



Grade 12 Physics

Gravitational, Electrical, Magnetic Fields Test

First Name: _____

Last Name: _____

Directions:

- Please answer to 2 decimal points
- The test is designed to be completed in 75 minutes

For grading use only

Page:	2	3	4	5	6	7	Total
Points:	6	19	20	10	10	20	85
Score:							

Multiple Choice (10 marks)

1. (1 point) Which of the following is true about gravitational fields?
 - A. Gravitational fields only exist near massive objects like planets.
 - B. Gravitational fields are regions where a mass experiences a force.
 - C. Gravitational fields are strongest at the center of a planet.
 - D. Gravitational fields do not depend on the mass of the object creating them.

2. (1 point) What is the direction of the electric field around a positive point charge?
 - A. Radially inward.
 - B. Radially outward.
 - C. Tangential to the charge.
 - D. There is no electric field around a positive charge.

3. (1 point) A magnetic field is produced by:
 - A. Stationary electric charges.
 - B. Moving electric charges.
 - C. Gravitational forces.
 - D. Static electric fields.

4. (1 point) The force experienced by a charged particle in a magnetic field is maximum when:
 - A. The particle is stationary.
 - B. The particle moves perpendicular to the magnetic field.
 - C. The particle moves parallel to the magnetic field.
 - D. The particle is uncharged.

5. (1 point) The gravitational force between two masses is inversely proportional to:
 - A. The product of the masses.
 - B. The square of the distance between them.
 - C. The sum of the masses.
 - D. The distance between them.

6. (1 point) The unit of electric field strength is:
 - A. Newton (N).
 - B. Newton per Coulomb (N/C).
 - C. Joule (J).
 - D. Volt (V).

7. (1 point) A proton and an electron are placed in the same electric field. Which experiences a greater acceleration?
- A. The proton.
 - B. The electron.
 - C. Both experience the same acceleration.
 - D. Neither accelerates.
8. (1 point) The magnetic field inside a long solenoid is:
- A. Zero.
 - B. Uniform and parallel to the axis.
 - C. Non-uniform and radial.
 - D. Strongest at the ends.
9. (1 point) The force between two parallel current-carrying wires is:
- A. Always attractive.
 - B. Attractive if currents are in the same direction.
 - C. Repulsive if currents are in the same direction.
 - D. Independent of the current direction.
10. (1 point) The work done in moving a charge in an electric field depends on:
- A. The path taken.
 - B. The potential difference.
 - C. The charge's mass.
 - D. The magnetic field present.

Long Answer (40 marks)

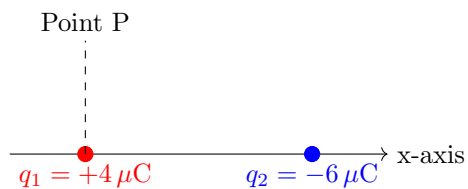
11. A satellite of mass 500 kg orbits the Earth at a height of 300 km above the surface. The radius of the Earth is 6.37×10^6 m, and its mass is 5.97×10^{24} kg.
- (a) (5 points) Calculate the gravitational force acting on the satellite.
 - (b) (5 points) Determine the orbital speed of the satellite.
 - (c) (5 points) Find the period of the satellite's orbit.

12. A proton moves with a velocity of 2×10^6 m/s perpendicular to a magnetic field of 0.5 T.
- (a) (5 points) Calculate the magnetic force acting on the proton.
 - (b) (5 points) Determine the radius of the proton's circular path.

13. Two point charges, $q_1 = 3 \mu\text{C}$ and $q_2 = -5 \mu\text{C}$, are placed 10 cm apart.
- (a) (5 points) Calculate the electric force between the charges.
 - (b) (5 points) Determine the electric field at the midpoint between the charges.

14. A wire carrying a current of 5 A is placed in a uniform magnetic field of 0.2 T. The wire is 0.5 m long and makes an angle of 30° with the magnetic field.
- (a) (5 points) Calculate the magnetic force acting on the wire.
 - (b) (5 points) Determine the direction of the force using the right-hand rule.

15. Two point charges, $q_1 = +4\ \mu\text{C}$ and $q_2 = -6\ \mu\text{C}$, are placed 12 cm apart along the x-axis, as shown below.



A point P is located 5 cm above q_1 .

- (a) (4 points) Calculate the electric field at point P due to q_1 .
- (b) (4 points) Calculate the electric field at point P due to q_2 .
- (c) (2 points) Determine the direction of the **net** electric field at P .

