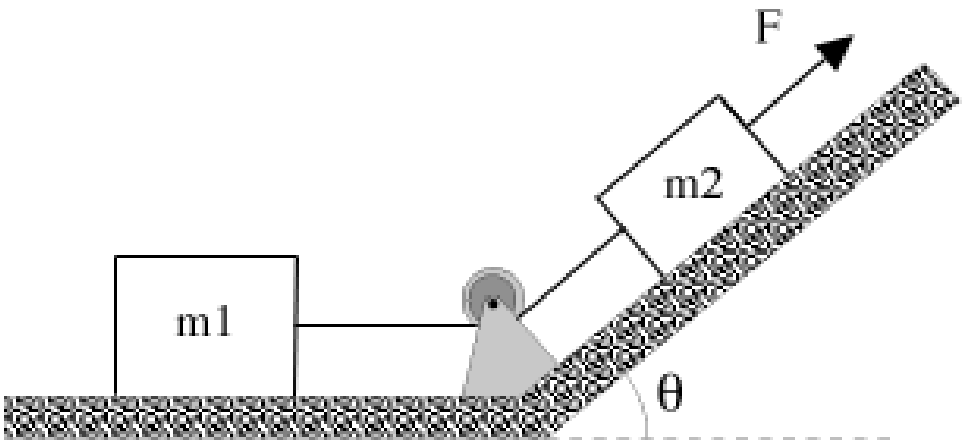
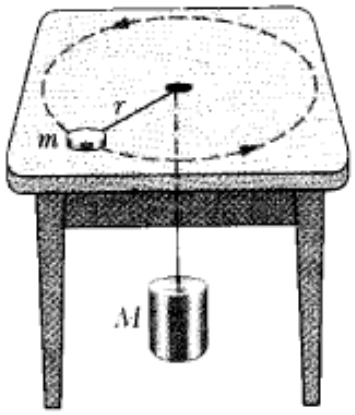
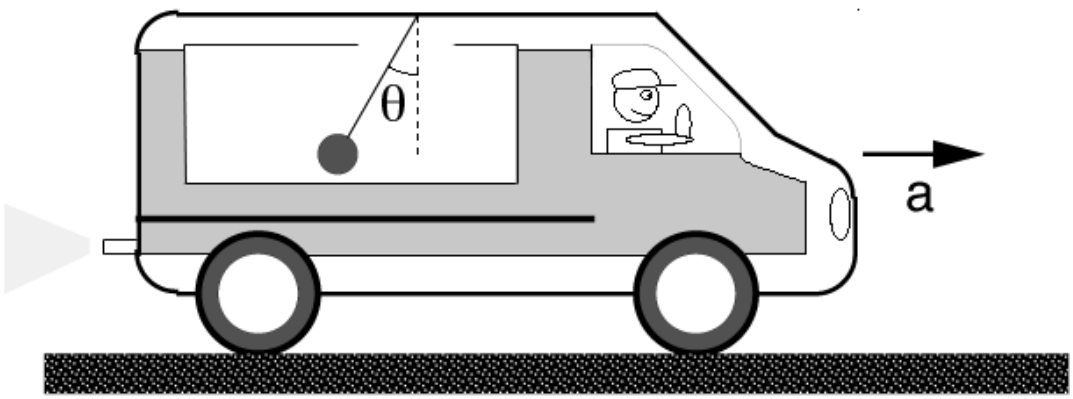
A 1.3 kg mass, m_2, on a 37.0^o incline is connected to a 6.2 kg mass, m_1, on a horizontal surface. The surfaces and the pulley are frictionless. If F = 21.4 N, what is the magnitude of the tension in the connecting cord?



A 4.5 kg mass, m, on a frictionless table is moving in a circle with radius 0.51 m at a constant speed. m is attached to a 6.9 kg mass, M, by a cord through a hole in the table. Find the speed with which m must move for M to stay at rest.



