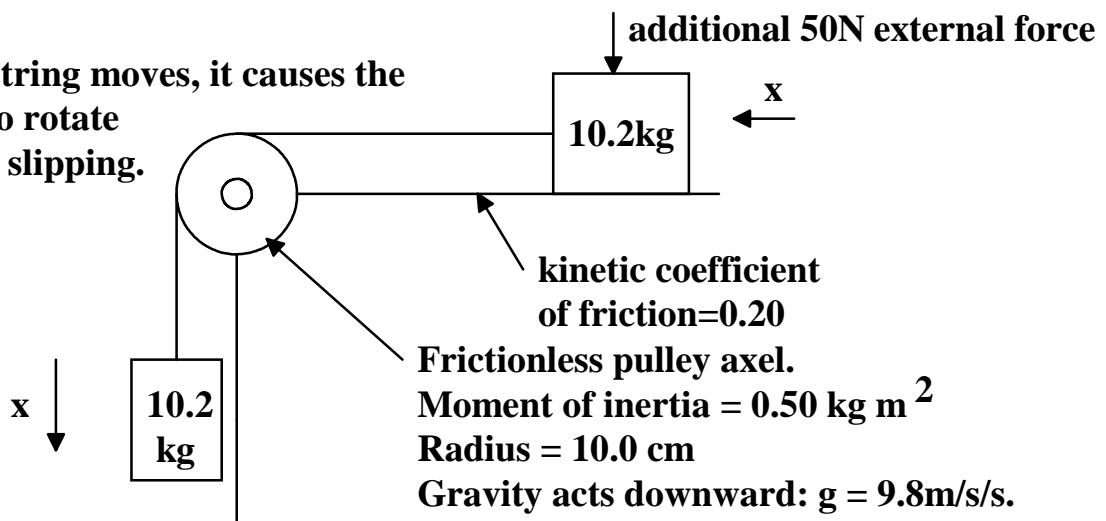


- 1(a.) Using the axes given above, what are the x and y components of the skier's velocity as she leaves the point indicated above?
- 1(b.) Using appropriate numerical values given above, what equation predicts the horizontal position of the skier as a function of time?
- 1(c.) Using appropriate numerical values given above, what equation predicts the vertical position of the skier as a function of time?
- 1(d.) Determine the x and y coordinates of the initial contact point between the skier and the lower slope.

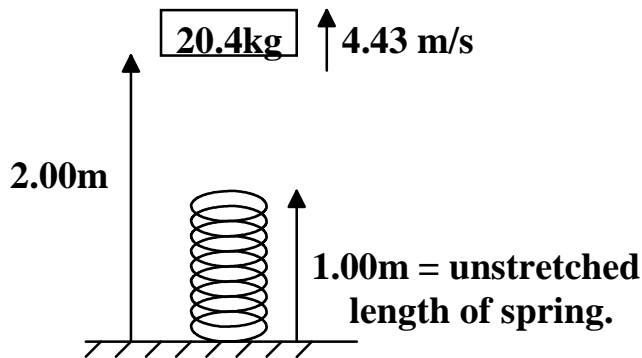
2.

As the string moves, it causes the pulley to rotate without slipping.



- 2(a.) Draw a free body diagram for each of the three bodies.
- 2(b.) For each body, write down the equations of motion.
- 2(c.) Determine the tension in the lower section of the string.

3.



When the block comes back down, it causes a maximum spring compression of 0.30m.

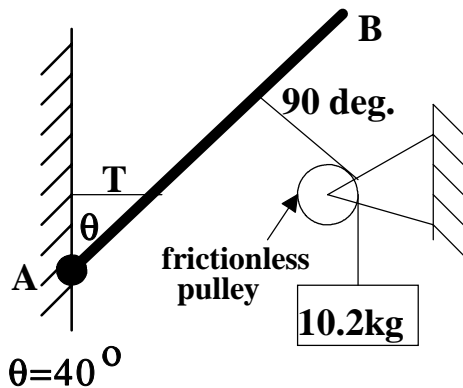
$$g = 9.8 \text{ m/s}^2$$

The initial condition of a block and spring is shown in the diagram above. After the block comes back down, it compresses the spring by 0.30m before being pushed back up. What is the spring constant of the spring?

4. A 60.0 kg male slides Eastward on frictionless ice with a speed of 3.00m/s before making a head-on collision with a 45.0 kg female sliding Westward at a speed of 4.5m/s. The two hold on to one another so that the two continue sliding as one unit.

- Determine the final **velocity** of the pair.
- Discuss the situation from an energy standpoint, using appropriate numerical values.

5.



Rod AB has negligible mass.
Cord T is attached 1/3 of the way between A and B.
The other cord is attached 2/3 of the way from A to B.
The pin at A rotates freely and would allow AB to swivel except for T.

Determine the tension in cord T and the force components on the rod at pin A.

6. A cube of wood 20 cm on a side has a density of 450 Kg/m³ and is floating in water. How much lead weight must be placed on top of the cube so that its top is 1.0 cm above the water surface?

7. An automobile has slid off the road into a lake.

- Determine the total **external** force on one of the car's doors if the door is vertically oriented with the top of the door being 8.0m below the water surface. Assume that the door is rectangular in shape, 150 cm tall and 180 cm wide.
- Determine the total **internal** force on the car door due to the trapped air in the car.
- How much push force would be required of a person to open the door? Note: 4.45N is equivalent to 1 pound.