



GRACE Education Curriculum Gravity	
Teachers	Grades 3-5
Science	

## Gravity – Attraction of Objects of Different Masses in Space

**Background Information:** Gravity controls the orbit of planets. We can see that the bigger the objects, the stronger their attraction. The force of the attraction between two objects is partly determined by the distance between the objects. Gravity from the Sun is what keeps the planets in orbit around the Sun, just as gravity from the Earth is what keeps the Moon and satellites and the space shuttle in orbit around the Earth.

- Objectives:** Following the lesson, the students will:
- Demonstrate that gravity is present now.
  - Describe attraction forces by using magnets.
  - Answer the question “Why doesn’t the moon crash into the Earth?”

**Standards:** Science: science & inquiry; earth & space science; physical science

**Materials:** For each student group (3 – 4 students) you will need:  
5 magnets of different size and strength  
1 iron ball  
Attraction Grid Worksheet  
Gravity in Space Experiment Sheet

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**Directions to the Teacher:**

- Divide the class into random groups of 3 or 4.
- Give each group a set of 5 magnets, an iron ball, an Attraction Grid Worksheet, and a "Gravity in Space" Experiment sheet.
- Before you begin, have your class hypothesize which magnet they think is the most powerful.

**Ask the following questions:**

1. What is gravity? *[Gravity is a force. It's the force that pulls me and you into our seats and tugs on an apple in a tree. It's the force that keeps the Moon in orbit around the Earth and the Earth in orbit around the Sun.]*

*The force of gravity is described by the law of universal gravitation. The law states that gravity is universal because it applies to all bodies throughout the entire known universe. It also states that gravity is mutual. This means, for example, that not only is the Moon attracted to the Earth, the Earth is also attracted to the Moon.*

2. Can you show me an example of how gravity works?

*The story goes something like this. Sir Isaac Newton was sitting under an apple tree in his garden one day. Suddenly, one of the apples fell and crashed on his head. That got him thinking (once the bump had gone down, of course!). Why did the apple fall towards the Earth? Why did it not "shoot upwards" when it came away from the branch? Newton came up with the idea that the Earth must attract the apple towards it with some "unseen force". He named this force gravity.*

3. Why does the moon continue to orbit the Earth? *[Gravity]*

4. If gravity helps the moon revolve around the Earth, why doesn't it crash into the Earth? *The moon is held in orbit by the pull of the earth, but also all of the planets are held in orbit by the gravitational pull of the sun.*

5. In today's lesson, students will discover the answers to these questions by experimenting with objects that attract each other: magnets. The magnets are simulating gravity.

6. Have the students:

- Place the iron ball in the circle on the **Gravity in Space Measuring Sheet**. Choose one magnet and place it on line # 7 on the sheet. Does the magnet attract the ball? If not, move it to line # 6. Does it attract the ball now? Keep moving the magnet closer until
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the two attract and come together. Record the data for that magnet on the **Gravity in Space** Experiment sheet.

- Now use a different magnet and repeat the above steps.

**Extensions:**

- Choose different ball sizes and repeat the experiment.
- Search the internet for stories about Sir Isaac Newton and his theories about gravity.
- Draw a picture of Sir Isaac Newton and one of his experiments about gravity.  
Explain it to the class.

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**References / Resources:**

<http://www.norfacad.pvt.k12.va.us/project/newton/gravity.htm>

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Name \_\_\_\_\_

Date \_\_\_\_\_

## **Gravity in Space Experiment**

Directions: Write down which line the marble had reached when the force of the magnet attracted it.

	<b>BIG MAGNET</b>	<b>SMALL MAGNET</b>
<b>BIGGEST PLANET</b>		
<b>MEDIUM PLANET</b>		
<b>SMALLEST PLANET</b>		

1. Which two objects had the strongest attraction? (They were attracted from farthest away.) \_\_\_\_\_  
\_\_\_\_\_
2. Which two objects had the weakest attraction? (They needed to be very close to attract.) \_\_\_\_\_  
\_\_\_\_\_
3. Why do you think these had the strongest and weakest attraction? \_\_\_\_\_  
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