

Gravity Well in a Bucket

Materials

Piece of 22"x28" poster paper
Scissors
Transparent Tape
Ruler

Bucket
Marbles
Short length of $\frac{3}{4}$ " PVC Pipe (optional)

Assembly

- Using a ruler, find the middle of the poster paper and draw a line from the middle of the long edge to the middle of the poster paper.
- Using a compass or a round object, draw a 2" diameter circle around the center of the paper.
- Cut from the long edge into the center of the paper and cut out the circle in the middle.
- Overlap the two edges to create a cone shape and tape both the front and back edges to secure the paper in the cone shape. NOTE: Do not make the cone too steep.
- Place the gravity well (cone) into a bucket to hold it. NOTE: Having a couple buckets with gravity wells of different depths is best.



Noticing and Wondering

Push marbles sideways inside the gravity well and observe what happens. If you have a short length of $\frac{3}{4}$ " PVC pipe, use it to start the marbles moving inside the gravity well.

- What is the best angle and speed to start the marbles at?
- What is the longest time you can get a marble to orbit the gravity well?

What the heck? (A little bit about the science)

Einstein dreamed up an explanation for why massive objects could influence other objects with mass. Gravity is a natural consequence of large masses warping space-time and creating a gravity well. The larger the mass, the more it will warp space-time, the deeper the gravity well it creates. Physicists experimenting with the paper gravity wells should be able to notice that the marbles generally move in an elliptical shaped orbit. It is pretty hard to get them to go in a perfect circle. When the marble is further from the "mass" create the gravity well in the middle, it is moving slower than when it is closer to the "mass" in the middle. This holds true for planets as well.

So what kind of a gravity well does a black hole create? One that has the steepest edges imaginable when you get too close to it!

#STEMAZingVideo of Gravity Well in a Bowl and a Bucket: <https://bit.ly/GravityWellBB>

Find Gravity Well in a Bowl Template HERE: <https://stemazing.org/gravity-well-bowl-or-bucket/>