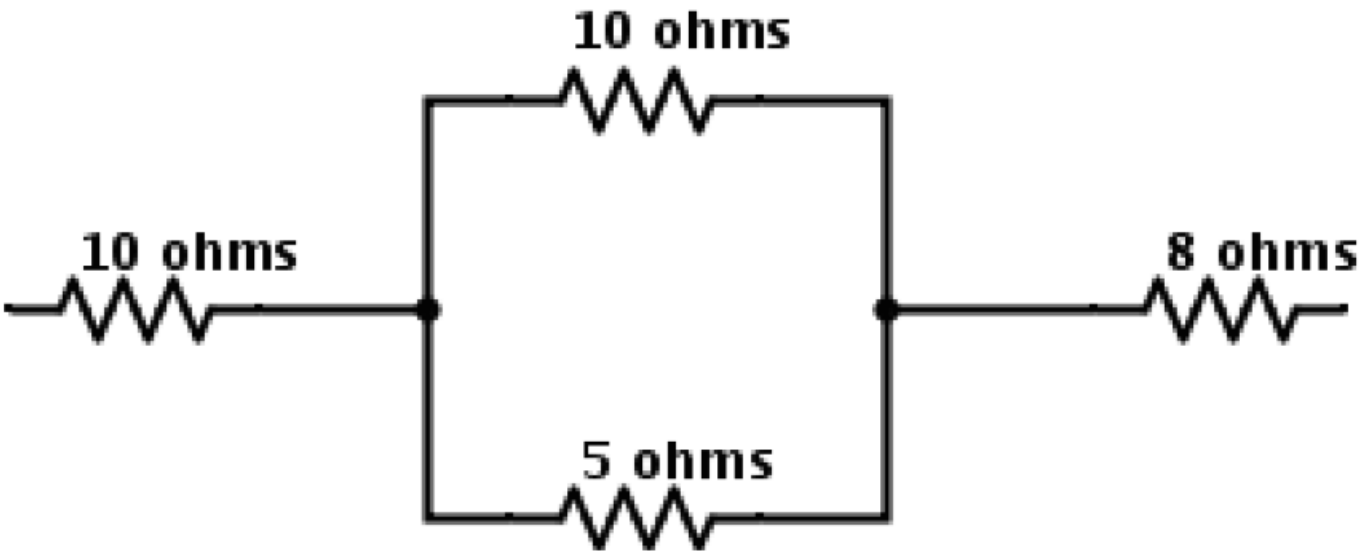
Electricity and Magnetism Review

This is a preview of the draft version of the quiz

Started: Nov 21 at 2:21pm

Quiz Instructions

Question 1 — 1 pts



Consider the system of resistors above. From the options below, select a resistor that could be used to replace this system in a circuit without changing the current through this part of the circuit.

- 33.0Ω
- 15.3Ω
- 21.3Ω
- 18.5Ω

Question 2 — 1 pts

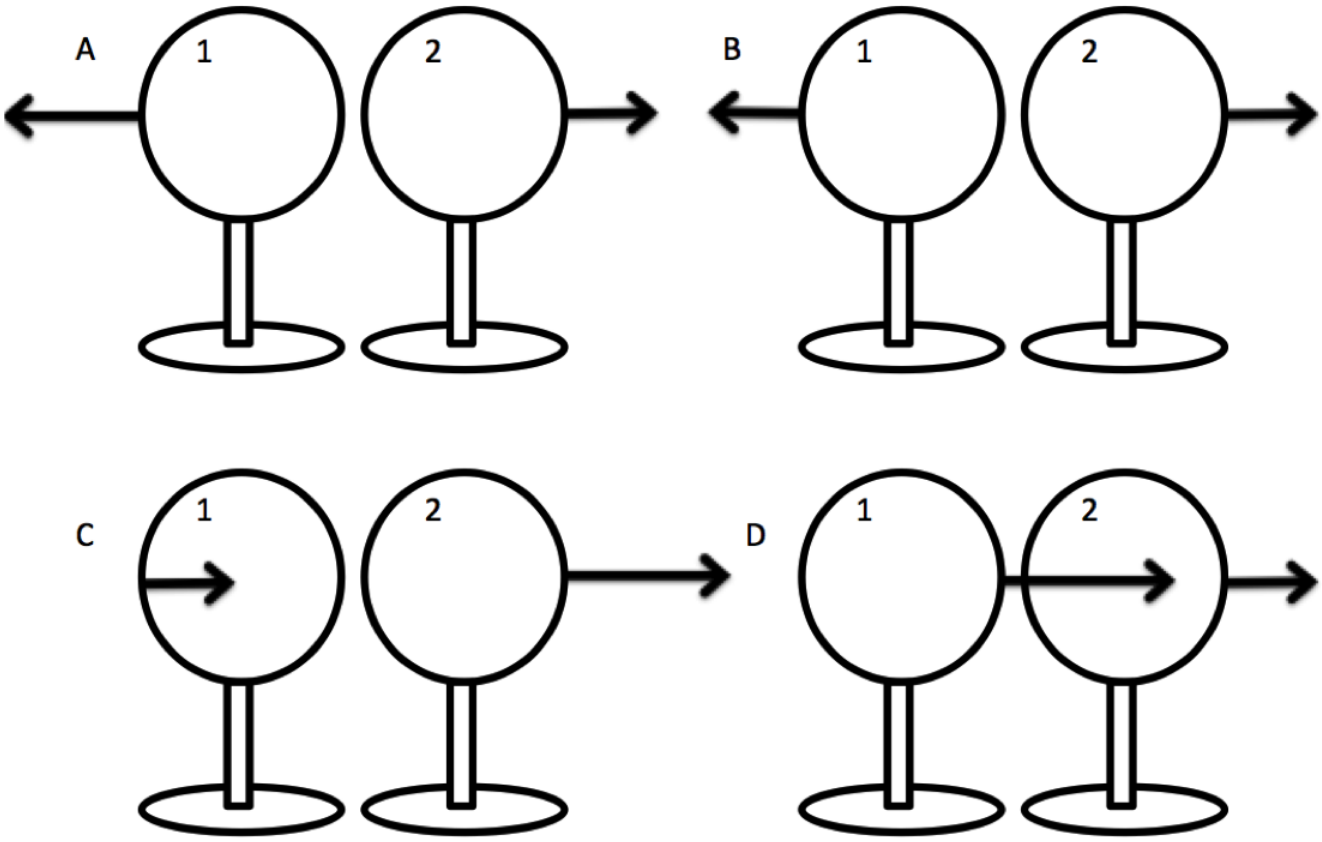
When there is a steady current in the circuit, the amount of charge passing a point per unit of time is -

