Rivers: Start to Finish

2nd grade

Background:
The second unit of our reading curriculum CKLA Listening and Learning is Called Ancient Asian Civilizations. Most of the stories that the students are hearing are about how the Ancient Asian Civilizations started around rivers and how the rivers were the lifeblood of the community. Teachings this lesson after the students have heard about the Ganges, Yangtze and Yellow rivers will help them understand where all the water that is helping these people survive is coming from and where it will ultimately end up.

Students will then be able to relate what they have learned both in reading and these lessons to the world around them.

Standards:
Performance Expectations:

- 2-ESS2-2
- 2-ESS2-3
- 3-5-ETS1-1
- 3-5-ETS1-2
- 3-5-ETS1-3

Disciplinary Core ideas

- ESS2.B
- ESS2.C
- ETS1.A
- ETS1.B
- ETS1.C

Scientific and Engineering Practices

- develop a model
- carry out an investigation
- construct an explanation
- define a problem
- design multiple solutions.
- carry out investigations

Cross Cutting Concepts

- patterns
- structure and function

Engaging Contexts

How many of you played in or sat next to the river this summer? What did you notice about the water? Did it ever stop moving? Where did all that water come from? Where is all that water going? How do people, cars and trucks cross the water? What makes bridges so strong? How are they able to hold up so much weight?

Justification:

Rivers are bodies of water that are constantly moving. When looking at a flat map you notice that all major rivers flow into the ocean. It is not until you look at a relief map that you notice that the origin of all rivers is in mountainous or hilly region and flow to landforms that are lower than the origin. By creating a model of the earths surface students will be able to see the movement from "rain" to "rivers" as well as source to mouth.

Students will then be able to take what they have learned from the previous lesson (where rivers start and end) and what they have learned in CLKA Listen and Learn (how water was the lifeblood of Ancient Civilizations) and apply it to their world today. By following a river from its source to the mouth students will be able students will be able to compare the amount of water from their hometown to the area that they have chosen to research. They then will be able to predict why there is a discrepancy.

Since the beginning of time humans have been able to cross bodies of water. It has been important to reach other landmasses in order to reach food, safety or even just out of curiosity. However building a bridge is hard work and engineers must learn to communicate with one another and work within their constraints. When testing their designs students must learn to learn form their mistakes and improve their design.

Objectives:

Students will develop a model of earth's surface.
Students will explore patterns of rivers.
Students will investigate and discover how rivers flow.
Students will be able to explain where rivers start and where they end.
Students will investigate the river that is closest to where they live.
Students will trace that river from its source to its mouth.
Students will compare water flow from where they live to different location on their river.
Students will define a problem
Students will explore the relationship between structure and function.
Students will design and test multiple solutions to that problem by improving their design.
Students will work together as engineers.

Lesson 1: Duration one class period
Paper Mountains (use provided PPT)

Engage: Show the students the video of the tubers going down the river. Ask: What did they notice? What is happening? How is the water constantly moving? Write down student's ideas on board or chart paper for later referencing.

Explore and Explain: Show map of North America and where the major rivers are located. Ask: What do you notice? Next show the start of where all the rivers start. Ask: what do students notice? Add in where all the rivers end. Ask: What do the students notice? If they end up in the Ocean where do rivers start? What makes them move?

After conversation on where rivers start make paper mountains model.

- Students should partner up.
- Each group needs:
  3 sheets of computer paper
  4 stickers or pieces of tape
  1 water-soluble marker or magic marker
- Each table group needs:
  1 spray bottle

1. Each partner group will need 2 pieces of paper laid on top of each other.
2. Wrap the paper (2pieces) around your partners fist.
3. Take paper off fist and crumple paper a bit more keeping a high center.
4. Un-crumple paper enough to tape to the remaining sheet of paper with about ½ inch border on the top and bottom. (See photo in power point). Now you have our paper mountains and a base for them to sit on.
5. Ask: What do the students notice about their landforms? (Mountains, Valleys, Plains, ect.)
6. Ask: If it were to rain on your model where would the water go?
7. Next have the students find the highest points on their model and color them using lots of ink.
8. Once all models have been colored have each group spray their model 5 times with the spray bottle. (The models will be sprayed again so each student will get a chance to spray)
9. Have students watch (30 seconds to 1 minute) Have students share their noticing's (write students ideas on board or chart paper to compare to earlier ideas.)
10. Complete step 9 again.
11. Complete step 9 for a third time. ("rivers" should be flowing by the third time.)
12. Ask: Did "rivers" form on your model?
    Where did they start?
    Were your predictions correct about where rivers started?
13. Show final slide of where mountains are located on the North American Map.

