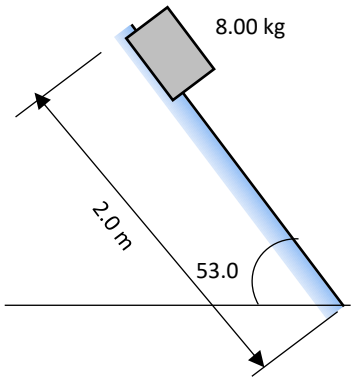
CLASS PROBLEMS - CHAPTER 6

Example 1 Sec. 6.1

An 8.0-kg package in a mail-sorting room slides 2.00 m down a chute that is inclined at 53.0^{O} below the horizontal. The coefficient of kinetic friction between the package and the chute's surface is 0.40. Calculate the work done on the package by

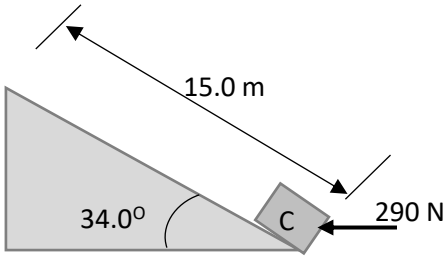
a) friction,
b) gravity, and
c) the normal force
d) What is the net work done on the package?



Example 2

A 20.0 kg crate sits at rest at the bottom of a 15.0-m-long ramp that is inclined at 34.0^{O} above horizontal. A constant horizontal force of 290 N is applied to the crate to push it up the ramp. While the crate is moving, the ramp exerts a constant frictional force on it that has magnititude 65.0 N.

a) What is the total work done on the crate during its motion from the bottom to the top of the ramp?
b) How much time does it take the crate to travel to the top of the ramp?
c) What is the coefficent of friction between the crate and the ramp?



Example 3 Sec. 6.2

Use the work-energy theorem to solve each of these problems. You can use Newton's law to check your answer. Neglect air resistance in all cases.

a) A branch falls from the top of a 95.0-m-tall redwood tree, starting from rest. How fast is it moving when it reaches the ground?
b) A volcano ejects a boulder directly upward 525 m into air. How fast was the boulder moving just as it left the volcano?
c) A skier moving at 5.00 m/s encounters a long, rough horizontal patch of snow having coefficient of kinetic friction 0.220 with her skis. How far does she travel on this patch before stopping?
d) Suppose the rough patch in part c) was only 2.90 m long. How fast would the skier be moving when she reached the end of the patch?
e) At the base of a frictionless icy hill that rises at 25.0^{O} above horizontal, a toboggan has a speed of 12.0 m/s toward the hill. How high vertically above the base will it go before stopping?

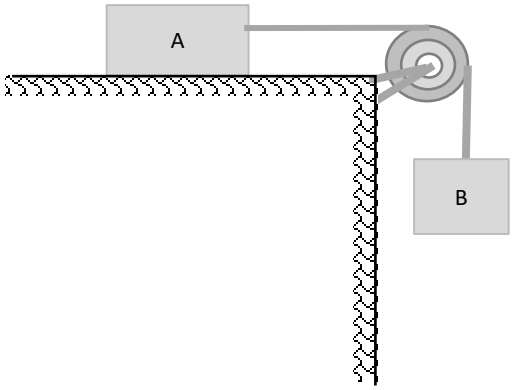
Example 4

Block A with mass 200 kg, and block B with mass 300 kg . Are joined by an inextensible cord, and released from rest.

Determine the velocity of block A after it had moved 2m

Assume μ_k = 0.25 between block A and plane.

Pulley is assumed to be frictionless and massless.



Example 5 Sec. 6.3

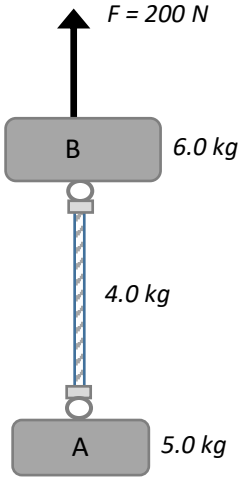
The two blocks A and B are connected by a heavy uniform rope of mass 4.0 kg. An upward force of 200 N is applied as shown.

a) draw the Free-Body-Diagrams (FBD) one for block A, one for rope and one for block B.

b) What is the acceleration of the system?

c) What is the tension at the top of the heavy rope?

d) What is the tension at the midpoint of the heavy rope?



Example 6

Someone is dragging a 7.5-kg box on a horizontal, frictionless surface with a velocity of 3.5 m/s. The box runs into a spring of force constant k = 80 N/cm. Use the work-energy theorem to find the maximum compression of the spring.