

# Earth's Systems

Earth's Systems

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Math Connections in the STEM Classroom  
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## Earth's Systems

### Lesson Objective:

This unit focuses on water and wind two elements of nature needed on Earth. This lesson specifically focuses on how water and wind can harm land structure and change the way of land formations. The objective of this unit is for students to understand how water and wind can damage parts of land but also to think of ways to prevent water and wind from hurting land. Students will use their knowledge of addition and subtraction in the unit to find the cost of what it takes to build a model as well as building it themselves.

### Statement of Purpose:

This unit is developmentally appropriate for second grade as students are learning how to do regrouping with addition and exchange and trade 10,s and 100's for subtraction. Students are now learning how to use money to buy things. This unit will give students a perspective of not only practicing math in the real world but getting a chance use data sources to help them learn how to be proactive in keeping their environment safe. One of the topics covered in the second grade New Jersey Science Curriculum is Earth Systems. Students will get a chance to do some engineering with building and planning of a model. For instance, with Hurricane Barry, students will be able to go online to a NASA resource and use it as a base to help them decide how to stop the water from flooding Louisiana.

Students will be work in groups of four. I will mix the high and low students based on their mathematical ability. In previous math lessons, this has worked before. This gives the students who need support to have their friends help them while high learners focus on the explanation and application of the concept and ideas.

Instruction:

This unit is called Earth's Systems. This unit will take place over a period of 8-9 days with each lesson being 45 minutes long.

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**The NGSS Standard for this Unit is 2ESS2- Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.**

**CCSS 2NBT.B.7- Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.**

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5E Model:

<p><b><u>Engage</u></b> <b><u>(Day 1)</u></b></p>	<p>I will introduce to students a current topic that we are facing and pose a question of what can we do to help our Earth. I will ask students "How are we going to start preparing ourselves for these systems that damage land? What types of things do wind damage?" I will have students turn and talk to one another to brainstorm ideas</p> <p>We will then create a list of things that wind can destroy on</p>
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land as well as ideas of how to prevent wind from damaging things. I will write both lists on a chart paper and put it up in the classroom.

Students will be introduced to the unit and learn about the overview of the unit and what they will be doing for the next 7-8 days. I will also explain that students will be working in groups during this unit and they will plan a model and build it using materials in a classroom to help prevent the water and wind from changing the structure of land. I will be asking questions to the students such as “As future scientists and “engineers”, how will you build something that will stand strong to prevent water from flooding, wind from blowing things down?” I will also explain that the students will need to use their best math skills to do adding and subtracting to build their models. This will include math problems that have regrouping in addition and subtraction. Students will also be practicing money with addition and subtraction regrouping.

**Explore  
(Day 2 & 3)  
\*Math  
practice is  
everyday**

For this second lesson, I will review the chart paper and remind students about the project they will be working on. We will review the chart with the ideas of what types of things can wind damage. I will tell students that in this lesson we will talk about things that water can damage. I will have students brainstorm what types of things can water damage and how can we prevent water from damaging land.

I will then write down the ideas for what types of things can water damage and how can water be prevented from damaging land.

I will then give an example of a current topic that may be a hurricane system, earthquake or storm we are facing. If there are none, I will use a recent topic that happened in the past few

months.

I will break the students up into their groups. I will be putting students into their groups so the high and lows are mixed together. Students will spend a day and half exploring and brainstorming ideas. Once the groups have spent time thinking what type of model they will build, they will also need to start thinking of what materials they need.

For the third lesson, I will start as a whole group and point to the wind and water charts. I will ask students about what things are similar and what things are different? What are some ways to prevent both water and wind with their model? Is there a way? What can you do as the future of the world? The model that they build will be used to prevent water, wind or both.

Engineers will spend one day to review how they will start building and what types of materials are needed to start building.

Students will then provide a list of materials they are going to use and would like to use for their model. Some of the materials required are (glue, print paper, scissors, pencil, fake money, construction paper). The materials should be things found in a classroom. If they would like to use other materials, they can bring it in from home. The materials must be brought in within two days if brought from home. The list of materials that will be brought in will be approved by me and signed by a parent/guardian acknowledging the student will be responsible for bringing it in. I will provide a paper with a few lines and a parent signature at the bottom to the students.

