1. The elevator $E$ is moving upwards at 2 m/s after travelling 10 m from its resting position. The elevator and its passengers $E$ have a mass of 1000 kg; the counterweight $C$ has a mass of 250 kg; all pulleys are massless; all cables are inextensible and massless.

(a) What is the relationship between the speed of $E$ and the speed of $C$?

(b) What is the magnitude of the constant force, $F$?
2. A helicopter pilot sees something interesting in the distance, and decides to land. At the instant shown, the blades spin at constant rate of 450 rpm, and the helicopter moves straight downwards with a speed of 10 m/s and an acceleration of 0.5 g. The blades on the main rotor are 5 m long. Relative to the stationary observer, what are the magnitudes of the velocity and acceleration of point $P$ on the tip of one of the main rotor blades?
3. Fearing that a passenger might be late for Dynamics, a bus driver accelerates steadily. The hand grips on the bus, each of which can be treated as a particle of mass $m$ on a very light cord, swing up to an angle $\theta = 10^\circ$. What is the acceleration of the bus?
4. The ball of mass $m$ spins around a post in such a way that the tensions in the upper and lower cables are equal. The lower cable forms an angle of $60^\circ$ with the post; the upper cable forms an angle of $30^\circ$ with the post. What is the speed $v_0$ of the ball?