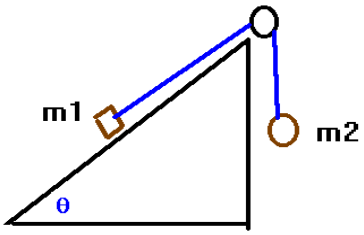
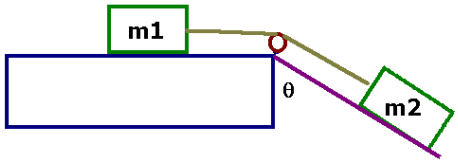
(1) Find the acceleration of the system shown when $m_2 > m_1$. The system is frictionless.



(2) A mass m_1 is resting on a table and is connected by a string to a mass m_2 which is on an inclined plane as shown. The coefficient of friction is μ between m_1 and the table. If the system is given an initial velocity in the direction of m_2 to overcome friction, find the tension and the acceleration of the system.



(3) Analyze Atwood's machine to obtain the tension and the acceleration of the Atwood's machine.

(4) Suppose a block of wood of mass m is kicked along the floor with an initial velocity v. The block has a coefficient of kinetic friction of μ between the floor and the block. How far will the block slide till it stops. If the block has an initial velocity v=5 m/s and μ=0.3, provide a numerical answer together with correct units.

(5) A mass m is on an inclined plane which is inclined at an angle Θ. If the mass is a length L above the base of the plane, and the coefficient of friction is μ, how fast is the mass moving at the bottom of the plane and how long does it take to get there if it starts with zero initial velocity?

(6) A mass m is on an inclined plane which is inclined at an angle Θ. If the mass is a length L above the base of the plane, and the coefficient of friction is μ, how long does it take to stop and how far does it travel up the plane until it stops if it starts with an initial velocity v_o up the plane?

(7) A 1 kg mass moving at 10 m/s collides and sticks to a 2 kg mass at rest. How fast is the system moving after the collision?

(8) A 1 kg mass moving at 10 m/s collides elastically with a 2 kg mass at rest. How fast is each mass moving after the collision?

(9) Suppose you can apply a force of 1 N to a mass. How long would this force need to be applied in order to produce a change in momentum of 1 kg m/s?

(10) A 1 kg mass moving at 2 m/s collides with a spongy-type thing and stops after 0.3 s. What was the average force exerted on the mass?

(11) A 2 kg mass which is moving towards a spring of spring constant 1 N/m is seen to stop after compressing the spring by 0.5 m. How fast was the mass moving before contacting the spring?

(12) A spring is compressed by 0.5 m and the spring constant is 2 N/m. A 0.5 kg mass is then propelled by the spring up a frictionless ramp. How high does the mass rise before stopping?

(13) A 1 N force is applied to a 3 kg mass for 3 s parallel to a frictionless surface. If the mass strikes a spring with a spring constant of 2 N/m, how much will the spring compress when the mass stops?