

This print-out should have 19 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

001 (part 1 of 3) 10.0 points

A boat moves through the water with two forces acting on it. One is a 2374 N forward push by the motor on the propeller, and the other is an 2170 N resistive force due to the water around the bow.

What is the acceleration of the 1058 kg boat? Answer in units of m/s^2 .

002 (part 2 of 3) 10.0 points

If it starts from rest, how far will it move in 10.9 s? Answer in units of m.

003 (part 3 of 3) 10.0 points

What will its velocity be at the end of this time interval? Answer in units of m/s .

004 10.0 points

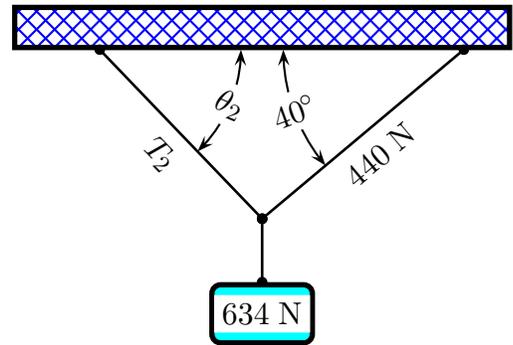
A standard object defined as having a mass of exactly 7.27 kg is given an acceleration of 2.4087 m/s^2 when a certain force is applied to it. A second object of unknown mass acquires an acceleration of 1.1089 m/s^2 when the same force is applied to it.

What is the mass of the second object? Answer in units of kg.

005 (part 1 of 2) 10.0 points

Consider the 634 N weight held by two cables shown below. The left-hand cable had tension T_2 and makes an angle of θ_2 with the ceiling. The right-hand cable had tension 440 N and makes an angle of 40° with the ceiling.

The right-hand cable makes an angle of 40° with the ceiling and has a tension of 440 N.



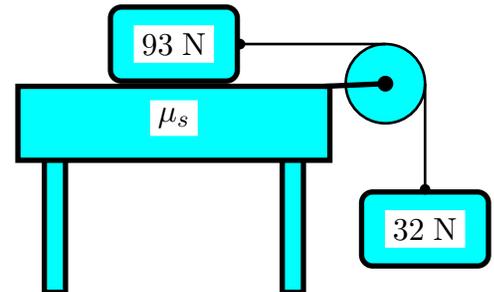
a) What is the tension T_2 in the left-hand cable slanted at an angle of θ_2 with respect to the wall? Answer in units of N.

006 (part 2 of 2) 10.0 points

b) What is the angle θ_2 which the left-hand cable makes with respect to the ceiling? Answer in units of $^\circ$.

007 10.0 points

A 93 N block rests on a table. The suspended mass has a weight of 32 N.

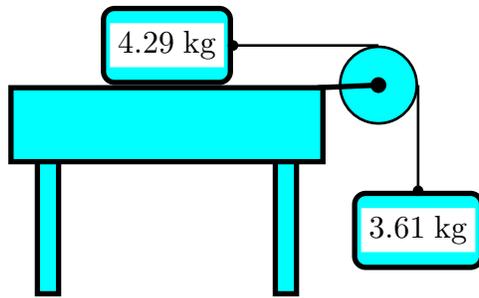


What frictional force is required to keep the blocks from moving? Answer in units of N.

008 (part 1 of 2) 10.0 points

A block of mass 4.29 kg lies on a frictionless horizontal surface. The block is connected by a cord passing over a pulley to another block of mass 3.61 kg which hangs in the air, as shown on the following picture. Assume the cord to be light (massless and weightless) and unstretchable and the pulley to have no friction and no rotational inertia.

The acceleration of gravity is 9.8 m/s^2 .



Calculate the acceleration of the first block.
Answer in units of m/s^2 .

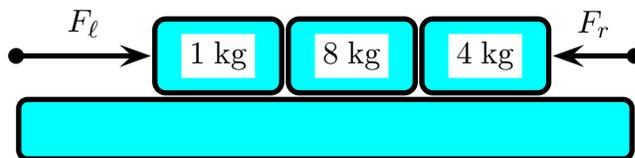
009 (part 2 of 2) 10.0 points

Calculate the tension in the cord. Answer in units of N.

010 10.0 points

The horizontal surface on which the objects slide is frictionless.