- greater in the left 10 Ω resistor than in the 8 Ω resistor
- greater in the top 10 Ω resistor than in the 5 Ω resistor

- greater in the left 10 Ω resistor than in the top 10 Ω resistor
- the same everywhere in the circuit

Question 3

1 pts



Two hollow conducting spheres on insulated bases are each given a charge. Sphere 1 is given a charge of +4Q and Sphere 2 is given a charge of +1Q. The spheres are then placed side by side on a frictionless surface. They are released from rest. Which diagram best represents the force that the spheres exert on each other?

- D
- B
- A
- C

Question 4

1 pts

An electron and a proton are placed in an uniform electric field. They are far enough apart so that when they are released, the only force that affects their motion is due to the electric field. The particles are released and allowed to move in the electric field, which of the following statements is/are true at a given point in time after being released (choose all that apply)?

- the particles move at the same speed
- the magnitude of force acting on each particle is the same
- the accelerations of the particles are equal
- the direction of the motion is the same for both particles

Question 5

1 pts

An electroscope is given a negative charge and its leaves separate. A plastic rod is brought near the electroscope and the leaves fall partially. Of the following possibilities, choose the ones that may be true.

- the rod has more negative charge compared to electroscope
- the rod has a positive charge
- the rod has less negative charge compared to electroscope
- the rod is neutral

Question 6

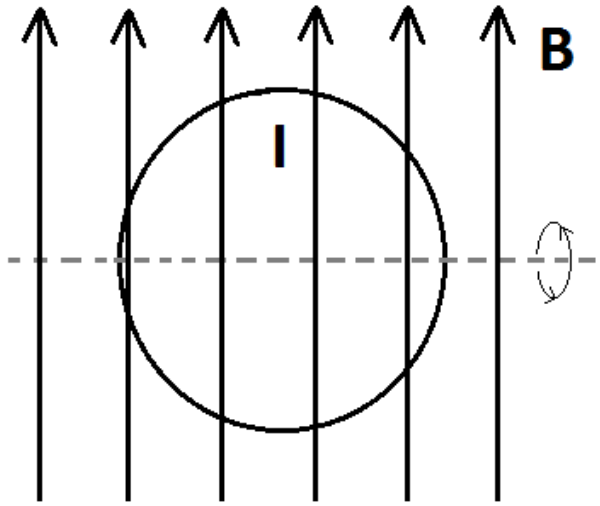
1 pts

Two equal charges are placed at a separation of 1m. What should be the magnitude of each charge so that the force between them equals around the weight of a 60kg person?

- 256μC
- 74μC
- 155μC
- 201μC

Question 7

1 pts

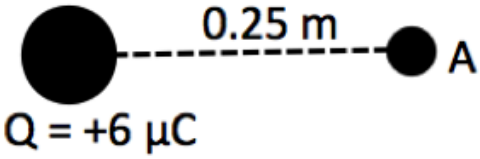


A wire loop is rotated in a uniform magnetic field about an axis perpendicular to the field, as shown. How many times is the induced current in the loop reversed if the loop makes 3 complete revolutions from the position shown?

- 2
- 12
- 1
- 6
- 3

Question 8

1 pts

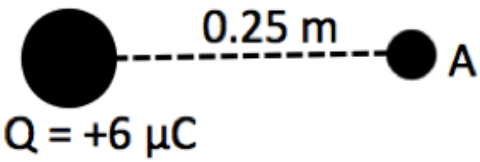


What is the electric field strength at point A?

- 8.64∗10^5 N/C
- 7.77∗10^5 N/C
- 1.99∗10^5 N/C
- 3.35∗10^5 N/C

Question 9

1 pts



What is the electric potential at point A?

- 2.93∗10^5 V
- 1.93∗10^5 V
- 1.03∗10^5 V
- 1.3∗10^5 V

Question 10

1 pts

A parallel plate capacitor has a capacitance C. A second parallel plate capacitor has 3 times the surface area and half the separation as the first. The capacitance of the second capacitor is

