

Electric Potential Energy

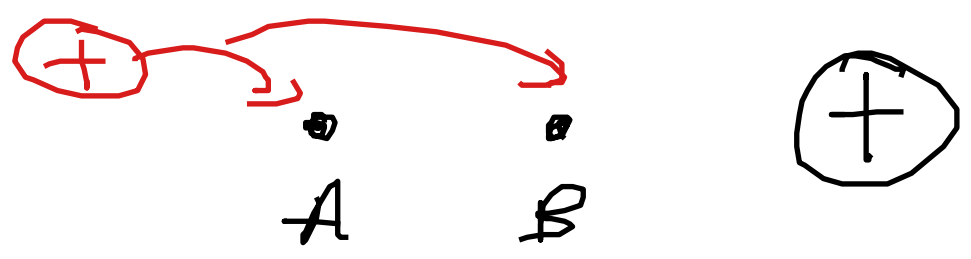


Potential energy is converted
into kinetic energy

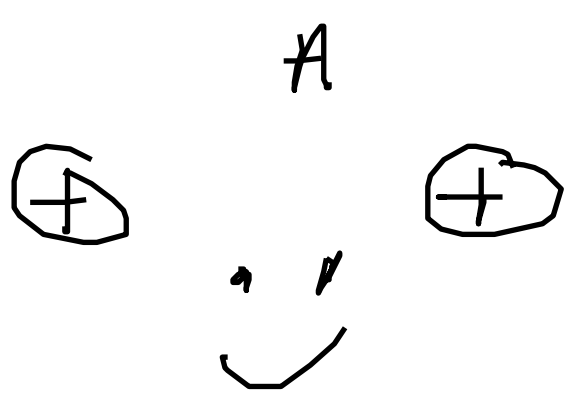
Decreasing PE : "relaxing"
- spontaneous motion
- what it "wants" to do

Increasing PE : "tensing"
- due to deliberate action
- what it doesn't "want" to do

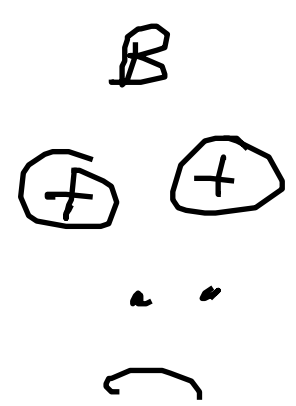
Electric PE depends only on relative locations of charges



