

# Advanced Mechanics

PH12-12

3 inquiry questions · 17 dot points

## 1 How can models that are used to explain projectile motion be used to analyse and make predictions?

- analyse the motion of projectiles by resolving the motion into horizontal and vertical components, making the following assumptions:...
- apply the modelling of projectile motion to quantitatively derive the relationships between the following variables:...
- conduct a practical investigation to collect primary data in order to validate the relationships derived above.
- solve problems, create models and make quantitative predictions by applying the equations of motion relationships for uniformly accelerated and constant rectilinear motion

## 2 Why do objects move in circles?

- conduct investigations to explain and evaluate, for objects executing uniform circular motion, the relationships that exist between:...
- analyse the forces acting on an object executing uniform circular motion in a variety of situations, for example:...
- solve problems, model and make quantitative predictions about objects executing uniform circular motion in a variety of situations, using the following relationships:...
- investigate the relationship between the total energy and work done on an object executing uniform circular motion
- investigate the relationship between the rotation of mechanical systems and the applied torque

## 3 How does the force of gravity determine the motion of planets and satellites?

- apply qualitatively and quantitatively Newton's Law of Universal Gravitation to:...
- determine the force of gravity between two objects  
 $F = GMm/r^2$
- investigate the factors that affect the gravitational field strength  $g = GM/r^2$
- predict the gravitational field strength at any point in a gravitational field, including at the surface of a planet
- investigate the orbital motion of planets and artificial satellites when applying the relationships between the following quantities:...
- predict quantitatively the orbital properties of planets and satellites in a variety of situations, including near the Earth and geostationary orbits, and relate these to their uses
- investigate the relationship of Kepler's Laws of Planetary Motion to the forces acting on, and the total energy of, planets in circular and non-circular orbits using:...
- derive quantitatively and apply the concepts of gravitational force and gravitational potential energy in radial gravitational fields to a variety of situations, including but not limited to:...