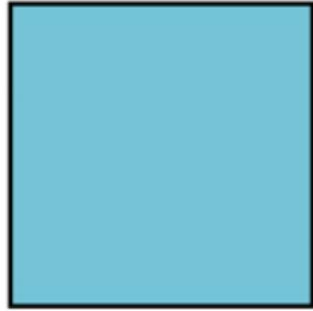
| Shape | Formula | Variables |
|---------------|-------------------------------|---------------------------------------|
| Square | Area = a^2 | a = side length |
| Rectangle | Area = l x w | l = length, w = width |
| Parallelogram | Area = b x h | b = base, h = vertical height |
| Rhombus | Area = $d_1 \times d_2 / 2$ | d_1, d_2 = lengths of the diagonals |
| Trapezoid | Area = $(a + b) \times h / 2$ | a, b = parallel sides, h = height |
| Kite | Area = $d_1 \times d_2 / 2$ | d_1, d_2 = lengths of the diagonals |

POLYGONS

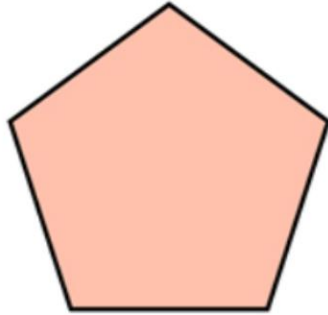
Polygons



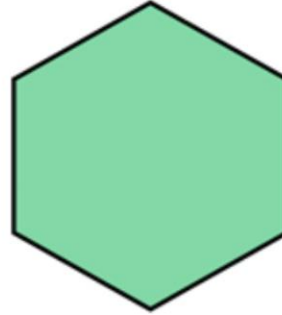
Triangle



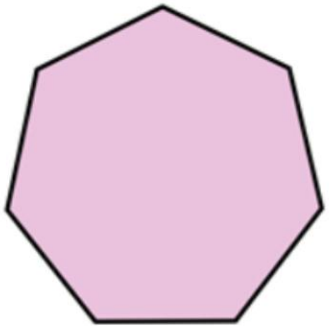
Quadrilateral



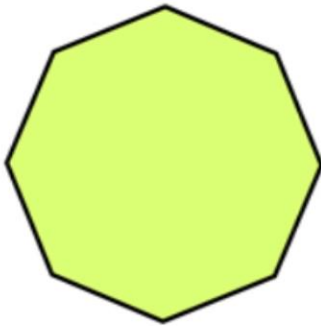
Pentagon



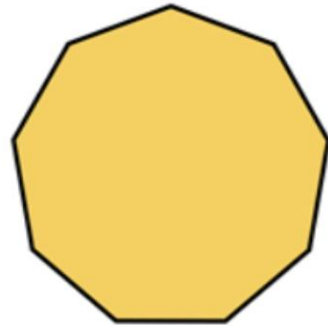
Hexagon



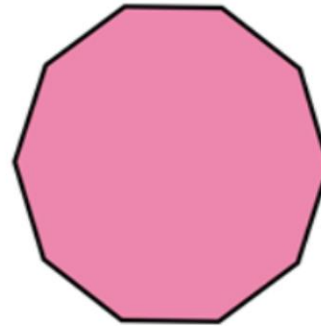
Heptagon



Octagon



Nonagon



