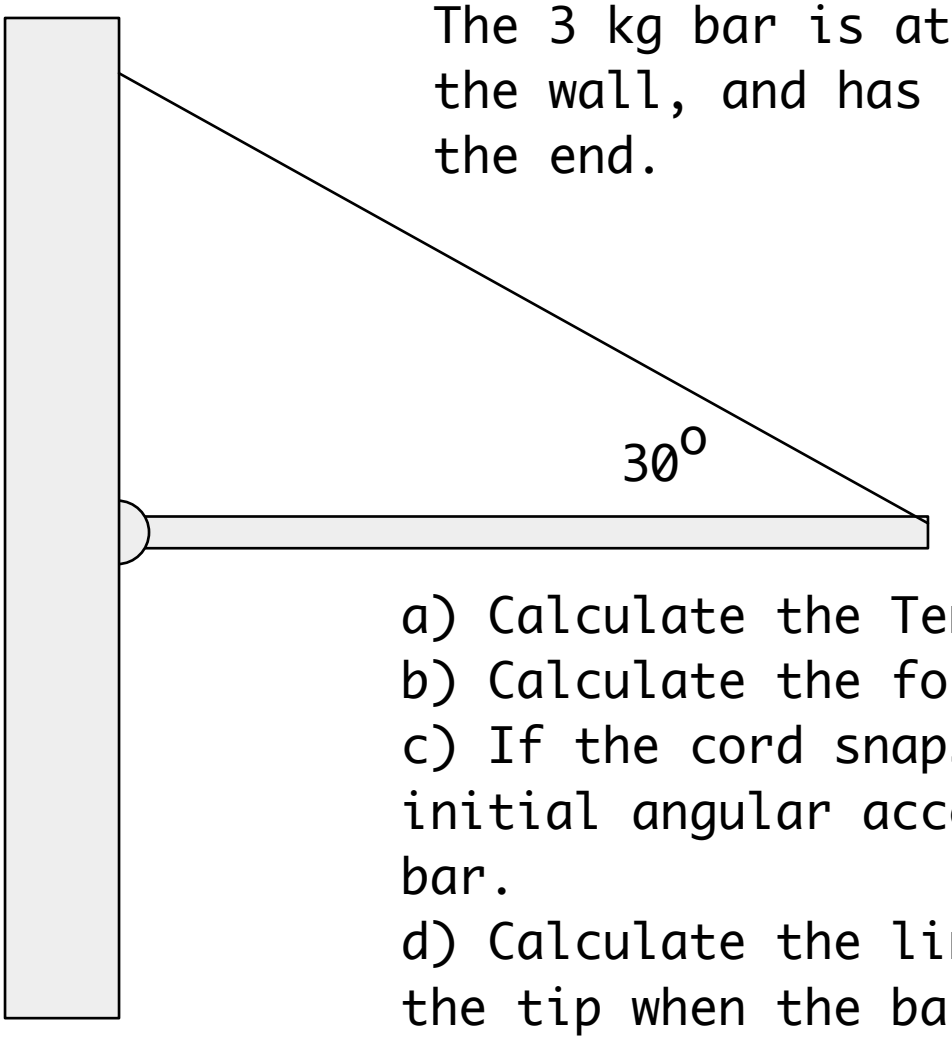
The 3 kg bar is attached to a hinge at the wall, and has a cord attached to the end.



a) Calculate the Tension in the cord.
b) Calculate the forces at the hinge.
c) If the cord snaps, calculate the initial angular acceleration of the bar.
d) Calculate the linear velocity of the tip when the bar has fallen to a vertical position.

a) T = 30 N b) Fv = 15 N; Fh = 26 N c) 15 rad/s^2 d) 5.5 m/s

a) A force acts according to:

$$F = 4t$$

on an object with mass 2 kg.

Assume that at t = 0, the object is at rest. Calculate the velocity of the object at t = 3 s.

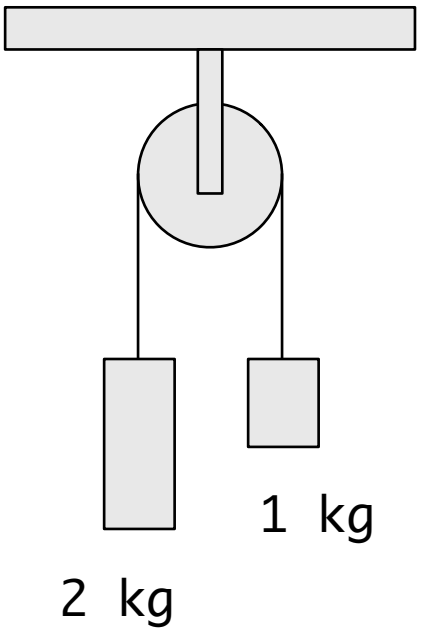
b) A force acts according to:

$$F = 4x$$

on an object with mass 2 kg.

