



GRACE Education Curriculum Intro - Jigsaw Puzzle	
Teachers	Grades K-12
<b>Science &amp; Math</b>	

## GRACE Jigsaw Puzzle

**Background Information:** To learn more about the mysteries of gravity, twin satellites named GRACE – short for the Gravity Recovery and Climate Experiment - are being launched to make detailed measurements of the Earth’s gravity field. This experiment could lead to discoveries about the Earth’s natural systems, which may have far reaching benefits to society and the world’s population. Previous satellite observations have clearly demonstrated that our Earth is not smooth and homogeneous and it really is not even a sphere! The reality is that the gravity field constantly changes with time, mostly due to variations in water content as it cycles between the atmosphere, hydrosphere (oceans), lithosphere (Earth’s crust and upper mantle) and cryosphere (polar ice and glaciers). By far the largest “lump” is the flattening observed at the poles, called the Earth’s oblateness, but the above profile shows that other smaller anomalies exist. GRACE will reveal even smaller scale features to be identified and studied with unprecedented accuracy, and it will show how the gravity field varies with time.

- Objectives:** At the end of the lesson, students will be able to:
- Work in cooperative groups to solve a puzzle.
  - Identify key characteristics of the GRACE mission.
  - Define the purpose of the GRACE mission.

**Standards:** Science: unifying concepts and processes; earth and space science;  
 And science as inquiry  
 Math: problem solving; measurement

**Vocabulary:**

homogeneous	sphere	atmosphere
hydrosphere	lithosphere	cryosphere
oblateness	gravity field	puzzle



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- Materials:** GRACE information from: <http://www.csr.utexas.edu/grace>  
Printed Mission Words (1 letter on each page)  
Example provided is "GRACE"  
Cover Stock Paper  
Laminate (optional)  
Scissors

**Directions to the Teacher:**

1. Introduce background information about the Gravity Recovery And Climate Experiment (GRACE) mission.
2. Choose a word or words about the GRACE mission that will reinforce mission concepts. Some examples are: GRACE, Gravity, GRACE in Space, Satellite, etc. Remember that you would copy one word on each page for the students to use as a puzzle. For younger students one word is recommended.
3. Copy one letter onto an 8 \_ x 11 piece of cover stock paper. Laminate if preferred. Cut this letter into pieces, depending on level. You may only have 4 to 6 pieces for some children and numerous pieces for more advanced. Place pieces in an envelope.
4. Divide the class into small groups (recommend 2 or 3). Explain that you will distribute an envelope with pieces of a puzzle. They must work cooperatively to solve their puzzle piece.
5. After their puzzle piece is complete, see if the students can determine how all the puzzle pieces would "fit" together. For example, if you distributed pieces to spell GRACE, they would put the pieces in that order. In a more advanced level, you may pose a question that when fit together they must answer, such as GRACE IS A \_\_\_\_\_ and they must fill in the blank.
6. You may want to create five puzzle pieces for the class, one for each letter of GRACE. Create five different clues, one for each letter of GRACE. (You may wish to relate each letter clue to information about the GRACE satellite.) Give each group an envelope that contains the puzzle and the corresponding clue.

Suggestions:

G: GRACE will measure tiny changes in the \_\_\_gravity\_\_\_ field of Earth.

R: GRACE will launch from \_\_\_Russia\_\_\_.

A: GRACE will carry a radar \_\_\_altimeter\_\_\_.

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C: GRACE looks at deep ocean currents.

E: GRACE will orbit the Earth.

7. Explain to the students that today a new unit of study begins. The puzzle the group puts together is a piece of the whole puzzle that will reveal the new topic. When the puzzle is complete, send a silent scout to gather the rest of the clues from the other four groups. After the team gathers all five clues, unscramble the clues to reveal the unit name.

**Extensions:**

- Students will draw a picture of the item formed from the puzzle.
- Write an Acrostic poem from the word puzzle.
- Students will identify shapes in the word puzzle pieces.
- Write a paper on the history of the jigsaw puzzle.