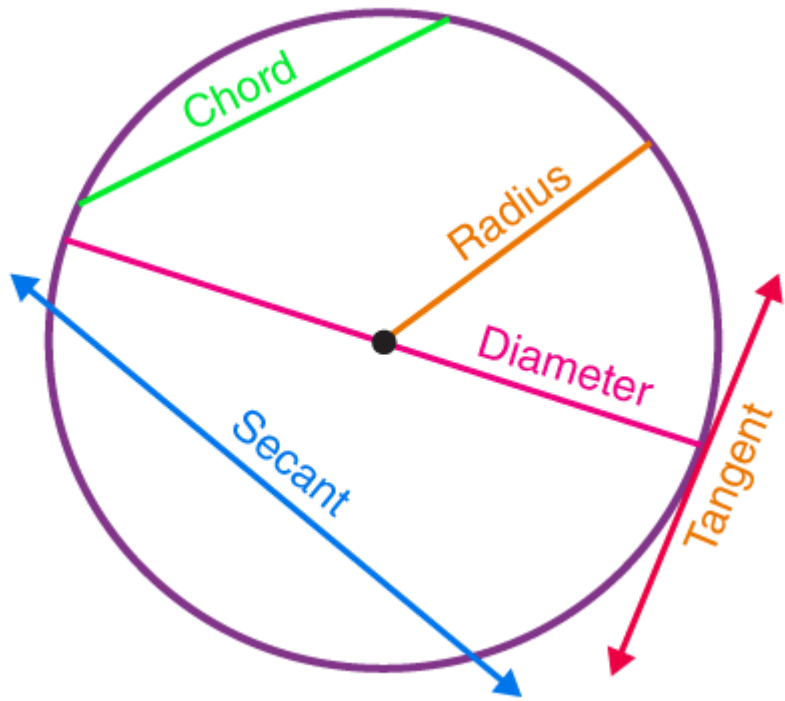
Decagon

$$\text{sum} = (n - 2) * 180^\circ$$

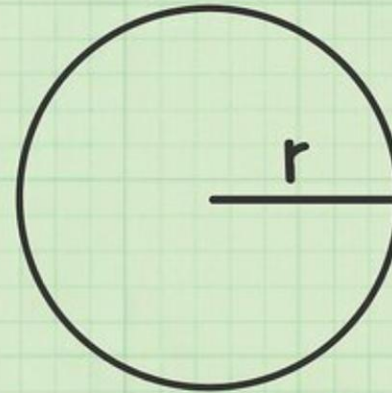
sum the sum of the interior angles of the polygon

n the number of sides in the polygon

CIRCLES



Area of a circle



$$A = \pi \cdot r^2$$

- **Center:** The exact middle point of the circle.
- **Radius (r):** The distance from the center to any point on the edge.
- **Diameter (d):** The distance across the circle passing through the center. It is always twice the radius ($d = 2r$).
- **Circumference (C):** The total distance around the edge of the circle (its perimeter).
- **Chord:** A line segment connecting any two points on the circle's edge.
- **Arc:** A portion of the circumference.

Pi

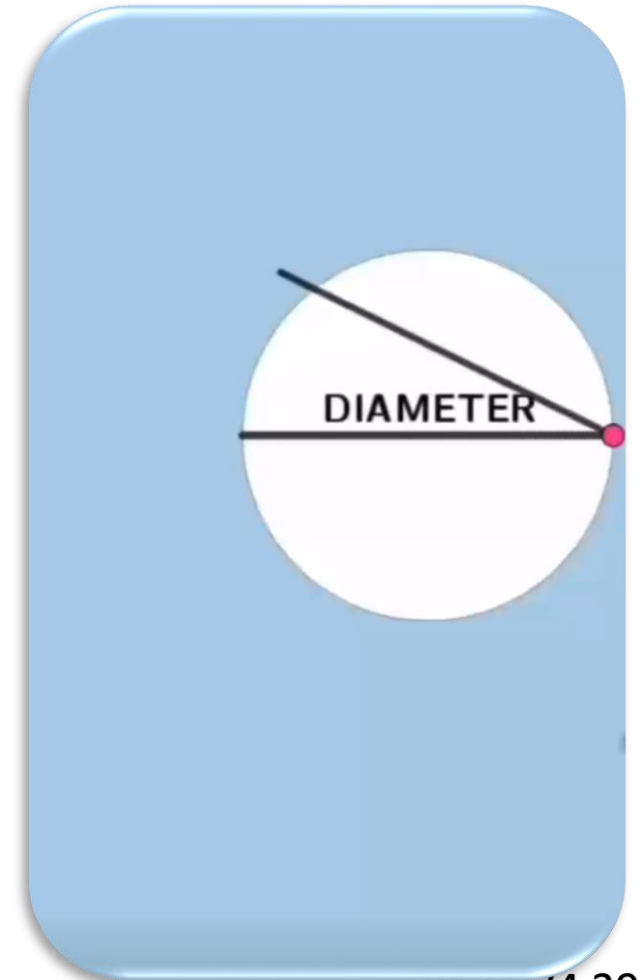
If you take any circle—a coin, a wheel, or a planet—and divide its **Circumference (C)** by its **Diameter (d)**, you will always get Pi.

