Year 12 Physics Revision Table

Topic 1: Projectile Motion

Expectation From SACE Subject Outline *Note: these can be asked in converse*	***Summary of things I know about this*** (for formulae, for example, this could be: what the symbols mean, what the units of each variable is, and some possible rearrangements)	***Example question(s) to practice until I can do under test conditions without help*** There are likely to be some in the textbook too; also take note of questions you'd like examples of from the teacher
Given a multi-image photograph of a projectile, demonstrate that the: • horizontal component of velocity is constant • acceleration is in the vertical direction and is the same as that of a vertically free-falling object.		Assignment 2 Q2 Test Q5
Draw a vector diagram in which the horizontal and vertical components of velocity are added, giving the resultant velocity vector at any instant. Using trigonometric calculations or a scale diagram, calculate, from its horizontal and vertical components, the magnitude and direction of a velocity vector at any instant.		Assignment 1 Q1 (c) Test Q3 (c)
On a diagram showing the path of a projectile, draw vectors to represent the velocity and acceleration of the projectile at any instant.		Assignment 2 Q1
Given the initial velocity of a projectile, calculate the vertical component of velocity at any instant.		Assignment 1 Q1 (c) Test Q3 (a)
Using trigonometric calculations or a scale diagram, resolve a velocity vector into its horizontal and vertical components.		Assignment 1 Q1 (a), Q4 Assignment 2 Q5 Test Q4 (a)
Calculate the time of flight of a projectile in cases where the final height is the same as the initial height.		Assignment 1 Q1 (a) Assignment 2 Q5 (a) Test Q4 (b)

Using the horizontal component of velocity and the time of flight, calculate the range of a projectile.		Assignment 1 Q1 (b) Assignment 2 Q5 (a) Test Q3 (b)
For a projectile launched from ground height, find, by using sample calculations or otherwise, the: • launch angle that results in the maximum range • relation between the launch angles that result in the same range.		Assignment 2 Q3
Using the vertical component of the initial velocity and the acceleration, calculate the maximum height of a projectile.		Assignment 1 Q4 Assignment 2 Q5 (b) Test Q2
Using the time of flight and the acceleration, calculate the maximum height of a projectile.		Assignment 1 Q5 Test Q5 (b)
Describe how air resistance affects both the horizontal component and the vertical component of velocity and hence the time of flight and range of a projectile.		Assignment 2 Q4
Compare qualitatively the force of air resistance acting on different objects.		Test Q3 (d)
Describe and explain the effect of the launch height of a projectile (e.g. a shot put launched from shoulder height) on the maximum range, and the effect of the launch angle for a given height.		Test Q4 (c)

Topic 2: Uniform Circular Motion

Expectation	*Summary of things I know about this*	*Example question(s) to practice*
Using a vector subtraction, show that the change in the velocity $\Delta\vec{v}$, and hence the acceleration, of an object over a very small time interval is directed towards the centre of the circle.		Assignment Q1
Using the relationship $v = 2\pi r/T$, relate the speed v to the period T for a fixed radius.		Assignment Q4 (a)
Solve problems involving the use of the equations $a = v^2/r$ and $v = 2\pi r/T$.		Assignment Q2 (a), Q4 (b) Test Q2(b)
Describe situations in which the centripetal acceleration is caused by a tension force, a frictional force, a gravitational force, or a normal force.		Assignment Q3 (a) Test Q1(b),2(a)
Identify the vertical and horizontal forces on a vehicle moving with constant velocity on a flat horizontal road.		
Explain that when a vehicle travels round a banked curve at the correct speed for the banking angle, the horizontal component of the normal force on the vehicle (not the frictional force on the tyres) causes the centripetal acceleration.		Test Q3(a)
Derive the equation $\tan\theta = v^2/rg$, relating the banking angle θ to the speed v of the vehicle and the radius of curvature r.		Assignment Q4 (c) Test Q3(b)
Solve problems involving the use of the equation $\tan\theta = v^2/rg$.		Assignment Q4 (d)

Topic 3: Gravitation and Satellites

Expectation	*Summary of things I know about this*	*Example question(s) to practice*
Solve problems involving the use of $F = Gm_1m_2/r^2$,		Assignment Q1
Using proportionality, discuss changes in the magnitude of the gravitational force on each of the masses as a result of a change in one or both of the masses and/or a change in the distance between them.		Assignment Q4 Test Q4(a)
Explain that the gravitational forces are consistent with Newton's third law.		
Using Newton's law of universal gravitation and second law of motion, calculate the value of the acceleration due to gravity g at a planet or moon.		
Demonstrate an understanding that the speed, and hence the period, of a satellite moving in a circular orbit depends only on the radius of the orbit and not on the mass of the satellite.		
Derive the formula $v = \sqrt{GM/r}$		
Solve problems involving the use of the equations $v = \sqrt{GM/r}$ and $v = 2\pi r/T$.		Assignment Q3
Explain why the centres of the circular orbits of Earth satellites must coincide with the centre of the Earth.		Test Q4(b)
Explain why a geostationary satellite must move in a particular orbit of relatively large radius in the Earth's equatorial plane and in the same direction as that in which the Earth rotates.		Assignment Q2
Explain the advantages of launching low-altitude equatorial-orbit satellites in a west-to-east direction.		5
Explain why low-altitude polar orbits are used in meteorology and surveillance.		6
Perform calculations involving orbital periods, radii, altitudes above the surface, and speeds of satellites, including examples which involve the orbits of geostationary satellites.		