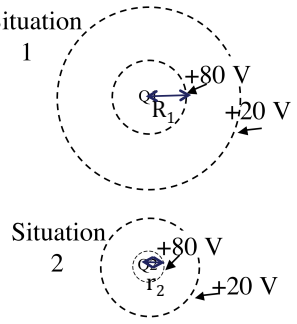
Which of these does NOT involve a capacitor as one of its “key physics” components?

A) Flashing traffic warning lights
B) Medical defibrillator
C) Cell membrane
D) Radio tuner
E) Car starter

4 points for reasoning. *For full credit we wanted both reasons, but you can get 3/4 for either one.*
0: blank or disaster
1: something is right, but much is wrong, or very hard to follow. This is "D level work". Totally handwavy reasoning goes here.
2: They have some reasoning, but it is confusing, or partially incorrect. "C level work". (If they JUST say "field lines are further apart", with NO further explanation, this would be a 2/4)
3: largely ok, but incomplete explanation (e.g. only mentioned one of the two reasons) , or a mix of right and wrong. "B" level work
4: mostly or fully correct, "A" level work

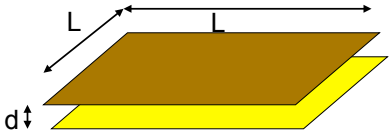
What can you conclude about Q1 and Q2?

A: Q1 > Q2 > 0
B: Q2 > Q1 > 0
C: Q1 < Q2 < 0
D: Q2 < Q1 < 0
E: ??



Parallel plate capacitor formulae from last time:
$E=4\pi k\, Q/A$ and $\Delta V=4\pi\, k\, Q\, d/A$

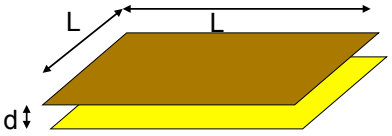
If you fix the charge on a capacitor, and double the spacing between the plates, what happens to the E field between the plates?



A: no change B: up by 2. C: up by 4.
D: decreases by 2 E: none of these

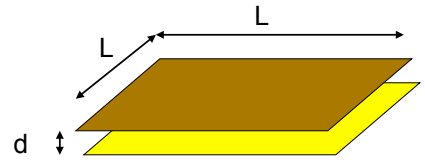
Parallel plate capacitor formulae from last time:
$Q=C\Delta V$, with Capacitance $C = A/(4\pi\, k * d)$

If we *double* the charge on the plates (so +Q and -Q have become +2Q and -2Q), what happens to the *capacitance?*



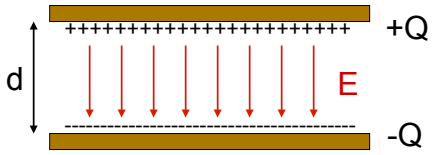
A: no change B: up by 2. C: up by 4.
D: decreases by 2 E: none of these

Parallel plate capacitor formulae from last time:
$Q=C\Delta V$, with Capacitance $C = A/(4\pi k * d)$
If we *double* L (both of them!) and *halve* d, by what factor have we changed capacitance?



A: no change B: up by 2. C: up by 4.
D: up by 8 E: none of these

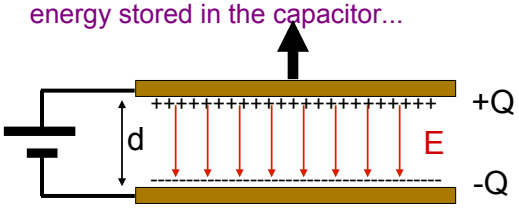
A parallel plate capacitor is charged (the plates are isolated so Q cannot change.) The plates are then pulled apart so that the plate separation d increases.
The total electrostatic energy stored ….



A:increases B:decreases C: stays same

What if the two plates were *not* isolated, but were attached to a battery, so that the voltage V between them is held fixed.

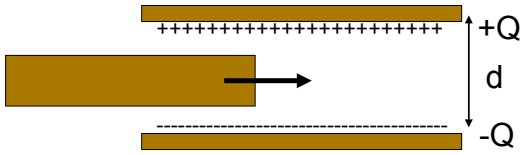
Now, as we increase d, the electrostatic energy stored in the capacitor...



A:increases B:decreases C: stays same

A parallel plate capacitor is charged (the plates are isolated so Q cannot change.)

A slab of dielectric is inserted. Upon insertion of the slab, the capacitance...

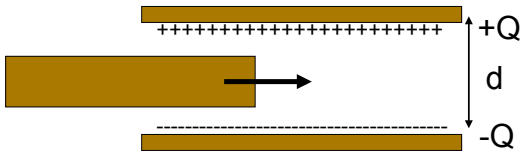


A:increases B:decreases C: stays same

Hint: $\Delta V = E\ d$

A parallel plate capacitor is charged (the plates are isolated so Q cannot change.)

A slab of dielectric is inserted. Upon insertion of the slab, the voltage difference between the plates

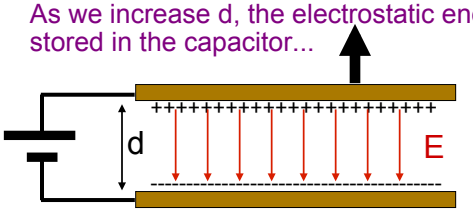


A:increases B:decreases C: stays same

Hint: $\Delta V = E\ d$

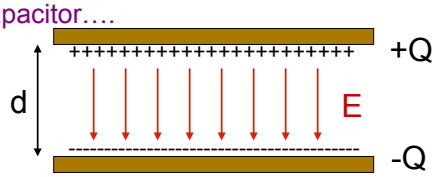
What if two capacitor plates were *not* isolated, but were attached to a battery, so the voltage V between them is held fixed.

As we increase d, the electrostatic energy stored in the capacitor...



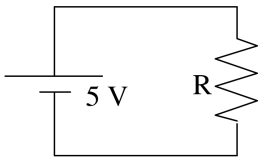
A:increases B:decreases C: stays same

A parallel plate capacitor is charged (the plates are isolated so Q cannot change.) The plates are then pulled apart so that the plate separation d increases.
The total electrostatic energy (U) stored in the capacitor….

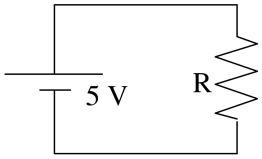


A:increases B:decreases C: stays same

(Hint: Did the person pulling the plates apart do positive work, negative work or no work?)



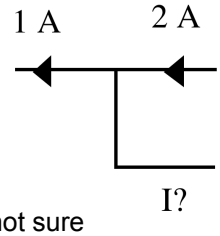
Which way does the current flow in this circuit?



A: Clockwise
B: Counterclockwise
C: Not enough information given

Current is flowing through wires which are part of a circuit, as shown.

What is the current in the wire at the bottom right?



A) 1 A to the left
B) 1 A to the right
C) 3 A to the left
D) 3 A to the right
E) none of these/not sure