Midterm

(Note: All answers obtained using g = 10.0 m/s^2 as suggested in the exam instructions.)

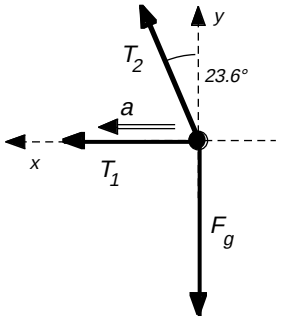
1. a) $\frac{ML^2}{T^3}$ b) 6.00 $\frac{ft}{s}$

2. 5.00 s, 2.00 $\frac{m/s}{s}$, opposite $\vec{v}$

3. a) 0 b) Newton's Second! c) 22.0 N d) 5.0 N e) 152°

4. a) 24.2 m/s, 65.6° above the horizontal.
   b) falling

5. a) 10.5 $\frac{m/s}{s}$
   b) See at right
   c) $T_1 + T_2 \sin\theta = ma$ and $T_2 \cos\theta = mg$
   d) 1.23 N
   (EC) 2.33 s



6. 99.0 N

Final

(Note: All answers obtained using g = 10.0 m/s^2 as suggested in the exam instructions.)

1. Oscillates back and forth between x = -35 m and x = 30m. Reaches local maximum speeds of 2.0 m/s at x = -25 m and 3.0 m/s at x = 15 m. Slows to a local minimum speed of 1.0 m/s at x = -5.0 m.
   (EC) Would lose energy and eventually be "trapped" to oscillate around and eventually come to rest near either x = -25 m or x = 15 m.

2. a) 125 m above the ground, 40 m/s.
   b) 320 m

3. a) 0.200 m/s $\hat{y}$
   b) 5.00 N $\hat{y}$
   c) 30.0 N
   d) –9.5 N

4. $v = \frac{\sqrt{2}}{2}u, \quad V = \frac{3}{2\sqrt{2}}u$
   (EC) $\frac{1}{12}$ or 8.33%

5. a) $I_o = 4.79\ \text{kg}\cdot\text{m}^2, \quad I_f = 0.766\ \text{kg}\cdot\text{m}^2$
   b) 12.5 rad/s

6. a) 424 N b) 820 N c) 1.46 m