



$A$  and  $B$  are two fixed points on a vertical axis with  $A$  above  $B$ . A particle  $P$  of mass  $0.4\text{ kg}$  is attached to  $A$  by a light inextensible string of length  $0.5\text{ m}$ . The particle  $P$  is attached to  $B$  by another light inextensible string.  $P$  moves with constant speed in a horizontal circle with centre  $O$  between  $A$  and  $B$ . Angle  $BAP = 30^\circ$  and angle  $ABP = 70^\circ$  (see diagram).

- (i) Given that the tensions in the two strings are equal, find the speed of  $P$ . [5]
- (ii) Given instead that the angular speed of  $P$  is  $12\text{ rad s}^{-1}$ , find the tensions in the strings. [5]