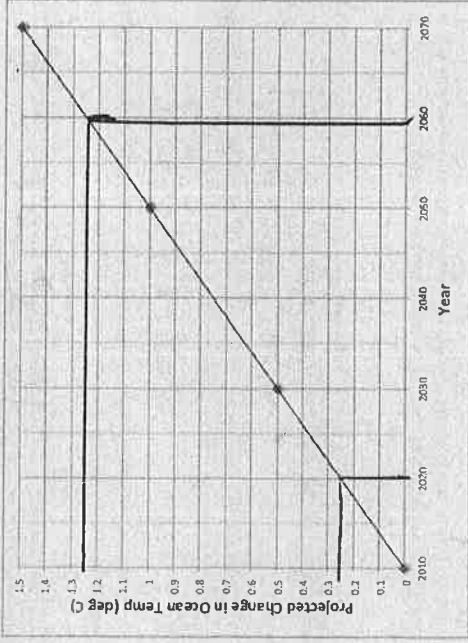


KEY

Graph Showing the Projected Increase in the Temperature of the Oceans



1. Why is the temperature of the oceans is increasing?

Carbon dioxide in the atmosphere

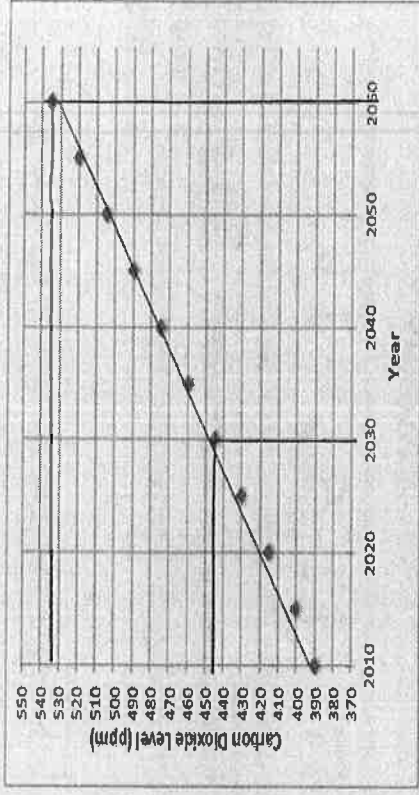
2. How much is the temperature of the ocean projected to change between 2020 and 2060? (Use the graph above to find your answer)

1.25      $1.25 - 2.25 = 1^{\circ}\text{C}$      .25

3. List two things that will occur as a result of the warmer ocean water?

- Storms will get stronger (more water vapor)
- Ocean levels will rise

Use the graph below to answer questions 4-7.  
Graph Showing the Current and Predicted CO<sub>2</sub> Levels in the Atmosphere



4. What is the projected carbon dioxide level in the atmosphere in the year 2030?

445 ppm

5. How much is the carbon dioxide level going to change between 2030 and 2060?

$200 - 2030$

$535 - 445 \text{ ppm} = 90 \text{ ppm}$

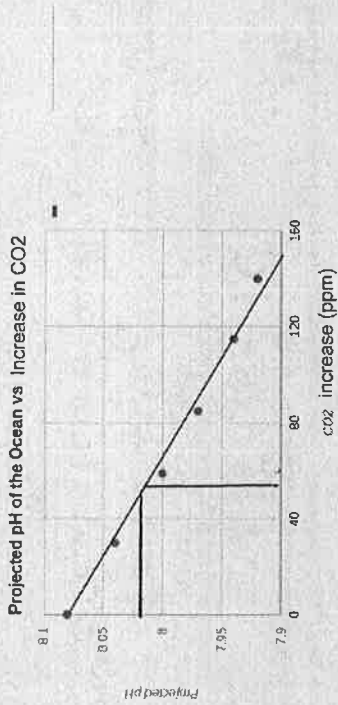
6. Why are carbon dioxide levels are increasing in the atmosphere?

Burning coal & increase gasoline

7. Write a story that describes the graph above?

Carbon dioxide levels will continue to increase in the future.

Use the graph below to answer the following questions 8-12



8. Write a story that describes the trend in the graph above?  
*The pH decreases when CO2 increases.*

9. Based on the graph above, if there is no increase in the level of CO2 in the atmosphere, what will be the pH of the ocean be in the future?  
*8.08*

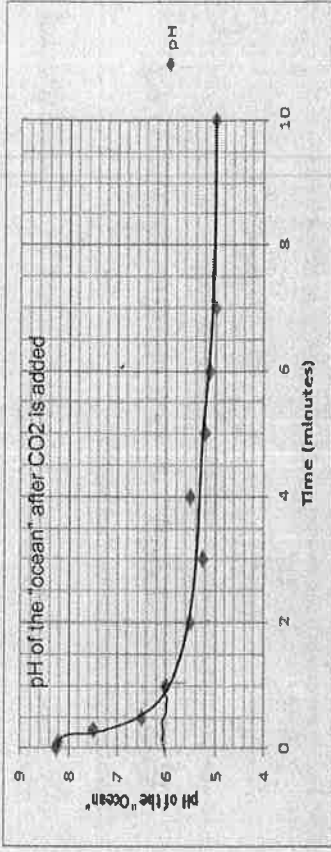
10. Based on the graph above, if the carbon dioxide level changes by 55 ppm in the future, the pH of the ocean will drop to about  
*8.01*

11. Based on the graph above, how much will the pH of the ocean change if we increase the level of carbon dioxide in the ocean by 55 ppm?  
*8.08 - 8.01 = .07*

12. Based on the graph above, how many more times acidic will the ocean become if we let the carbon dioxide level increase by 55 ppm?  
*10 ~~times~~ .07 = 1.17x*  
*times*  
*more*  
*acidic*

**Ocean Acidification**

The graph below shows the pH of a beaker of salt water after a student added solid dry ice (CO<sub>2</sub>) to the beaker. Use the graph below to answer the following questions 13-17.