- (3C)/2
- 12C
- (2C)/3
- 6C

Question 11

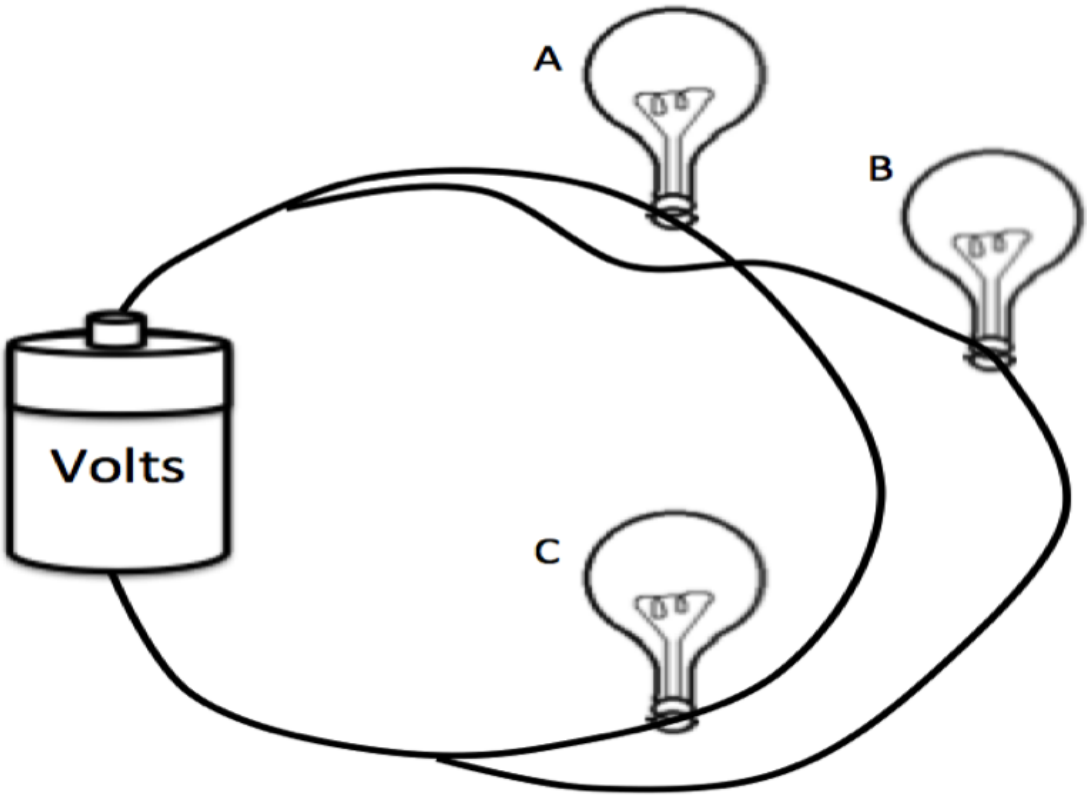
1 pts

When a postive charge moves with a velocity v in an electric field E, the force it experiences is _____ but when a positive charge moves in a magnetic field B, the force it experiences is _____.

- perpendicular to E; parallel to B.
- parallel to E; perpendicular to B
- in the same direction as E; is in the opposite direction as B
- opposing E; parallel to B

Question 12

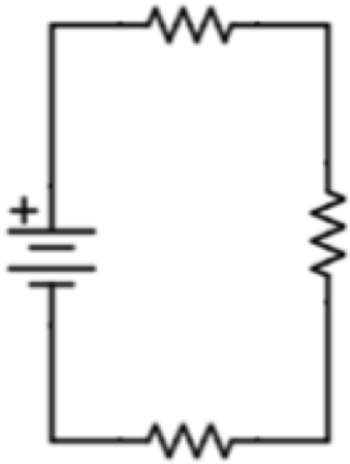
1 pts



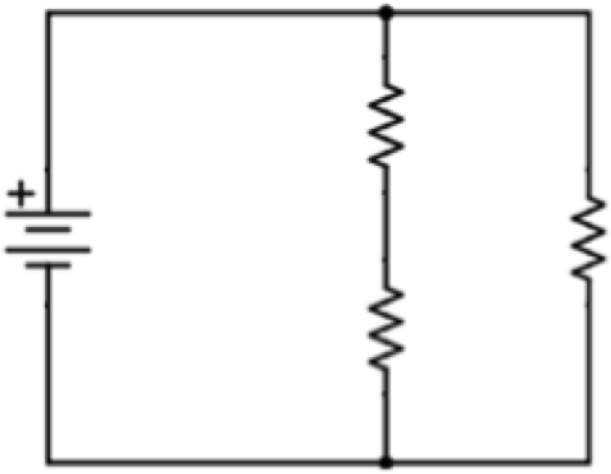
In the circuit, there are three identical lightbulbs, each with a resistance of 1800 Ω, connected to a 9 V battery.

Which schematic diagram accurately depicts the illustration above?

