



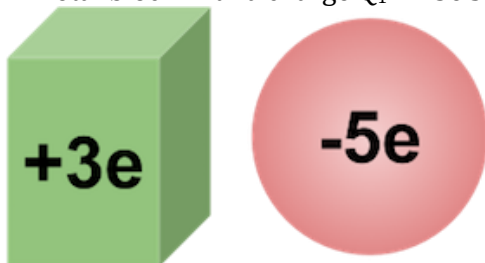
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SUMMATIVE ASSESSMENT
ACADEMIC YEAR OF 2023/2024

Subject : Physics
Day, date : Thursday, 21 March 2024
Grade : XII MIPA
Duration : 110 minutes

Multiple Choices

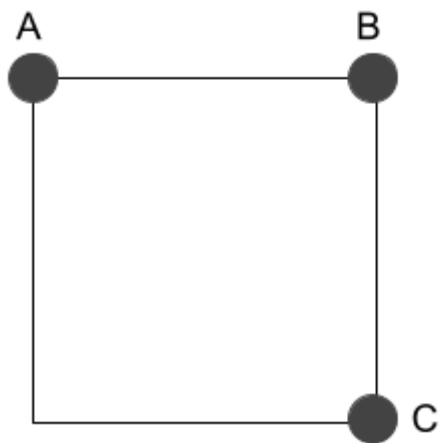
1. A particle physicist analyzes the results of her particle collider experiment. The analysis shows that a nucleus involved in the collision had a charge of $8.5 \times 10^{-19} \text{ C} \pm 0.2 \times 10^{-19} \text{ C}$. The magnitude of an electron's charge is $e = 1.60 \times 10^{-19} \text{ C}$. Concerning the validity of the experimental results, the particle physicist should ...
A. not be concerned since the observed charge is greater than e
B. not be concerned since the observed charge is a multiple of e
C. be concerned since it is impossible to have an observed charge greater than $5e$
D. be concerned since the observed charge is not an integer multiple of e
E. be concerned since the observed charge is lower than e
2. An object that is initially neutral will be positive when ...
A. it loses electrons
B. it loses proton
C. it gains protons
D. it gains additional neutrons
E. it gains additional protons and electrons
3. A metal block with a charge $Q_1 = +3e$ sits near a metal ball with a charge $Q_2 = -5e$.



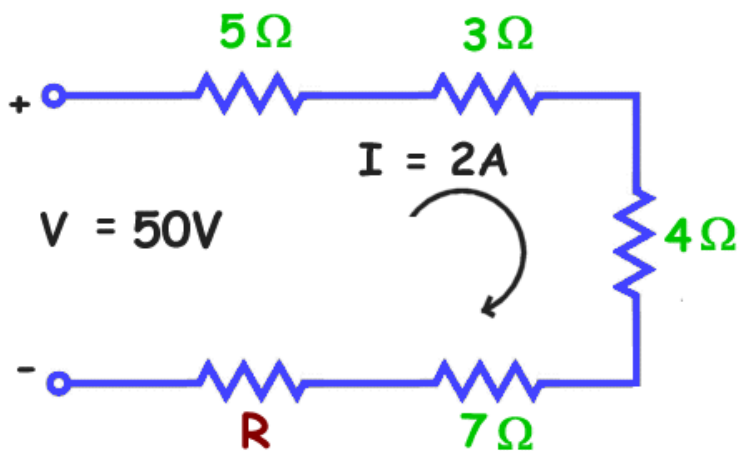
If the block is touched to the ball, the possible final charge on each object is ...

