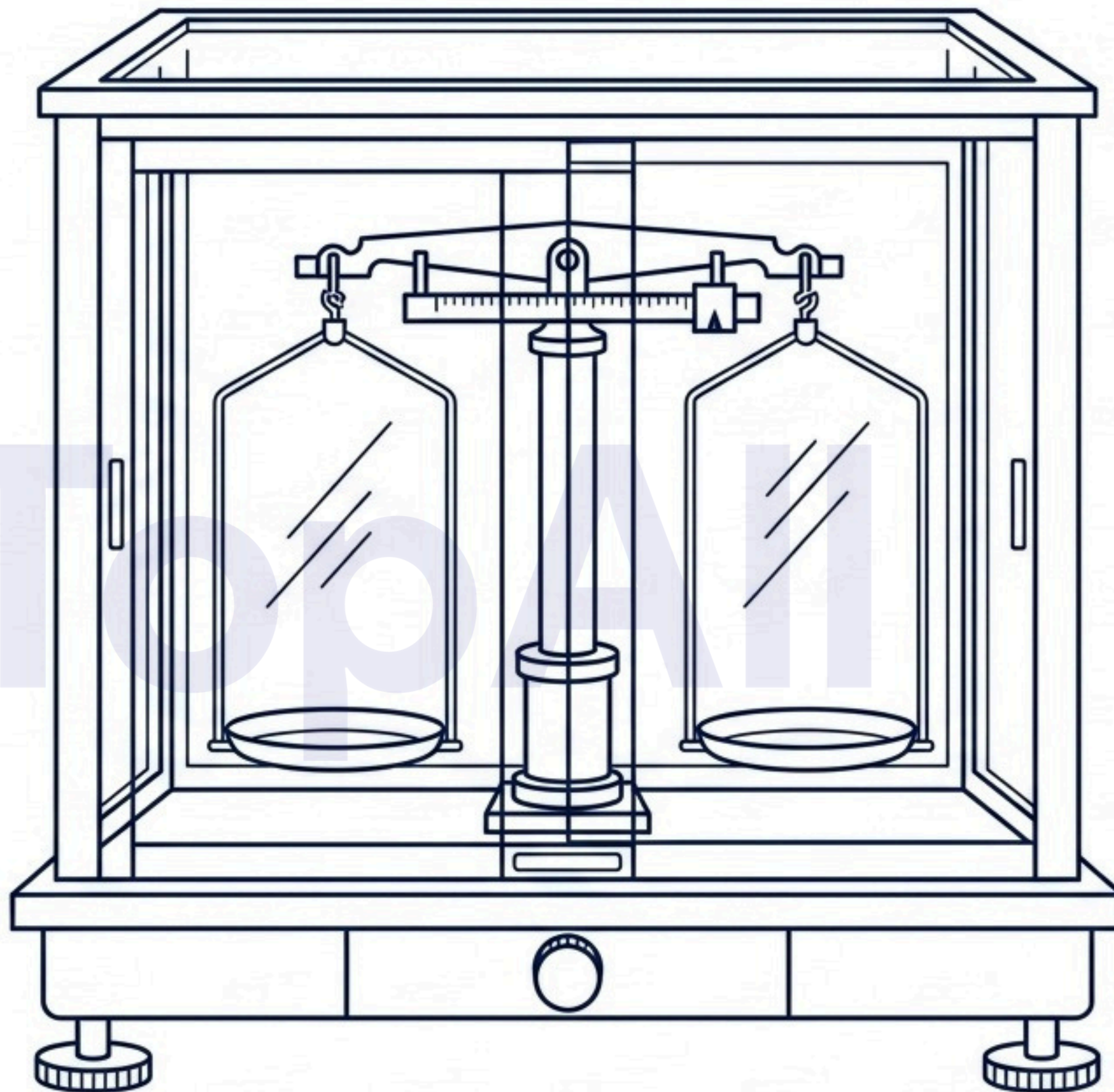


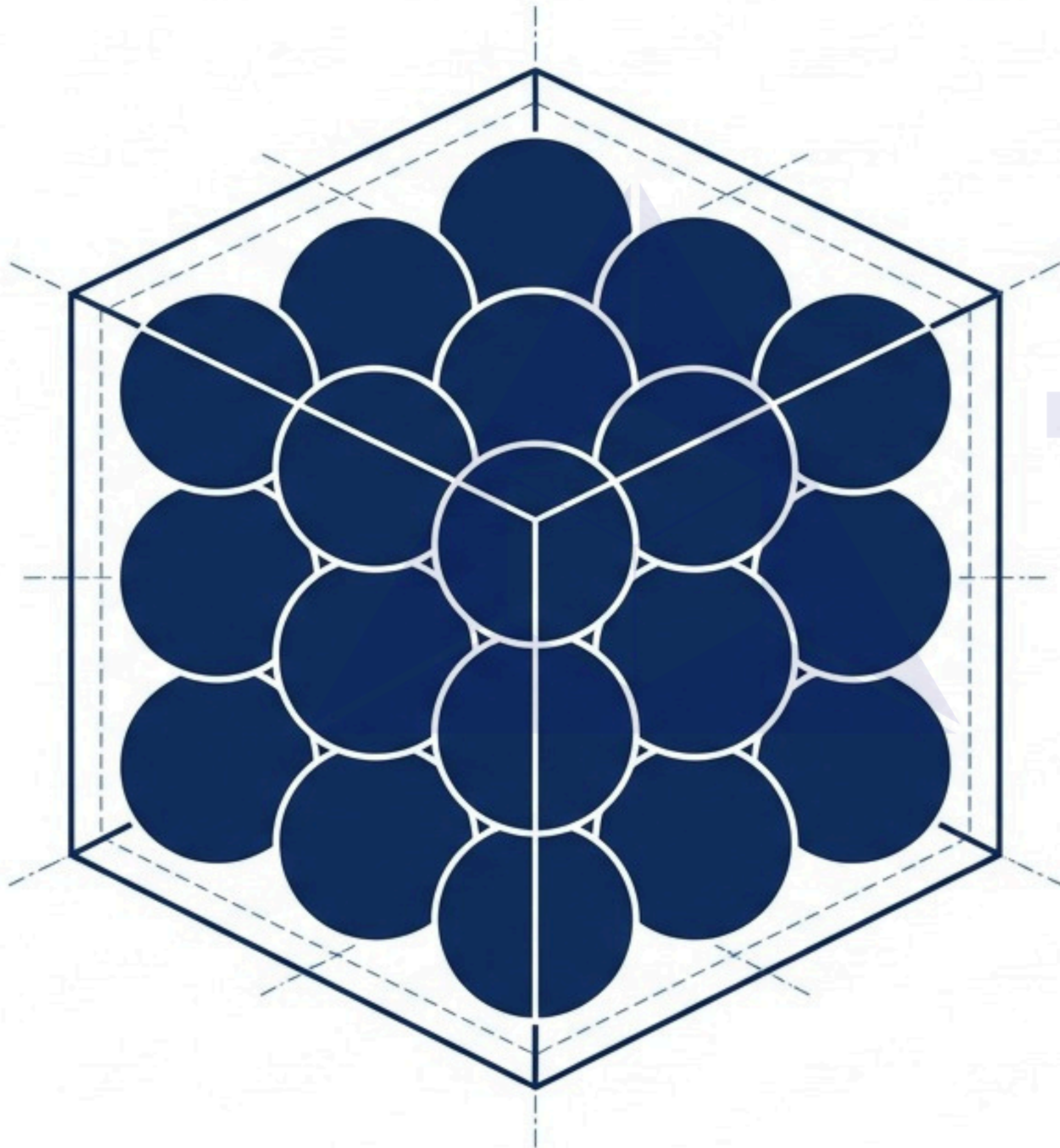


Mass vs. Weight

Foundational Concepts in Chemistry



Mass: The Intrinsic Property



Definition

The amount of matter present in a substance.