A mass M = 22.0 kg is suspended by a massless string from the ceiling of a van which is moving with constant acceleration a, as shown in the figure.



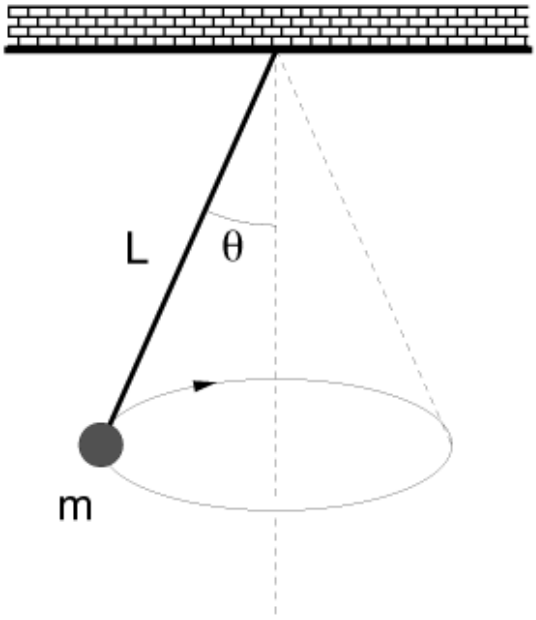
If the string makes an angle theta = 21^o with respect to the vertical, what is the acceleration a of the

---

van?

What is the tension in the string?

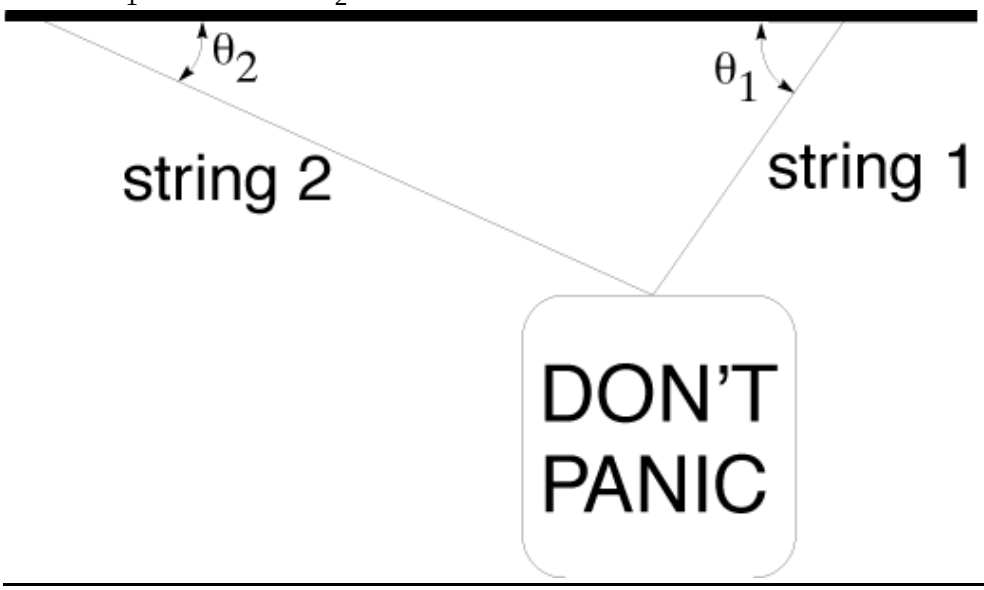
A mass m = 16.0 kg is attached to the lower end of a massless string of length L = 71.0 cm. The upper end of the string is held fixed. Suppose that the mass moves in a circle at constant speed, and that the string makes an angle theta = 25^o with the vertical, as shown in the figure.