**References / Resources:**

Gonzalez-Granat, Olga. Pattern Block Patterns and Shapes. Learning Resources Inc., Vernon Hills: IL, 1997.

<http://www.jigsaw-puzzle.org/>

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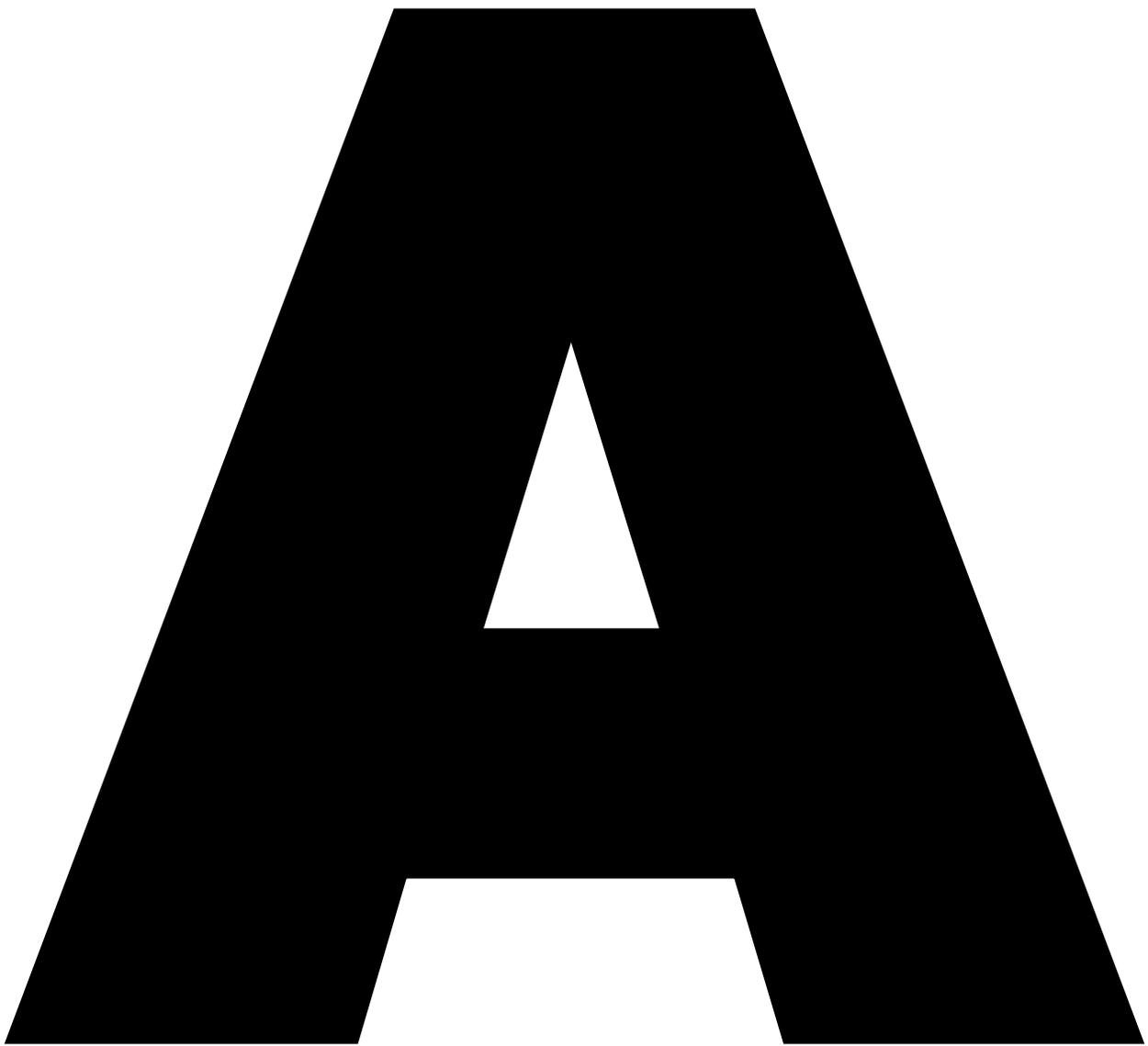
**G**