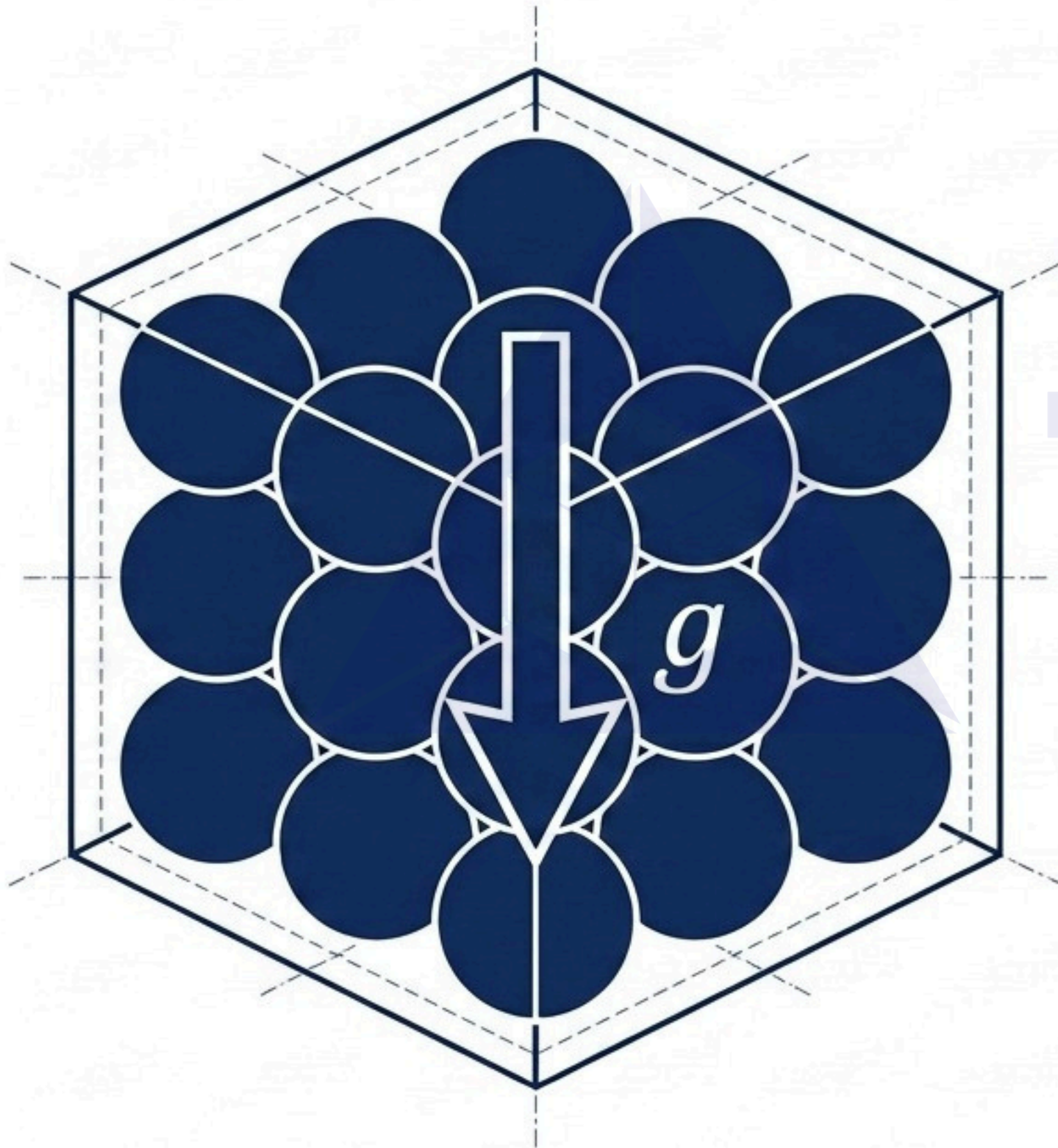
Nature

An intrinsic property (strictly internal to the object itself).

Constancy

Strictly constant, regardless of physical location in the universe.

Weight: The Extrinsic Force



Definition

The force exerted by gravity on an object.

Nature

An extrinsic property (highly dependent on the external environment).

Variability

May vary from one place to another due to changes in local gravity.



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$$E=mc^2$$



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Standard Units & Lab Applications

SI Unit of Mass = kilogram (kg)

Lab Scale Unit = gram (g)

Conversion Rule = $1 \text{ kg} = 1000 \text{ g}$

Why grams? Chemistry laboratories use smaller fractional units due to the tiny, precise amounts of chemicals required for reactions.



