

MATHS PROJECT

Presentation

The Team



B.PAVITHRA



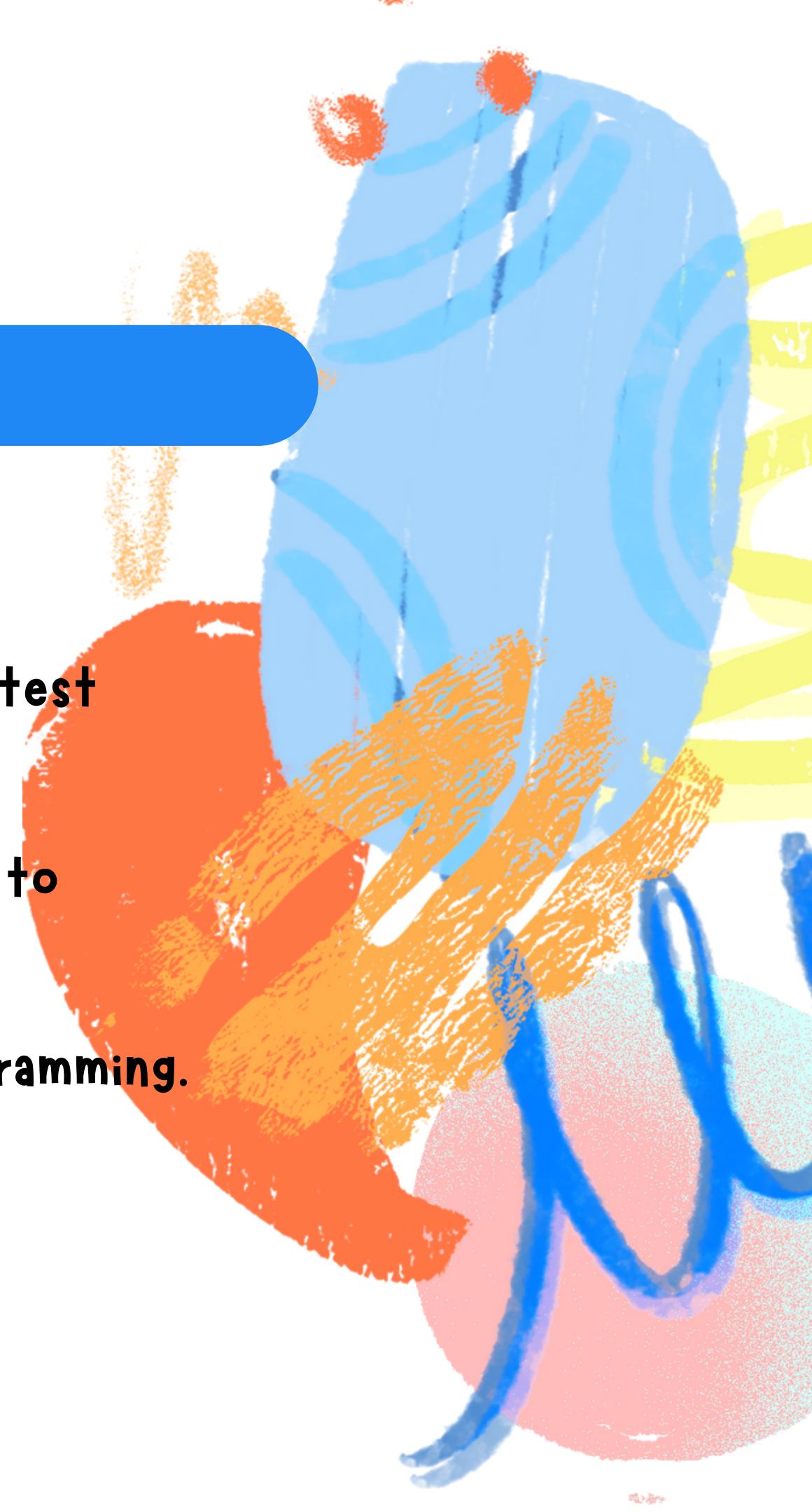
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Computer Engineering

- Math is used extensively in computing.
- People willing to pursue a career in computer science use discrete math to test different algorithms and hypotheses.
- Relational databases and logic gates often use concepts of Boolean algebra to produce significant results.
- You also get to learn logical thinking alongside the basics of software programming.



