Newton’s Laws in Combination

1. Block A (m = 5.00 kg) is moving on a frictionless 300 incline plane. This block is connected to a block B (m = 10.0 kg) by a cord that passes over a pulley *(assume there is no friction in the pulley)*. Find the acceleration of the each block.



1. For the same situation, find the acceleration if the coefficient of friction between Block A and the incline is 0.10.
2. On Earth a block with a weight of 75 N is being pulled by a rope along a horizontal surface. The tension in the rope is 18 N and the coefficient of kinetic friction between the block and the surface is 0.20. Determine the acceleration of the block if it (and the entire system) was taken to the moon where the acceleration due to gravity is 1.60 m/s2.
3. Airplane flight recorders must be able to survive catastrophic airplane crashes so they are usually encased in steel or titanium cases and tested before they are installed. One of the tests they must pass is a shock test where the block must survive being thrown at high speed against a metal barrier. The flight recorder is 41 kg and is thrown at 220 m/s. It comes to a stop in 6.5 ms. Determine the average net force that acts on the recorder during this time?
4. Mars has a mass of 6.5 x 1023 kg and a radius 3.39 x 106 m. What gravitational force would Mike (60.0 kg) experience on the surface of the planet? What is the acceleration due to gravity on Mars surface?
5. Jupiter is the largest planet in the Solar System having a mass 318 times that of Earth and radius 11.2 times that of Earth. If Mike has a weight of 650 N on earth, determine his weight on the surface of Jupiter.
6. A 5.00 kg box is sliding across the horizontal floor of an elevator. The coefficient of kinetic friction between the box and the floor is 0.40. Determine the force of friction that acts on the box when the elevator is
	1. Stationary
	2. Accelerating upwards at 1.50 m/s2
	3. Accelerating downwards at 1.50 m/s2
7. Three boxes are resting as shown in the diagram. A ropes passes over a frictionless pulley. One end of the rope is connected to box 2 and the other to box 3. The weights of the boxes are:

Box 1: 100 N

Box 2: 80 N

Box 3: 65 N

 Determine the magnitude of the normal force that the table exerts on box 1.