Clicker Questions (with answers)for Physics 2B: Electricity and Magnetism

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Consider a distribution of charges in a small region giving rise to an E field, E at a distance d. If d is doubled what happens to E?

a. E goes to 1/2
☺ b. E goes 1/4
c. E goes to 1/8
d. Magnitude stays same but direction changes
☺ e. Can't say from this info

What electric field is needed to levitate a 0.01 gram rice crispy charged to -1 micro Coloumb against gravity?

a. 100 N/C upward
☺ b. 100 N/C downward
c. 10 N/C upward
d. 10 N/C downward
e. Can't say from this info

What is electric field inside of a hollow sphere of radius R carrying a total charge Q?

a. $E = kQ/r^2$
b. $E= Q/(4 \text{ pi epsilon } r^{2)}$
☺ c. $E = 0$
d. $E = -kQ/r^2$
e. Can't say without a complicated calculation

If the uniform charge on a hollow sphere is doubled what happens to E inside and outside?

a. Outside doubles, inside halves
b. Both inside and outside E doubles
c. Inside doubles, outside halves
☺ d. Outside doubles, inside stays the same
e. Both outside and inside stay the same

A charge of +3mC is at the center of a hollow conductor which has a charge of +1mC on it. What is the charge on inner surface of the conductor

a. 0 mC
☺ b. -3 mC
c. 4 mC
d. 3 mC
e. Depends on shape of conductor

What is the E field inside a long charged hollow pipe?

☺ a. E=0
b. $E=\lambda/(2\pi\varepsilon_0 r)$
c. $E = 2k\lambda/r$
d. E=0 at the center of the pipe, need a complicated calculation near the wall

A charge of +3μC is at the center of a hollow neutral conductor (neutral means has a charge of 0 μC). What are the charges on the inner and outer surfaces of the conductor

a. Inner surface 0 μC, outer surface 0 μC
☺ b. Inner -3 μC, outer 3 μC
c. Inner -3 μC, outer 4 μC
d. Inner 0, outer 3 μC
e. Inner -3 μC, outer 0 μC

The potental difference between battery terminals is 1.5 volts. Some electrons travel between the terminals via a long wire and a complicated circuit. Other electrons travel via a short wire, thereby creating a spark. Which is true?

a. Short wire electrons arrive with more energy
b. Long wire electrons arrive with more energy
☺ c. Both wires give the same energy
d. Can't say with this info

Consider a charged hollow sphere of radius 5 cm. The electric potential at a point 15 cm from the sphere's center is 30 Volts. What is the potential 30 cm from the sphere's center?

a. 0 Volts
b. 60 Volts
c. The same, 30 Volts
☺ d. 15 Volts
e. Can not tell from this info; need to know the charge on the sphere

Consider a charged hollow sphere of radius 5 cm. The electric potential at a point 15 cm from the sphere's center is 30 Volts. What is the potential on the surface of the sphere?

☺ a. 90 Volts
b. 100 Volts
c. 30 Volts
d. 15 Volts
e. Can not tell from this info; need to know the charge on the sphere

Consider a charged hollow sphere of radius 5 cm. The electric potential at a point 15 cm from the sphere's center is 30 Volts. What is the potential at the sphere's center?

☺ a. 90 Volts
b. 60 Volts
c. 30 Volts
d. 15 Volts
e. Can not tell from this info; need to know the charge on the sphere

In the field of a point charge you find a potential difference of 25 Volts between two points 10 cm apart. Now you move closer to the charge and remeasure the potental of two points 10 cm apart. The new voltage is

a. lower
☺ b. higher
c. The same
d. Can not tell from this info
e. Depends on shape of conductor

What is potential at center of square of side a, with charges +q, -q, +q, -q at edges?

☺ a. 0
b. 4kq/a
c. $4kq/\sqrt{(a/2)}$
d. 15 Volts
e. kq/a^2

If an E field in the x direction is $E=a\ q\ x^2$, what is the potential as a function of x? (Assume V=0 at x=0)

a. $V(x) = 2\ a\ q\ x$
b. $V(x) = -2\ a\ q\ x$
c. $V(x) = a\ q\ x^3/3$
☺ d. $V(x) = -a\ q\ x^3/3$
e. Can not tell from this info; need to know the distribution of charge

The energy work done by bringing 2 charges together is:

a. disappears
b. Is converted into heat
c. Is stored in the charges themselves
☺ d. Is stored in the invisible electric field
e. Like gravitational energy can never be recovered

The big demo capacitor was 0.014 Farads and was charged to 6000V. How many Couloumbs did it hold when charged?

☺ a. 84 C
b. 840 C
c. 2.3 μC
d. 428,000 C
e. Can't say from this info

The big demo capacitor was 0.014 Farads and was charged to 6000V. How many joules of energy did it hold?

a. 72,000 J (lift one metric tonne 7 meters)
☺ b. 252,000 J (lift one metric tonne 25 meters)
c. 840J (lift one tonne 1.5 cm)
d. 428,000 J (lift one tonne 43 meters)
e. Can't say from this info

As current moves through a circuit from one terminal of a battery to the other:

a. The amount of current decreases
b. The amount of voltage decreases
c. Energy is converted to heat
d. Both a. and c.
☺ e. Both b. and c.