Assume that at t = 0, the object is at rest at x = 0. Calculate the velocity of the object when it gets to x = 3 m.

a) 9 m/s b) 4.2 m/s

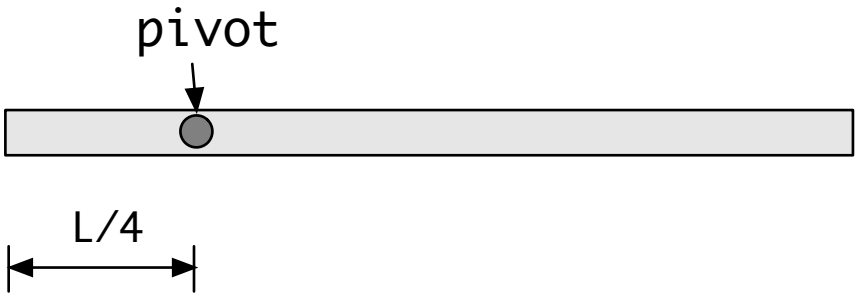


Assuming that the pulley is massless...

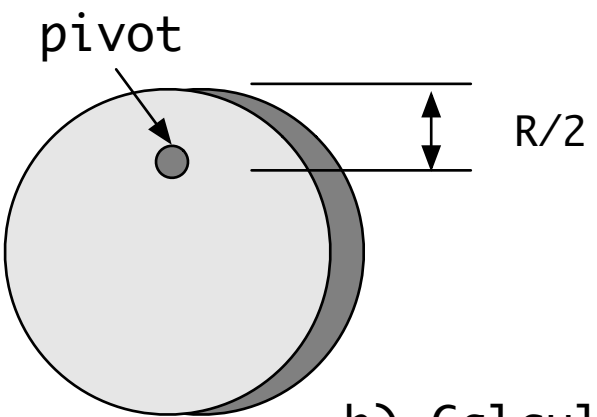
a) Calculate the acceleration of the system.

b) Calculate the tension in the cord.

a) 3.3 m/s^2 b) 13.3 N

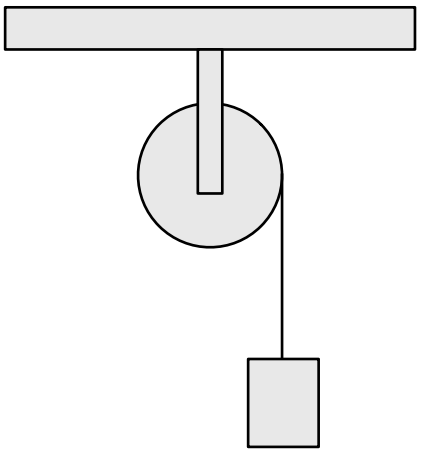


a) Calculate the rotational inertia of the uniform bar, mass M and length L, with the pivot marked.



b) Calculate the rotational inertia of the uniform disk, mass M and radius R, with the pivot marked.

a) $\frac{7}{48}ML^2$ b) $\frac{3}{4}MR^2$



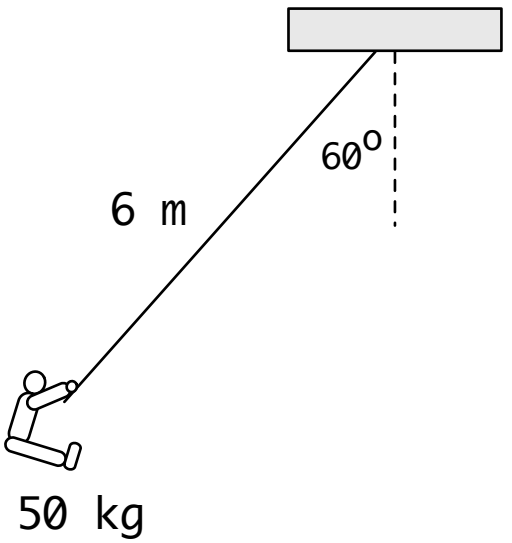
1 kg

A string is wrapped around a pulley and a 1 kg mass is attached and then released. Assume that the pulley is a disk with mass 1 kg and radius 0.4 m.

