38. The height of the center of gravity at stable equilibrium is 
\[ d = \frac{0.500 \text{ m}}{2} = 0.250 \text{ m}. \]
The minimum height of the center of gravity at unstable equilibrium is half the diagonal distance 
\[ d' = \sqrt{\frac{0.500 \text{ m}}{2}} = 0.3536 \text{ m}. \]
So the minimum distance that CG has to be raised is \( 0.3536 \text{ m} - 0.250 \text{ m} = 0.1036 \text{ m}. \)
Therefore the work done against gravity is \( W = (10.0 \text{ kg})(9.80 \text{ m/s}^2)(0.1036 \text{ m}) = 10.2 \text{ J}. \)

39. When it is about to tip over the left support, the force on the right support is zero.
Choose the left support as the axis of rotation.
Using \( \Sigma \tau = 0, \) \( (70 \text{ kg})(9.80 \text{ m/s}^2)(1.5 \text{ m}) - (15 \text{ kg})(9.80 \text{ m/s}^2)(2.75 \text{ m}) + T_1(5.5 \text{ m}) = 0, \)
so \( T_1 = \frac{2.6 \times 10^4 \text{ N}}{5.5 \text{ m}} = 0.473 \text{ N}. \)
\( \Sigma F_y = 0, \quad \Rightarrow \quad T_1 - T_2 = (70 \text{ kg} + 15 \text{ kg})(9.80 \text{ m/s}^2), \)
so \( T_2 = 833 \text{ N} - 261 \text{ N} = 5.7 \times 10^2 \text{ N}. \)
\( T_2 \) can also be found by choosing the right end as the axis.

40. Choose the left end as the axis. \( \Sigma \tau = 0, \)
\[ T_1(0) - (70 \text{ kg})(9.80 \text{ m/s}^2)(1.5 \text{ m}) - (15 \text{ kg})(9.80 \text{ m/s}^2)(2.75 \text{ m}) + T_1(5.5 \text{ m}) = 0, \]
so \( T_1 = \frac{2.6 \times 10^4 \text{ N}}{5.5 \text{ m}} = 0.473 \text{ N}. \)
\( \Sigma F_y = 0, \quad \Rightarrow \quad T_1 - T_2 = (70 \text{ kg} + 15 \text{ kg})(9.80 \text{ m/s}^2), \)
so \( T_2 = 833 \text{ N} - 261 \text{ N} = 5.7 \times 10^2 \text{ N}. \)
\( T_2 \) can also be found by choosing the right end as the axis.

41. (a) \( \tan \theta \) should be equal to \( f_i/N. \)
Assume the distance from the center of gravity (CG) to the point where the wheel touches the ground is \( d. \) Choose CG as the axis. \( \Sigma \tau = 0, \)
f \( f_i d \cos \theta - Nd \sin \theta = 0, \quad \Rightarrow \quad f_i d \cos \theta = Nd \sin \theta, \) or \( f_i = f_i \sin \theta = \tan \theta = \frac{\mu g r}{\mu_g}. \)
(b) \( f_i = \mu_g N = N \tan \theta, \quad \Rightarrow \quad \mu_g = \tan \theta = \tan 11^\circ = 0.19. \)
(c) \( \Sigma F_y = N - mg = 0, \quad \Rightarrow \quad N = mg. \)
f \( f_i = \mu_g mg = F_i = \frac{mv^2}{r}, \quad \Rightarrow \quad v = \sqrt{\mu_g g r} = \sqrt{0.19(9.80 \text{ m/s}^2)(6.5 \text{ m})} = 3.5 \text{ m/s}. \)

42. (d).