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| **Curriculum Requirements** | **Section 1** | **Section 2** | **Section 3** |
| year 11 prior knowledge |  | Q14 (4) | Q18 (8) |
| * The movement of free‐falling bodies in Earth’s gravitational field is predictable. |  | Q11 (3) |  |
| * All objects with mass attract one another with a gravitational force; the magnitude of this force can be calculated using Newton’s Law of Universal Gravitation.   *This includes applying the relationship* | Q4 (5) | Q13 (6) |  |
| * Objects with mass produce a gravitational field in the space that surrounds them; field theory attributes the gravitational force on an object to the presence of a gravitational field.   *This includes applying the relationship*  Fweight = m g |  |  |  |
| * When a mass moves or is moved from one point to another in a gravitational field and its potential energy changes, work is done on the mass by the field.   *This includes applying the relationships*  Ep = m g Δh , W = F s , W = ΔE , Ek = ½ m v2 |  | Q11 (7) |  |
| * Gravitational field strength is defined as the net force per unit mass at a particular point in the field.   *This includes applying the relationships* |  | Q11 (3) |  |
| * The vector nature of the gravitational force can be used to analyse motion on inclined planes by considering the components of the gravitational force (that is, weight) parallel and perpendicular to the plane. | Q2 (6) | Q17 (5) |  |
| * Projectile motion can be analysed quantitatively by treating the horizontal and vertical components of the motion independently.   *This includes applying the relationships*  , , s = u t + ½ a t2 , v2 = u2 + 2 a s , Ek = ½ m v2 |  | Q12 (16)  Q16 (7) |  |
| * When an object experiences a net force of constant magnitude perpendicular to its velocity, it will undergo uniform circular motion, including circular motion on a horizontal plane and around a banked track; and vertical circular motion.   *This includes applying the relationships*  , , Fresultant = m ac = | Q8 (5) | Q13 (4) | Q18 (10) |
| * Newton’s Law of Universal Gravitation is used to explain Kepler’s laws of planetary motion and to describe the motion of planets and other satellites, modelled as uniform circular motion.   *This includes deriving and applying the relationship* | Q1 (4) |  |  |
| * When an object experiences a net force at a distance from a pivot and at an angle to the lever arm, it will experience a torque or moment about that point.   *This includes applying the relationship*  τ = r Fsinθ |  | Q14 (5) |  |
| * For a rigid body to be in equilibrium, the sum of the forces and the sum of the moments must be zero.   *This includes applying the relationships*  ƩF = 0 , τ = r Fsinθ , Ʃτ = 0 | Q5 (5) | Q14 (6) |  |
| **Number of Question** | 5 | 6 | 1 |
| **Amount of Marks** | 25 | 66 | 18 |
| **Percentage of Marks** | 46% | 73% | 50% |
| * Electrostatically charged objects exert a force upon one another; the magnitude of this force can be calculated using Coulomb’s Law.   *This includes applying the relationship*  F = | Q4 (2) |  |  |
| * Point charges and charged objects produce an electric field in the space that surrounds them; field theory attributes the electrostatic force on a point charge or charged body to the presence of an electric field. | Q7 (6) | Q16 (3) |  |
| * A positively charged body placed in an electric field will experience a force in the direction of the field; the strength of the electric field is defined as the force per unit charge.   *This includes applying the relationship*  E = |  |  |  |
| * When a charged body moves or is moved from one point to another in an electric field and its potential energy changes, work is done on the charge by the field.   *This includes applying the relationship*  V = |  | Q16 (4) |  |
| * The direction of conventional current is that in which the flow of positive charges takes place, while the electron flow is in the opposite direction. |  |  | Q19 (2) |
| * Current‐carrying wires are surrounded by magnetic fields; these fields are utilised in solenoids and electromagnets. |  |  |  |
| * The strength of the magnetic field produced by a current is a measure of the magnetic flux density.   *This includes applying the relationship* |  |  |  |
| * Magnets, magnetic materials, moving charges and current‐carrying wires experience a force in a magnetic field when they cut flux lines; this force is utilised in DC electric motors and particle accelerators.   *This includes applying the relationships*  F = q v B where v perpendicular B,  F = I l B where l perpendicular B | Q3 (7) |  |  |
| * The force due to a current in a magnetic field in a DC electric motor produces a torque on the coil in the motor.   *This includes applying the relationship*  τ = r F |  |  |  |
| * An induced emf is produced by the relative motion of a straight conductor in a magnetic field when the conductor cuts flux lines.   *This includes applying the relationship*  induced emf = l v B where v perpendicular B | Q10 (6) |  |  |
| * Magnetic flux is defined in terms of magnetic flux density and area.   *This includes applying the relationship*  Φ = B A |  | Q15 (4) |  |
| * A changing magnetic flux induces a potential difference; this process of electromagnetic induction is used in step‐up and step‐down transformers, DC and AC generators.   *This includes applying the relationships*  AC generator emfmax = -2 N l v B = - 2 π N B A f  emfrms =  , P = V I = I2 R = | Q6 (4) | Q15 (13) | Q19 (16) |
| * Conservation of energy, expressed as Lenz’s Law of electromagnetic induction, is used to determine the direction of induced current. | Q9 (4) |  |  |
| **Number of Question** | 5 | 2 | 1 |
| **Amount of Marks** | 29 | 24 | 18 |
| **Percentage of Marks** | 54% | 27% | 50% |
| **TOTAL** | 10 (54) | 8 (90) | 2 (36) |