PHYS 201 Fall 2016 Atwood’s Machine & Newton’s 2nd law

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Equations of Kinematics for constant acceleration and Newton’s second law are given below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1. | 2. |  3. | 4. | 5. | Newton’s 2nd Law |
| $$x=\overbar{v} t$$ | $$x=\frac{1}{2}\left(v\_{0}+v\right)t$$ | $$v=v\_{0}+at$$ | $$x=v\_{0}t+\frac{1}{2}at^{2}$$ | $$v^{2}=v\_{0}^{2}+2ax$$ | $$\sum\_{}^{}\vec{F}=m\vec{a}$$ |

For the Atwood Machine experiment shown in the video, calculate the acceleration using,
a. Kinematic Equations b. Newton’s second law
<http://www.youtube.com/watch?v=4ovhEkSIqV0>

OpenStax, College Physics, Chap 4

1. A 63.0-kg sprinter starts a race with an acceleration of 4.20 m/s2 . What is the net external force on him?

3. A cleaner pushes a 4.50-kg laundry cart in such a way that the net external force on it is 60.0 N. Calculate the magnitude of its acceleration.

PHYS 201 Newton’s 2nd Law Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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15. What net external force is exerted on an 1100-kg artillery shell fired from a battleship if the shell is accelerated at 2.40×104 m/s2? What force is exerted on the ship by the artillery shell?

43. A 35.0-kg dolphin decelerates from 12.0 to 7.50 m/s in 2.30 s to join another dolphin in play. What average force was exerted to slow him if he was moving horizontally? (The gravitational force is balanced by the buoyant force of the water.)

44. When starting a foot race, a 70.0-kg sprinter exerts an average force of 350 N backward on the ground for 0.500 s. (a) What is his final speed? (b) How far does he move during the 0.500 s?