

1. The potential energy of two point charges is proportional to:
 - ☐ $1/r^2$
 - ☐ $1/r$
 - ☐ r
 - ☐ r^2
2. Electric potential V is:
 - ☐ power per second
 - ☐ energy per unit charge
 - ☐ charge per unit volume
 - ☐ force per unit charge
3. A charge is released in a field (only the electric force acts). As it speeds up, its potential energy:
 - ☐ falls
 - ☐ stays constant
 - ☐ rises
 - ☐ becomes infinite
4. Two opposite charges have a potential energy that is:
 - ☐ positive
 - ☐ zero
 - ☐ negative
 - ☐ infinite
5. Potentials from several charges must be added as vectors, using their directions.
 - ☐ True ☐ False
6. A 2 C charge falls through $\Delta V = 5$ V. How much kinetic energy (in J) does it gain?
_____ J
7. Find U (in J) for a +1 nC and +1 nC charge 1 m apart. Use $k = 9 \times 10^9$.
_____ J

8. Two charges give $+50\text{ V}$ and -20 V at a point. Find the total V (in V).

_____ V

9. The energy an electron gains crossing 1 V is one _____.

10. The work done by the electric field equals the decrease in potential energy, $W = -\Delta U$.

☐ True ☐ False

AP Physics C: Electricity and Magnetism

1. $1/r$

$U = kq_1q_2/r$ – energy goes as $1/r$ (force goes as $1/r^2$).

2. **energy per unit charge**

$V = U/q$ – potential energy per unit charge, in volts.

3. **falls**

$\Delta KE + \Delta U = 0$: as KE rises, U falls.

4. **negative**

Opposite charges attract, so $U = kq_1q_2/r < 0$ – a bound pair.

5. **False**

False. Potential is a scalar: $V = \sum kQ_i/r_i$, so you add the values with their signs. It is the electric field that must be added as vectors.

6. **10 J**

$KE = q \Delta V = 2 \times 5 = 10 \text{ J}$.

7. **9e-09 J**

$U = \frac{(9 \times 10^9)(10^{-9})(10^{-9})}{1} = 9 \times 10^{-9} \text{ J}$.

8. **30 V**

Scalars add: $50 + (-20) = 30 \text{ V}$.

9. **electron-volt**

That energy is $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$.

10. **True**

A drop in U releases energy as work: $W = -\Delta U$.