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 Investigations · CCC Cause and Effect

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

1. Our question: ☐ A ☐ B ☐ C ☐ D The ONE thing that changes:

☐ vinegar strength ☐ temperature ☐ chalk size ☐ kind of liquid

2. Record what you measure.

Example: Before 5.00 g, after 4.80 g. Lost = 5.00 – 4.80 = 0.20 g. The lab works out the % lost for you.

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

3. The cup that lost the most: cup _____. When my change went up, the % lost went

☐ up ☐ down ☐ stayed the same

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

4. Tick one box in each row.

Part of my test	What it is
The % of chalk lost	☐ independent variable ☐ dependent variable ☐ control
The cup with the normal condition	☐ independent variable ☐ dependent variable ☐ control
The one thing I changed on purpose	☐ independent variable ☐ dependent variable ☐ control

WORD BANK CO2 · oxygen · calcium carbonate · salt · acid

5. The bubbles were _____ gas. The _____ broke down the _____ in the chalk, so it lost mass.

6. A student puts chalk in **warm vinegar** and in **cold seltzer** . What is wrong?

☐ She changed two things at once ☐ She should use eggshell ☐ Nothing is wrong

Fix it: keep both cups _____ and change only the _____.

Part 2. The ocean near Hawaii (Tab 2)

SEP 4 Analyzing Data · CCC Stability and Change

Move the slider to **1990** and press **Record this year**. Do the same for **2024** and one year you pick. 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, tick one box in each row.

Measurement	What it did
CO2 in the air	☐ went up ☐ went down ☐ stayed the same
Seawater pH	☐ went up ☐ went down ☐ stayed the same
Building material	☐ went up ☐ went down ☐ stayed the same

On the pH graph, the pH ☐ fell every single year ☐ bounced a little, but went down over the years

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

CLUE: Lower pH = more acidic. Each 1 step on the pH scale is 10 times. Above 7 is basic. Below 7 is acidic.

9. From 1990 to 2024 the seawater got about _____% more acidic. Is the ocean turning into vinegar?
☐ Yes ☐ No

Because seawater is pH _____, still basic, and vinegar is pH _____.

WORD BANK acid · carbonate · less · more · oxygen · sugar

10. CCC Cause and effect. More CO2 in the air → the ocean soaks it up and it makes an _____ → the acid uses up the _____ → coral builds _____ skeleton.

11. My seawater cup lost almost nothing. Does that prove CO2 cannot hurt coral? ☐ Yes ☐ No

Because from 1990 to 2024 the building material fell from _____ to _____, so coral has a harder time ☐ dissolving ☐ building.

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. Tick one tank as the **control**. Press **Run one year**. Copy **Your tanks**.

Example of a testable question: Does *the amount of salt* (ONE change) affect *how fast a plant grows* (a MEASUREMENT) in *a pot of soil*?

12. My question: Does _____ affect _____ in _____?

Check it. My question has: ☐ ONE CHANGE ☐ A MEASUREMENT ☐ DATA CAN ANSWER IT

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. Tick one box in each row.

In the model	It stands for
The air above the tank	☐ a coral reef ☐ the air over the ocean ☐ one year
The coral in the tank	☐ a coral reef ☐ the air over the ocean ☐ one year

One thing the model leaves out: ☐ hot water and bleaching ☐ CO2 in the air

15. At 936 ppm the model says the coral builds _____% less. The real reef built about _____% less. The real reef lost ☐ more ☐ less, because a real reef has ☐ heat, light, food and many living things ☐ no CO2

Wrap it up

SEP 7 Argument from Evidence · CCC Stability and Change

16. Claim: "The chalk in seawater lost nothing, so CO2 in the air is harmless to reefs." ☐ I agree ☐ I disagree

Evidence from Part 2: the seawater pH fell from _____ to _____. Evidence from Part 3: at _____ ppm, skeleton built was _____.

Reasoning: a reef stays only if coral builds faster than waves wear it down. Building a little less every year

_____