3B Hooke's Law in Dynamics

1. One end of a light elastic string, of natural length 0.5m and modulus of elasticity 20N, is attached to a fixed point A. The other end of the string is attached to a particle of mass 2kg. The particle is held at a point that is 1.5m below A and released from rest. Find:

a) The initial acceleration of the particle

b) The length of the string when the particle reaches its maximum speed

2. A particle of mass 0.5kg is attached to one end of a light elastic spring of natural length 1.5m and modulus of elasticity 19.6N. The other end of the spring is attached to a fixed point O on a rough plane which is inclined to the horizontal at an angle θ, where $\tan\theta = {}^{3}/_{4}$. The coefficient of friction between the particle and the plane is 0.2. The particle is held at rest on the plane at a point that is 1m from O down the line of greatest slope of the plane. The particle is released from rest and moves down the slope. Find its initial acceleration.