Engineering especially in Electrical engineering

- Calculus is most important in Electrical engineering field.
- From circuit theory to control systems, from thermodynamics to microprocessors, digital signal processing, linear control system, high voltage engineering, robotics, micro controller with program and illumination, solar, energy structures, communication all are based on this pillar.
- In the field of voltage generator, computation of current, power, efficiency, RLC circuits and other useful quantities are relies on the knowledge of trigonometric identities.
- Linear algebra is used in digital signal processing, communication systems, error control coding, circuit analysis, robotics circuits and power systems.
- To find the probability of signals and events in telecommunication systems and random events, Probability and Statistics is important.
- For real example:
- Current i Amps am the rate of change of charge q Coulombs. That is Current, $I = dq/dt$.
- . In electromagnetism Stokes and Divergence theorems are utilized as a part of depicting basics of electricity produced via friction

Mechanical engineering

- Mechanical engineers use math and physics formulas to determine the amount of energy and force produced by a machine.
- A mechanical engineer designs, develops, builds, and tests mechanical devices, engines, and machines. They are involved in many different industries, including automotive, aerospace, construction, energy, and manufacturing.



- **Mechanics of Materials** There are many applications of the subject such as in buildings and structures of cars and heavy equipment.
- An example of the application is in the determination of the deflection when a beam is given a partial triangle
- We will find the curve of deflection along the beam and determine the maximum deflection that occurs. The relationships between the bending moment M_x for the distance x from the left support and the deflection y is given by
- $$M_x = EI d^2y / dx^2$$

