

Solar System Gravity – Student Activity

Gravity is a force that attracts objects to each other. The more massive an object is, the stronger is its gravitational force of attraction. Gravity acts over great distances. Gravity is the “glue that binds the Solar system together

The formation of the solar system (continued after static electricity)

As the clumps of nebula dust held together by static electricity increased in mass they would also have been attracted together by the much stronger force of gravity. The spinning proto-planetary disc pulled larger pieces towards its centre creating the proto-Sun. This became very hot and exploded blowing away most of the surrounding disc. The remaining pieces dispersed, crashed and reassembled to eventually form the planets of the solar system and were held in place by the Sun’s gravitational pull.

Teacher demonstration -The effect of gravity on objects in the solar system

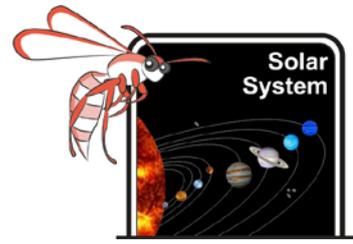


Materials

- Half a heavy duty rubbish bag
- A circular bucket or rubbish bin
- A heavy elastic band or gaffer tape
- A heavy object representing the Sun and lighter spherical object representing a planet orbiting round the Sun.

Method

1. Stretch a thick flexible plastic membrane such as a single sheet cut from a large bin bag over a circular container (rubbish bin or bucket) and anchor it to keep the membrane taut (elastic bands and gaffer tape).
2. Depress the centre point by placing a sufficiently heavy object (lead weight) on it.
3. Set the marble or Ping-Pong ball spinning round the outer edge of the stretched plastic. If the marble is travelling fast it will not be sufficiently deviated from its forward path. With a little less speed the marble will spiral down towards the denser weight at the centre with increasing speed.
4. Repeat step 3 to confirm observation.



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Observation

What happened to the plastic surface when a heavy weight was placed on it? _____

What is this depression supposed to represent? _____

What happened when the marble was moving fast? _____

What happened when the marble was travelling slower? _____

Extension - Weight, mass and gravity

Materials

- A weighing machine
- Access to the Internet

$$\text{Weight} = \text{Mass} + \text{Gravity}$$



Your weight on Earth is a combination of the mass of your body and the gravitational pull of this planet. If you were weighed on a smaller planet or on a moon your mass (the amount of stuff that makes your body) would remain the same because all the body would still be there but your weight would be much less as that moon has a much smaller mass and consequently smaller gravitational pull than the Earth. A student who weighs 32 kg on Earth will weigh 5.3kg on the moon. If they survived the

horrific heat on the Sun, their weight would be an equally horrific 866.3kg.

“Your weight on other worlds” www.exploratorium.edu/ronh/weight/ will allow you to calculate your weight on planets and moons of our solar system.

	My weight (kg)		My weight (kg)
Mercury		Jupiter	
Venus		Saturn	
Earth		Uranus	
Mars		Neptune	