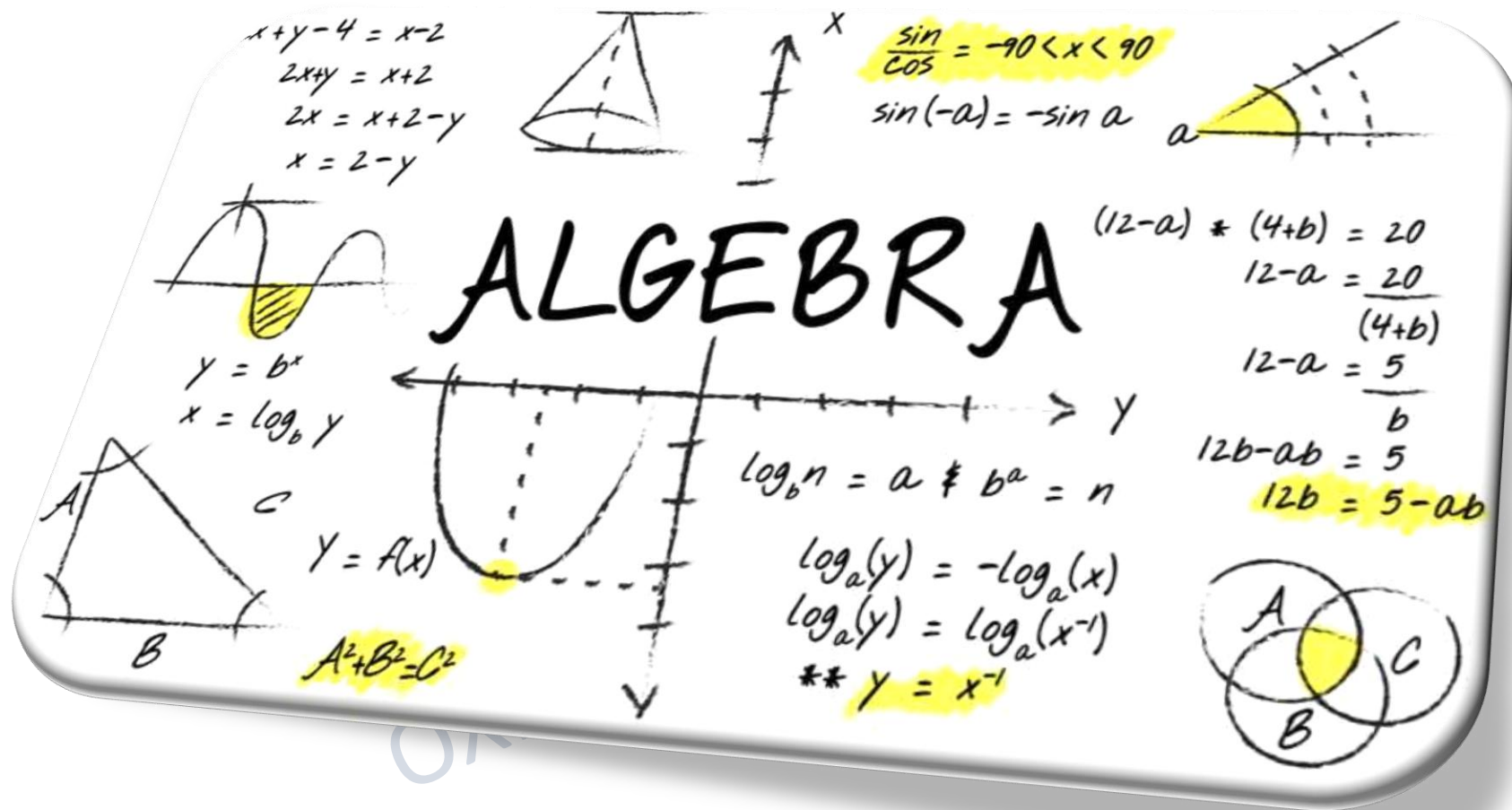
$$\pi = C/d$$

π

=

3.1415926535897932384626433832795028841971693993751058209749445923078164062862089986280348253421170679.