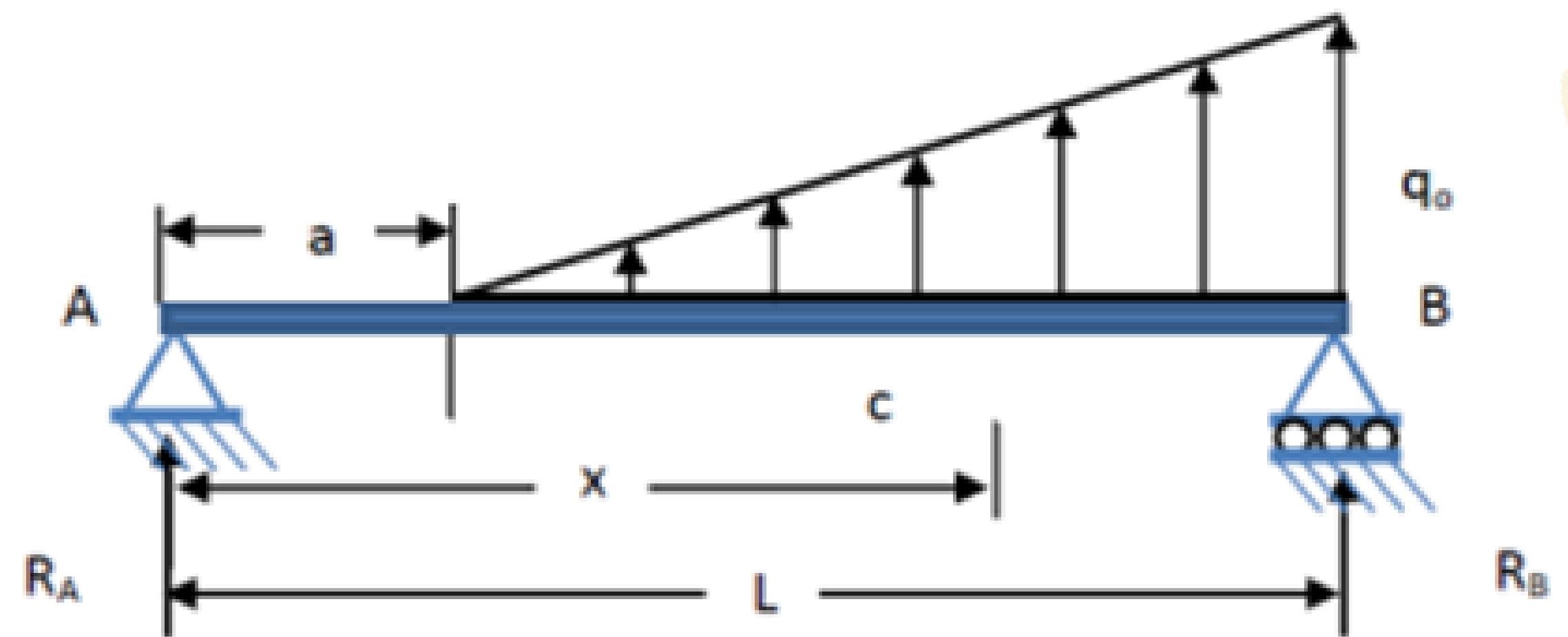


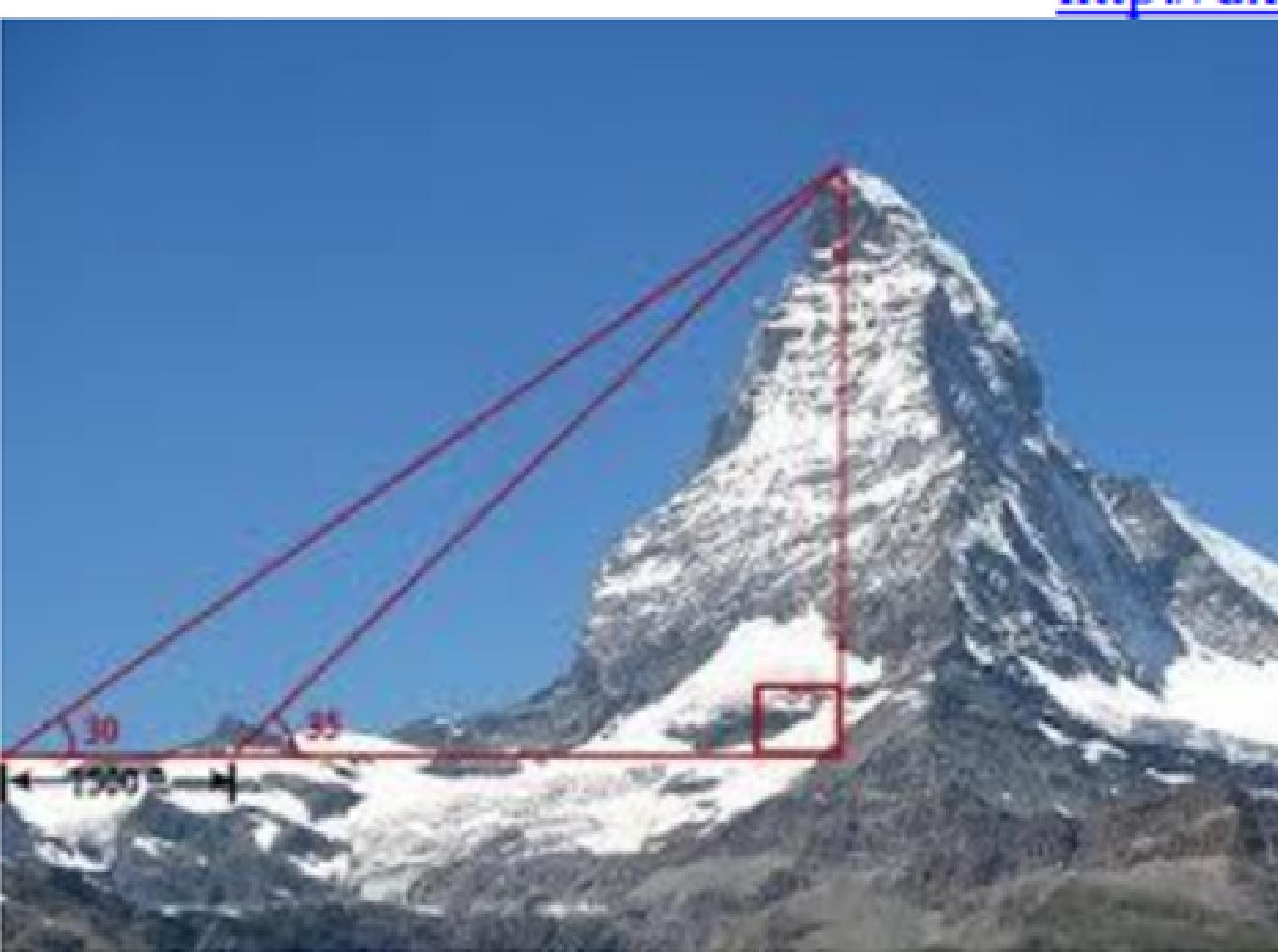
Figure 1 Partial triangular load on a simply supported beam

