**Pulleys**

A pulley is a wheel on which a rope/string/cable passes.

What modelling assumptions are made?

**Example**

Particles of mass 4kg and 2kg are connected by a light string passing over a smooth, fixed pulley. The particles hang freely and are released from rest.

i) Find the acceleration of the two particles and the tension in the string. Let the acceleration be *a* and the tension in the string be T

ii) Find the force exerted on the pulley by the string

**Example – Horizontal and Vertical String**

*(Take g = 10ms-2 in this question)*

The diagram shows a particle, P, of mass 0.5kg on a smooth horizontal table. P is connected to another particle, Q, of mass 1.5kg, by a taut, light, inextensible string which passes over a small, fixed, smooth pulley at the edge of the table, Q hanging vertically below the pulley.

A horizontal force of magnitude *X*N acts on P as shown.

a) Given the system is in equilibrium, find *X*

b) Given that *X* = 12, find the distance travelled by Q in the first two seconds of its motion, following the release of the system from rest. You may assume that P does not reach the pulley in this time.



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