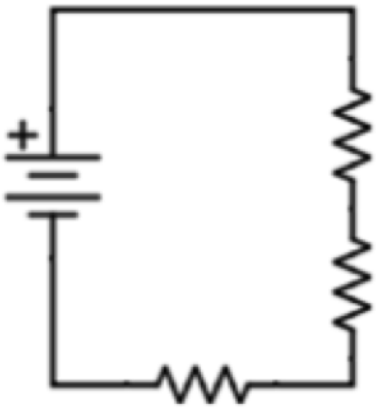
A



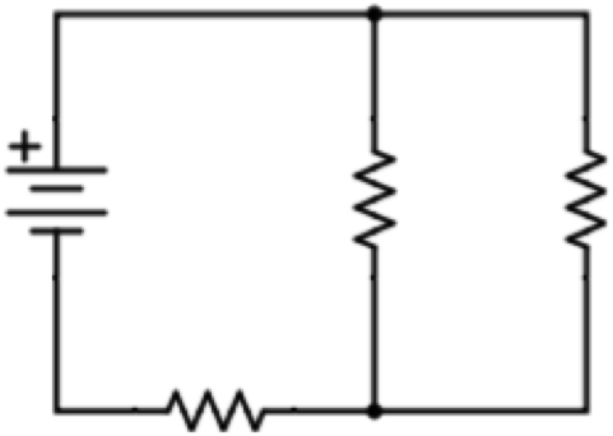
B



C



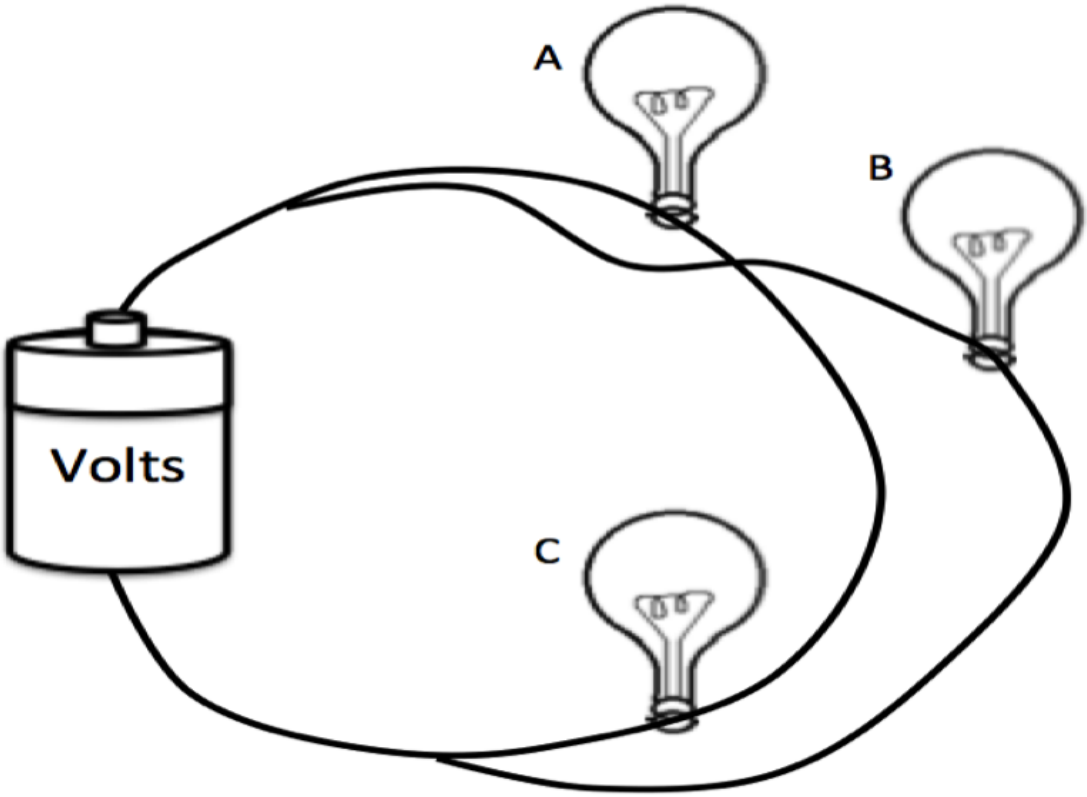
D



- C
- A
- D
- B

Question 13

1 pts



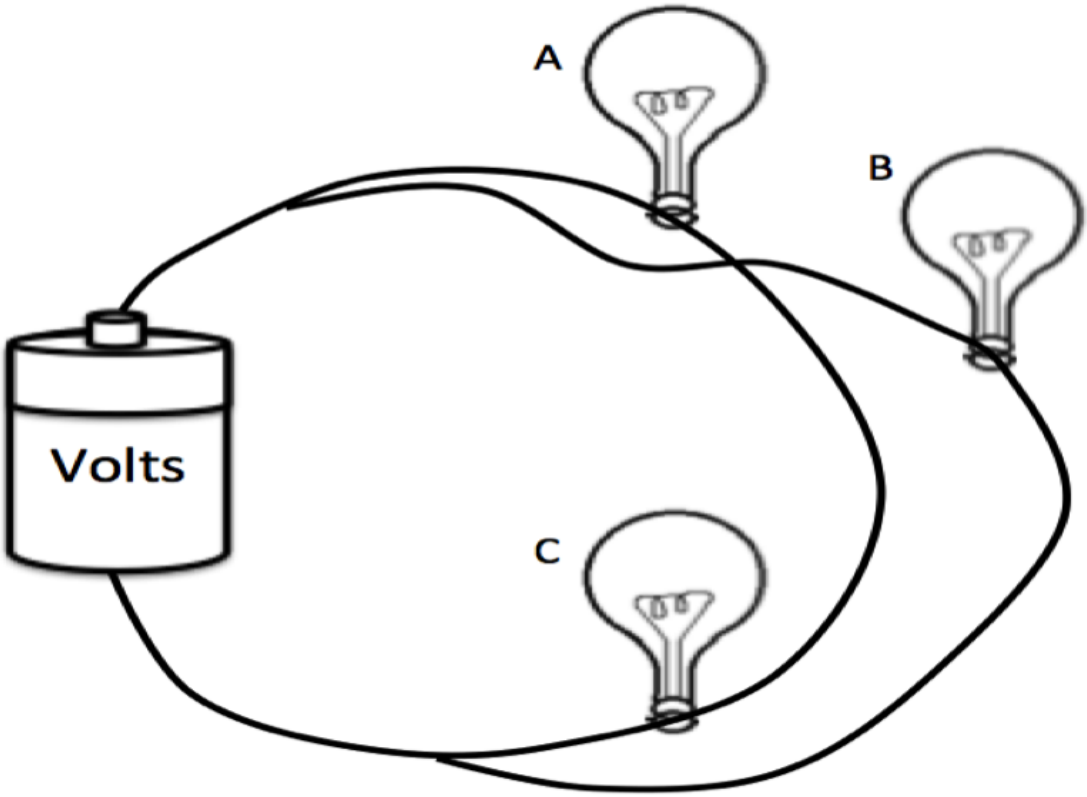
In the circuit, there are three identical lightbulbs, each with a resistance of 1800 Ω, connected to a 9 V battery.