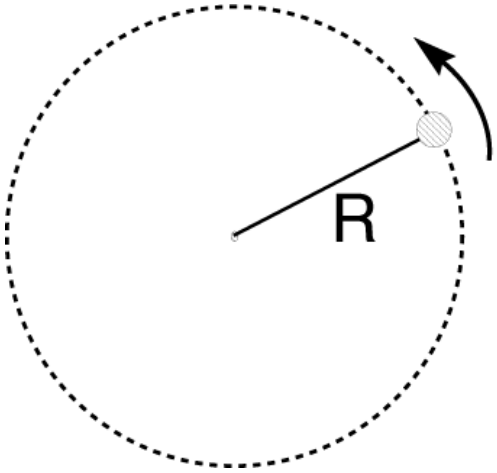
How long does it take the mass to make one complete revolution?

What is the tension in the string?

A sign hangs precariously from your prof's office door. Calculate the magnitude of the tension in string 1, if $theta_1$ = 32.48^o, $theta_2$ = 73.83^o, and the mass of the sign is 5.1 kg.



A 2.79 kg disc is attached to the end of a string whose length is 0.45 m. The disc slides without friction on a horizontal surface as indicated in the Figure.



If the string can withstand a maximum tension of 141.9 N, what is the maximum tangential speed the disc can have before the cord breaks?

The disc is whirled in a vertical circle of the same radius about a fixed point. Find the tension at the top if the speed at the top is 2.43 m/s.

A man stands on a scale in an elevator that is accelerating upward. The scale reads 671.2 N. When he picks up a 22.0 kg box, the scale reads 894.9 N. What is the man's mass?

What is the acceleration of the elevator?

A 55.0 kg girl weighs herself by standing on a scale in an elevator. What does the scale read when the elevator is descending at a constant speed of 10 m/s?

What does the above scale read if the elevator is accelerating downward with an acceleration of 2.3 m/s^2?

If the elevator's descending speed is measured at 10 m/s at a given point, but its speed is decreasing by 2.3 m/s^2, what does the scale read?

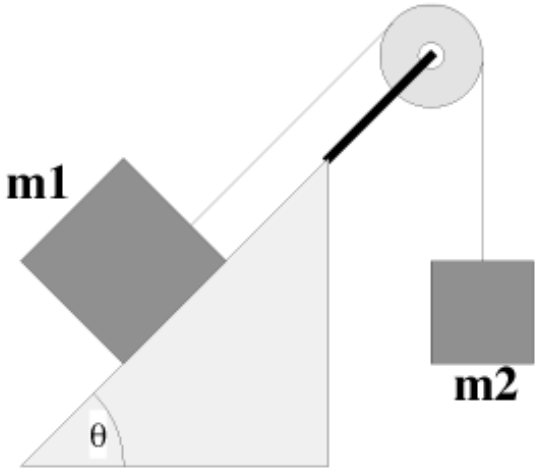
Indicate whether the following statements are always true or can be false. (Select T-True, F-False. If the first is F and the rest T, enter FTTTTT).

A) An object's velocity will change if a net force acts on the object.
B) The net force which acts on an object which maintains a constant velocity is zero.
C) If two objects are under the influence of equal forces, they have the same acceleration.
D) In order not to slow down, a bicycle moving at a constant velocity needs a small net force applied.
E) During the collision of a car with a large truck, the truck exerts an equal size force on the car as the car exerts on the truck.
F) If a net force acts on an object, the object's speed will change.

A parachutist of mass 69.4 kg lands with legs bent, coming to rest with an upwardly directed average acceleration of 3.4 g. What is the magnitude of the average force exerted on him by the ground?

A body pulled by a constant force accelerates from 10 cm/s to 25 cm/s in 2.5 s. A second force accelerates the same body from rest to 120 cm/s in 11.0 s. If the first force is known to be 6.0 N, that what is the second force?

Two blocks with mass m_1 = 3.5 kg and m_2 = 29.0 kg are connected by a massless string over a frictionless and massless pulley. The angle of the incline is equal to 20.0^o. The kinetic coefficient of friction between m_1 and the incline is 0.19.