Maths Concepts That Are Applied In Civil Engineering

- Civil engineering deals with real-world problems using the application of mathematical principles like trigonometry, geometry, linear algebra, differential equations, calculus, probability, statistics, etc.



Civil engineers use Trigonometry often when surveying a structure. Surveying deals with land elevations as well as the various angles of structures.

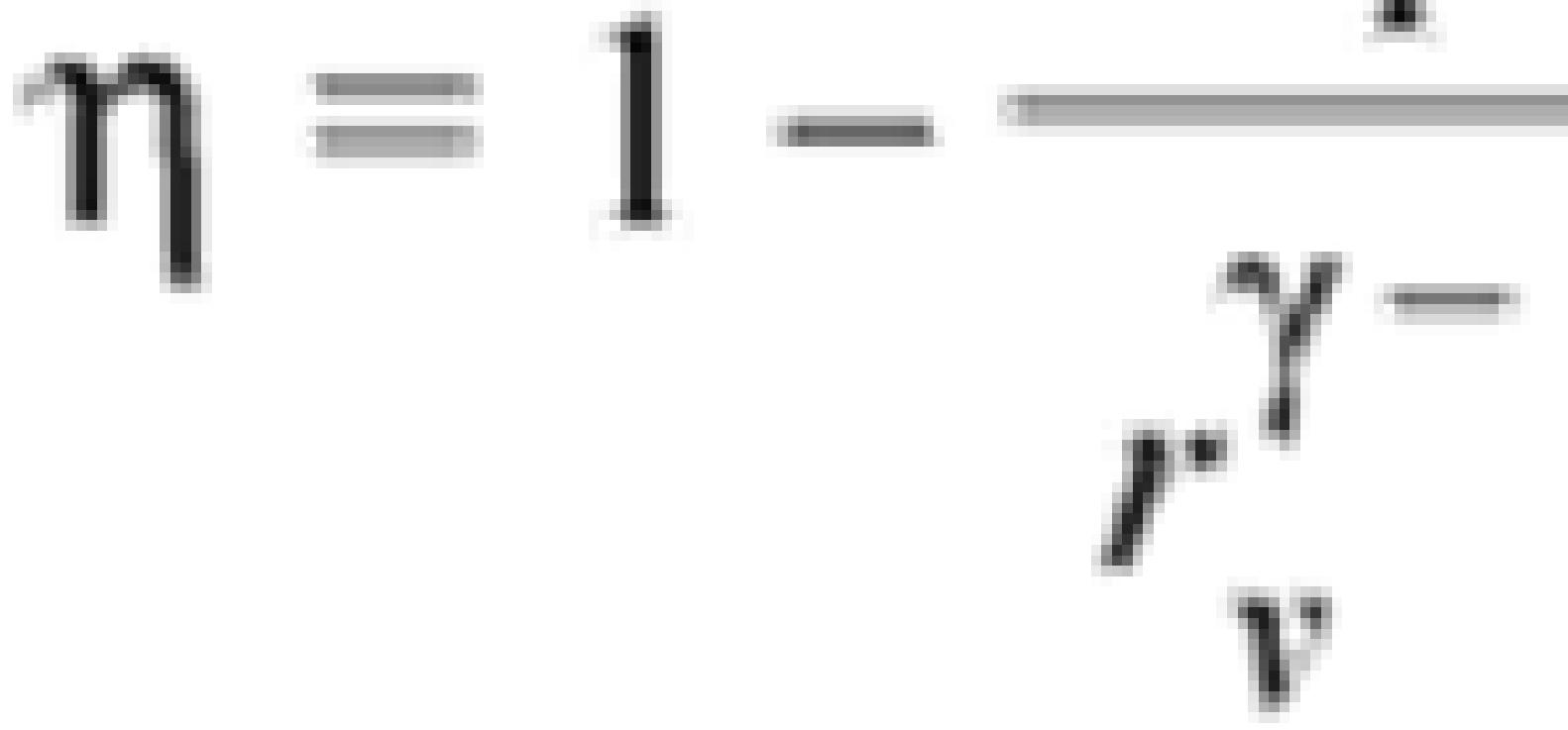
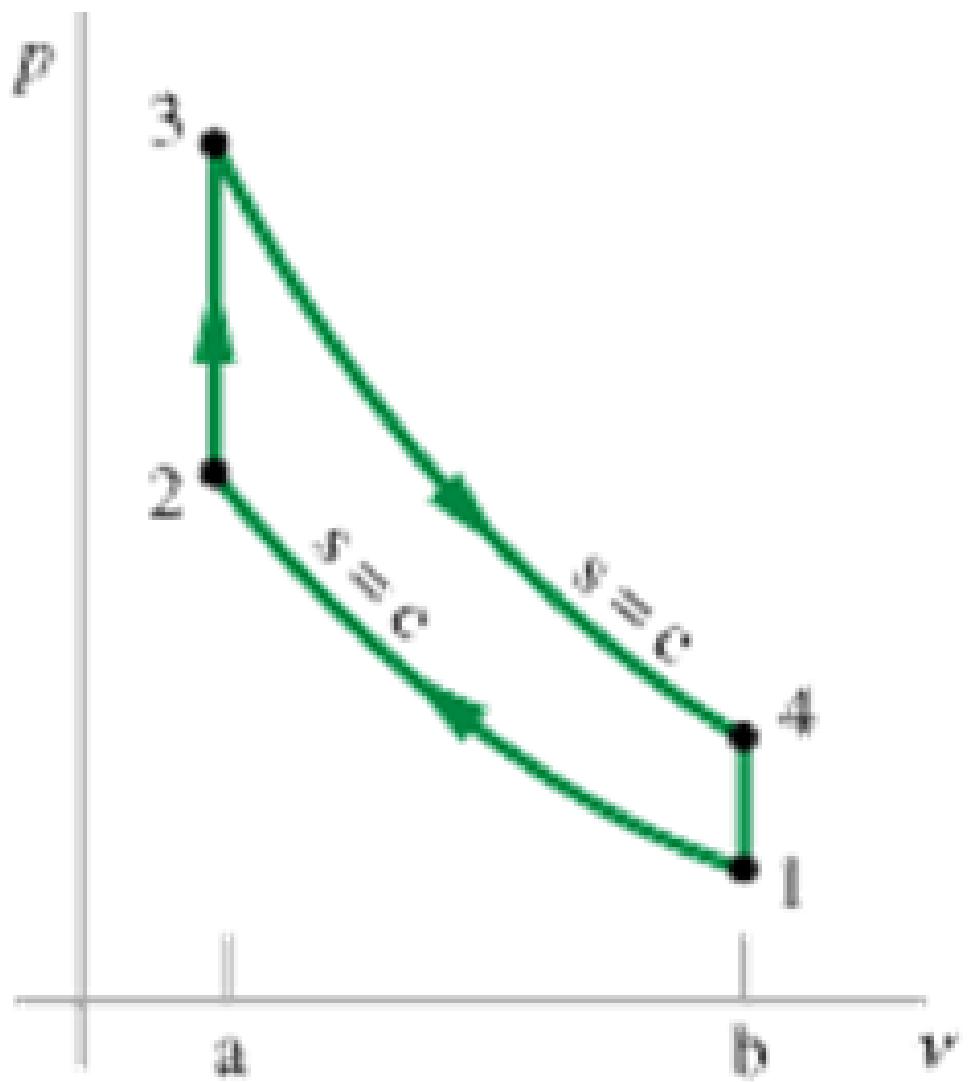


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Automobile Engineering

- The automobile industry is another field where engineers often use math formulas and equations.
- A lot of mathematical concepts and formulas are used while building an automobile.
- Automobile engineering uses **geometry** to calculate the relationship between tires and their **revolutions per minute(RPM)**. It is also useful for projecting quarter-mile and top-end speeds, among other things.
- Automobile engineers need to know the basic concepts of math, apart from having a working knowledge of physics and chemistry.