- A. $Q_1 = +4e, Q_2 = -4e$
 - B. $Q_1 = +1e, Q_2 = +1e$
 - C. $Q_1 = -1e, Q_2 = -1e$
 - D. $Q_1 = 0e, Q_2 = -3e$
 - E. $Q_1 = +2e, Q_2 = -2e$
4. When two electric charges are held at a distance of r , the electrostatic force between them is F_E . Subsequently, the distance between these charges is increased to $3r$. The new electrostatic force between the charges is ...
A. $3 F_E$
B. $(\frac{1}{4}) F_E$
C. $9 F_E$
D. $(\frac{1}{9}) F_E$
E. $(\frac{1}{3}) F_E$

5. Three equal charges $+q$ are each placed at the corners of a square with side length r as shown in the figure. The force magnitude on the charge B is



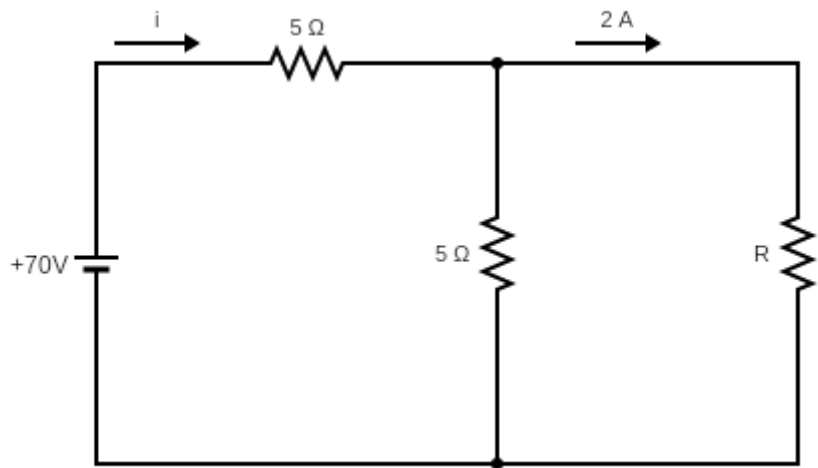
- A. $\left(k \frac{q^2}{r^2}\right)$
 B. $\sqrt{2} \left(k \frac{q^2}{r^2}\right)$
 C. $\left(k \frac{q^2}{4r^2}\right)$
 D. $\sqrt{3} \left(k \frac{q^2}{r^2}\right)$
 E. $\left(k \frac{q^2}{2r^2}\right)$
6. Look at the circuit diagram below.



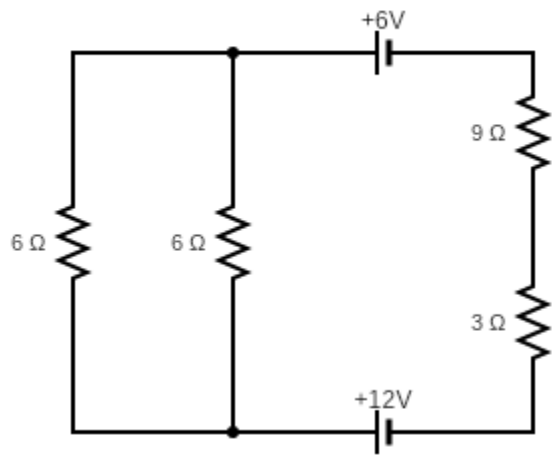
The value of the unknown resistance R is

- A. $5\ \Omega$
 B. $6\ \Omega$
 C. $7\ \Omega$
 D. $8\ \Omega$
 E. $9\ \Omega$

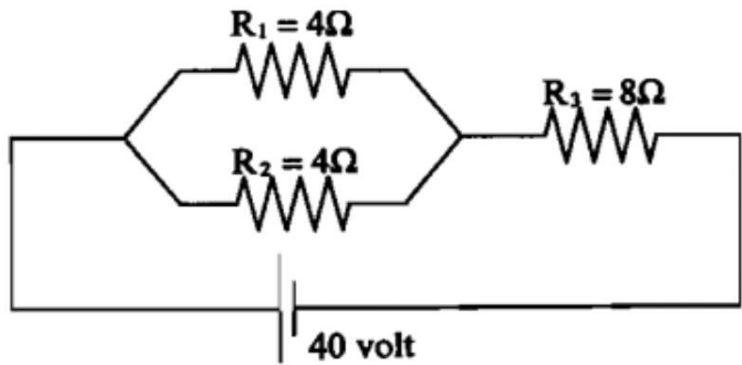
7. The value of R in the circuit below is



