Chalk, Coral, and an Acid Ocean Lab

Name _____

Date _____

Period _____

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Do Now Chalk fizzes and wears away in vinegar. A coral skeleton is made of calcium carbonate, the same mineral as chalk. The ocean is soaking up CO2 from the air. 2 minutes, before you open the lab

A. What do you think happens to chalk dropped into seawater?

☐ It fizzes away fast ☐ It wears away slowly ☐ Nothing much happens

B. Write one question about what could harm a coral reef.

_____

☐ I can run a fair test: one change, one measurement, the rest kept the same.

☐ I can use real ocean data to explain how CO2 is changing seawater.

☐ I can turn a question about reefs and climate into a testable question and test it in a model.

Part 1. The chalk test (Tab 1)

SEP 3 Planning and Carrying Out Investigations · CCC Cause and Effect

Pick question **A**, **B**, **C** or **D**. Press **Soak 10 minutes**. Copy **Your results**. Then set any one cup's liquid to **Seawater** and soak again.

1. Our question: letter _____ The ONE thing that changes from cup to cup: _____

2. Record what you measure.

Cup	What is in it	Before (g)	After (g)	Lost (g)	% lost
1					
2					
3					
Sea	Seawater, _____ °C				

3. The cup that lost the most: cup _____, _____% lost. Use your numbers: when _____ went up, the % lost went _____.

READ FIRST. In the lab, find the green **Learn It** box and read it. Then answer 4 to 6.

4. Name the parts of your test. Independent variable: _____ Dependent variable: _____

Control: cup _____, because _____

5. The bubbles in the cups were _____ gas. Use the words **calcium carbonate** and **acid** to explain why the chalk lost mass.

6. A student puts chalk in **warm vinegar** and chalk in **cold seltzer** . The warm vinegar cup loses more. What is wrong with this test? How would you fix it?

Part 2. The ocean near Hawaii (Tab 2)

SEP 4 Analyzing and Interpreting Data · CCC Stability and Change

Move the slider to **1990** and press **Record this year**. Do the same for **2024** and one year of your choice. Click **CO2**, **pH** and **Building material** above the graph.

7. Real yearly averages from Station ALOHA.

Year	CO2 in the air (ppm)	CO2 in the seawater (µatm)	Seawater pH	Building material
1990				
2024				
My year: _____				

8. From 1990 to 2024, CO2 in the air went up by _____ ppm. The pH went _____. The building material went _____. Look at the pH graph. Did the pH go down every single year? Describe the pattern.

READ FIRST. In the lab, find the green **Learn It** box and read it. Then answer 9 to 11.

9. From 1990 to 2024 the seawater got about _____% more acidic. A classmate says, "The ocean is turning into vinegar." Use the pH of seawater and the pH of vinegar to answer.

10. Explain, step by step, how more CO2 in the air makes it harder for coral to build its skeleton. Use **ocean acidification** and **carbonate** .

11. Your seawater cup in Part 1 lost almost nothing. Does that prove CO2 cannot hurt coral? Use one number from Question 7.

Part 3. Test a reef question (Tab 3)

SEP 1 Asking Questions · SEP 3 Planning Investigations · CCC Cause and Effect

Build your question from the three boxes. Pick three **different** air values for the tanks. Tick one tank as the **control**. Press **Run one year**. Copy **Your tanks**.

12. My testable question: Does _____ affect _____ in _____? Why is it testable?

13. Record what you measure. Circle the control tank.

Tank	CO2 in the air (ppm)	Seawater pH	Building material	Skeleton built (today = 100)
1				
2				
3				

READ FIRST. In the lab, find the green **Learn It** box and read it. Then answer 14 to 16.

14. Model check. What does each part of the tank model stand for? The air above the tank: _____ The coral in the tank: _____ Name one thing this model leaves out:

15. Run a tank at **936 ppm** if you have not. The model says the coral builds _____% less than today. The real reef test at One Tree Reef built about _____% less. Give one reason the real reef could lose more than the model.

Wrap it up

SEP 7 Engaging in Argument from Evidence · CCC Stability and Change

16. A classmate says, "The chalk in seawater lost nothing, so the CO2 in the air is harmless to reefs." Argue against this claim. Use one number from Part 2 and one number from Part 3. Explain why a slow, small change still matters to a reef.

NYSSLS: building toward HS-ESS2-5 and HS-ESS2-7, with DCI ESS2.D Weather and Climate and LS2.C Ecosystem Dynamics. Environmental Science, Chapter 6 Case Study: The Importance of Coral Reefs, and Lesson 6.3. Tags: SEP = Science and Engineering Practice, CCC = Crosscutting Concept. Tab 2 is real data (NOAA Mauna Loa; Hawaii Ocean Time-series, Station ALOHA).