Name: _____   **Date:** _____

Centripetal Acceleration Activity –
Accelerometer Survey – Answer Key

1) What is force?

   Force – Is any influence that may cause an object to change its speed, direction or shape. The push or pull on an object may cause an object to deform or cause a change in its velocity.

   $F = ma$

2) What are Newton's *Three Laws of Motion?*

   Any object in motion will stay in motion unless affected by an external force.

   The heavier the mass, the greater the amount of force needed to accelerate the object.

   For every action, there is an equal, but opposite reaction.

3) Define centripetal force:

   Centripetal Force – Is the force on an object that makes it follow a curved path

   $F = ma$

   $ma = mV^2/r$

   $a = V^2/r$

4) Charlie is swinging his keychain (1 kg) around on the end of his .75 m long lanyard. He notices it makes 85 revolutions in one minutes. What is the centripetal force of the keys?

   85 rev/min = 8.9 rad/s = w

   V = wr = (8.9)(.75) = 6.68 m/s

   Fc = mv2/r = (1)(6.68)2/.75 = 59.4 N

5) How does an accelerometer work?

   Acceleration is measured in the range of –2g to +2g with scaling of approximately 200 counts per g. The Acceleration Sensor can also be used to measure tilt in three axes. This is possible because gravity is perceived as acceleration. When the sensor is stationary and in the normal horizontal position, the x and y axis will be near zero, because they are horizontal, while the z axis will be near 200, which represents one *g*. If you tilt the sensor then gravity will also be detected on the other axis and the value for the z axis will go down. The microscopic crystal structures will get stressed from accelerative forces and cause a change in voltage. Some of the accelerative forces may cause a change in capacitance, which will get converted into voltage. They may also measure the change in g-force (free fall reference frame relative to itself). They will be able to detect this change in three different directions as a vector quantity.