B.4: Algebraic Atwood Machine:

Mass 1 [right side] = M
Mass 2 [left side] = m

Assume that $M > m$. For the free-fall acceleration, use g.

A) Draw a schematic of the Atwood machine.

B) Draw a free-body diagram of the Atwood machine.

C) Find the net force acting on the Atwood machine.

D) Find the total mass of the Atwood machine.

E) Use Newton's Second Law to find the acceleration of the Atwood machine. Give magnitude and direction.

C.3: An Atwood machine has three masses:
m_l on the left side
m_r on the right side
m_t on the table (which is frictionless)
Consider clockwise to be the *positive direction* and *counterclockwise* to b the negative direction.

A) Draw a schematic of the Atwood machine.
B) Draw a free-body diagram of the Atwood machine.
C) Find the net force acting on the Atwood machine.
D) Find the total mass of the Atwood machine.
E) Use Newton's Second Law to find the acceleration of the Atwood machine. Give magnitude and direction.

D.3 An Atwood machine has *three masses*
m_l on the left side
m_r on the right side
m_t on the table.
The coefficient of kinetic friction between the table and the mass is μ.
Consider clockwise to be the *positive direction* and *counterclockwise* to b the negative direction.

Answers:

B.4 Algebraic Atwood Machine:

$a = g\left(\frac{M-m}{M+m}\right)$ in the clockwise direction.

C.3

$$a = g\left(\frac{m_r - m_l}{m_r + m_l + m_t}\right)$$

The direction is clockwise if $m_r > m_l$
the direction is clockwise if $m_r < m_l$

D.3

$$a = g\left(\frac{m_r - m_l \pm \mu m_t}{m_r + m_l + m_t}\right)$$

In which the term $\pm$ is + if $m_l > m_r$ and – if $m_l < m_r$