a) Calculate the linear acceleration of the hanging mass.

b) Calculate the tension in the cord.

a) 6.7 m/s^2 b) 3.3 N

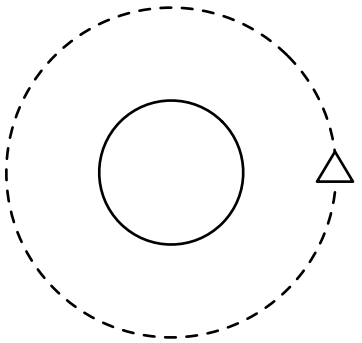


The person begins to swing from rest at the position shown.

a) Calculate the speed of the person at the bottom of the swing.

b) Calculate the tension in the rope at the bottom of the swing.

c) Calculate how much time it takes to get from the start position to the bottom of the swing.



$M_{earth} = 6.0 \times 10^{24}$ kg

$R_{earth} = 6.37 \times 10^{6}$ m

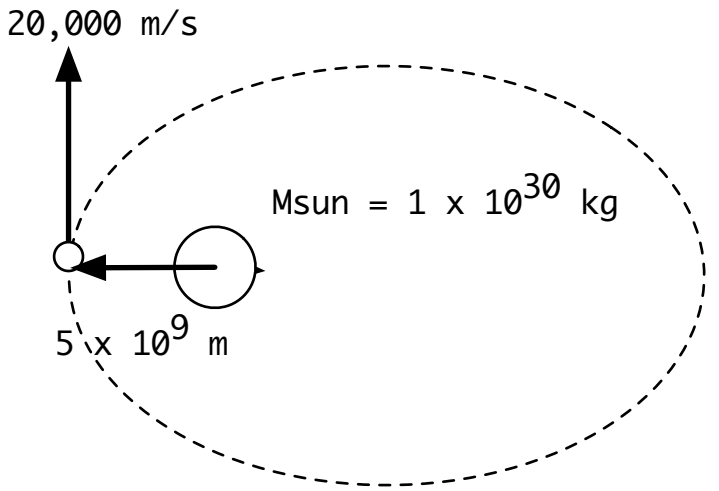
A satellite is in a circular orbit with a radius equal to twice the Earth's radius.

a) Calculate the required orbital speed.

b) Calculate the work it takes to get the satellite into orbit from rest at Earth's surface if its mass is 1,000 kg.

c) Calculate the period of the orbit in seconds.

a) 5600 m/s b) 2.36×10^{10} J c) 14,300 s



An asteroid is in an elliptical orbit around the sun with a period of 800,000 s (about 9.25 days). At its perihelion distance of 5 x 10^{9} m, it has a speed of 20,000 m/s.

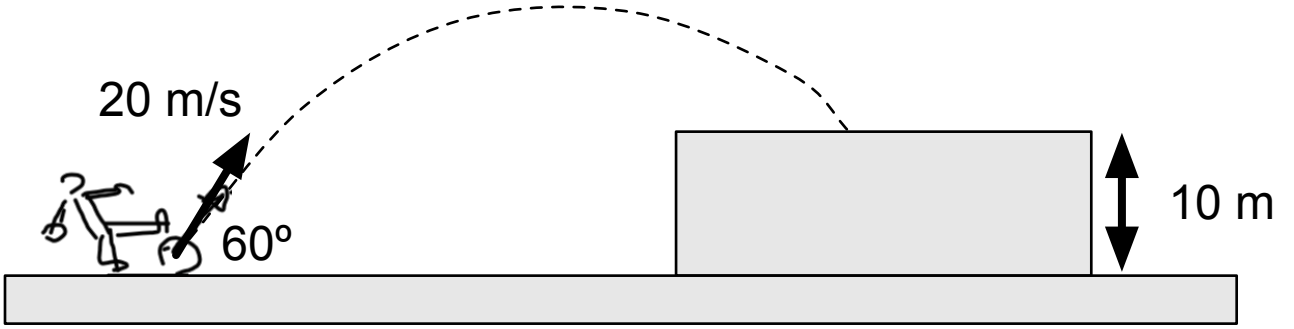
Calculate its speed at aphelion.

