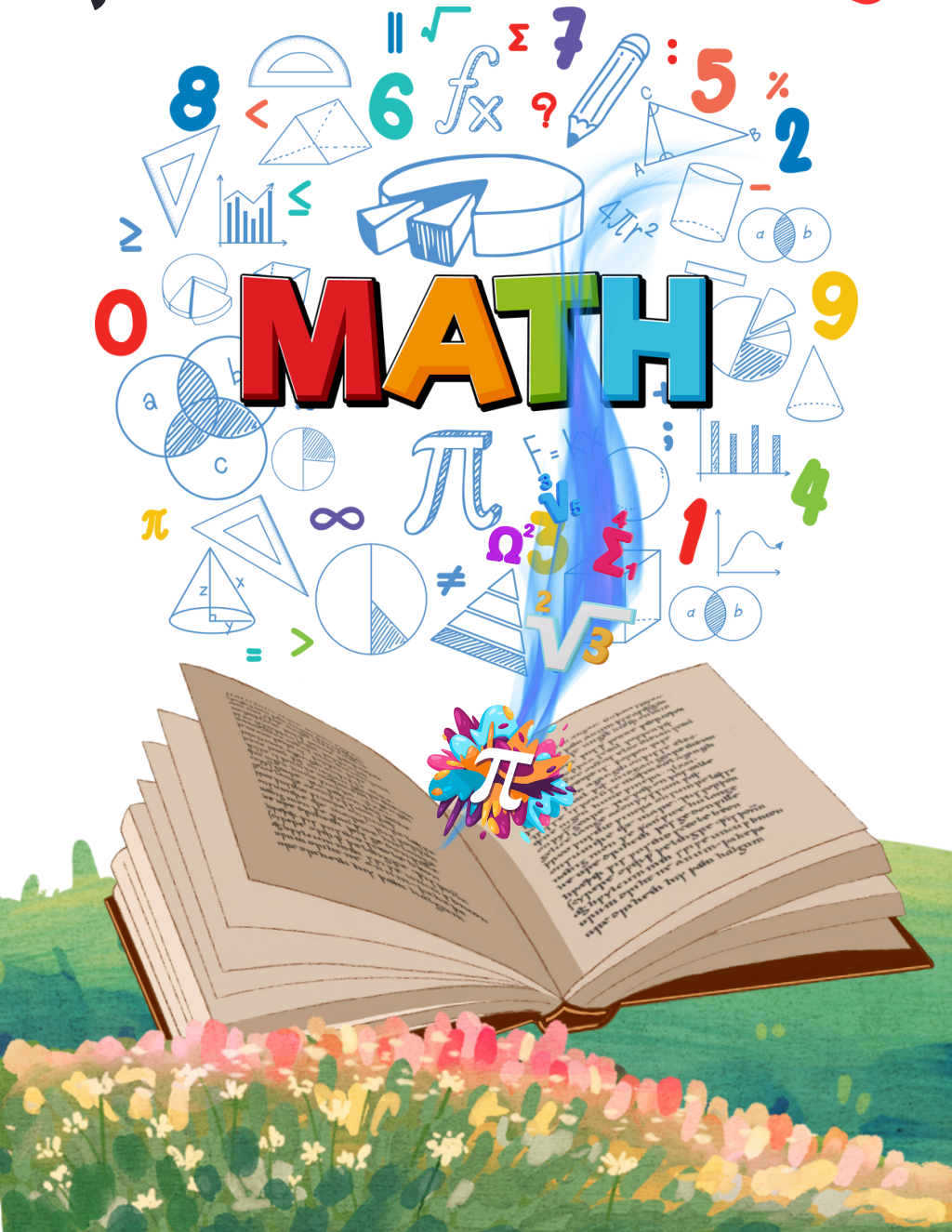
# MATHS FORMULAS



# Basic Arithmetic

- **Addition and Subtraction:**
  $a + b = c, a - b = c$

- **Multiplication and Division:**
  $a \times b = c, a \div b = c$

# Geometry

- **Area of a Rectangle:**
  $A = \text{length} \times \text{width}$

- **Area of a Triangle:**
  $A = 1/2 \times \text{base} \times \text{height}$

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# Geometry

- **Perimeter of a Rectangle:**

  $P = 2(l + w)$

- **Circumference of a Circle:**

  $C = 2\pi r$

- **Surface Area of a Cylinder:**

  $A = 2\pi r(r + h)$

- **Sum of Interior Angles of a Polygon**

  $(n - 2) \times 180^\circ$

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# Sequences and Series

- **Arithmetic Sequence (nth term)**

$$a_n = a_1 + (n - 1)\,d$$

- **Sum of an Arithmetic Series**

$$S_n = n/2\,(2a + (n - 1)\,d)$$

# Coordinate Geometry

- **Distance Formula (2D):**

$$\sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2]}$$

- **Midpoint Formula (2D):**

$$[(x_1 + x_2)/2, (y_1 + y_2)/2]$$

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# Algebraic Identities:

- $(a + b)^2 = a^2 + 2ab + b^2$
- $(a - b)^2 = a^2 - 2ab + b^2$
- $a^2 - b^2 = (a + b)(a - b)$
- $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$
- $(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$
- $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

# Pythagorean Identities

- $\sin^2(\theta) + \cos^2(\theta) = 1$
- $1 + \tan^2(\theta) = \sec^2(\theta)$
- $1 + \cot^2(\theta) = \csc^2(\theta)$

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# Angle Sum/Difference

- sin(A + B) = sinAcosB + cosAsinB
- sin(A - B) = sinAcosB - cosAsinB
- cos(A + B) = cosAcosB - sinAsinB
- cos(A - B) = cosAcosB + sinAsinB
- tan(A + B) = (tanA + tanB) / (1 - tanAtanB)
- tan(A - B) = (tanA - tanB) / (1 + tanAtanB)

# Reciprocal Ratios

- csc(θ) = 1 / sin(θ)
- sec(θ) = 1 / cos(θ)
- cot(θ) = 1 / tan(θ)

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# Calculus

- Derivative of $x^n$: $nx^{n-1}$
- Derivative of sin(x): cos(x)
- Derivative of cos(x): -sin(x)
- Derivative of $e^x$: $e^x$
- Product Rule: (uv)' = u'v + uv'
- Quotient Rule: (u/v)' = (u'v - uv') / $v^2$
- Chain Rule: dy/dx = dy/du * du/dx
- Integral of $x^n$: $(x^{n+1}) / (n + 1) + C$
- Integral of sin(x): -cos(x) + C
- Integral of cos(x): sin(x) + C
- Integral of $e^x$: $e^x + C$

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