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**R**

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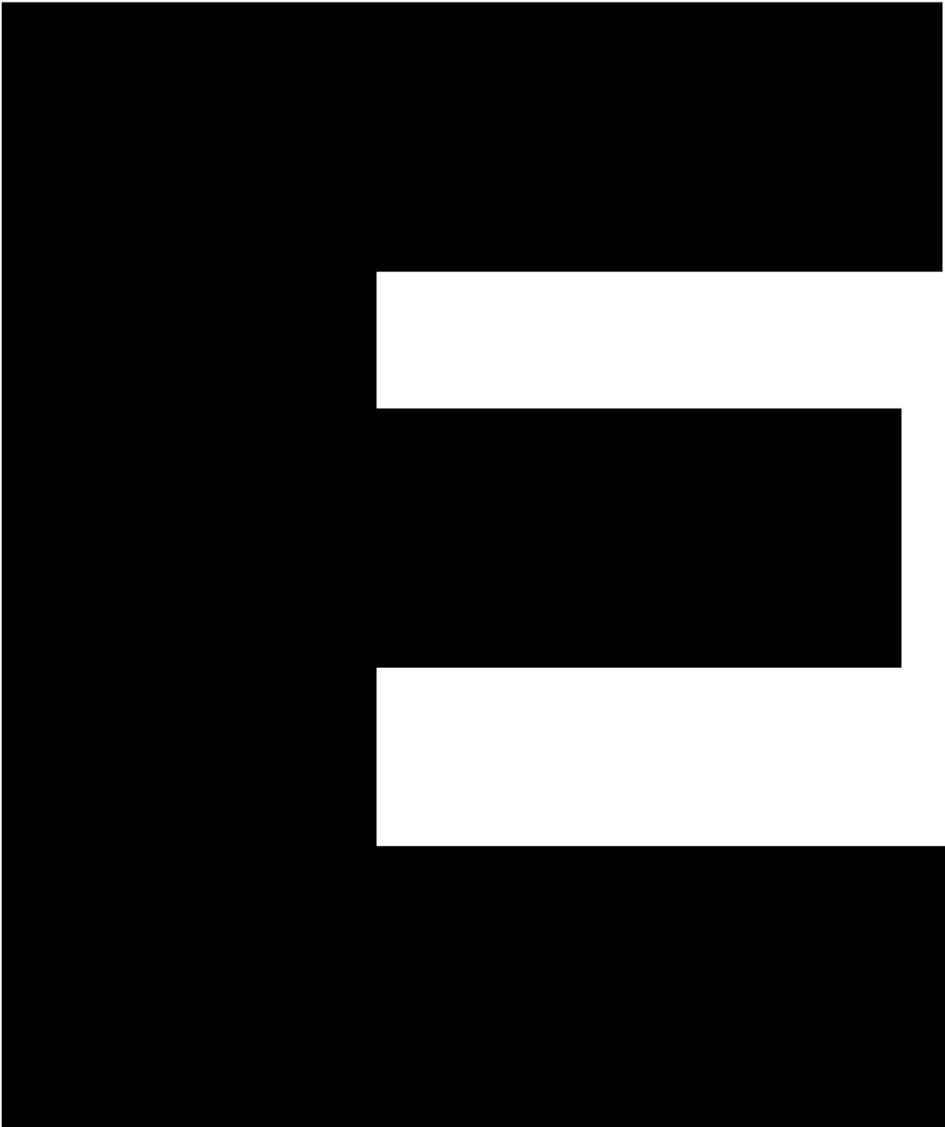


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**C**

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