

APPHE Practice Questions

Free community edition B | College Board AP - Turkey | 8 questions

QUESTION 1 SINGLE CHOICE

An inductor of inductance L is connected in series with a resistor R and an ideal battery of emf ϵ . A long time after the switch is closed, what is the current flowing in the circuit?

- ☐ A $\epsilon / (2R)$
- ☐ B Zero, because the inductor blocks all DC current
- ☒ C ϵ / R
- ☐ D $\epsilon / (L/R)$, growing without bound

ANSWER C

QUESTION 2 SINGLE CHOICE

A thin semicircular ring of radius R carries a uniform total charge Q distributed along its arc. What is the magnitude of the electric field at the center of curvature of the semicircle?

- ☐ A kQ / R^2
- ☒ B $2kQ / (\pi R^2)$
- ☐ C $kQ / (\pi R^2)$
- ☐ D Zero by symmetry

ANSWER B

QUESTION 3 SINGLE CHOICE

A parallel-plate capacitor with capacitance C is connected to a battery of emf V . While the battery remains connected, a dielectric slab of dielectric constant κ is inserted between the plates. How does the charge on the plates change?

- ☐ A It decreases by a factor of κ .
- ☐ B It remains the same.
- ☒ C It increases by a factor of κ .
- ☐ D It increases by a factor of κ^2 .

ANSWER C**QUESTION 4** SINGLE CHOICE

In the circuit shown, three resistors of $2\ \Omega$, $4\ \Omega$, and $12\ \Omega$ are connected in parallel. What is the equivalent resistance of this combination?

- ☐ A $6/11\ \Omega$
- ☒ B $18/11\ \Omega$
- ☐ C $6\ \Omega$
- ☐ D $24\ \Omega$

ANSWER B

QUESTION 5 SINGLE CHOICE

A straight wire carrying current I lies along the y -axis in a uniform magnetic field $\mathbf{B} = B \hat{x}$ (pointing in the $+x$ direction). What is the magnetic force per unit length on the wire?

- ☐ A $F/L = IB \hat{z}$ (in the $+z$ direction)
- ☐ B $F/L = IB \hat{y}$ (in the $+y$ direction)
- ☐ C $F/L = IB(\hat{y} \times \hat{x})$ per unit length, which is undefined since $\hat{y} \times \hat{x}$ is parallel to the current
- ☐ D $F/L = 0$ (no force, since the current is parallel to $\mathbf{B}$)
- ☐ E $F/L = IB \hat{x}$ (in the $+x$ direction)

ANSWER D**QUESTION 6** SINGLE CHOICE

A long, straight solenoid of n turns per unit length carries a steady current I . Using Ampère's law, which of the following is the magnitude of the magnetic field B inside the solenoid, far from its ends?

- ☐ A $B = \mu_0 n I$
- ☐ B $B = \mu_0 N I / \diamond$
- ☐ C $B = \mu_0 I / (2\pi r)$, where r is the radial distance from the solenoid's axis
- ☐ D $B = \mu_0 I / (2R)$, where R is the radius of the solenoid

ANSWER A

QUESTION 7 SINGLE CHOICE

A spherical conducting shell of inner radius a and outer radius b carries a net charge $+Q$. A point charge $+q$ sits at the center of the cavity. What is the surface charge density on the outer surface of the shell?

- ☐ A $+q/(4\pi a^2)$
- ☐ B $-q/(4\pi a^2)$
- ☒ C $+(Q + q)/(4\pi b^2)$
- ☐ D $+(Q - q)/(4\pi b^2)$

ANSWER C**QUESTION 8** SINGLE CHOICE

Four identical point charges, each of charge $+q$, are placed at the corners of a square of side length a . What is the electric potential at the center of the square, taking $V(\infty) = 0$?

- ☐ A $V = (1 / (4\pi\epsilon_0)) \cdot (4q / a)$
- ☐ B $V = (1 / (4\pi\epsilon_0)) \cdot (4q / (a\sqrt{2}))$
- ☒ C $V = (1 / (4\pi\epsilon_0)) \cdot (4q / (a/\sqrt{2}))$
- ☐ D $V = 0$

ANSWER C