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| **Curriculum Requirements** | **Section 1** | **Section 2** | **Section 3** |
| * distinguish between vector and scalar quantities, and add and subtract vectors in two dimensions. | Q1 (4)  Q8 (5) |  |  |
| * uniformly accelerated motion is described in terms of relationships between measurable scalar and vector quantities, including displacement, speed, velocity and acceleration.   *This includes applying the relationships* | Q11 (4) | Q2 (9)  Q4 (4) |  |
| * representations, including graphs, vectors, and equations of motion, can be used qualitatively and quantitatively to describe and predict linear motion | Q5 (3) SI units | Q3 (17) |  |
| * vertical motion is analysed by assuming the acceleration due to gravity is constant near Earth’s surface. |  |  |  |
| * Newton’s three Laws of Motion describe the relationship between the force or forces acting on an object, modelled as a point mass, and the motion of the object due to the application of the force or forces. | Q4 (3) |  | Q1 (4) |
| * free body diagrams show the forces and net force acting on objects, from descriptions of real-life situations involving forces acting in one or two dimensions   This includes applying the relationships | Q7 (4)  Q11 (1) |  |  |
| * energy is conserved in isolated systems and is transferred from one object to another when a force is applied over a distance; this causes work to be done and changes the kinetic ( Ek) and/or potential (Ep) energy of objects   This includes applying the relationships  Ek = ½ m v2, Ep = m g Δh,  W = F s, W = ΔE | Q2 (2) | Q4 (11) | Q1 (4) |
| * power is the rate of doing work or transferring energy   This includes applying the relationship | Q9 (2) |  |  |
| * momentum is a property of moving objects; it is conserved in a closed system and may be transferred from one object to another when a force acts over a time interval   This includes applying the relationships  p = m v, ∑ m vbefore = ∑ m vafter  m v – m u = Δp = F Δt |  | Q2 (3)  Q5 (9) | Q1 (3) |
| * collisions may be elastic and inelastic; kinetic energy is conserved in elastic collisions   This includes applying the relationship |  | Q5 (6) |  |
| * safety for road users has been increased through development and use of devices, including: (SHE) * helmets & safety barriers * seatbelts & airbags * crumple zones |  |  | Q1 (11) |
| * waves are periodic oscillations that transfer energy from one point to another. |  |  |  |
| * mechanical waves transfer energy through a medium; longitudinal and transverse waves are distinguished by the relationship between the directions of oscillation of particles relative to the direction of the wave velocity. |  |  |  |
| * waves may be represented by displacement/time and displacement/distance wave diagrams and described in terms of relationships between measurable quantities, including period, amplitude, wavelength, frequency and velocity.   *This includes applying the relationships* | Q3 (2) light  Q9 (3) sound  Q10 (6) sound |  |  |
| * the mechanical wave model can be used to explain phenomena related to reflection and refraction, including echoes and seismic phenomena. | Q14 (4) |  |  |
| * the superposition of waves in a medium may lead to the formation of standing waves and interference phenomena, including standing waves in pipes and on stretched strings.   This includes applying the relationships for | Q12 (4)  Q13 (4) | Q1 (8) |  |
| * application of the wave model has enabled the visualisation of imaging techniques, for geophysical exploration, such as seismology. SHE |  |  |  |
| * application of the wave model has enabled the visualisation of imaging techniques for medical applications, such as ultrasound. (SHE) |  |  |  |
| * a mechanical system resonates when it is driven at one of its natural frequencies of oscillation; energy is transferred efficiently into systems under these conditions. | Q13 (3) sound |  |  |
| * noise pollution comes from a variety of sources and is often amplified by walls, buildings and other built structures. Acoustic engineering, based on an understanding of the behaviour of sound waves, is used to reduce noise pollution. It focuses on absorbing sound waves or planning structures so that reflection and amplification do not occur. (SHE) | Q6 (4) |  |  |
| * the intensity of a wave decreases in an inverse square relationship with distance from a point source   This includes applying the relationship |  |  |  |
| Questions (total) | 14 q (58) | 5 q (67) |  |