What is the equivalent resistance of the lightbulbs in the circuit?

- 1200Ω
- 1800Ω
- 3600Ω
- 5400Ω

Question 14

1 pts



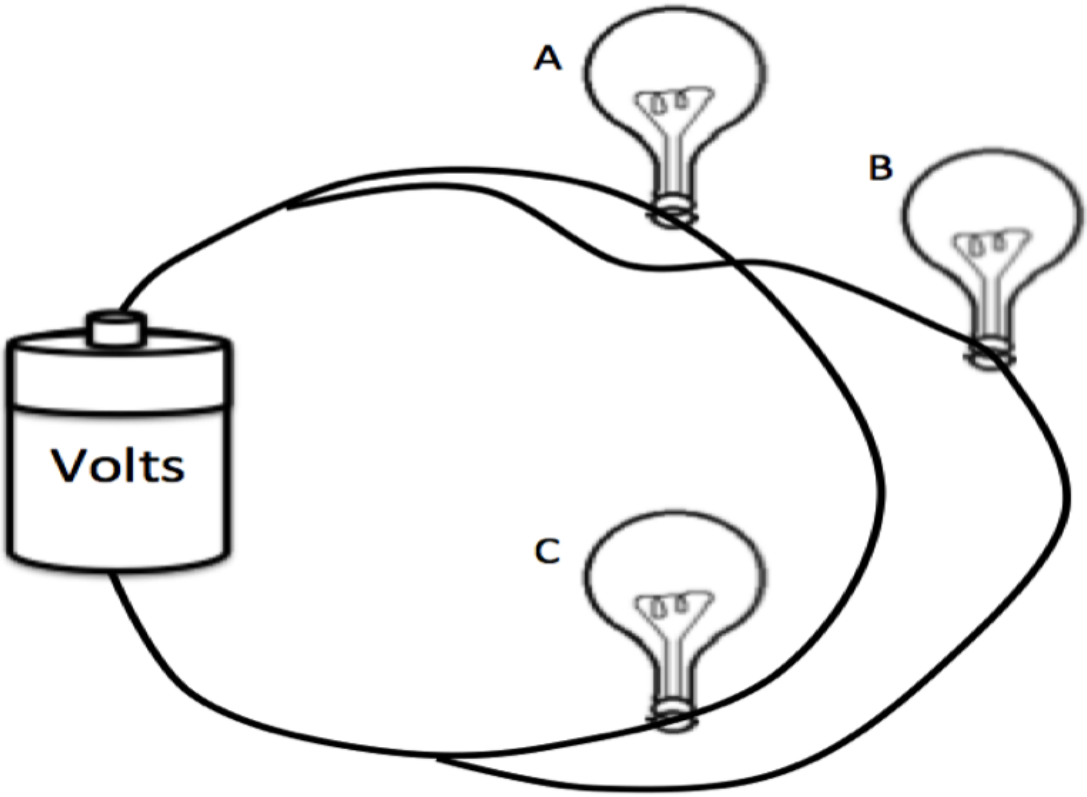
In the circuit, there are three identical lightbulbs, each with a resistance of 1800 Ω, connected to a 9 V battery.

What is the current in the circuit?

- 0.0075A
- 0.0025A
- 0.0050A
- 0.0100A

Question 15

1 pts



In the circuit, there are three identical lightbulbs, each with a resistance of 1800 Ω, connected to a 9 V battery.

What is the current through bulb A?

- 0.0025A
- 0.0050A
- 0.0075A
- 0.0100A

Question 16

1 pts

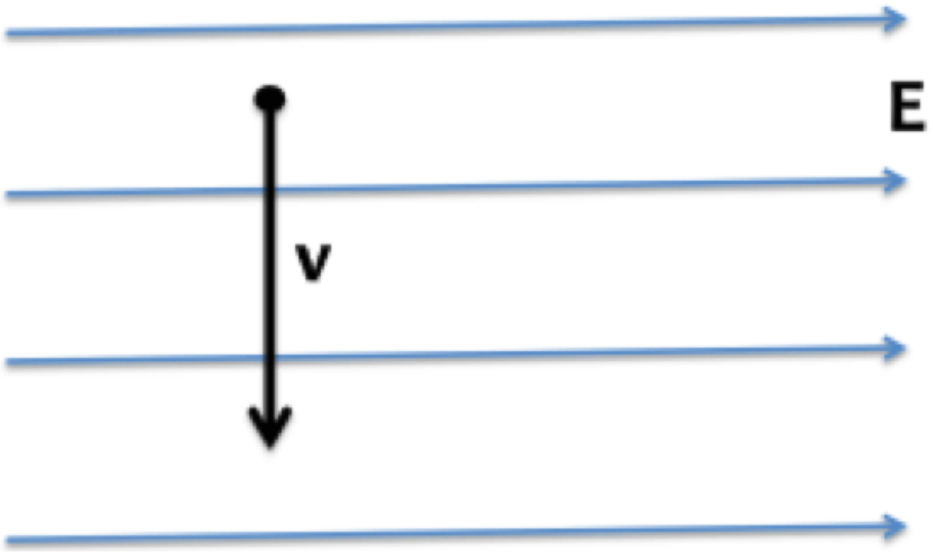
A parallel plate capacitor is connected to a battery and allowed to charge. The plates are then separated further while still connected to the battery. Which of the following is the result of this action?

