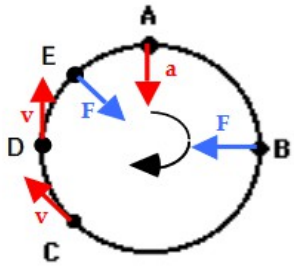
Day 63

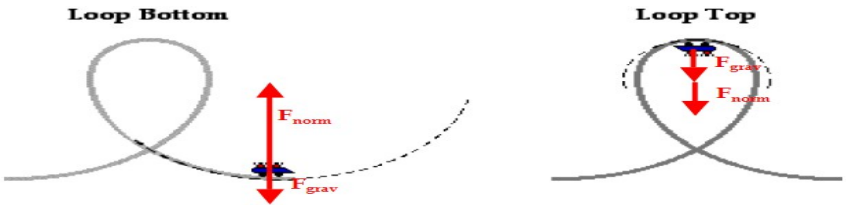
1. a. in the same direction



2. The acceleration vector should be directed inwards; the velocity vector should be directed tangent to the circle.

3.
   a) Gravity force
   b) Tension force (supplied by strings)
   c) Normal force (supplied by wall)
   d) Gravity force
   e) Friction force
   f) Friction and Normal force
   g) Friction force (supplied by ground)
   h) Gravity and Normal force
   i) Normal force
   j) Normal force (supplied by wall of barrel)

4. see diagram for #2

5. 

6. up; down

7. bottom: > top: ???
   The normal force must be greater than the gravity force when the rider is at the bottom of the loop. This is necessary because there MUST BE a net force upwards – i.e., towards the curve's center. Since the F_{grav} is directed outward, the F_{norm} must overwhelm it to produce an upward F_{net}. At the top of the loop, the net force must be downward – i.e., towards the curve's center. Since the gravity force is directed downward, there is no need for the normal force at the top of the loop to be a given size.)

8. Bottom of the Loop
   Since the normal force is what gives a person a sensation of their weight, the feeling of heaviness will be greatest wherever the normal force is greatest. As shown in the free-body diagram (question #5) and explained in question 7, the normal force is greatest at the bottom of the loop. At the loop bottom, the normal force must be greater than F_{grav}, thus providing the heavy sensation.

9. False! Centripetal is simply an adjective that describes the direction of the net force. This net force can be supplied by any force or combination of forces, but it must be centripetal or directed towards the center of the circle for any object moving along a curved or circular path.