Algebra is one of the most powerful branches of mathematics because it allows us to move from solving specific problems with fixed numbers to solving general problems using **variables**.

$$2x - 3 = -7$$

Think of algebra as a "mathematical shorthand" that describes relationships.

Instead of saying "I have some apples, and if I get 5 more, I'll have 12,"

we write: $x + 5 = 12$

Core Concepts

$$2x - 3 = -7$$

- **Variables:** Letters (like x , y , z) that represent unknown numbers.
- **Constants:** Fixed numbers that don't change (like 5, -10, or $1/2$).
- **Expressions:** A combination of numbers, variables, and operations (e.g., $3x + 7$). These do **not** have an equals sign.
- **Equations:** A statement that two expressions are equal (e.g., $2x = 10$). The goal is usually to "solve for x ."

The Golden Rule of Algebra

Whatever you do to one side of the equation, you must do to the other side.

If you add 5 to the left, you must add 5 to the right to keep the "balance."

- Like Terms: $2x + 3x = 5x$ (They have the same "family" name).
- Unlike Terms: $2x + 3y$ cannot be added into a single term (They are like apples and oranges).

Transposition Method

When moving a number across the "equal to" (=) sign, its operation changes:

+ becomes -

- becomes +

× becomes ÷

÷ becomes ×

$$3x - 5y + 3 = 24$$



$$\text{Solve : } 2x + 5 = 15$$

