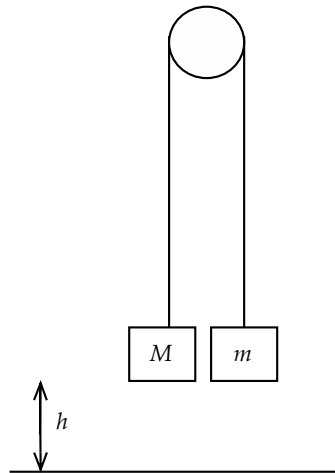# Single Mechanics – Pulleys

1. Two particles of mass m kg and M kg (with $M > m$) are held at the same height h above above the ground. The system is then released from rest.

(a) Find an expression for the maximum height above the ground reached by m. $\boxed{\frac{h(3M+m)}{M+m}}$

(b) Find an expression for the time taken for m to reach its maximum height. $\boxed{\sqrt{\frac{2h}{g}}\left(\sqrt{\frac{M+m}{M-m}} + \sqrt{\frac{M-m}{M+m}}\right)}$

2. A system is setup as below. m is at the bottom of a slope inlined at $\theta°$ to the horizontal.
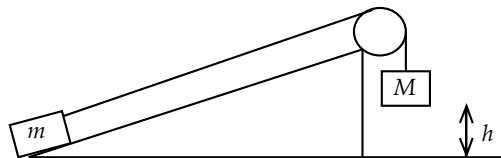
(a) Find an expression for the maximum distance that m makes it up the slope before stopping if the slope is smooth. ☐

(b) Find an expression for the maximum distance that m makes it up the slope before stopping if the slope is rough with coefficient of friction μ. ☐