- | | |
|------------------|------------------|
| A. 15.8 Ω | D. 14.0 Ω |
| B. 15.0 Ω | E. 13.0 Ω |
| C. 14.5 Ω | |
8. Electric current in the circuit is



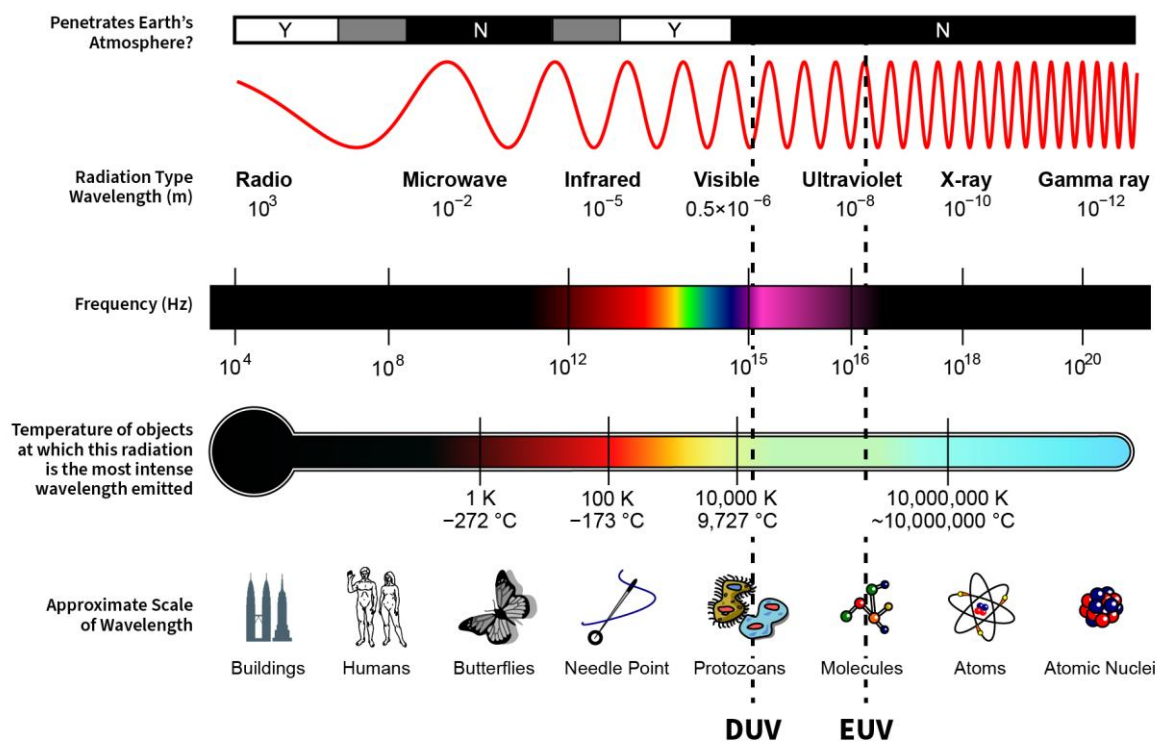
- | | |
|----------|----------|
| A. 0.2 A | D. 0.8 A |
| B. 0.4 A | E. 1.2 A |
| C. 0.6 A | |
9. The magnitude of the current through R3 is... .