Two capacitors are connected in series:

a. They both have the same voltages across their terminals
☺ b. They both have the same charges on their plates
c. Both the voltages and charges can differ depending upon their capacitances
d. Both the voltages and charges are the same independent of their capacitances

Two capacitors are connected in parallel:

☺ a. They both have the same voltages across their terminals
b. They both have the same charges on their plates
c. Both the voltages and charges can differ depending upon their capacitances
d. Both the voltages and charges are the same independent of their capacitances

Amps x seconds (Current times time) equals=

a. Volts (Voltage) (volts)
b. Ohms (Resistance) (ohms)
☺ c. Coulombs (Charge)
d. Joules (Energy)

In m = F/a, m depends upon:

a. The force
b. The acceleration
c. Both the force and the acceleration
☺ d. None of the above

Two resistors R1 and R2 are in series. The total resistance is

a. R1 R2 /(R1 + R2)
☺ b. R1 + R2
c. 1/R1 + 1/R2
d. Can't tell unless you know the voltage across them

Two capactors C1 and C2 are in series. The total capacitance is

☺ a. C1 C2 /(C1 + C2)
b. C1 + C2
c. 1/C1 + 1/C2
d. Can't tell unless you know the charge on them and voltage across them

Two resistors R1=3 Ohms and R2=2 Ohms are in series connected to a 12 volt battery. The total current flowing in the circuit is

☺ a. 12/(2+3) = 2.4 amps
b. 12/3 + 12/2 = 10 amps
c. 12 x (3+5) = 180 amps
d. Can't tell from this info

Two resistors R1=3 Ohms and R2=2 Ohms are in series connected to a 12 volt battery. Which resistor is using more power?

☺ a. R1
b. R2
c. They use the same power since they have the same current flowing through them
d. Can't tell from this info

Two resistors R1=300 Ohms and R2=200 Ohms are in parallel connected to a 12 volt battery. Which resistor is using more power?

a. R1
☺ b. R2
c. They use the same power since they have the same current flowing through them
d. Can't tell from this info

A 60 W bulb (240 Ohms) and a 75W (192 Ohms) bulb are in series connected to a 120 volt wall socket. Which bulb will be brighter?

☺ a. 60W
b. 75W
c. They use the same power since they have the same current flowing through them
d. Can't tell from this info

Which is correct language usage?

a. Voltage through a resistor, current in a resistor
☺ b. Voltage across a resistor, current through a resistor
c. Voltage in a resistor, current through a resistor
d. Voltage against a resistor, current across a resistor
e. It's just semantics; doesn't matter

For the Kirchhoff loop drawn on the board the loop equation is

a. $E_1 - I_1R_1 + E_2 - I_4R_4 - I_3R_3 = 0$
b. $E_1 - I_1R_1 - E_2 - I_4R_4 - I_3R_3 = 0$
c. $E_1 - I_1R_1 - E_2 - I_4R_4 + I_3R_3 = 0$
d. $E_1 - I_1R_1 + E_2 - I_4R_4 + I_3R_3 = 0$
e. $E_1 - I_1R_1 - E_2 - I_4R_4 + I_3R_3 = 0$

For a Kirchhoff loop with a battery, resistor and capacitor in series, the equation is $E - IR - Q/C = 0$. There is only one equation for two unknowns: Q and I. How can this be solved?

a. Another equation is the node equation, which must be included
☺ b. Q and I are related by differentiating
c. It requires knowledge of other parts of the circuit
d. Sometimes one can solve a single equation for 2 unknowns
e. Sometimes equations such as this cannot be solved

A capacitor of 100 microFarads and a resistor of 1000 Ohms are in series.
The time constant of this circuit is

☺ a. 0.1 seconds
b. 10 seconds
c. Depends on the voltage applied
d. Depends on boundary conditions

A capacitor of 100 microFarads and a resistor of 1000 Ohms are in series.
A time constant of 0.1 second means:

a. It takes 0.1 seconds to charge or discharge the capacitor
☺ b. It takes several times 0.1 second to charge or discharge the capacitor
c. The electrons take 0.1 seconds to move around the circuit due to slow drift velocities
d. The electrons take 0.1 seconds to move around the circuit due to electric forces in the capacitor

A positively charged particle moves to the right in a magnetic field that points upward. Which way does the magnetic force on the particle point?

a. Upward
b. Into the board
c. Downward
☺ d. Out of the board
e. There is no force since the velocity and B field are perpendicular

A negatively charged particle moves to the left in a magnetic field that points downward. Which way does the magnetic force on the particle point?

a. Upward
☺ b. Into the board
c. Downward
d. Out of the board
e. There is no force since the velocity and B field are perpendicular

A current in a wire moves to the left in a magnetic field that points downward. Which way does the magnetic force on the wire point?

a. Upward
b. Into the board
c. Downward
☺ d. Out of the board
e. There is no force since the velocity and B field are perpendicular

The magnetic field of the Earth is useful to us. Why?

a. Enables birds to navigate long distances
b. Deflects dangerous particles from the Sun to the poles
c. Tells us about the interior of the Earth
☺ d. All of the above
e. None of the above

What would happen if you heated a bar magnet (like a refrigerator magnet)?

a. Higher temp means faster motion: magnetic strength would increase
b. Higher temp means slower motion: magnetic strength would decrease
☺ c. Higher temp means random motions would knock atoms out of alignment: magnetic strength would average to zero
d. Magnetism is not related to temperature; no change

To calculate a magnetic field you would use

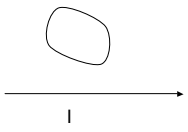
a. Faraday's law
☺ b. Ampere's law
c. Coulomb's law
d. Gauss's law
☺ e. Biot-savart law

To create an electric field you would use

a. A distribution of charges
b. A changing magnetic field
c. A steady current
☺ d. Both a. and b.
e. All of the above

The current flowing through a wire is turned off. Which way does the induced current in the loop flow?

a. Clockwise
☺ b. Counterclockwise
c. No current will flow



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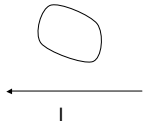

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