

## Topic 9: Motion in Fields

### Projectile Motion

Statement Number	Assessment Statement	Obj
9.1.1	State the independence of the vertical and the horizontal components of velocity for a projectile in a uniform field	1
9.1.2	Describe and sketch the trajectory of projectile motion as parabolic in the absence of air resistance.	3
9.1.3	Describe qualitatively the effect of air resistance on the trajectory of a projectile	2
9.1.4	Solve problems on projectile motion	3

### 9.1 Gravitational field, potential and energy

Statement Number	Assessment Statement	Obj
9.2.1	Define <i>gravitational potential</i> and <i>gravitational potential energy</i>	1
9.2.2	State and apply the expression for gravitational potential due to a point mass.	2
9.2.3	State and apply the formula relating gravitational field strength to gravitational potential gradient	2
9.2.4	Determine the potential due to one or more point masses	3
9.2.5	Describe and sketch the pattern of equipotential surfaces due to one and two point masses	3
9.2.6	State the relation between equipotential surfaces and gravitational field lines	1
9.2.7	Explain the concept of escape speed from a planet	3
9.2.8	Derive an expression for the escape speed of an object from the surface of a planet	3
9.2.9	Solve problems involving gravitational potential energy and gravitational potential	3

### 9.2 Electric Field, potential and energy

Statement Number	Assessment Statement	Obj
9.3.1	Define <i>electric potential</i> and <i>electric potential energy</i> .	1
9.3.2	State and apply the expression for electric potential due to a point charge.	2
9.3.3	State and apply the formula relating electric field strength to electric potential gradient	2
9.3.4	Determine the potential due to one or more point charges	3
9.3.5	Describe and sketch the pattern of equipotential surfaces due to one and two point charges	3
9.3.6	State the relation between equipotential surfaces and electric field lines	1
9.3.7	Solve problems involving electric potential energy and electric potential	3

### 9.4 Orbital Motion

Statement Number	Assessment Statement	Obj
9.4.1	State that gravitation provides the centripetal force for circular orbital motion.	1
9.4.2	Derive Kepler's third law.	3
9.4.3	Derive expressions for the kinetic energy, potential energy and total energy of an orbiting satellite.	3
9.4.4	Sketch graphs showing the variation with orbital radius of the kinetic energy, gravitational potential energy and total energy of a satellite.	3
9.4.5	Discuss the concept of "weightlessness" in orbital motion, in free fall and in deep space.	3
9.4.6	Solve problems involving orbital motion.	3