A non-linear spring applies a force to a 2 kg mass according to the equation:

$$F = -3x^2-2x$$

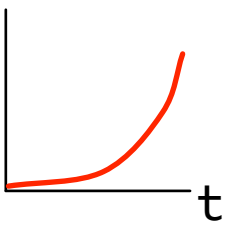
If the mass is pulled out to x = 2 m and released from rest, calculate how fast will it be moving when it gets back to x = 0.

3.46 m/s



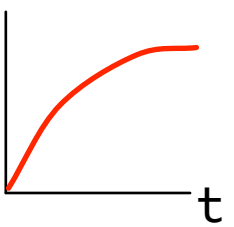
a) Calculate the maximum height of the ball.
b) Calculate the time it takes to land.
c) Calculate the horizontal distance the ball travels before landing.

Match each x vs t graph with one v vs t and a description.

1. 

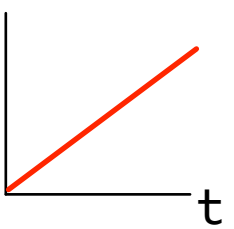
i. constant velocity left.

ii. constant velocity right.

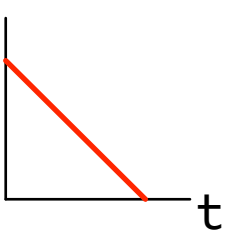
2. 

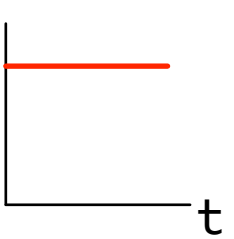
iii. stopped.

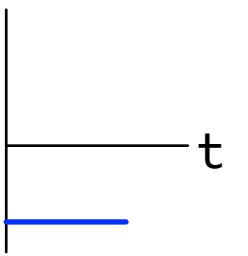
iv. speeding up.

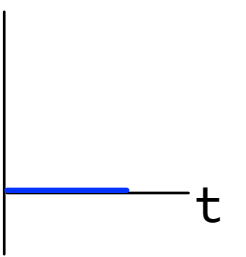
3. 

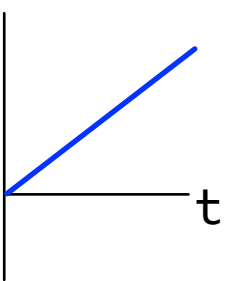
v. slowing down.

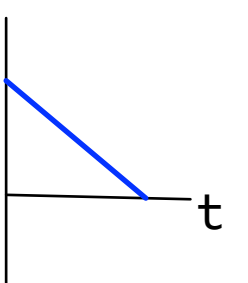
4. 

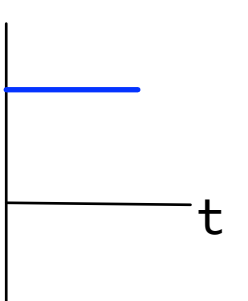
5. 

a. 

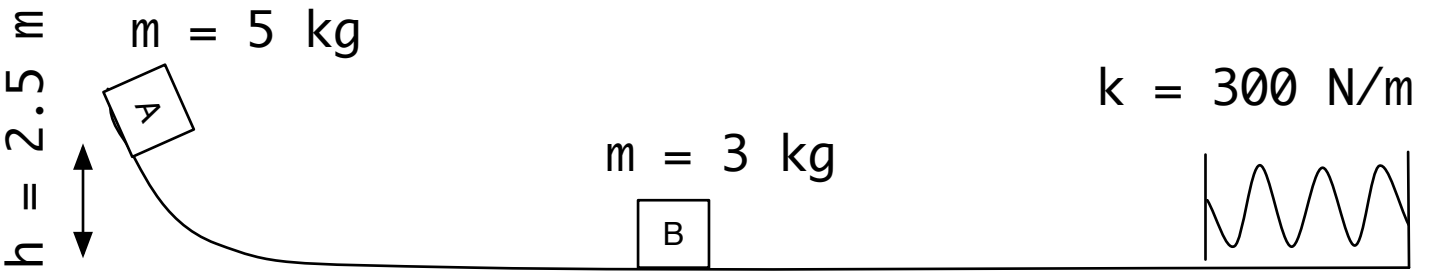
b. 

c. 

d. 

e. 

1) c iv
2) d v
3) e ii
4) a i
5) b iii



The surface is frictionless, and the blocks will stick together when they collide. Calculate how far the spring will compress.