

Engineering Physics I – Fall 2015

Quiz 5 – October 15, 2015

Name: **SOLUTIONS**

1. What are the two types of friction? (Circle the right answers from the choices below)

Gravitational

Static

Tension

Kinetic

Contact

Normal

2. True or **False** The constant $g = 9.81 \text{ m/s}^2$ is a force.

The constant g is the acceleration due to gravity and is not a force. It should not be included in a free body diagram. (The weight, mg , should be included in a free body diagram where appropriate.)

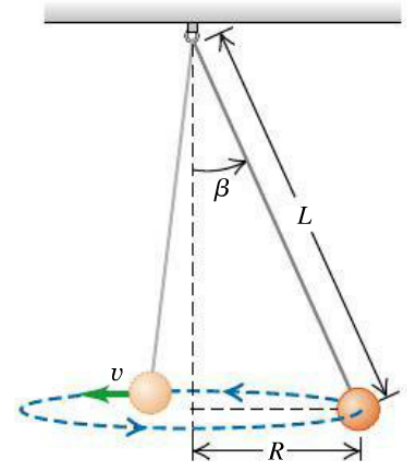
3. What is the net force on the ball shown in the figure?
(The ball is hanging on a string and is spinning around at a constant speed. Gravity is acting on the ball.)

mg

ma_c

zero (N)

T (tension in rope)



The net force is due to the centripetal acceleration, which is the acceleration that keeps the ball moving in a circle rather than in a straight line. The acceleration is pointed toward the center of the circle.

4. I apply a force of magnitude $F=10 \text{ N}$ to an object that is initially at rest on a horizontal surface, and it remains at rest.

a) What is the magnitude of the friction force?

$\mu_s mg$

$\mu_k mg$

zero (N)

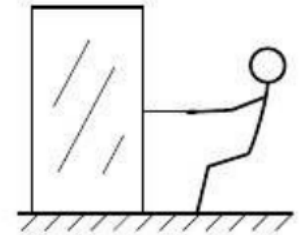
F (10 N)

Because the object does not move the static friction force must balance the force I apply, so both have a magnitude of 10 N.

b) Do you have enough information to calculate μ_s ?

Yes

No



To calculate μ_s you would need to know the maximum force I must apply before the object starts to move (to overcome static friction). The force of static friction can have any value between 0 and $\mu_s N$ (where N is the normal force). If you know the object's mass (or the normal force) you can place a lower bound on μ_s but you cannot calculate μ_s unless you know what force is needed to overcome the static friction.