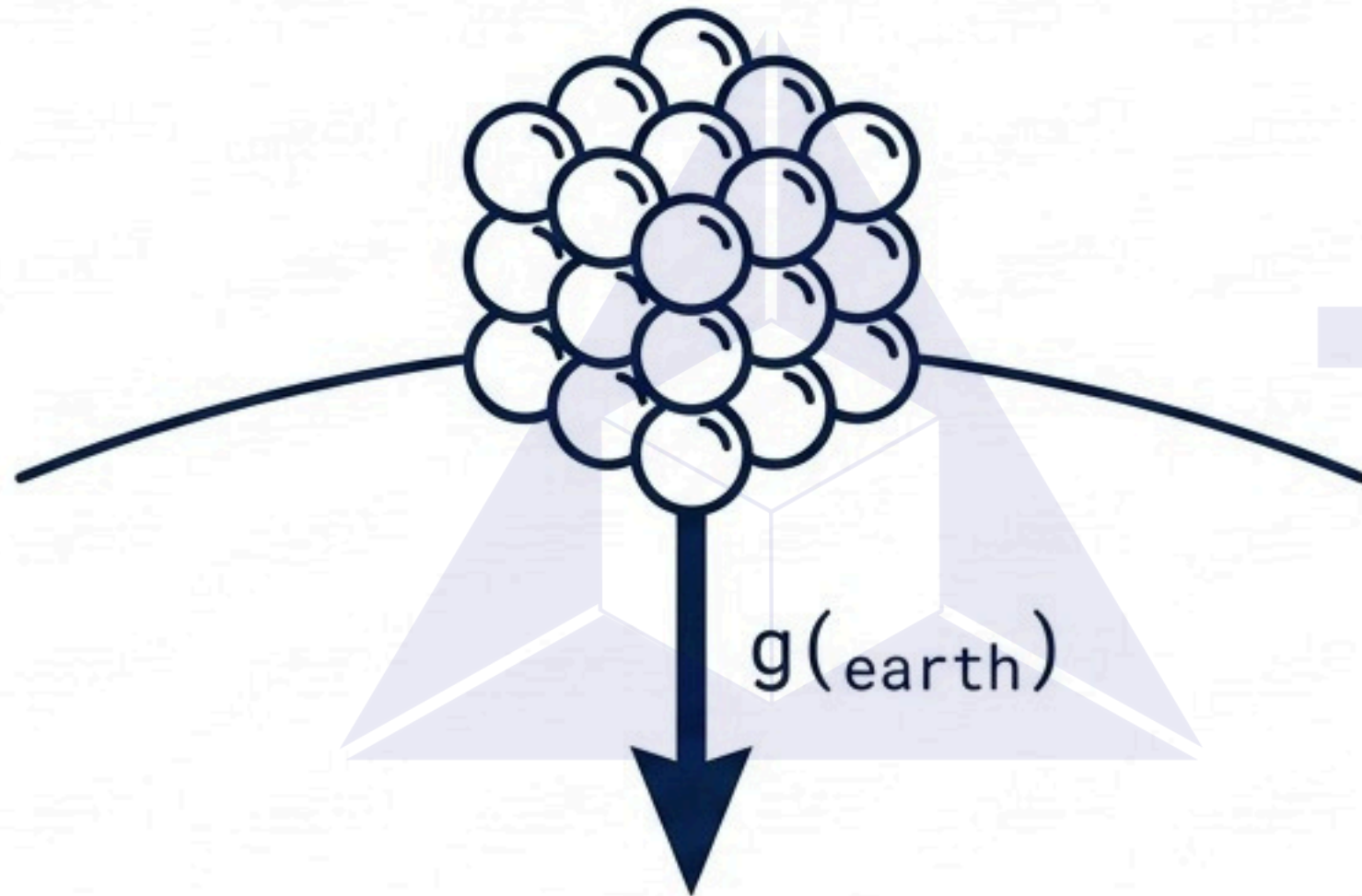
JEE TRAP ALERT

The Trap: Assuming mass and weight can be used interchangeably in calculations.

