61. (a) The derivation of the acceleration is found in §12-4; Eq. 12-13 gives

$$a_{\text{com}} = -\frac{g}{1 + I_{\text{com}}/MR_0^2}$$

where the positive direction is upward. We use $I_{\text{com}} = \frac{1}{2}MR^2$ where the radius is $R = 0.32$ m and $M = 116$ kg is the *total* mass (thus including the fact that there are two disks) and obtain

$$a = -\frac{g}{1 + \frac{1}{2}MR^2/MR_0^2} = \frac{g}{1 + \frac{1}{2}\left(\frac{R}{R_0}\right)^2}$$

which yields $a = -g/51$ upon plugging in $R_0 = R/10 = 0.032$ m. Thus, the magnitude of the center of mass acceleration is 0.19 m/s^2 and the direction of that vector is down.

(b) As observed in §12-4, our result in part (a) applies to both the descending and the rising yoyo motions.

(c) The external forces on the center of mass consist of the cord tension (upward) and the pull of gravity (downward). Newton's second law leads to

$$T - Mg = ma \quad \Longrightarrow T = M\left(g - \frac{g}{51}\right)$$

which yields $T = 1.1 \times 10^3$ N.

(d) Our result in part (c) indicates that the tension is well below the ultimate limit for the cord.

(e) As we saw in our acceleration computation, all that mattered was the ratio R/R_0 (and, of course, g). So if it's a scaled-up version, then such ratios are unchanged and we obtain the same result.

(f) Since the tension also depends on mass, then the larger yoyo will involve a larger cord tension.