Name_____ Period _____ Date _____

Storm Surge STEM Sims

Lesson 2: What Affects Storm Surge Damage?

Each year, around 10,000 people from around the world die due to hurricanes and tropical storms. Between 1980 and 2020, storms caused almost 1.9 trillion dollars worth of damage to homes and businesses. What are some factors that impact the possible damage from storms? In this investigation, you'll discover a couple of these factors. Put on your raingear because you'll be in the eye of a storm in this study.

Here are some definitions to help you in your investigation.

Storm Surge -	a rise in the ocean level due to storms pushing water in towards the coastline
Ocean Tides -	are caused by the gravitational attraction on the ocean of the Earth, Moon, and Sun System. Most coastlines on Earth experience two low tides and two high tides each day.
Sound -	a body of water that connects in two or more places to another body or bodies of water
Barrier Island -	a long, narrow island lying along a coast that protects the coastline from erosion due to storms
River Estuary -	a part of a coast with brackish water flowing into it from one or more rivers
Spit -	a narrow piece of land tied to the coastline at one end
Constant -	keeping a variable from changing
Manipulated Variable -	the variable that the researcher changes. This is called the "cause."
Response Variable -	the variable that the researcher measures. This is called the "effect."

Doing the Science

1. Start the Storm Surge Simulation by clicking on the "Simulation" tab.

2. Select "Basic Factors."

3. Select "Tides."

4. Choose one of the two different tides.

5. Make sure to keep all other factors constant, that is, do not change shelf width, water depth, or location.

6. Click on the "Run" icon.

7. Record the Cost and Damage values displayed in the Damage Assessment portion of the screen in Table 1 below.

8. Select the "Reset" button. Again, click on "Tides." Select a different tide from step 3. Repeat steps 5 – 7.

Table 1.

Tide	Cost of Damage ($)	Damage Factor
High		
Low		

9. Select "Basic Factors."

10. Select "Water Depth."

11. Choose one of the three different water depths.

12. Make sure to keep all other factors constant, that is, do not change water depth or tides.

13. Select the "Location" icon. Select one of the three locations.

14. Click on the "Run" icon.

15. Record the Cost and Damage values displayed in the Damage Assessment portion of the screen in Table 2 below.

16. Select the "Reset" button. Again, click on "Location." Select a different location from step 13. Repeat steps 14-15.

17. Repeat step 13 for the remaining location.

Table 2.

Location	Cost of Damage ($)	Damage Factor
A		
B		
C		

Do You Understand?

1. For the tides part of this investigation, what factors other than tides did you keep constant?

2. For the tides part of this investigation, what was the manipulated variable?

3. For the tides part of this investigation, what was the response variable?

4. How do changing tides impact the damage done by a storm surge?

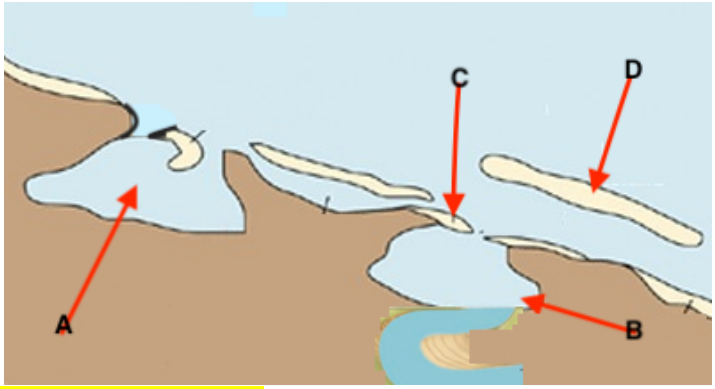
5. Looking at the other Basic Factors, what other factor(s) is related to the changing tides in this simulation?

6. When do you think the ocean tides would be the highest, during a full moon or during a first quarter moon? Please support your answer with a reason.

7. What are some factors that you think might impact the amount of physical property damage present in a given location?

8. How does location impact the damage done by a storm surge?

9. Given the following coastline map, please match the letter with the correct coastal feature.



****Justin - please redo this artwork!

Spit -

Sound -

River Estuary -

Barrier Island -

10. How does a barrier island protect a coastline during a storm?