Discuss: What the students learned and weather or not student's ideas were correct from the start, if original ideas were incorrect why?
Have a student state why rivers flow?

<u>Lesson 2:</u> Duration: 2-5 class periods depending on how tech savvy your group is.

Following a River Source to Mouth

Elaborate: Ask: What are some of the rivers in or around our community? What are they used for? Where do they start? Where do they go?

In todays lesson show the students the USGS website and how they will use it. Show students that they can find a river and either trace it up to its source or down to the ocean it empties into. Show them how rivers empty in to others to form an even bigger river. You will also show them how to find gages to find the amount of water that is currently flowing also known as Stream Flow.

Be sure to play around with the website before you teach the lesson so you can show the students how it works!

To find your location click on the icon that looks like a sight and crosshairs on the far right of the page. Then click trace report and it will get the information for the first 4 questions on the note catcher.

To finish the note catcher you will still have to have your river highlighted. Now click on identify. If you click on your town name and gaging station then click on NWISWeb hompage for gaging data.

To find the amount of water that is currently flowing through the gage click on Daily Data. The site shows a great graph that shows the trend in water over the last year (great for visual people). But to get numbered data change the output format to table and it will show you the daily flow. To just get the Stream flow data in real time click the "realtime" tab. This will tell the real time data but will not give you any trends or previous data.

To find information on another gage follow your river up or down and find another green dot and follow the same steps as above.

Independently or in partner group, students are to find information asked on note catcher.

Directions, website, and note catcher can be found at the end of document .

Lesson 3 Duration: 1- 2 class periods depending on your kiddo's.

Bridge Building

Explain the challenge: You and your friends are looking for a place to build a fort. Your annoying brothers and sisters have invaded the last two forts that you have built because they were too close to your house. After exploring the area you found the perfect place. BUT there is a stream that runs between you and the perfect place. The stream is too wide to jump across and your parents don't like it when you come home with wet clothes and shoes. So you and your friends are going to have to build a bridge to get to your new fort.

Today you are going to practice your bridge building strategies by building a bridge out of paper. Your bridge must:

- only build using 2 sheets of paper
- span 6 inches across
- be 3 inches wide
- hold 50 or more pennies.

Search bridge images online and discuss what the students notice? (You could start the conversation with famous bridges they may already know about.) How might they be able to create something that can hold at least 50 pennies?

If students are having difficulties starting their bridge building you can show them a piece of paper suspended between 2 desks or textbooks 6 inches a part. Place one penny on the center. Show them that it can't support much weight. Ask for ideas? Make a crease in the center of the paper, to show that the paper has been made stronger by putting a crease in it. Paper should be able to hold about 5 pennies now.

Materials needed for bridge building.

- Plenty of computer paper
- About $5 worth of pennies

Each group of students will need:

- 1 ruler
- 2 textbooks (to create a gap to build bride across)

Each student will need:

- Bridge Builder note catcher

Send students on their way. Be sure to have students design a "bridge" and sketch it before they test it on provided hand out. If their bridge does not hold 50 + pennies they need to draw/ write how they are going to improve their structure and have a teacher check to get new supplies.

Following a River Source to Mouth

Today you will be exploring the river that runs through or is closest to your community. Please start your investigations by going to the Streamers website.

https://txpub.usgs.gov/DSS/streamer/web/

Name the River that runs through your Community

_____

What ocean does this river empty into?

_____

How many States does this river run though?

_____

How many cities does this river run though?

_____

What is the discharge or stream flow though the gage in your community?

_____

Now find a different town or city that your river runs through.

What is the name of this town or city?

_____

What state is this city or town located in?

_____

What is the Discharge or Stream flow in this new town or City?

_____

Is that more or less water than the stream flow in your community?

_____

By looking at the map and what you have learned about rivers make a prediction as to why there is more or less water in this location than where you live.

_____

_____

_____

_____

_____

_____

Bridge Building

Sketch	How will you improve your design?
1.	
2.	

3.	

Why is the water in rivers constantly moving? -
_____

_____
_____

_____
_____