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 moves through a potential drop of 5 V, so $\Delta V = V_f - V_i = -5$ V. Only the electrostatic force acts. 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

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_____ 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

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**

   With U = 0 at infinite separation, opposite charges have U = k q1 q2/r < 0. Binding also depends on kinetic energy: the total K + U must be negative.

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**

   $\Delta KE = -q\Delta V = -(2)(-5) = 10$ J.

7. **9e-09 J**

   $U = \dfrac{(9\times10^{9})(10^{-9})(10^{-9})}{1} = 9\times10^{-9}$ J.

8. **30 V**

   Scalars add: $50 + (-20) = 30$ V.

9. **electron-volt**

   That energy is 1 eV $= 1.6\times10^{-19}$ J.

10. **True**

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

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