

A 0.5-kilogram object rotates freely in a vertical circle at the end of a string of length 2 meters as shown above. As the object passes through point P at the top of the circular path, the tension in the string is 20 newtons. **The total energy of the system remains constant.**

a) On the box to the right, draw and clearly label all significant forces on the object when it is at the point P.



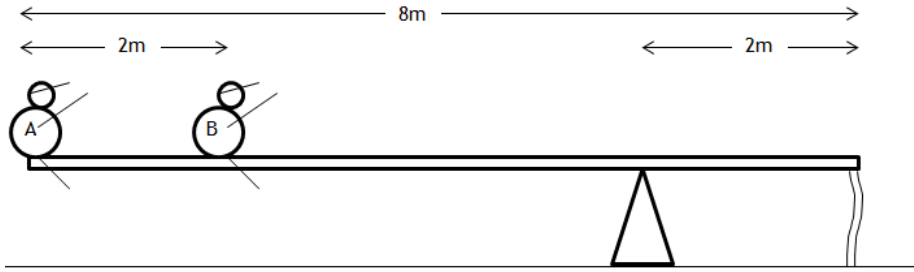
b) Calculate the speed of the object at point P.

c) Calculate the increase in kinetic energy of the object as it moves from point P to point Q.

d) Calculate the tension in the string as the object passes through point Q.

e) What would be the minimum speed to keep this object in circular motion?

Person A (75kg) sits at the far left end of an 8 m board (20kg). Two meters to the right of person A, sits person B (50kg). The far right end of the board is anchored to the ground by a rope. The fulcrum sits 2 meters to the left of the rope.



a) Draw the FBD for the board.



b) What is the tension in the string?

c) What is the force from the fulcrum (pivot point) on the board?

d) If the string breaks at 4000 N, how many 1 kg cheeseburgers could person A eat before the string breaks?