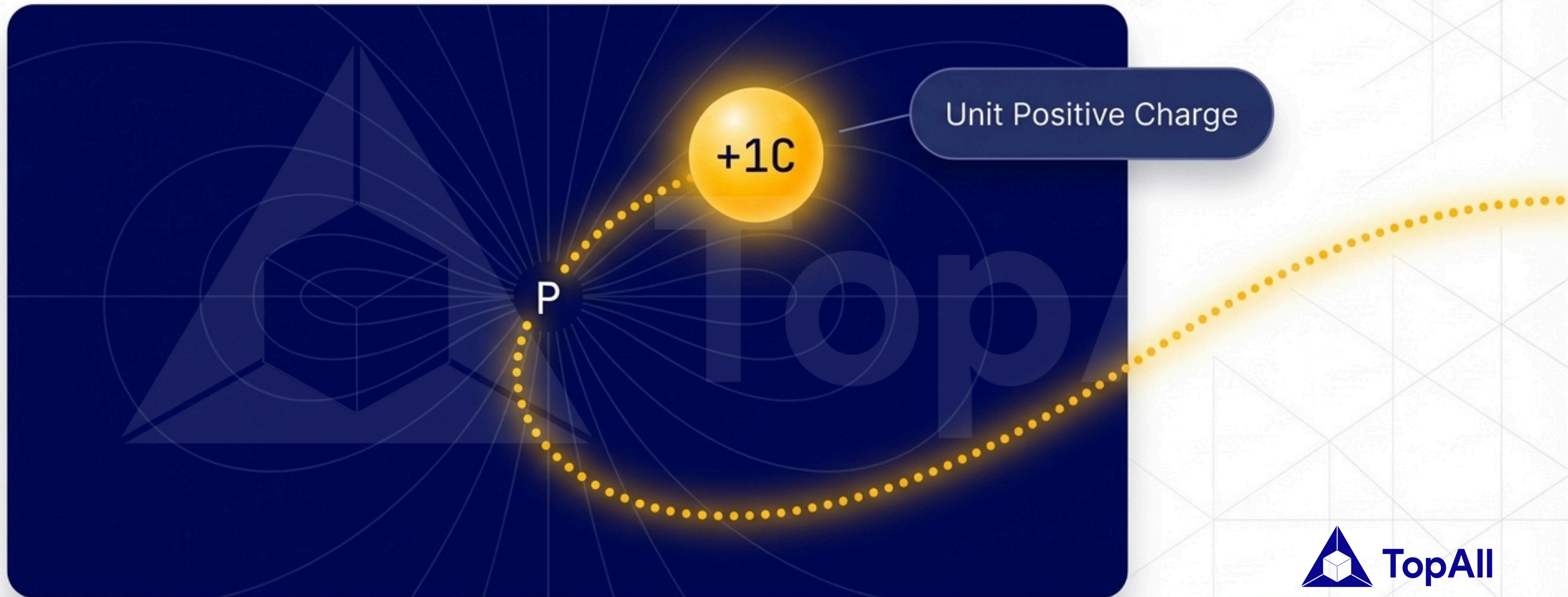


Potential = Work for One Unit Charge

Understanding Section 2.2 – The bridge between electric fields and work done.



Why Divide by Charge q ?

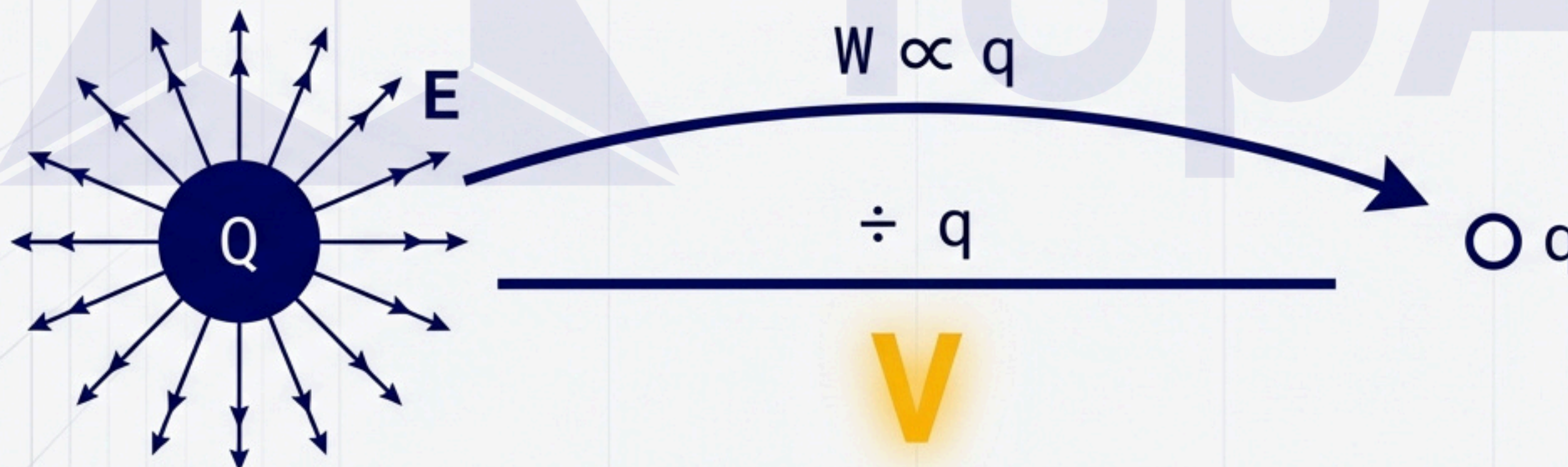
The work done on a test charge q is proportional to q , because the force at any point is qE . To find a value that represents the field itself, we must remove q .