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RATIOS

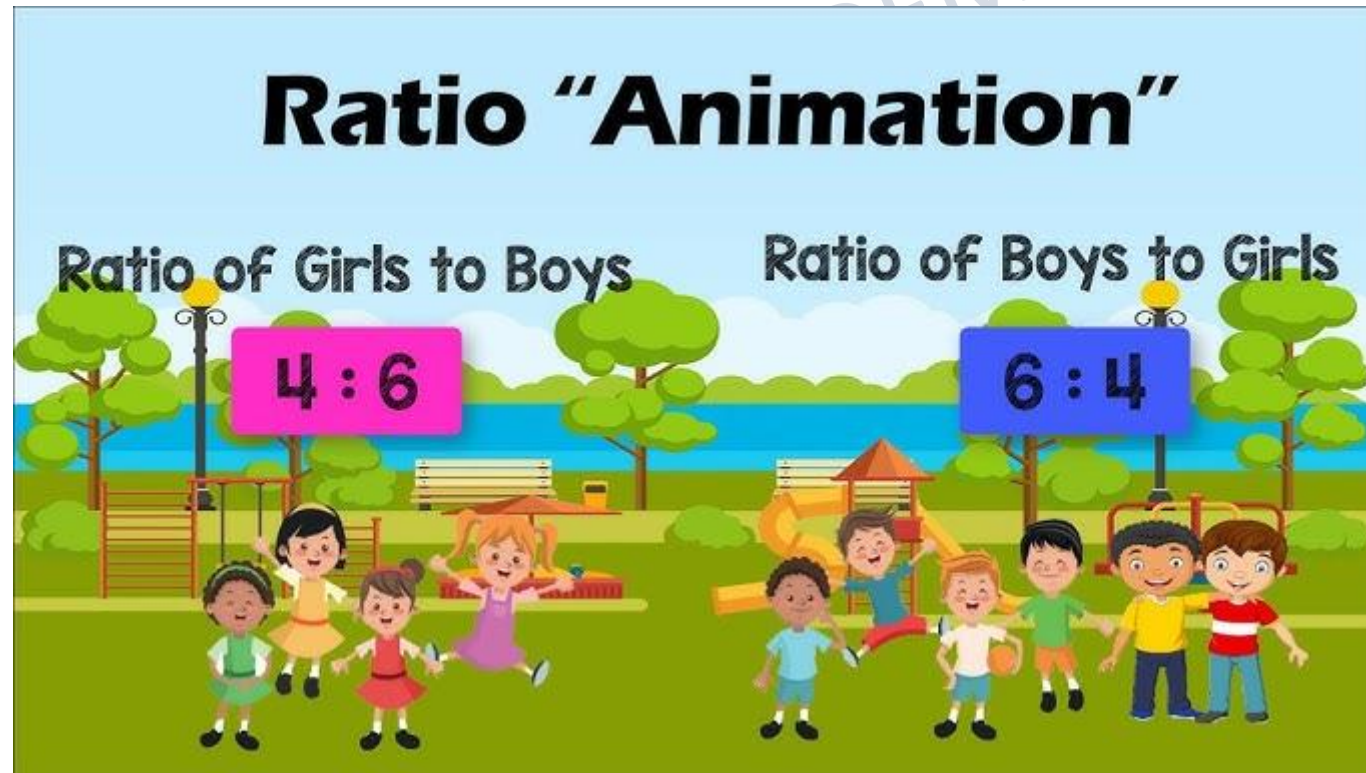
The Concept of Ratio

A ratio is a way of comparing two or more quantities of the same kind (same units) by division.

- **Notation:** If we compare a and b, we write it as a:b (read as "a is to b") or as a fraction as $\frac{a}{b}$
- **Simplest Form:** Just like fractions, ratios should always be reduced. 10:20 becomes 1:2.



The Golden Rule: Ratios have no units. If you compare 2 kg to 500 g, you must convert them both to grams first (2000:500, which simplifies to 4:1).



Percentage

Percentage is a way of expressing a number as a fraction of **100**. The word comes from the Latin *per centum*, which literally means "by the hundred."

| | |
|------------------------------|------------------------------|
| $1\% = \frac{1}{100}$ | $66.\dot{6}\% = \frac{2}{3}$ |
| $10\% = \frac{1}{10}$ | $75\% = \frac{3}{4}$ |
| $20\% = \frac{1}{5}$ | $100\% = 1$ |
| $25\% = \frac{1}{4}$ | $150\% = 1\frac{1}{2}$ |
| $33.\dot{3}\% = \frac{1}{3}$ | $200\% = 2$ |
| $50\% = \frac{1}{2}$ | $250\% = 2\frac{1}{2}$ |

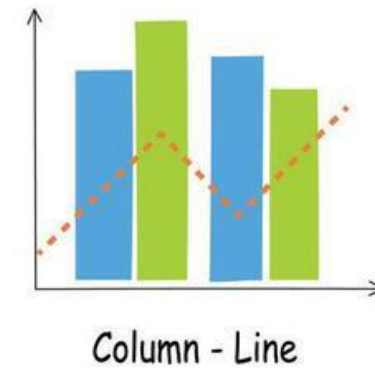
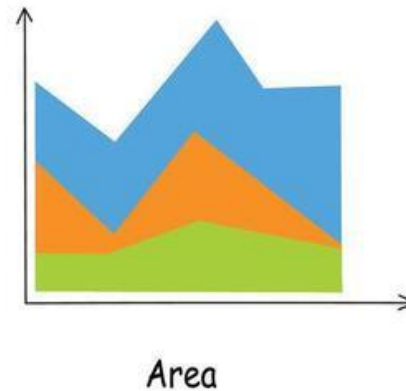
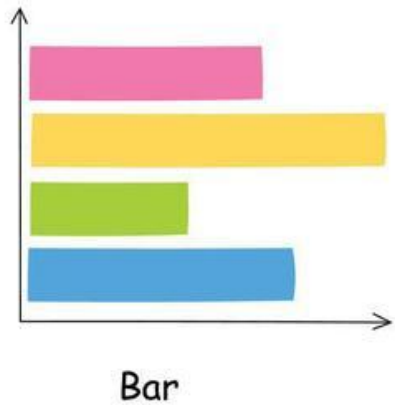
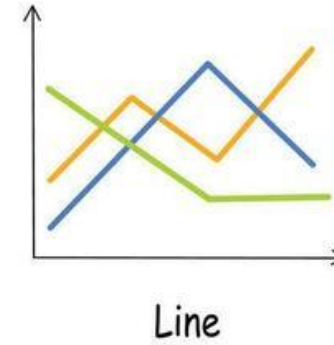
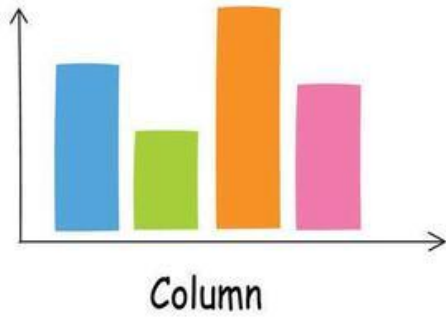
$$\text{Percentage} = \left(\frac{\text{Part}}{\text{Whole}} \right) \times 100$$

