

Part C: Atwood Machines On a Frictionless Table:

These problems are similar to those in Part B, but have one slight addition.

C.1 Mass 1 = 0.7 kg is on the LEFT side

Mass 2 = 0.9 kg is on the RIGHT side

Mass 3 = 0.4 kg is on a *table* between two pulleys. The table is *frictionless*.

A) Draw a schematic of the Atwood machine.

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

[There are now going to be *FOUR* forces, *but* two of them will cancel each other out!]

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.2 An Atwood machine has *three* masses

Mass 1 = 2.9 kg is on the LEFT side

Mass 2 = 3.5 kg is on the RIGHT side

Mass 3 = 2.7 kg is a block on a *table* between two pulleys. The table is *frictionless*.

- 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: Atwood Machines with friction:

D.1 An Atwood machine has *three masses*

Mass 1 = 0.7 kg is on the LEFT side

Mass 2 = 0.4 kg is on the RIGHT side

Mass 3 = 0.3 kg is on a TABLE between the two pulleys. The coefficient of kinetic friction between the block and the table is 0.2.

A) Draw a schematic of the Atwood machine.

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

[There are now going to be *five* forces, *two* of them will cancel each other out, but *three* will help determine the acceleration of the 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.2 An Atwood machine has *three masses*

Mass 1 = 1.5 kg is on the LEFT side

Mass 2 = 1.0 kg is on the RIGHT side

Mass 3 = 0.4 kg is on a TABLE between the two pulleys. The coefficient of kinetic friction between the block and the table is 0.2.

Answers:

C.1 0.98 m/s^2 clockwise

C.2 0.646 m/s^2 clockwise

D.1 1.68 m/s^2 counterclockwise

D.2 1.42 m/s^2 counterclockwise