- the voltage will increase and the stored energy will stay the same
- the voltage will stay the same but the energy stored will decrease
- the voltage will stay the same and the capacitance will increase

- the voltage will stay the same and the charge on the plates will increase
- the voltage will decrease and the capacitance will increase

Question 17

1 pts

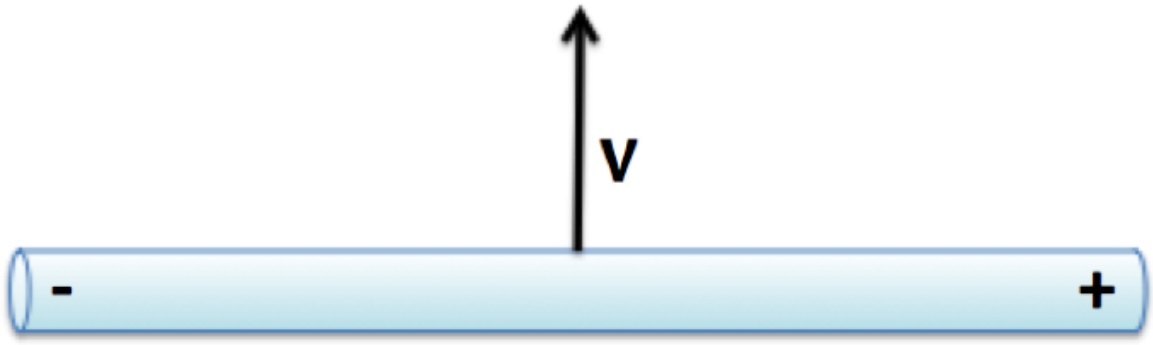


A positive charge moving with a constant velocity moves into a region of space with an electric field directed to the right in the plane of the page. In what direction must a magnetic field point in this region in order for the charge to move through undeflected?

- down the plane of the screen
- out of the screen
- up the plane of the screen
- into the screen

Question 18

1 pts

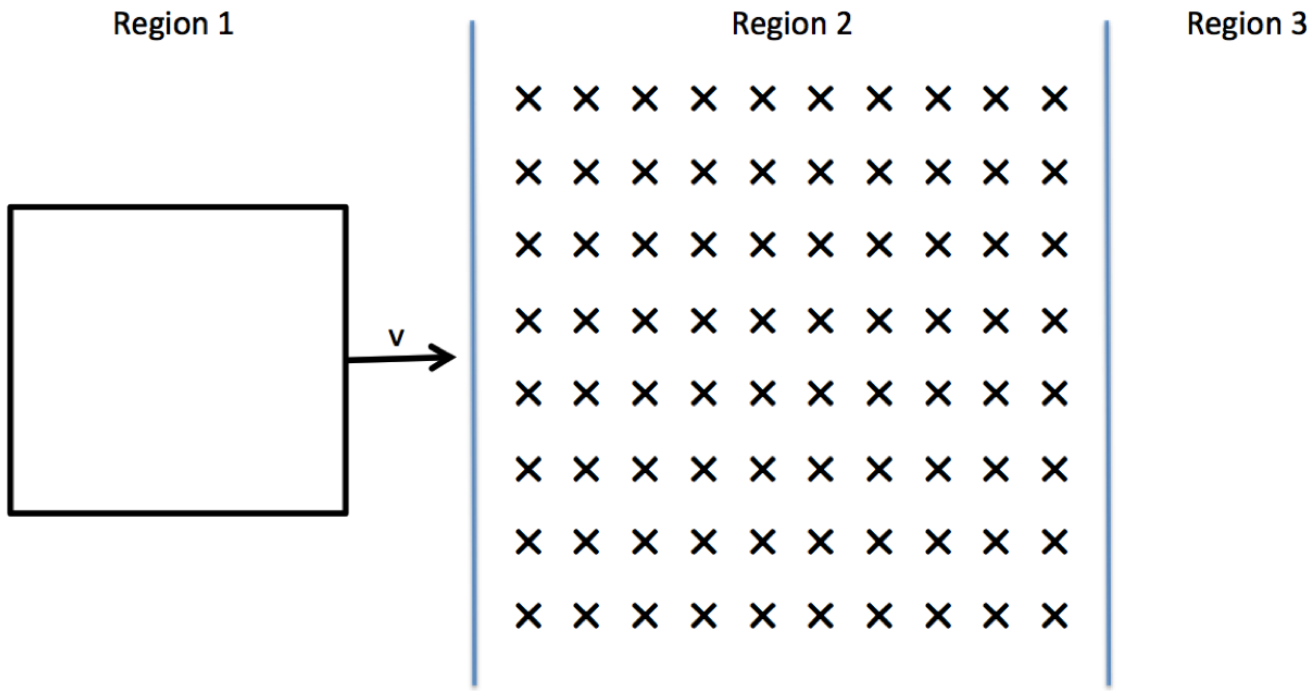


A segment of wire that is moving through a region with a magnetic field experiences a charge separation as seen in the diagram above. What is the direction of the magnetic field?

- into the screen
- to the bottom of the screen
- to the top of the screen
- out of the screen

Question 19

1 pts



What is the direction of the current in the wire as it moves from Region 2 into Region 3?