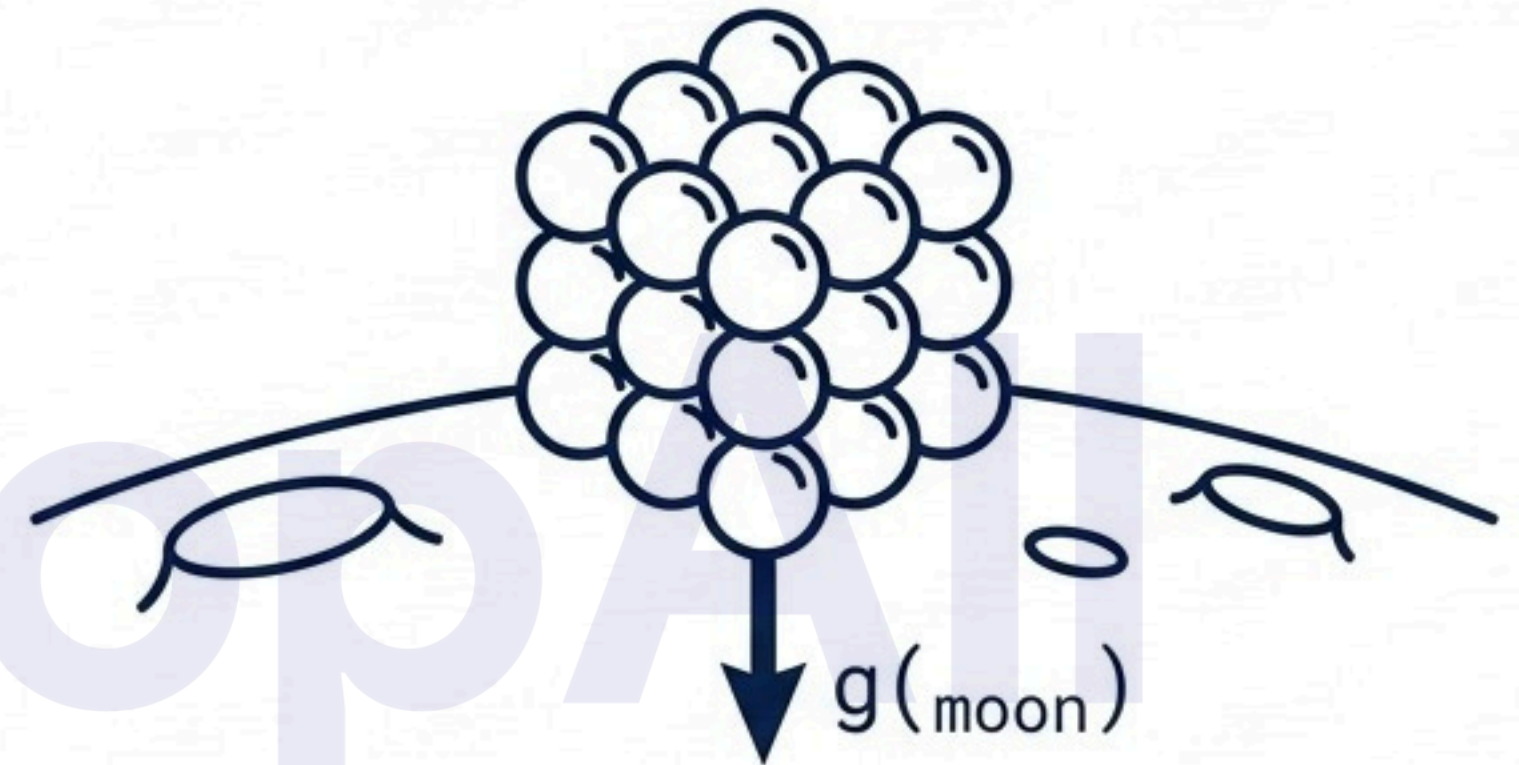
The Reality: Mass is strictly **CONSTANT**. Weight is **VARIABLE** and fluctuates based on local gravitational fields.

Mini Application: Gravitational Shift

Environment: Earth



Environment: Moon



Earth: Mass = m | Weight = $m \times g(\text{earth})$

Moon: Mass = m | Weight = $m \times g(\text{moon})$

The internal grid of matter (m) remains identical; only the external downward force (g) decreases.

Revision: The Analytical Balance



Mass

Measures the constant,
intrinsic amount of
matter.

Weight

Measures the variable,
extrinsic force of
gravity.

Lab Application

The analytical balance
accurately measures mass.
It isolates the true
amount of matter,
providing precise,
universal measurements
unaffected by
gravitational shifts.



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