At which spot would there be a higher PE? B



low PE



high PE

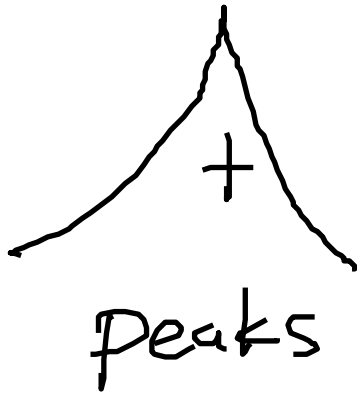


Source charges:
 not moving
 creating force/field

Target charge:
 experiences force/field

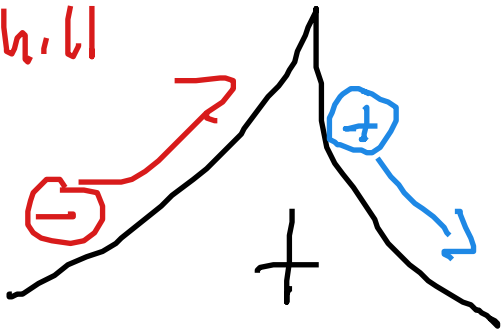
Height Metaphor

- sources create a landscape



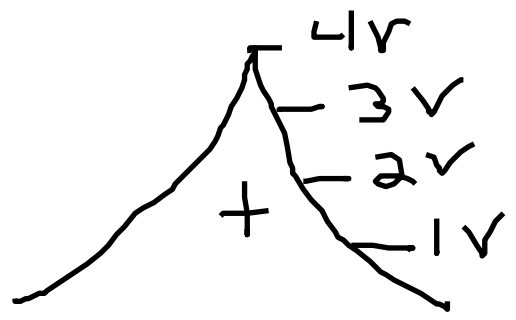
- targets move along landscape

negative targets
roll uphill

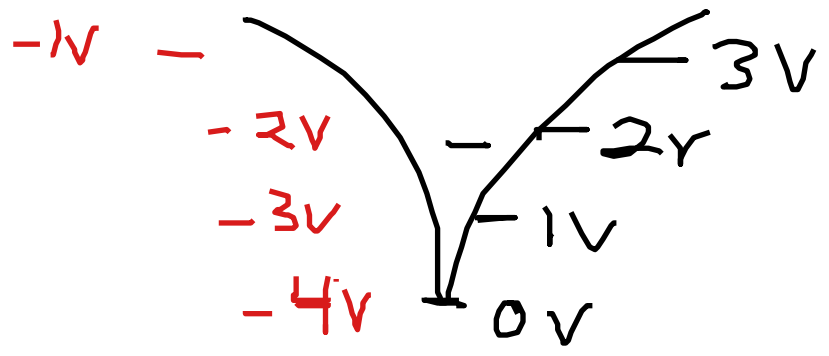


positive targets
roll downhill

"height" = electric potential
 variable V
 units volts (V)



+ source =
 maximum V

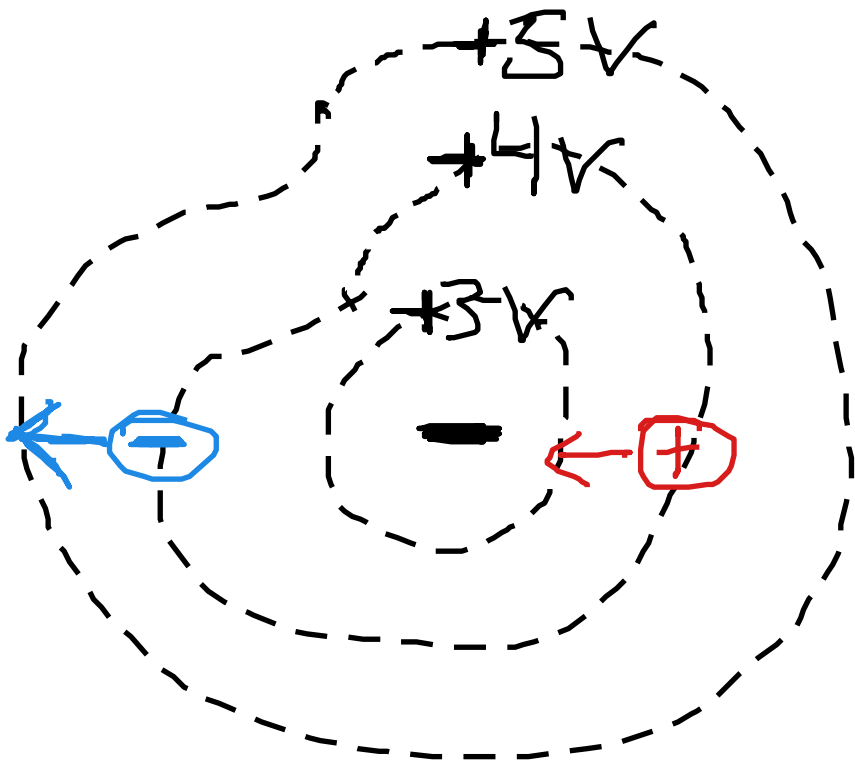


- source =
 minimum V

"0V" = arbitrary origin

For now: 0V = "far away",
 from all charges

Equipotential Lines



+ Charge moves toward lower potential & has lower PE as it does

- charge moves to left. potential is increasing

PE is decreasing 😊

potential energy

vs

potential

PE

V

joules

$$V = \frac{J}{C}$$

volts

"happiness"

