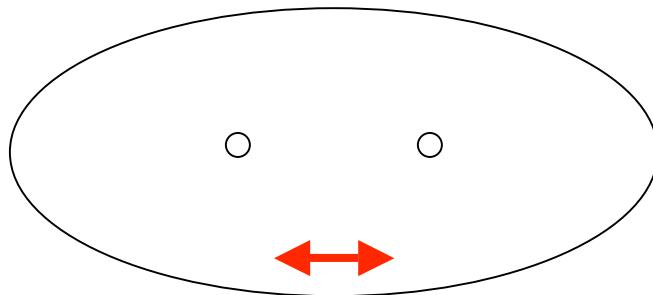


CHAOTIC ORBITS

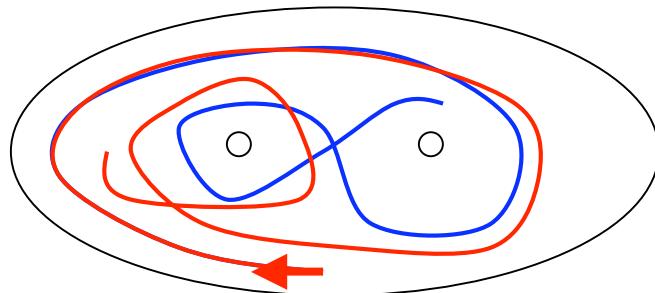
INSTRUCTIONS

1. Start the ball rolling and see if you can guess which hole it ends up in. Were you right?
2. *Hint:* Try not to roll it too hard. Give the ball a gentle push so it *doesn't* bounce off the sides.
3. Roll it again from exactly the same place. Does it do the same thing the second time?

Which hole does the ball end up in?



The ball rolling is an example of **chaos**; no matter how hard we try we can't predict which hole the ball will end up in. If we start the ball rolling in exactly the same way and from the same place, it will start off the same, but it will end up doing something completely different. This is because very tiny differences in how we start it rolling get magnified as it rolls.



This type of behavior is sometimes called “*The Butterfly Effect*”, because something very small, like the flap of a butterfly’s wings can grow to become an enormous hurricane.



*** There are some other points we could make, but perhaps it is best to focus on what we have so far. 161 words so far.

- you can imagine if the Solar System had 2 suns, rather than just one, then the Earth would be just like the rubber ball, and things would just go crazy. Most stars in the galaxy occur in binary systems.
- since the other planets (like Jupiter) are also pulling gravitationally on the Earth in addition to the Sun, the orbit of the Earth actually may behave chaotically just like the rubber ball. We're pretty much in a circular orbit right now, but as time goes on that may change and we have no way of predicting what will happen...
- there were a couple other chaos exhibits, one with a magnetic pendulum I remember, we could point them to...