- AUTOMOBILE ENGINEERING
- Nikolaus Otto (German, 1832–1891), a scientist, developed a version of the internal combustion engine that was efficient enough for practical automobiles. Today, his Otto thermodynamic cycle is the scientific foundation for most gas-powered cars.



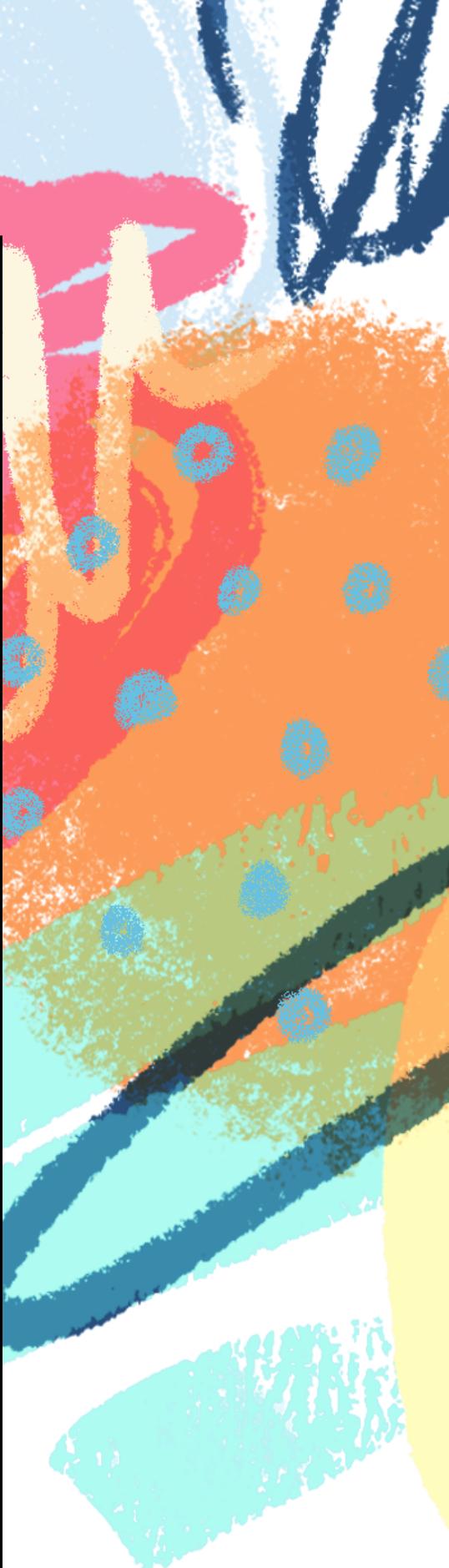
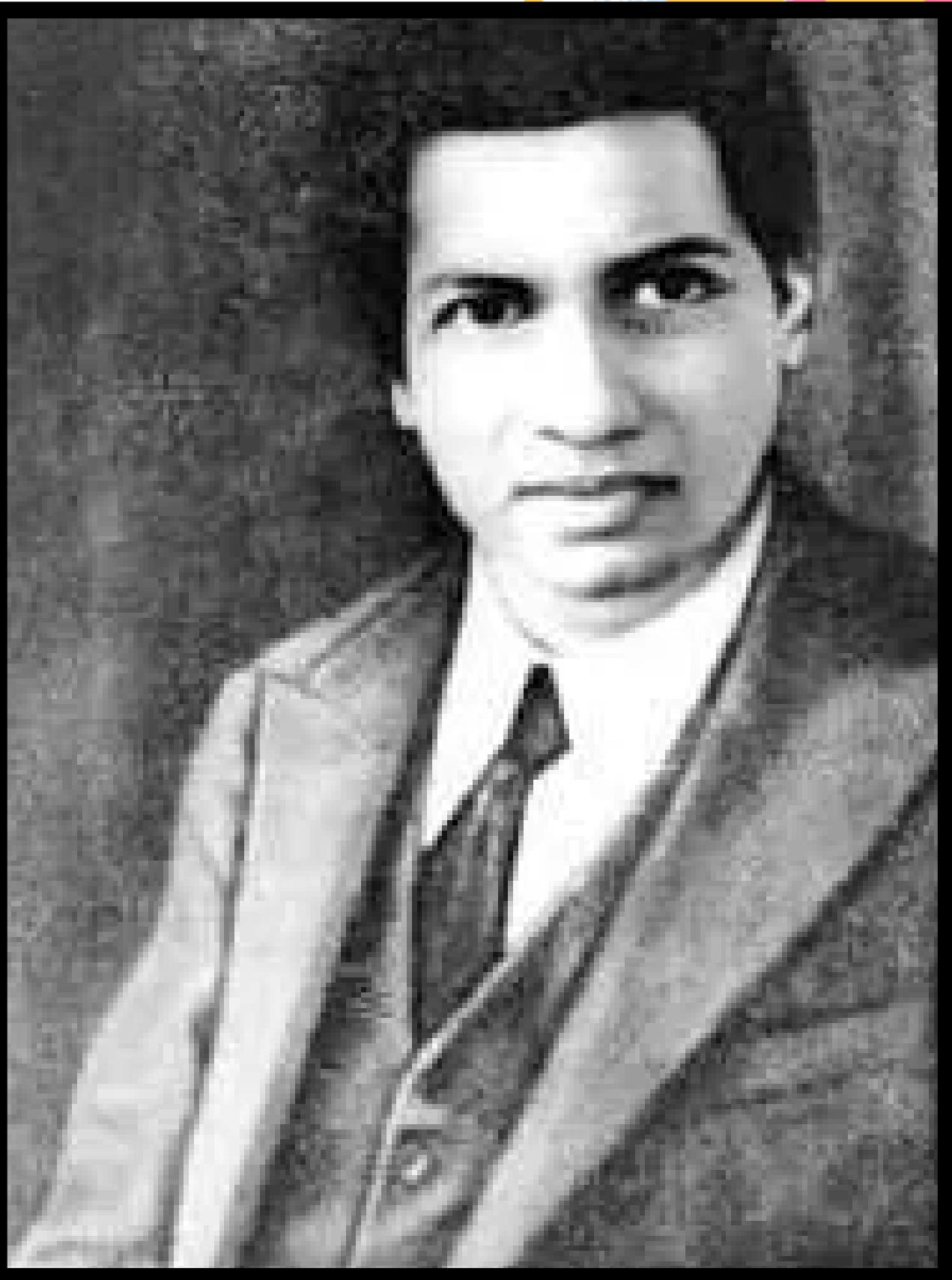
Specific Examples