Depends on the Charge

Work done (W) varies depending on how big the test charge q is.

Belongs to the Field

Work done per unit charge (W/q) is a constant characteristic of the electric field configuration.



The Formal Definition

Work done by an external force in bringing a unit positive charge from point R to P.


$$V_P - V_R = \frac{U_P - U_R}{q}$$

Electrostatic potentials at P and R

Potential energies

(Equation 2.4)



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Key Highlights

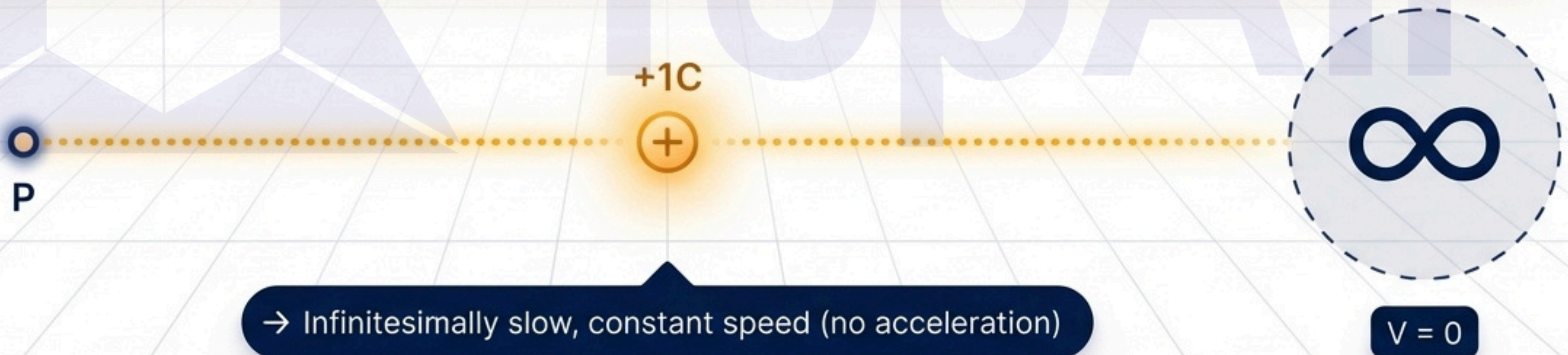
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Infinity as the Ultimate Reference

If we choose the potential to be zero at infinity ($V_R = 0$ as $R \rightarrow \infty$), Equation 2.4 simplifies perfectly.

Work done by an external force in bringing a unit positive charge from infinity to a point = electrostatic potential (V) at that point.



What is Physically Significant?

The actual absolute value of potential is not physically significant; only the potential difference is physically significant.



Electrostatic Potential (V)

- Work done per unit charge.
- Characteristic of the electric field itself.

Versus

Potential Energy (U)

- Total work done.
- Depends on the specific test charge (q) placed in that field.

Key Takeaways

- **Define potential** as work done by an external force per unit positive charge.
- **Remember** Equation 2.4: $V_P - V_R = \frac{W_{RP}}{q}$
- **Set the** baseline electrostatic potential to zero at infinity.
- **Differentiate** potential (belongs to the field) from potential energy (depends on the charge).
- **Recognize** that only potential difference has true physical significance.

Presenter Note / Narration Cue: Here is your revision checklist for Section 2.2. Master these five points, and you have successfully locked down the core theory of electrostatic potential for your exam.



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