

CONCEPT: ELECTRIC POTENTIAL

- ELECTRIC POTENTIAL, also called simply POTENTIAL, is related to, but **different** from Electric Potential ENERGY.

FIELD → FORCE	POTENTIAL → ENERGY
- A single charge produces an Electric FIELD - Field tells charges how much _____ to feel - Once there's a second charge, there is _____ → $\mathbf{F} = q \mathbf{E}$ - E is the strength of the _____ field - q is the [PRODUCING FEELING] charge → "Electric FIELD" E = FORCE Field	- A single charge also produces an Electric POTENTIAL - Potential tells charges how much _____ to have - Once there's a second charge, there is _____ → $\mathbf{U} = \underline{\hspace{2cm}}$ - V is the strength of the _____ field - q is the [PRODUCING FEELING] charge → "Electric POTENTIAL" V = ENERGY Field

- The UNIT of Electric Potential is the _____ ($\mathbf{V} = \frac{1\text{J}}{1\text{C}}$)
 - CAREFUL! **V** is the symbol for both Electric Potential AND its unit. Example: _____

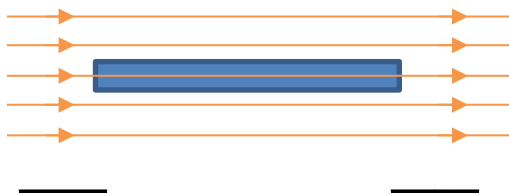
EXAMPLE: A 5C and 3C charge are separated by some distance. If the 5C charge feels 200 V from the 3C charge, what is the potential energy of the 5C charge?

CONCEPT: MOVEMENT OF CHARGES IN POTENTIAL FIELDS

- [+ | -] charges ALWAYS move to low potential, and [+ | -] charges ALWAYS to high potential.
 - Potential is a field that provides “motivation” for charges to move → gives them potential energy

EXAMPLE: An electron is at rest between two points, A at 10 V, and B at 0 V. Which point will the electron move to?

EXAMPLE: A metal rod is placed in a uniform electric field as shown below. Which end of the rod is at a higher potential?



CONCEPT: POTENTIAL DUE TO A POINT CHARGE

- Remember: Electric POTENTIAL (POTENTIAL) is an ENERGY field $\rightarrow U = qV \rightarrow V = \underline{\hspace{2cm}}$

$\rightarrow$ So we think of POTENTIAL as Electric Potential Energy per .

- A POINT CHARGE produces a Potential:

- $V = \underline{\hspace{2cm}}$ - Units are VOLTS (1 V)

- Potential **DIFFERENCE** $\rightarrow$ difference in potential between 2 points = (aka)

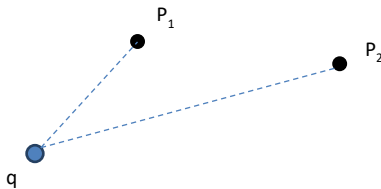
- CAREFUL! Voltage Volts

- Potential **DIFFERENCE** measured from Point A to Point B $\rightarrow \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

- This means that a charge q either gains or loses energy through a potential difference.

$\rightarrow \Delta U = \underline{\hspace{2cm}}$

EXAMPLE: a) What is the potential 0.5 m away from a $2\mu\text{C}$ charge? b) What about 1 m away? c) What is the potential difference from P_1 to P_2 ? The voltage?



$\rightarrow$ Remember: Voltage is , not !

PRACTICE: ELECTRIC POTENTIAL DUE TO A POINT CHARGE

How far from a $5\text{ }\mu\text{C}$ charge will the potential be 100 V ?

PRACTICE: POTENTIAL BETWEEN TWO POINT CHARGES

A $-1\ \mu\text{C}$ and a $5\ \mu\text{C}$ charge lie on a line, separated by 5cm. What is the electric potential halfway between the two charges?

EXAMPLE: POTENTIAL DIFFERENCE BETWEEN TWO CHARGES

Two charges, q and $-3q$, lie on a line as shown below. What is the potential difference between point A and point B?

