

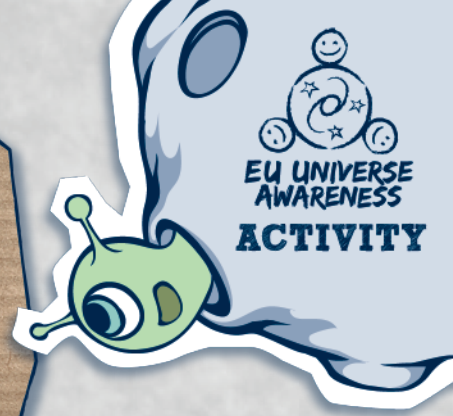
8-10



PRIMARY SCHOOL



# Model of a Black Hole



EU UNIVERSE AWARENESS ACTIVITY

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## BRIEF DESCRIPTION



Many children have already heard of black holes, with the understanding that they are bottomless wells. If something falls into a black hole, it is impossible for it to escape — even light cannot escape and is swallowed. That is how a black hole gets its name; it is a point in space that does not give out any light. It is not easy to explain black holes in a simple way, but this experience will help children visualize the concept.

## KEYWORDS



- Black holes
- Gravity
- Space
- Time
- Mass
- Interactive
- Model



## MATERIALS



- Large elastic bandage, used for muscular injuries (i.e. Tubifix, sold in chemists)
- Small marble
- Very heavy ball (such as those used in games of Boules, Bocce or Pétanque)

## LEARNING OBJECTIVE



- Use an interactive, hands-on activity to introduce children to the important astronomical concepts of black holes, gravity and space-time,
- Build a physical model of the space curvature around an object and observe the effect of a less massive object





passing close to it,

- Demonstrate what happens to the passing object if its velocity is not high enough, or if the gravity well is deep enough.

## BACKGROUND INFORMATION



A black hole is a region in space where gravity is so strong that nothing that enters it, not even light, can escape. They form when a star runs out of fuel and becomes unable to support its heavy outer layers of gas. If the star is large enough — about 25 solar masses — then gravity pulls on the gas and causes the star to grow smaller and smaller until its density reaches infinity at a single point. This is called a 'singularity'.



After the black hole forms, it can continue to grow by absorbing mass from its surroundings, such as other stars and other black holes. If a black hole absorbs enough material, it can become a "supermassive black hole", which means it has a mass of over one million solar masses. It is believed that supermassive black holes exist in the centers of many galaxies, including the Milky Way.



A black hole is made up of three parts: the singularity (the collapsed star), the 'inner event horizon' (the region around the singularity where nothing, not even light, can escape), and the 'outer event horizon' (where objects will still feel the gravity of the black hole, but not become trapped).

Usually, astronomers observe objects in space by looking at the light (for example, that is how they study stars). However, since black holes don't emit any light, they can't be observed in the usual way. Instead, astronomers have to observe the interaction of the black hole with other objects. One way is to observe the motions of stars around the black hole, since their orbits will be altered by its presence.

