Centripetal Force High speeds Lower speeds Very low speeds How to solve **Type of Motion** Provided by: The object If the object **Inner Circles** The object **Energy:** to find the speed at a describes travels partway doesn't have particular point. Forces: Eg: **Tension** in the complete round the circle enough energy resolving radially and weight on a string circles. applying F = ma to find to go beyond string or then falls car doing a loop-the-loop Normal inwards at the the halfway tension or normal reaction at reaction of the point it simply a specific point. This cannot moment where track (acting tension or oscillates be negative if the string is taut (or the object is in radially) normal abound the combined with reaction drops lowest point of contact with the surface), so the **radial** the circle. if it reaches 0, the object is on to zero. component of the point of falling inwards. weight. **Outer Circles** Provided by: Once the While there is While there is **Energy:** to find the speed at a still a normal still a normal particular point. normal Eg: **Forces:** resolving radially and reaction force Normal reaction reaction force object balanced on a sphere reaction acting away applying F = ma to find the acting away becomes car driving over a bridge normal reaction at a specific zero. the from the from the (acting away object falls point. This cannot be from the centre, the centre, the outwards object will negative if the object is still centre), object will combined with from the in contact with the surface, continue to continue to circular so the instant it reaches 0. the the **radial** travel in travel in component of path. circular circular object is on the point of falling motion. motion. outwards. weight. The object Provided by: The object **Energy:** to find the speed at a **Fixed Circles** The object may describes still describe particular point. Forces: oscillates Eg: about the Normal complete complete resolving radially and roller-coaster car on a track reaction circles and circles, but the lowest point if applying F = ma to find the bead threaded on a wire (acting either the normal normal the **speed** normal reaction at a specific *towards* or reaction will be drops to 0 point. May be positive or reaction negative, as the normal away from the acting away before reaching acts centre), the top. reaction may point in or towards from the combined with outwards. Since the object centre for the Normal the centre. the **radial** cannot leave the circular path, part of the reaction may component of motion when point towards the key factor is the **speed of** the speed is or away from motion at each point. weight. very low. the centre.

Vertical Circles There are three main types of vertical circular motion, and each one must be treated differently.