<u>CONCEPT: RELATIONSHIPS BETWEEN FORCE, FIELD, ENERGY, POTENTIAL</u>

● So far we have seen FOUR related terms with similar NAMES and EQUATIONS. Now let's put it all together:

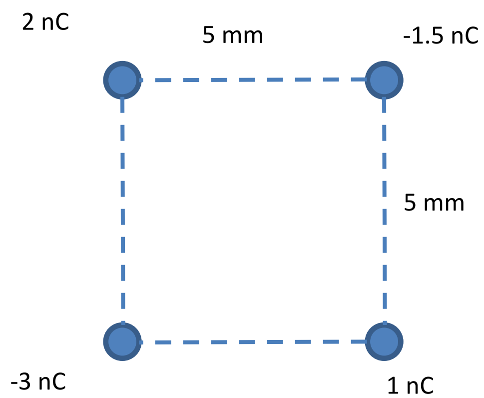
	r^2	r
q1 q2	**ELECTRIC <u>FORCE</u>** $F = k\frac{q_1 q_2}{r^2}$	**ELECTRIC POTENTIAL <u>ENERGY</u>** $U = k\frac{q_1 q_2}{r}$
q	**ELECTRIC <u>FIELD</u>** (ELECTRIC FORCE FIELD) $E = k\frac{q}{r^2}$	**ELECTRIC <u>POTENTIAL</u> (POTENTIAL)** (ELECTRIC ENERGY FIELD) $V = k\frac{q}{r}$

⟶ Remember:

- Electric Potential <u>DIFFERENCE</u> = Potential Difference = VOLTAGE = ΔV
- Electric Potential *ENERGY* difference = $-\Delta U$ = "WORK"

EXAMPLE: POTENTIAL AT CENTER OF CHARGES ARRANGED IN A SQUARE

What is the potential at the center of the arrangement shown in the following figure?



PRACTICE: POTENTIAL DIFFERENCE DUE TO A POINT CHARGE

A -2 C charge lies at rest. a) What is the potential difference between point A, which is 1.5m from the charge, and point B, which is 4m from the charge? b) What would the work on a 4 C charge be to move it from A to B?

EXAMPLE: POTENTIAL DIFFERENCE DUE TO TWO CHARGES

A 5 nC charge and a -3 nC charge lie on a line, separated by 6 mm**.** a) What is the potential halfway between the two charges on the line connecting them? b) What is the potential halfway between the charges, but 4 mm *above* the line connecting them? c) How much work would it take to move a 1 nC charge from the first point to the second?

PRACTICE: STOPPING A POINT CHARGE

A 5 g, 3 μC point charge is moving with an initial speed of 20 m/s away from a –5 μC charge**.** If they are initially 5 cm apart, how far can the 3 μC travel before stopping?