

What is an eV?

eV → is an electronvolt. It is (ironically) a unit of energy!

1 eV is the energy you get when you move 1 electron of charge through 1 volt of potential electric difference.

$$\begin{aligned}1 \text{ eV} &= (1.6 \times 10^{-19} \text{ C}) (1 \text{ V}) \\ &= (1.6 \times 10^{-19} \text{ C}) (1 \text{ J/C}) && * \text{ remember } 1 \text{ V} = 1 \text{ J/C} \\ &= (1.6 \times 10^{-19} \text{ C}) (1 \text{ J/C}) && * \text{ coulombs cancel out} \\ &= 1.6 \times 10^{-19} \text{ J} !\end{aligned}$$

So... **1 eV = 1.6 x 10⁻¹⁹ J** of energy. Write this on your formula sheet.

We use this unit of energy because particle accelerators use very small charges and thus, the energies involved are small. This unit makes the numbers more manageable.

So... 6 MeV means 6 mega-electronvolts. Remember your metric prefixes!
Mega = 10⁶ so 6 MeV = 6 x 10⁶ Joules of energy or 6,000,000 J of energy.

Remember: If you have a charge particle moving through an electric field, the 2 energies you are concerned with are Ek and Ee.

If the charged particle is accelerating and thus gaining Ek, it is losing Ee and moving with the electric field.

If you are asking a charge particle to move against the electric field, you are storing/gaining Ee and thus the particle must be slowing down and losing Ek. This principle of conservation of energy helps solve problems!