# Year 12 Physics Self-Assessment Topics 2-3 Formative Test

# Topic 2: Uniform Circular Motion

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| ***Learning Intention*** | ***Test Q*** | ***Proficiency***  (beginning/sometimes/proficient) | ***Comments/questions*** | ***Assignment question(s)*** |
| Using a vector subtraction, show that the change in the velocity 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 relate the speed to the period for a fixed radius. | **-** |  |  | Assignment Q4 (a) |
| Solve problems involving the use of the equations | **2(b)** |  |  | Assignment Q2 (a), Q4 (b) |
| Describe situations in which the centripetal acceleration is caused by a tension force, a frictional force, a gravitational force, or a normal force. | **1(b)**  **2(a)** |  |  | Assignment Q3 (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. | **3(a)** |  |  |  |
| Derive the equation relating the banking angle to the speed of the vehicle and the radius of curvature | **3(b)** |  |  | Assignment Q4 (c) |
| Solve problems involving the use of the equation | **-** |  |  | Assignment Q4 (d) |

### Topic 3: Gravitation and Satellites

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| ***Learning Intention*** | ***Test Q*** | ***Proficiency***  (beginning/sometimes/proficient) | ***Comments/questions*** | ***Assignment question(s)*** |
| Solve problems involving the use of | **-** |  |  | 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. | **4(a)** |  |  | Assignment Q4 |
| 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 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 | **-** |  |  |  |
| Solve problems involving the use of the equations | **-** |  |  | Assignment Q3 |
| Explain why the centres of the circular orbits of Earth satellites must coincide with the centre of the Earth. | **4(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. | **-** |  |  |  |