During this time, I will pose a few questions, what do you think should be the strongest part to build when building the

model? Would the length of a material matter? How are you going to keep the model strong so that builders and engineers can make sure the infrastructure (building) is strong?

During math class, I will give my students 15 minutes to play **Coin Box** on Illuminations to practice using money and build a strong foundation for the project. I will also have the students practice the regrouping strategy for both addition and subtraction. They can play **Chip Trading: Practicing Single Digit Addition with Colored Chips Representing Ones, Tens, and Hundreds**. This game will be for those students who need extra help with the regrouping strategy. I will also be conferencing with the groups. I will be checking to make sure the model is built well and checking for math errors.

**Explain  
(Day 4 and  
5)**

In the fourth and fifth lesson as a whole group, we will discuss some ideas why the Earth is changing. I will show them the NASA websites and resources to help them rethink their model. Students can at this point use the chromebooks to look up the NASA website to look at the landforms and strength of the storms and see damage to the land. Students should not have started any building at this point in the lesson. They should still be redesigning and brainstorming materials for building stronger foundations.

In the fifth lesson, I will let students know they are going to present their idea and what they have so far of their planned model. Each group will come up and present.

The groups will quickly come up for two minutes to present what they are doing. I would like the students to see what their classmates are doing. This will help give ideas on if they need to change anything or add something.

<p><b>Extend</b> <b>(Day 6 &amp; 7)</b> <b>*Extra time</b> <b>will be given</b> <b>for this if</b> <b>needed</b></p>	<p>After the presentations, students will jot down ideas and discuss them with their groups about what they liked about the other models.</p> <p>After students have finished their presentations, they will start the building phase. Students will spend the next two days building their models. I will be floating around the room to help monitor and assist as needed. An extra day will be given if needed to complete the project.</p>
<p><b>Evaluate</b> <b>(Day 8)</b></p>	<p>Groups will get another opportunity to show off their final model to the class with another three-minute presentation.</p> <p>I will then be using a rubric to assess how well the students did on their projects. I will assess them mainly on group work, materials, presentation and if the model holds well. Did they apply the idea of preventing water or wind from damaging the land? Is their math correct? Did they use their knowledge of money in this project? Was it creative?</p>

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### RUBRIC

	3	2	1
Creativity in Wind/Water Prevention	Students show creativity in the blocking of water and wind. Students must have several blocks to show the high and low levels of water/wind.	Students show little creativity in the blocking of water and wind. There are one or two blocks to show the high and low levels of water/wind.	There is no creativity in the blockage. There are no blocks stopping the water and wind.
Materials	Students have used 6-8 different	Students have fewer resources for their model.	Students have barely used any materials and

	resources for the model. The materials used are strong enough to hold the water/wind.	Some materials are not strong enough to hold the water/wind from damage.	they are not strong enough to keep the water/wind from damage.
Collaboration	Students worked well in their groups. All group members shared the work equally.	Some students may not have worked well together. One or two students did more work than the other.	Group members had many arguments about what to do and could not agree on anything. Members did not share the work equally.
Presentation	The presentations were well organized and everyone in the group said one thing.	The presentations were organized but not everyone said one thing. Only a few members said something.	The presentation was unorganized and only one person spoke.
Math (Money and Regrouping)	All the group members contributed in the math and checked the work. The errors were all corrected.	The group members did the math and some errors were corrected.	Only one member did the math and some problems were incorrect.

Total Points for Project = \_\_\_\_\_

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### Resources

NASA, Rob Garner (2019, June 21) Earth  
<https://www.nasa.gov/topics/earth/index.html>

Paul Przyborski (2019, July 15) Visible Earth  
<https://visibleearth.nasa.gov/>

NCTM (2019, July 15) Illuminations - Chip Trading: Single Digit Addition with Colored Chips Representing Ones, Tens and Hundreds  
<https://illuminations.nctm.org/Search.aspx?view=search&kw=addition%20regroup&gr=Pre-K-2>

NCTM (2019, July 15) Illuminations - Coin Blocks: Counting Money with Value-Sized Block  
<https://illuminations.nctm.org/Search.aspx?view=search&kw=Coins&gr=Pre-K-2>