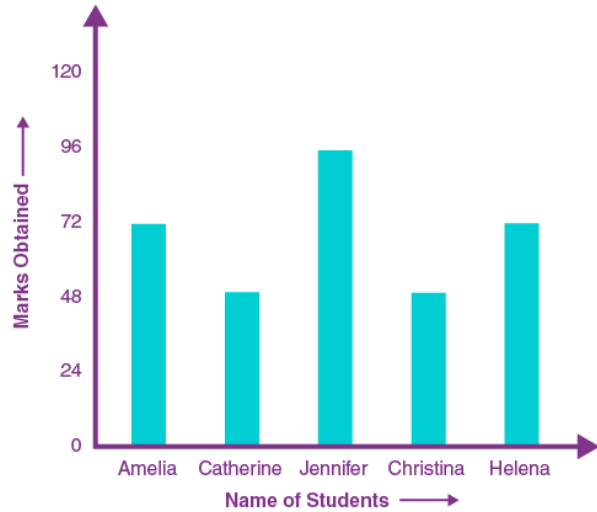
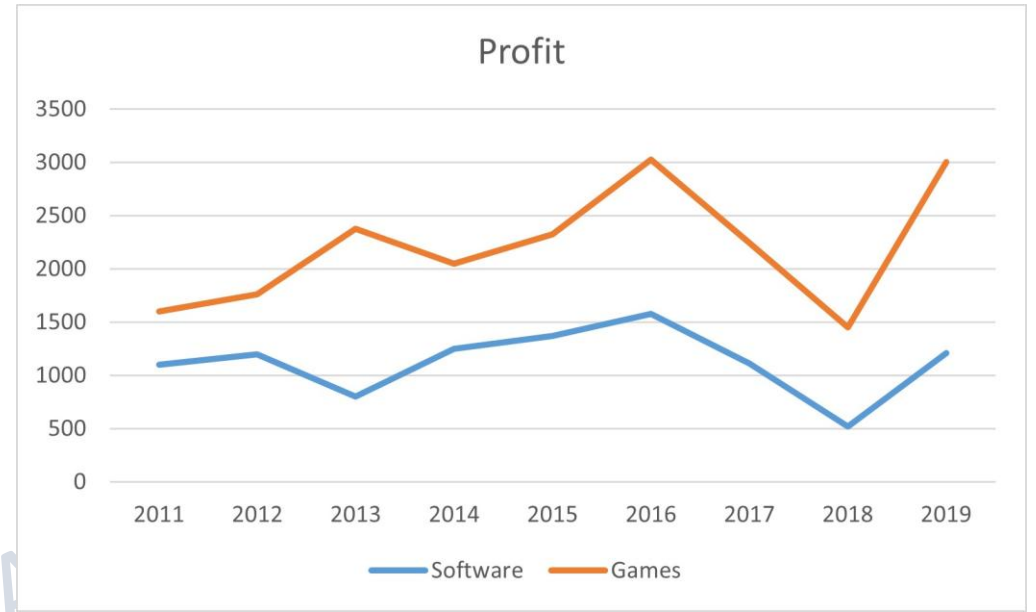
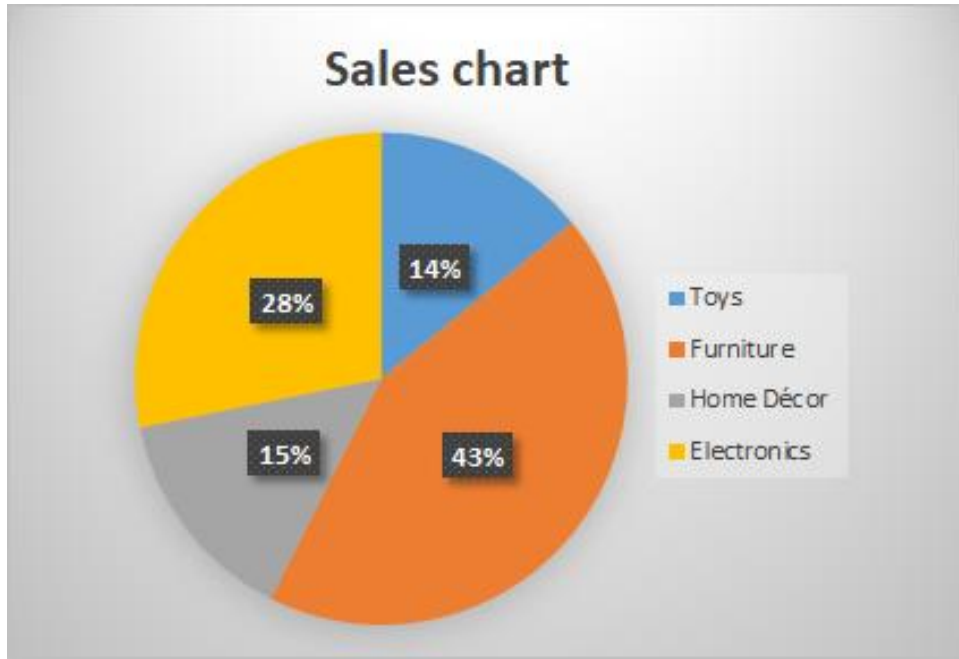
Solve this

