PhET simulation from Exploration of Fields/Voltage shows contour lines for the field's equipotential. A couple interesting things can be noted by utilizing one of the sensors: first that the direction of the sensor's force is always perpendicular to the contour line (for the exact same reason as gradients are), and second that the magnitude of the force is proportional to the density of the potential lines.

1 | Gravitational Potential

Gravitational potential energy is not present in a sole mass, but only exists/changes when the configurations of 2+ masses change. PE_g is expressed in terms of differences as well (a rock lying on the ground has a PE_g of "0", which is in fact relative to an arbitary point like a table or the ground).

To distinguish the PE_g of a 1kg object at three different points on a mountainscape, one could refer to them by their relative height or gh. Units of gh are m^2/s^2, a.k.a. J/kg. gh is the gravitational potential (note: **not** PE_g) of different heights relative to the ground.

2 | Electrical Potential

The equivalent of the gravitational potential (or gh) for the electrical force is electrical potential, the unit of which is called the Volt (which is equal to 1 J/C). For two points at 0V and 1V respectively, moving a charge of 1 C from 0V to 1V would increase its PE_v by 1J (hence V = J/C). This means $\Delta PE_v = \Delta VQ$).

EXAMPLE: Moving a charge of 1C from the bottom to the top of a 1V battery would increase its electrical potential energy by 1.5J.

3 | Video Mini-Review

See here at 24:00.

1. 4.5 J
2. 4.8 * 10^{19} protons.