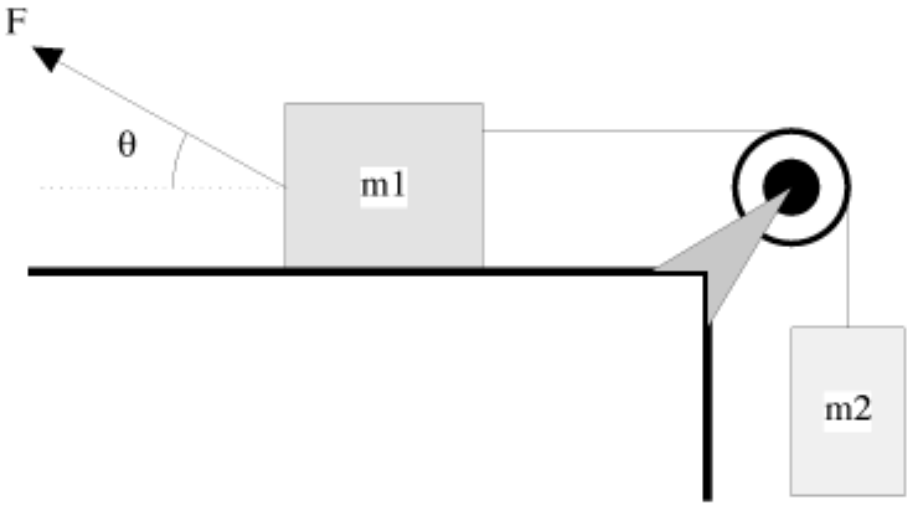


What is the minimum value of the static friction coefficient that will prevent m_1 from starting to move if it is at rest.

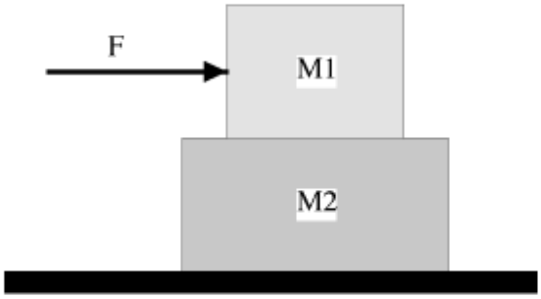
Find the magnitude of the acceleration of the system if m_1 is moving up the incline (acceleration is pointing up along the incline).

Find the magnitude of the acceleration of the system if m_1 is moving down the incline (the acceleration is still pointing up the incline).

A 28.9-kg block (m_1) is on a horizontal surface, connected to a 6.3-kg block (m_2) by a massless string as shown in the Figure. The pulley is massless and frictionless. A force of 223.3 N acts on m_1 at an angle of 31.7^o. The coefficient of kinetic friction between m_1 and the surface is 0.233. Determine the upward acceleration of m_2.



A block M_1 of mass 18.0 kg sits on top of a larger block M_2 of mass 28.0 kg which sits on a flat surface. The kinetic friction coefficient between the upper and lower block is 0.420. The kinetic friction coefficient between the lower block and the flat surface is 0.120. A horizontal force F = 91 N pushes against the upper block, causing it to slide. The friction force between the blocks then causes the lower block to slide also.



Find the magnitude of the acceleration of the upper block.

Find the magnitude of the acceleration of the lower block.

An engineer must design a curved exit ramp for a highway in such a way that a car, exiting at the posted speed limit of 11.18 m/s (25 mi/hr), does not depend on friction to round the curve without skidding. The radius of the curve is 197.0 m. At what angle with respect to the horizontal must the curve be banked?

A bicyclist traveling at 11 m/s rides around an unbanked curve. The coefficient of friction (is this static or kinetic friction?) between the tires and the road is 0.33. What is the radius of the shortest turn that the bicyclist can safely make?

A youngster shoots a bottle cap up a 17.5^o inclined board at 1.86 m/s. The cap slides in a straight line, slowing to 0.99 m/s after traveling some distance. If the coefficient of kinetic friction is 0.43, find that distance.