Solar System Gravity Simulation

* A CoSpaces Edu Pro license plan is needed for this lesson.

Lesson complexity: Intermediate/Advanced
Grades: Grade 8 and up
Subjects: Maths, Physics, Natural Science
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Introduction:

Letting your students build their own 3D creations with CoSpaces Edu is a great way for them to develop their spatial skills, imagination, and get familiar with using the building blocks in CoSpaces Edu.

This project will allow your students to simulate how a ball would fall on planets / moons with different gravity forces as an Augmented Reality solar system in your classroom!

Student benefits:

- Learn basic 3D creation skills
- Improve spatial skills
- Computational thinking and coding of physics simulations
- Research of gravity forces on planets/moons besides Earth

Activity preparation:

- Have your students do some basic CoBlocks programming such as animating a character to rotate in place.
- Have students use CoSpaces Physics to see the default state of objects falling with simulated Earth gravity.
- Have students research how fast objects fall on other planets. By documenting how fast objects fall per second on different planets, your students will have the information they need to simulate gravity in other places.
Creation guide

Begin by creating a floor shape (Library > Building) so your planets have something to bounce off of.

Double click and turn the physics on and set this ground object to “static”.

Your planets will bounce off of this ground at the same rate a ball would fall on that same planet!

Now start placing the planets of your solar system. You can use Library > Building > Ellipsoid and give each sphere a color. Or spruce it up in Upload > 3D models > Web Search to find existing 3D models of our various planets/moons.

Drag each shape or 3D model onto your scene and place them above the static ground you created. Give each object a name.

Double click on each planet/moon and select Code. Toggle Use in CoBlocks so we can program these, and Show name to make it clear which planet you are interacting with at a time.
Also, turn on **Physics** for each planet/moon and set them to static so they stay in the air waiting to click over them to trigger their actions.

Now for a bit of programming. This is where you insert the “rate of fall” your students already researched for each planet/moon. **Set gravity pull** uses how many meters an object falls per second.

(Example: An object on earth falls at 9.8 meters per second)
Open CoBlocks and create the following code for each object:

- When “planet/moon” is clicked
  - Set gravity pull to (the meters per second objects fall on the planet you have researched)
  - Set “planet/moon” bounciness to 0.5
  - Set “planet/moon” static to “off” - this releases the object to fall after you have set its gravitational pull.

Examples:

- When “Earth” is clicked
  - Set gravity pull to “9.8”
  - Set “Earth” bounciness to 0.5
  - Set “Earth” static to “off”
- When “Mercury” is clicked
  - Set gravity pull to “3.7”
  - Set “Earth” bounciness to 0.5
  - Set “Earth” static to “off”

You are now ready to view your project in AR/VR or on a MERGE Cube!

You may like to add a dark environment for VR or just have the planets float and drop in your classroom.

By clicking each planet/moon, you will activate their gravity and they will fall to the ground as if they were a ball on that planet!
Example space

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View example space