Name _____

Date _____

Class _____

1. Upon loading the site the following values for the parameters should be preset. (See Table I.) If this is not the case, make the necessary changes.

Table I. Initial Values of Physical Parameters.

q	v	B	m
+1	4×10^7	0.5	+1

(a) Adjust the field strength B such that the particle hits closest to the left-upper corner of the shaded-purple area. What field strength does this correspond?

(b) Why does the radius of curvature shorten when the field is increased in strength? (Explain in terms of the net force acting on the particle.)

(c) Now increase the speed of the charged particle to $v = 8 \times 10^7$. Explain what happens to the radius of curvature of the charged particle. What value of field strength will produce the same radius of motion as found in part (a)? (Show all work.) Does the operation of the applet verify your calculations?

2. Reset all physical variables to coincide with those listed in Table I and run the applet. Now change the charge q on the particle from +1 to -1 and run the applet again.

(a) Describe how the path of the charged particle changes.

(b) If the charge on the object was doubled (from q = –1 to q = –2), what would happen to the radius of curvature? Calculate the change in this radius from Newton's Second Law.

(c) Does the operation of the applet verify your calculations?

(d) Describe (in terms of the net force acting on the particle) why you would expect such a result from increasing the charge on the particle.

3. Again, reset all physical variables to those listed in Table I and run the applet. Now double the mass of the particle and run the applet.

(a) Describe the change in the radius of curvature. Calculate the change in this radius from Newton's Second Law. Does the operation of the applet verify your calculations?

(b) Describe qualitatively why you would expect such a change in the motion by increasing the mass of the particle.

4. Again, reset all physical variables to those listed in Table I and run the applet. Now press the "Reverse B" button. Notice that the field direction is now pointing into the page (away from you). Run the applet again and describe what changes in the motion of the charged particle. What does not change?

5. For a given motion (that is, a motion defined by the direction -- clockwise or counter-clockwise -- and radius of curvature) describe four ways that the physical properties of the system can be changed yet produce the exact same motion. Limit your changes to situations where physical properties are doubled or halved. (For example, the field strength can be doubled, while the speed of the charge is doubled.) Do not forget that the field can be reversed in direction. To ensure correctness, use the applet to verify your answers.

(1) _____

(2) _____

(3) _____

(4) _____