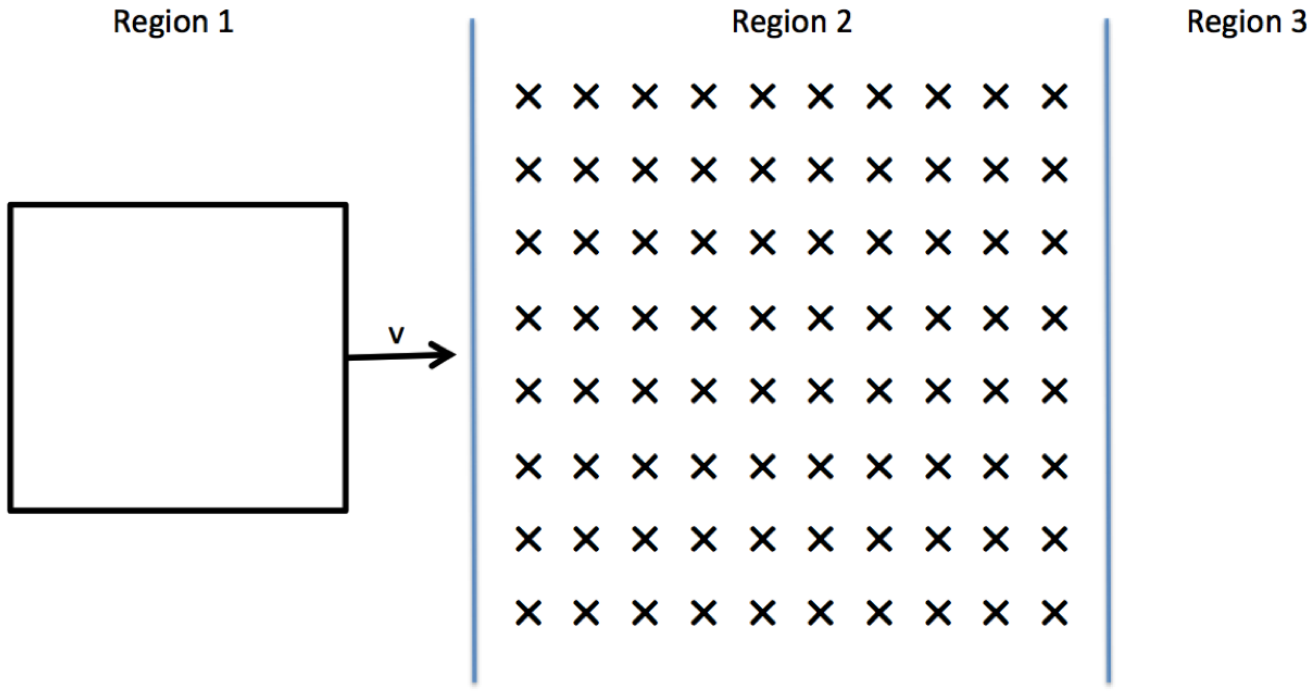
- counter-clockwise

- there is no current
- there is not enough information to find the direction of the current
- clockwise

Question 20

1 pts

What is the flux in the loop when it is entirely in Region 2?



- 1.5∗10^−3 T·m^2
- 3.5∗10^−3 T·m^2
- 0.5∗10^−3 T·m^2
- 2.5∗10^−3 T·m^2

Question 21

1 pts

If the wire was bent in a way that it formed a rectangle instead of a square so that the total length of the wire stayed the same, but the side of the rectangle entering the magnetic field was shorter, which of the following would change?

- the magnetic field strength

- [ ] the induced emf
- [ ] the current in the loop
- [ ] the resistance of the loop

Question 22

1 pts

Which of the following particles will describe the smallest circle when projected with the same velocity perpendicular to a magnetic field?

- [ ] electron
- [ ] proton
- [ ] Li+
- [ ] He+

Question 23

1 pts

A beam consisting of protons and electrons moving at the same velocity goes through a thin region in which there is a magnetic field perpendicular to the beam. Which of the following will happen?

- [ ] The protons and the electrons will go undeviated
- [ ] The electrons will be deviated more compared to protons and hence the beams will separate
- [ ] The protons and the electrons will be deviated by the same angle and will not separate
- [ ] The protons will be deviated more compared to electrons and hence the beams will separate
- [ ] The protons and the electrons will be deviated by the same angle and but will separate.

Question 24

1 pts

If a charged particle projected in a gravity-free room deflects, then which of the following statement(s) is/are true? (choose all that apply)

- [ ] both fields can be nonzero.
- [ ] both fields cannot be zero

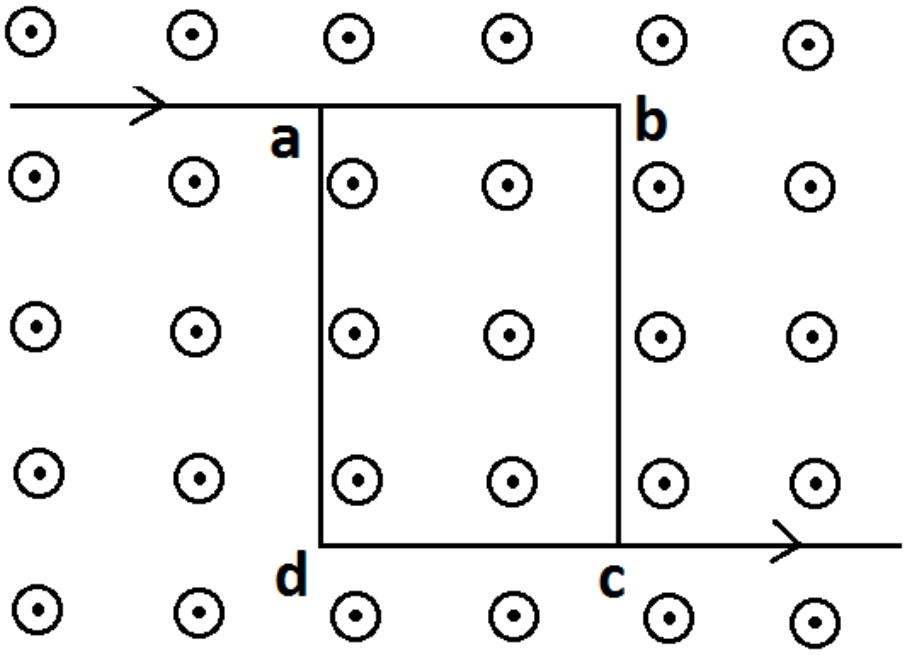
- [ ] there must be an electric field
- [ ] there must be a magnetic field