The acceleration of gravity is 9.8 m/s^2 .



If $F_l = 20 \text{ N}$ and $F_r = 7 \text{ N}$, what is the magnitude of the force exerted on the block with mass 8 kg by the block with mass 4 kg ?
Answer in units of N.

011 (part 1 of 2) 10.0 points

An elevator accelerates upward at 1.2 m/s^2 .

The acceleration of gravity is 9.8 m/s^2 .

What is the upward force exerted by the floor of the elevator on a(n) 69 kg passenger?
Answer in units of N.

012 (part 2 of 2) 10.0 points

If the same elevator accelerates downwards with an acceleration of 1.2 m/s^2 , what is the upward force exerted by the elevator floor on the passenger? Answer in units of N.

013 (part 1 of 2) 10.0 points

An inventive child named Chris wants to reach an apple in a tree without climbing the tree. Sitting in a chair connected to a rope that passes over a frictionless pulley, Chris pulls on the loose end of the rope with such a force

that the spring scale reads 337 N . Chris's true weight is 442 N , and the chair weighs 214 N .

The acceleration of gravity is $g = 9.8 \text{ m/s}^2$.



Find the magnitude of the acceleration of the system. Answer in units of m/s^2 .

014 (part 2 of 2) 10.0 points

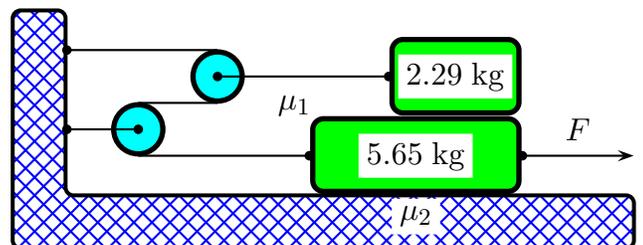
Find the magnitude of the force Chris exerts on the chair. Answer in units of N.

015 10.0 points

A force F acts to the right on a 5.65 kg block. A 2.29 kg block is stacked on top of the 5.65 kg block and can slide on it with a coefficient of friction of 0.15 between the blocks. The table has a coefficient of friction of 0.18 .

The acceleration of gravity is 9.8 m/s^2 .

The system is in equilibrium.



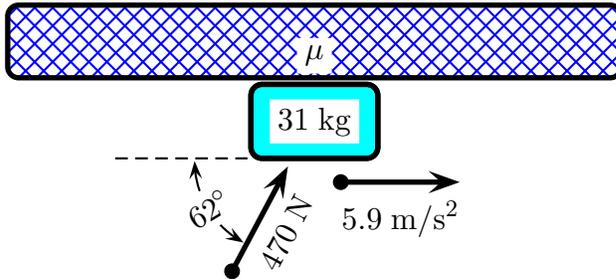
Find the force F required to accelerate the 5.65 kg block at 2 m/s^2 . Answer in units of N.

016 (part 1 of 2) 10.0 points

A(n) 31 kg block is pushed along the ceiling with a constant applied force of 470 N that acts at an angle of 62° with the horizontal,

as in the figure. The block accelerates to the right at 5.9 m/s^2 .

The acceleration of gravity is 9.8 m/s^2 .



What is the magnitude of the normal force the ceiling exerts on the block? Answer in units of N.

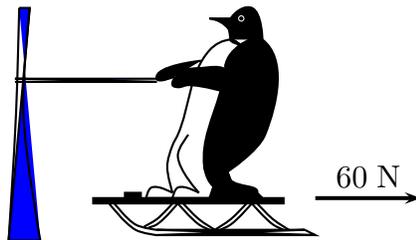
017 (part 2 of 2) 10.0 points

What is the coefficient of kinetic friction μ between the block and the ceiling?

018 (part 1 of 2) 10.0 points

A 5.9 kg penguin is on a(n) 10 kg sled, as shown in the figure. A horizontal force of 60 N is applied to the sled, but the penguin impedes his motion by holding onto a cord attached to a wall.

The acceleration of gravity is 9.8 m/s^2 .



Find the tension in the cord. The coefficient of kinetic friction between the sled and the snow as well as between the sled and the penguin is 0.17 . Answer in units of N.

019 (part 2 of 2) 10.0 points

Find the acceleration of the sled. Answer in units of m/s^2 .