- | | |
|--------|--------|
| A. 2 A | D. 6 A |
| B. 3 A | E. 8 A |
| C. 4 A | |

10. An electric current flow along a high-voltage power line from the North to the South. The direction of the magnetic field caused by the current above that wire is towards the... .
 A. South
 B. North
 C. East
D. West
 E. Southeast
11. A long straight wire carrying current towards the East is placed in a homogeneous magnetic field of 100 T towards the North. If the current is 5 A and the wire's length is 4 m, then the wire experiences a Lorentz force of... .
 A. 2000 N towards the North
B. 2000 N upwards
 C. 2000 N downwards
 D. 5 N towards the South
 E. 5 N towards the North
12. A transformer has 300 turns in the primary coil and 1200 turns in the secondary coil. If the current flowing through the primary coil is 8 A, what is the current flowing through the secondary coil?
 A. 0.5 A
 B. 32 A
 C. **2 A**
 D. 20 A
 E. 4 A
13. The magnetic flux in a closed circuit of resistance 15 Ω varies with time t as $\Phi = 2t^3 - 3t^2 + 5t + 1$. Calculate the magnitude of the induced emf at $t = 2$ s.
 A. 3 V
 B. 5 V
 C. 7 V
 D. 14 V
E. 17 V
14. Which law is used in finding the direction of current in a.c. generator?
 A. Maxwell's law
B. Lenz's law
 C. Corkscrew law
 D. Ampere circuital law
 E. Fleming's right-hand rule
15. How does a generator produce an electric current?
 A. By converting gravitational energy into electrical energy through the rotor.
B. By converting kinetic energy into electrical energy through a magnetic field.
 C. Through the conversion of chemical energy into electrical energy through wire coils.
 D. By converting heat energy into electrical energy through a working fluid.
 E. Through the transformation of nuclear energy into electrical energy using an electrolyte.
16. An electromotive force (EMF) can be generated by... .
 A. alterations in the magnetic field solely
 B. adjustments in the material's resistivity solely
 C. modifications in the circuit's temperature solely
D. shift in the circuit's area
 E. variations in the conductivity of the connecting wires
17. What is the expression for induced electromotive force (emf) when the magnetic field, length, and velocity of the conductor are mutually perpendicular?
 A. $\text{emf} = B^2l$
 B. $\text{emf} = Bil$
C. $\text{emf} = Blv$
 D. $\text{emf} = B^2v$
 E. $\text{emf} = B\sqrt{l}$
18. A conductor moves with a velocity of 0.3 m/s in a magnetic field of 6 T, inducing an emf of 18 V. If the magnetic field, velocity, and emf are mutually perpendicular, what is the length of the conductor?
 A. 0.9 m
 B. 0.5 m
 C. 0.6 m
D. 1.2 m
 E. 1.5 m
19. The voltage output of an AC source is given by the expression $\Delta v = (200 \text{ V}) \sin \omega t$. Find the rms current in the circuit when this source is connected to a 100- Ω resistor.
 A. 0.63 A
 B. 1.21 A
C. 1.41 A
 D. 2.45 A
 E. 3.66 A
20. An 8.00- μF capacitor is connected to the terminals of a 60.0-Hz AC source whose rms voltage is 150 V. Find the capacitive reactance.
 A. 100 Ω
 B. 222 Ω
C. 332 Ω
 D. 414 Ω
 E. 552 Ω

21. Look at the picture below.



- What type of electromagnetic spectrum is safe for humans?
- A. radio, visible, x-ray
 - B. ultraviolet, infrared, microwave
 - C. ultraviolet, x-ray, gamma ray
 - D. some portions of the UV, radio, microwave**
 - E. visible, gamma ray, x-ray
22. How can we minimize the negative impacts of electromagnetic radiation use?
- A. By significantly increasing radiation exposure
 - B. By reducing the use of modern technology
 - C. By adopting stricter privacy policies for online data
 - D. By tightening regulations on the use of electromagnetic wave-based technology**
 - E. By drastically increasing internet speed
23. What should be a priority in the use of electromagnetic wave technology?
- A. Speed and efficiency
 - B. Human safety and health**
 - C. Affordability and accessibility
 - D. Pleasure and entertainment
 - E. Utilizing the latest and most advanced technology
24. Which of the following statements best describes radioactivity?
- A. A process of converting matter into energy
 - B. The emission of particles or electromagnetic waves from unstable atomic nuclei**
 - C. A method of generating electricity from renewable sources
 - D. The absorption of radiation by living organisms
 - E. The process of creating isotopes in a laboratory
25. How does radioactivity contribute to the dating of archaeological artifacts?
- A. By measuring the rate of decay of radioactive isotopes in the artifact**
 - B. By analyzing the color and texture of the artifact's surface
 - C. By examining the artifacts under ultraviolet light
 - D. By calculating the distance of the artifact from known radioactive sources
 - E. By studying the magnetic properties of the artifact