**Marble Force**

We will be using marbles to observe how the speed and direction of an object can change when a force acts on it.

**Procedure:**

You will need to assign 1 of the following tasks to each person in your group:

Marble Set-up (MS)

Holder of the Big Marble (HBM)

Flicker of the Big Marble (FBM)

Distance recorder (DR)

1. **Practice:** To set-up this activity, the person in charge of Marble Set-up (MS) needs to put 5 little marbles in the center of the circle drawn on the cardboard. Holder of the Big Marble (HBM) will put the big marble on the launch line. They will hold the marble. The Flicker of the Big Marble (FBM) will flick it at the marbles in the circle.

The person flicking the big marble will need to practice 2 or 3 times to make sure they can aim the big marble at the little marbles well and to make sure they can do a good **hard flick** and a good **soft flick**.

2. **Trial 1:** The MS will set your 5 little marbles in the center of the circle. **Make sure you pay attention to how you set up the marbles because you will have to set them up in the same position for the second trial.** In your data collection handout on the picture above the tables, draw in how you set-up your little marbles.

3. The HBM will hold the big marble for the FBM. The FBM will flick the marble with a **SOFT** flick. The big marble must be flicked enough that it actually reaches the little marbles, but not so hard that things go flying.

4. Watch very carefully. See which little marble the big one hits and what happens to all of the marbles.

5. Everyone needs to record your observations for what happened to the big marble and the little marbles in the table on the next page (under Trial 1). Then, the DR will measure the distance each of the little marbles moved from the middle of the circle with a ruler. Make sure you measure in cm! **Everyone will record these distances in their table**.

6. After you have made all your observations and recorded all your data you can repeat your experiment.

7. **Trial 2:** The MS will set-up the little marbles in the exact same way they were for Trial 1.

8. Follow all of the same directions as for Trial 1, EXCEPT this time the FBM will flick the big marble with a **HARD** flick.

9. Again, record all of your observations and all of the measurements of the little marbles that the DR makes. Put these in the table under Trial 2.