1. A local library has **600** books. If **15%** of the books are detective novels, how many detective novels does the library have?
2. A small tutoring center had **80** students enrolled last year. This year, the enrollment increased by **25%**. How many students are enrolled at the center now?
3. A shop offers a **10% discount** on a specific study material. If the discount amount is **₹45**, what was the original price of the material before the discount?

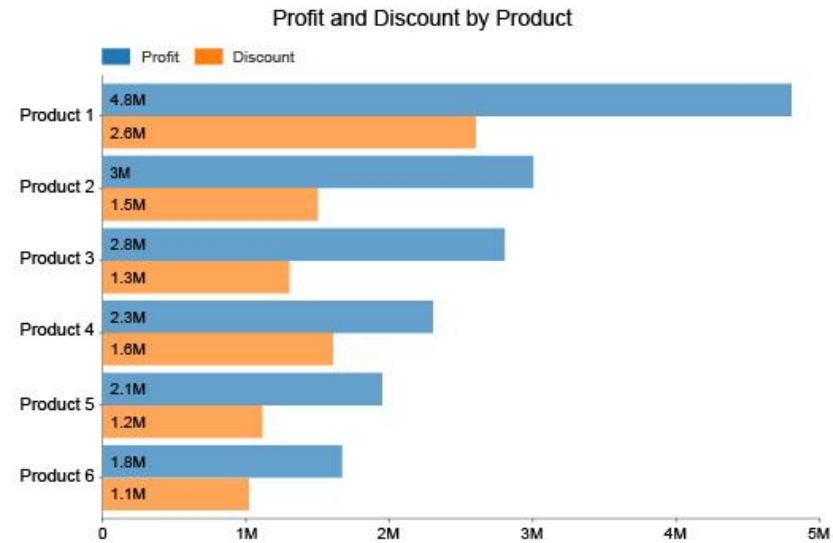
Graphs

CHART TYPES





ORD AC



A group of 10 students was asked about their favorite fruit. The results are:
Draw a Bar Chart

- **Apple:** 4 students
- **Banana:** 3 students
- **Mango:** 2 students
- **Orange:** 1 student

The table below shows the number of hours Rahul spent studying different subjects on Sunday: Draw a bar chart.

| Subject | Hours Spent |
|----------------|--------------------|
| Mathematics | 3 |
| Science | 2 |
| English | 1 |
| Social Science | 2 |

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