Answer on Question #69051, Physics / Other

Question:

A stationary elevator and its contents have a combined mass of 2000 kg. The elevator is suspended by a single cable. (Assume 3 significant digits.)

(a) Draw a free-body diagram of the elevator and calculate the values of all the forces that are acting on it, when at rest.
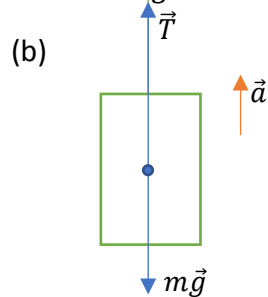
(b) If the elevator is ascending at a speed of 4.0 m/s, what are the values of the forces acting at this point?
(c) If the elevator is descending at 4.0 m/s2
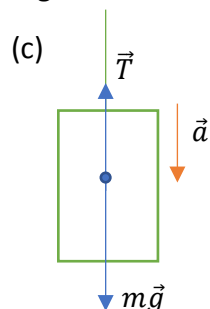what are the values of all the forces acting at this point?

Answer:

(a)
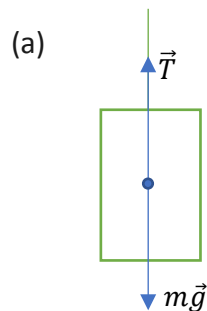
$At\ rest: mg = T = 2000 * 9.8 = 19.6 * 10^3 N = 1.96 * 10^4 N$ – cable tension/gravity force

(b)

According to 2nd Newton's law:

$T - mg = ma \rightarrow T = m(g + a) = 2000 * (9{,}8 + 4) = 2.76 * 10^4 N$ – cable tension

$mg = 1.96 * 10^4 N$- gravity force

(c)

According to 2nd Newton's law: $mg - T = ma \rightarrow T = m(g - a)$
$T = 2000 * (9{,}8 - 4) = 1.16 * 10^4 N$ – cable tension
$mg = 2.76 * 10^4 N$ - gravity force