

UNITED BY GRAVITATIONAL EQUALITY



Project description

Title	United by gravitational equality
Short description	<p>The project is based on the central theme of gravity understood as a fundamental physical quantity and as a powerful element of cultural union. The laws of physics are universal and scientific research is a field on which men and women from different nations meet sharing the same language, that of mathematics and physics, beyond the differences in language and culture. From this perspective, we propose a series of experimental measurements of gravity conducted with different methodologies (via pendulum or via springs or free balls, for example) and/or measurements linked to the equivalence principle, such as Einstein's elevator experiment. The tools used can be very different, preferring the use of the smartphone as a mobile laboratory that facilitates collaboration between international working groups.</p>
Language	English
Number of pupils	60-150
Age taught form	13
Age taught to	19
Subject	Physics, English, ICT
Key competences	<p>Our project especially strengthens key skills</p> <p>2. Communication in foreign language, thanks to the interaction between groups of international students, reading and understanding texts, handouts, scientific articles and writing laboratory reports, communicating via videoconference with other students and teachers from other countries in English</p> <p>3. Mathematical competence and basic competences in science and technology, for obvious reasons linked to the central theme of gravity measurement.</p> <p>Certainly it also promotes</p> <p>8. Cultural awareness and expression, as the activities also involve phases of mutual knowledge that compare uses, habits, places, passions, celebrations, etc... of different countries and communication and collaboration activities, including interactive ones</p> <p>4. Digital competence, thanks to the use of a digital platform for the communication and sharing of materials and the planning of activities, the creation and manipulation of digital contents (laboratory schemes and reports, laboratory simulators, spreadsheets, graphic elaborators/calculators, presentations, etc.), participation in interactive activities like escape rooms or Kahoot quizzes.</p> <p>The use of active teaching methodologies such as Inquire based Teaching, typical of the scientific approach, or Hackathon (a challenge to overcome), collaborative learning, Debate, and research aimed at finding correct information, promotes the development of other skills such as</p> <p>5. Learning to learn</p> <p>6. Social and civic competence</p> <p>7. Sense of initiative and entrepreneurship</p>
Aims	

- Promote physics competences:
 - Observe e identify phenomena
 - Formulate hypothesis explanatory statements using models, analogies and laws
 - Formalize a issue of physics and apply the instruments mathematics e disciplinary relevant to the his resolution
 - Get experience and make it right of the meaning of the various aspects of the method experimental
- Improve language and communicative skills
- Develop collaborative writing and consolidate the technical-scientific language
- Develop ICT competencies also using collaborative web tools
- Foster creativity and critical thinking
- Encourage initiative and self-expression
- Become more responsible and curious
- Develop social and civic competences
- Develop international collaboration and learning skills

Expected results

We expect:

- to make students aware of the profound unity of the nature and universal value of science
- to have them produce videos, slogans, leaflets by working together with their international peers
- to develop European friendships and the feelings of belonging to the same planet
- to improve digital, linguistic and math/scientific competences
- to apply mathematical tools in a real life situation and so to increase the scientific citizenship
- to help our school to experience a more international dimension and to encourage teachers to experiment with new forms of collaboration through networks of European teachers



 **SEHER ALI ORTAOKULU**
UNITED BY GRAVITATIONAL EQUITY!
2023-2024

A vibrant cartoon illustration of a diverse group of students and a teacher standing in a grassy field. The teacher, a man with a beard, stands in the center. Students around him hold flags of Italy and Turkey. A white car with the heart and globe logo is on the left, and a QR code is on the right. A red apple is falling from the sky in the background.

GRAVITY



Gravity is like the Earth being a great wizard, possessing a magical force that pulls all objects towards it! The enchantment of Earth draws everything around it closer.

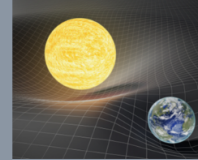
Discovery of Gravity:

Isaac Newton discovered gravity, inspired by an event where an apple fell, leading him to contemplate about gravity.



Definition:

Gravity is the force of attraction between two objects and typically refers to the gravitational pull one object exerts on another.



Universal Gravitation:

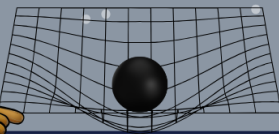
Isaac Newton's law of universal gravitation defines the gravitational force between two objects. This law involves a gravitational formula where the masses are directly proportional and the square of the distance between them is inversely proportional.

$$F_1 = F_2 = G \frac{m_1 \times m_2}{r^2}$$



Einstein's General Theory of Relativity:

Albert Einstein's theory explains that gravitational forces arise due to the bending and warping of spacetime by massive objects. This theory defines gravity as the curvature created by mass in spacetime.



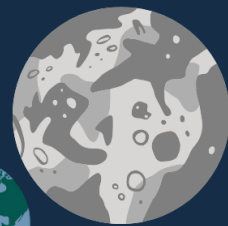
Force of Gravity:

Gravity is the force that pulls an object downwards on the surface of the Earth, typically considered as an acceleration of 9.81 m/s^2 .



Moon and Earth:

Gravity causes the Moon to orbit around the Earth and remain under the influence of Earth's gravity, thus maintaining its orbit around Earth.




eTwinning



Effects of Gravity:

Gravity affects the motion of planets, stars, galaxies in the universe. Additionally, many natural phenomena such as falling motions, ocean tides are fundamentally based on gravity.



Interaction

Gravity interacts only between massive objects. Every object has the capacity to attract other massive objects, but the degree of this attraction depends on the masses of the objects and the distance between them.



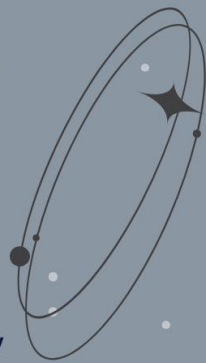
Zero Gravity:

In space stations beyond Earth or during flights, the gravitational effect can be nearly zero. This situation allows astronauts to move freely and experience a sensation of weightlessness.



Orbital Decay:

Over time, satellites may experience orbital decay due to various factors such as atmospheric drag, solar wind, or gravitational perturbations from other celestial bodies. If a satellite loses its orbital velocity or encounters increased atmospheric resistance, it may gradually spiral towards Earth.



Station-Keeping Maneuvers:

To maintain their orbits, satellites often require occasional adjustments known as station-keeping maneuvers. These maneuvers involve using onboard thrusters or propulsion systems to counteract orbital decay and maintain the desired orbit by adjusting speed and trajectory.

