

AP Physics – Assignment #8
Newton's Second Law (Two bodies –Level 1)

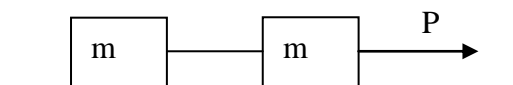
Instructions: Complete these problems on separate paper. On ALL questions (yes, even multiple choice), you must:

1. Draw a picture or diagram to visualize the problem
2. Show each step of your calculations clearly
3. Write a few sentences explaining important steps and discussing the reasonableness of your result.

It is ok to collaborate with your peers, but the work must be your own.

You must take assignments seriously to learn physics

1. Two blocks, each with mass m , are connected by a string and accelerated to the right by a single force P (pull). Friction is negligible.

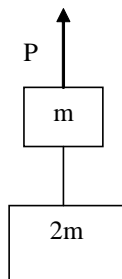


- a) Solve for the acceleration of the first mass. Express your answers in terms of m and P only.
 - b) Solve for the tension in the string connecting the blocks in terms of P only.
2. (MC) Two blocks of mass 1.0 kg and 3.0 kg are connected by a string which has a tension of 2.0 N. A force F acts in the direction shown to the below.



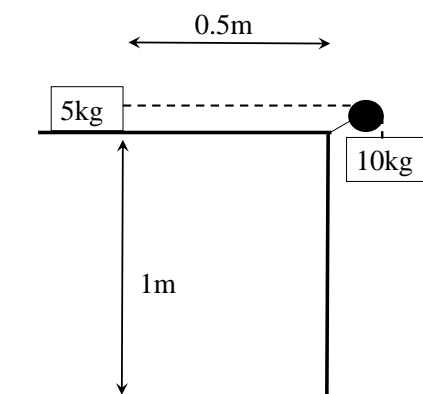
Assuming friction is negligible, what is the value of F ?

- (A) 1.0 N
 - (B) 2.0 N
 - (C) 4.0 N
 - (D) 6.0 N
 - (E) 8.0 N
3. Two blocks, one with mass m and the other with mass $2m$, are connected by a string and accelerated upwards by a single force P (pull).



- a) Solve for the acceleration of mass $2m$ in terms of m , P , and g .
- b) Solve for the tension in the string connecting the blocks in terms of P only.

4. A 5 kg block is initially held at rest on a frictionless table. It is connected by a string to a 10 kg mass over a frictionless pulley. The 5 kg mass is released and accelerates 0.5 m towards the edge of the table. When it reaches the end of the table the string detaches and the 5 kg block leaves the 1 m tall table with no initial vertical motion.



- i. Draw a FBD for each block just after they are released.
- ii. What is the acceleration of the 5 kg block?
- iii. How long does it take the 5 kg block to reach the edge of the table?
- iv. How fast is the 5 kg block moving when it reaches the edge of the table?
- v. How far does the 5 kg block land from the base of the table?

Answers

These answers are provided so that you receive immediate feedback. Use them to check your work and to assess your own understanding. If you don't 100% understand how to reach these answers, come in for extra help.

Part 1a: $a=P/2m$

Part 1b: $T=P/2$

Part 3a: $a=(P-3mg)/3m$

Part 3b: $T=2P/3$

"You don't have to be a fantastic hero to do certain things. You can be just an ordinary chap, sufficiently motivated to reach challenging goals."

- Sir Edmund Hillary