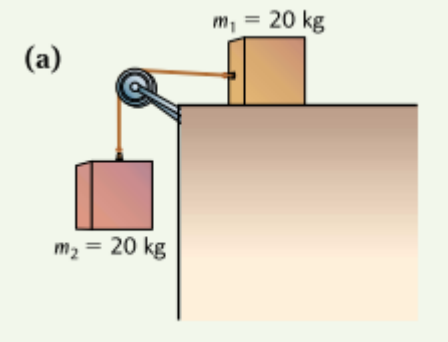
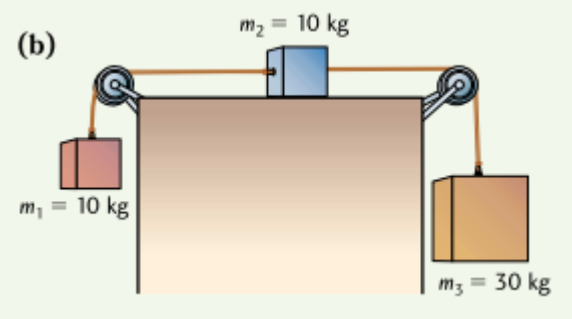
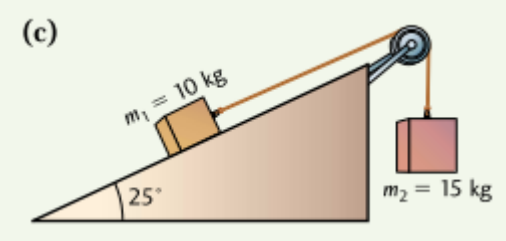
Problems

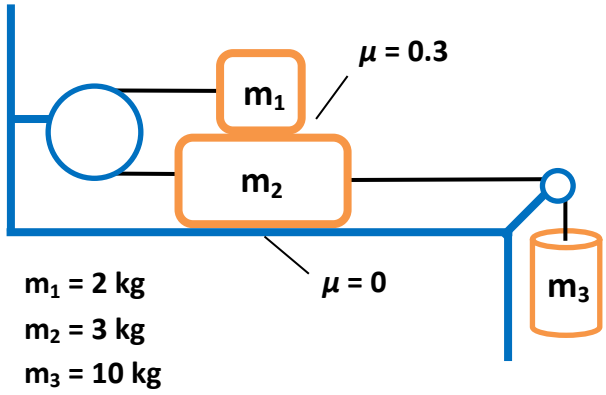
1. For each situation below, determine the acceleration of the system and then tension in each rope when
   a) friction is absent b) $\mu_K = 0.20$[1]



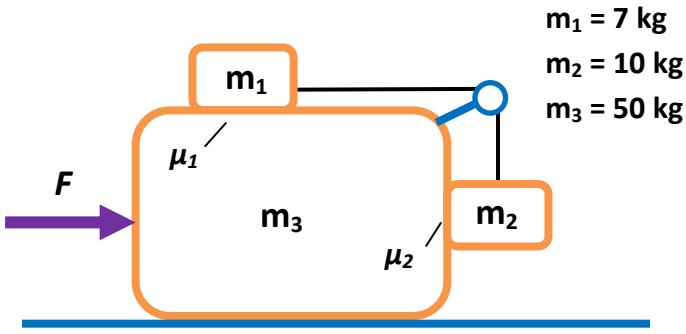




2. a) Find the acceleration of the system and the tension in the two strings.
   b) Calculate the minimum coefficient of friction between m_1 and m_2 that would cause the system to remain motionless when released.[2]

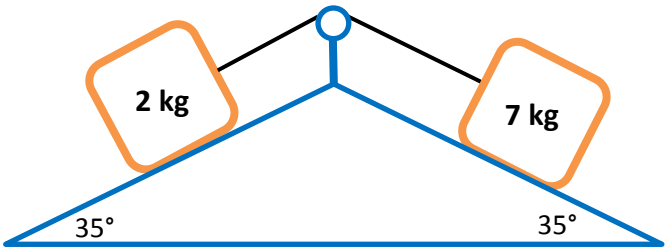


3. a) Find F such that m_1 and m_2 remain stationary relative to m_3 (no friction).
   b) If $\mu_1 = 0.25$ and $\mu_2 = 0$, find the maximum and minimum F required to keep m_1 and m_2 stationary relative to m_3.[3]

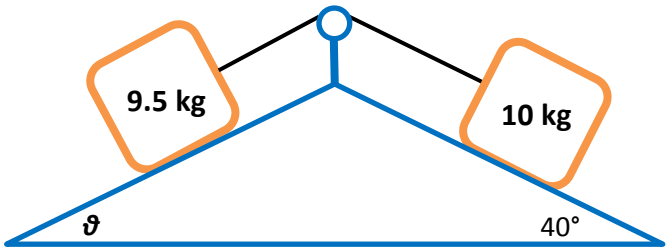


[1] Physics Book Two, Irwin Publishing, Chapter 2 Problems, #49
[2] Advanced Block & Pulley Problems, Origin Unknown
[3] Advanced Block & Pulley Problems, Origin Unknown

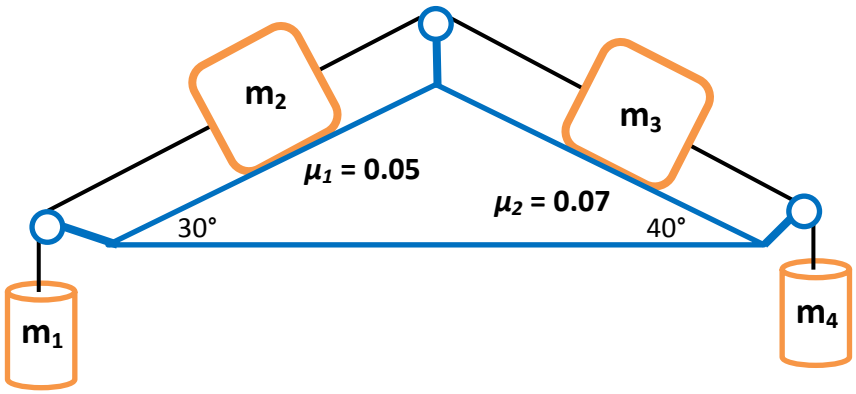
4. a) Find the acceleration of the system and then tension in the rope (no friction).
   b) If the acceleration is 1.5 m/s^2, determine the coefficient of friction.[4]



5. a) Find ϑ such that the system has an acceleration of zero (no friction).
   b) If $\mu_S = 0.3$ for each block, find the maximum and minimum values of ϑ that would result in the system having an acceleration of zero.[5]
   *Hint: $\sin^2\vartheta + \cos^2\vartheta = 1$



6. a) Find the acceleration of the system and the tension in each of the strings.
   b) If μ_1 and μ_2 were equal to zero, then what would the 30° angle have to change to in order for the system to remain at rest when released?[6]



m_1 = 15 kg
m_2 = 20 kg
m_3 = 20 kg
m_4 = 18 kg

[4] Advanced Block & Pulley Problems, Origin Unknown
[5] Advanced Block & Pulley Problems, Origin Unknown
[6] Advanced Block & Pulley Problems, Origin Unknown