13. At the end of the experiment (Time = 10 min), the sample would be classified as a(n)  
*ACID*

14. How many minutes passed until the sample was at a pH of 6?  
*1 minute*

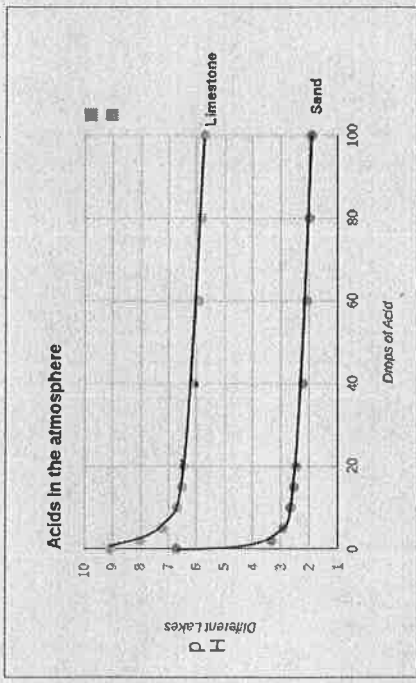
15. What was the ΔpH of the ocean water between the beginning of the experiment and 2 minutes?  
*8.2 - 5.6 = 2.6*

16. How much more acidic was the ocean at 2 minutes of the experiment compared to the beginning?  
*398 times more acidic*  
~~3.2x~~ ~~3.300x~~ ~~3.585x~~

17. Why are the oceans getting more acidic? (write the chemical reaction)  

$$1 \text{ CO}_2 + 1 \text{ H}_2\text{O} \rightarrow 1 \text{ H}_2\text{CO}_3$$

The graph below shows the pH of two simulated lakes after they received heavy doses of acid rainfall. Use the graph below to answer the questions 18-22.



18. What was the pH of the limestone lake after 40 drops of acid rain were added?

~6 pH

19. Which lake would be considered an base at the end of the experiment? Which lake would be considered an acid at the end of the experiment?

Both are acidic

20. Would all of the life in the limestone lake have been killed off by the end of the experiment? Explain why or why not.

NO, pH 4 is where I

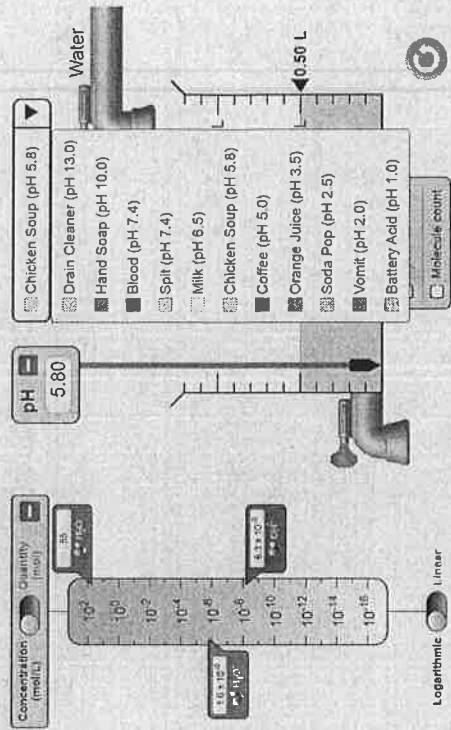
21. How many times more acidic was the sand lake compared to the limestone lake 20 minutes into the experiment?

6.5 - 2.5 = 4 1000 times more acidic

22. Describe what you could add to the sand bottom lake to raise the pH back to safe levels.

a base

The diagram below shows a screenshot of the acid pHet. Use the diagram above to answer questions 23-26.



23. Which of the liquids listed would be classified as acids?

milk, chicken soup, coffee, orange juice, Soda, vomit, battery acid

24. What is the difference in pH between coffee and vomit?

3

25. How many more times acidic is coffee compared to spit?

1000

26. A student did an experiment to determine the pH of all of the substances listed above. What are the dependent and independent variables in their experiment?

IV: substance

DV: pH

↑ C, H

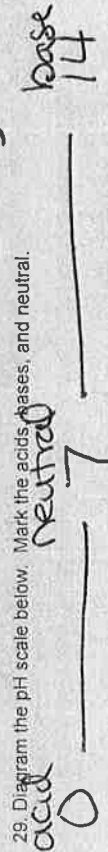
27. What are the reactants and products for all hydrocarbon combustion reaction?



28. What is formed when carbon dioxide is dissolved in seawater? Write the chemical equation for this reaction.



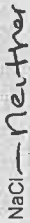
29. Diagram the pH scale below. Mark the acids, bases, and neutral.



30. What happens to the pH of the ocean when CO<sub>2</sub> levels increase in the atmosphere?

The pH decreases making it more acidic

31. Which of the following compounds represents an acids? Which compounds represent bases? Which are neither acid or base?



↳ base