Question 25 — 1 pts

A charged particle goes undeflected in a region containing electric and magnetic field. It is possible that (choose all that apply)-

- [ ] E || B but v is not parallel to E.
- [ ] E is not parallel to B
- [ ] E || B, v || E
- [ ] v || B but E is not parallel to B

Question 26 — 1 pts

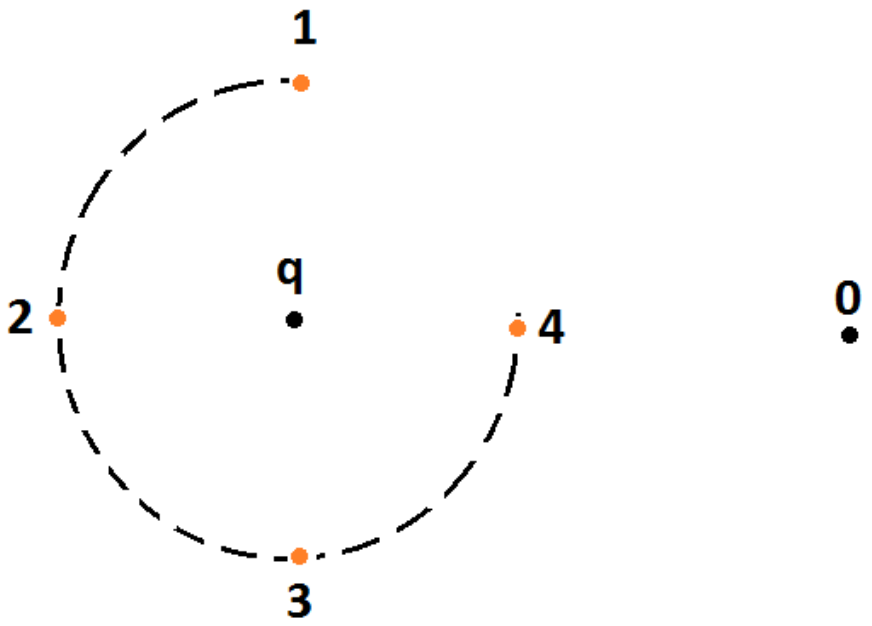


A current of 4A enters at the corner 'a' of a rectangular frame abcd of sides 20cmx30cm and leaves at the opposite corner 'c'. A magnetic field B=0.1T exists in the space in a direction perpendicular to the plane of the frame and out of the screen as shown in figure. What is the magnitude and direction of the magnetic forces on the sides bc and cd of the frame?

- [ ] 0.06N towards left on bc and 0.04N downwards on cd
- [ ] 0.04N towards left on bc and 0.06N downwards on cd
- [ ] 0.08N towards right on bc and 0.06N downwards on cd
- [ ] 0.08N towards right on bc and 0.06N upwards on cd
- [ ] 0.06N towards right on bc and 0.04N upwards on cd

Question 27

1 pts



The work done in taking a point charge from 0 to 1 is W_1, from 0 to 2 is W_2, from 0 to 3 is W_3 and from 0 to 4 is W_4. Which of the following statement(s) is/are correct (choose all that apply)?

- [ ] W1 is equal to W3
- [ ] W1 is greater than W4
- [ ] W2 = W1 = W3 = W4
- [ ] W2 is greater than W1
- [ ] W4 is the least among all.
- [ ] W2 is greater than W4

Question 28

1 pts

The electric field at the origin is along the negative X-axis. A small circle is drawn with the center at the origin cutting the axes at points A, B, C and D having coordinates (a, 0), (0, a), (-a, 0), (0, -a) respectively (a>0). Out of the points on the periphery of the circle, the potential is minimum at-

- B
- D
- C
- A

Question 29

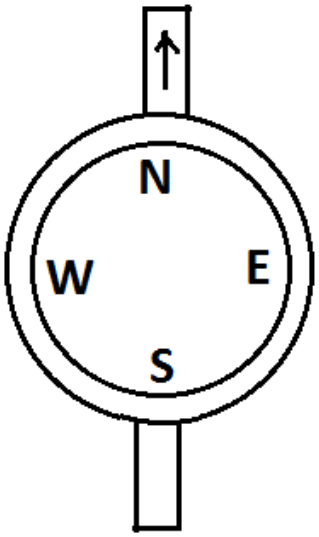
1 pts

The operating efficiency of a 0.6A, 120V electric motor that lifts a 10kg mass against gravity at an average velocity of 0.5m/s is most nearly -

- 98
- 25
- 43
- 68

Question 30

1 pts



A long straight wire conductor is placed below a compass as shown in the top view figure. When a large conventional current flows in the conductor as shown, the N pole of the compass:

- [ ] remains undeflected
- [ ] points to the west
- [ ] points to the east
- [ ] points to the south
- [ ] has its polarity reversed

Quiz saved at 2:22pm Submit Quiz