height

possessed by targets

created by sources

only defined where targets exist

defined everywhere in space

charge of target



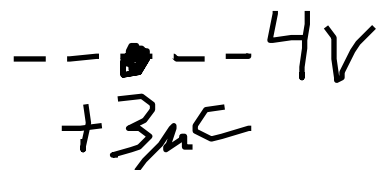
potential energy of target

PE

$$= q_T V$$

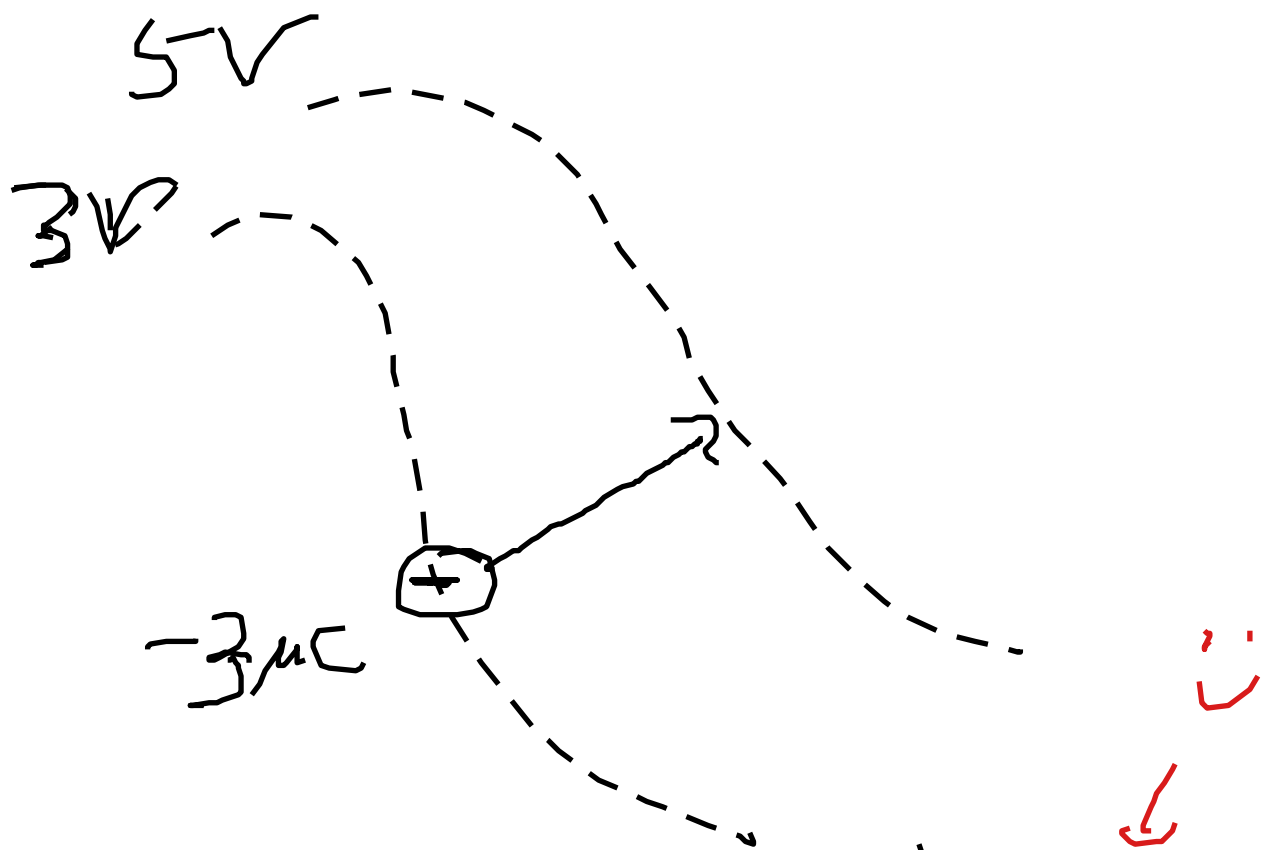
Potential at charge's location

$$+12 \mu J = (+3 \mu C)(4V)$$



Changes in those are what's important.

$$\Delta PE = q_T \Delta V$$



$$\Delta PE = (-3\mu\text{C})(+2\text{V}) = -6\mu\text{J}$$