- One of the simplest models ,Newton's second law that relates the force F acted on a body with a mass m to its acceleration a .
- That is $F = ma$. This is a linear relationship and thus a linear model.
- Apart from a simple mathematical formula, as a mathematical model, all the quantities involved such as force, mass and acceleration must have appropriate units.
- UNITS: F = Newton (N), mass =kilogram (kg),
acceleration (derived unit) (a combination of units)= m/s^2 .
- Ex:a person of 80 kg has a weight (the force acted upon the person by the Earth) is $W = mg$ where $g = 9.8 m/s^2$ is the acceleration due to gravity.
- That is $W = mg = 80 \text{ (kg)} \times 9.8 \text{ (m/s}^2\text{)} = 784 \text{ N}$.
- If the units are wrong, even a good model will give wrong values

Specific examples

- Viscoelasticity is an important phenomenon in engineering.
- For example, the behavior of chocolate flow, glasses, rubbers, plastic bags and a bicycle pump can be described by viscoelastic behavior. Loosely speaking, linear viscoelastic constitutive relationships or laws can be expressed as
- $$\sigma(t) = \sigma_0 + \% + 0 E(t - \eta) \epsilon(\eta) d\eta,$$
- where $\sigma(t)$ is the time-dependent stress and $\dot{\epsilon}$ is the strain rate that can also depend on time t . E is the so-called relaxation modulus, while σ_0 is a constant. This stress-strain relationship, unlike the generalized Hooke's law, is essentially a Volterra integral equation.

“An equation for me has no meaning, unless it expresses a thought of God.”



THANK YOU

REFERENCES:

- University websites
- Research gate
- MIT open source
- IJIET
- IJRTE