Problem 4: (20 pts.) You are working at a construction site and need to use a cable to lift a 7.00 kg package. The package starts at rest on the ground, and you need to lift it to a height of 20.0 m in 7.30 s. Assume constant acceleration.

a. (5 pts.) What acceleration is required?

b. (15 pts.) What tension is required in the cable?

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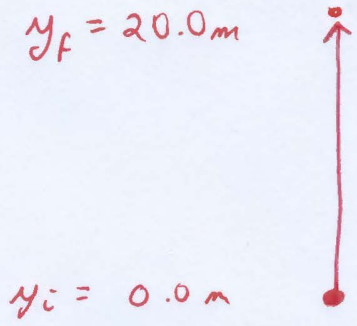
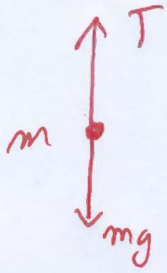


$v_i = 0\ m/s \qquad t = 7.30\ s$

$$y_f = y_i + v_i t + \frac{1}{2} a t^2$$

$$a = \frac{2(y_f - y_i)}{t^2} = \frac{2(20.0\,m)}{(7.30\,s)^2} = \boxed{0.751\ \frac{m}{s^2}}$$

b. (15 pts.) What tension is required in the cable?



$$\Sigma F = ma$$

$$T - mg = ma$$

$$T = m(g + a)$$

$$= (7.00\,kg)(9.8 + 0.751)\ m/s^2$$

$$\boxed{T = 73.9\ N}$$