A particle P of mass 0.1 kg is attached to one end of a light inextensible string of length 0.5 m. The other end of the string is attached to a fixed point A. The particle P moves in a circle which has its centre O on a smooth horizontal surface 0.3 m below A. The tension in the string has magnitude T N and the magnitude of the force exerted on P by the surface is R N.

(i) Given that the speed of P is $1.5\,\mathrm{m\,s^{-1}}$, calculate T and R. [4]

(ii) Given instead that $T = R$, calculate the angular speed of P. [4]