# Year 13 Science: The ocean carbon cycle and ocean acidification

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

## Practice

1. If ocean pH fell from 8.10 to 7.80, by what factor would $[H^+]$ increase?

2. Calculate $[H^+]$ in seawater at pH 8.1.

3. Using the solubility table, how many times more $CO_2$ dissolves at 10 °C than at 30 °C?

4. Phytoplankton turn $CO_2$ into sugar, and their remains sink as marine snow. Which pump is this?

5. Why does adding $CO_2$ to seawater reduce the concentration of carbonate ions?

## Exam-style question: carbon and pāua

**The cold waters south and east of New Zealand take up large amounts of $CO_2$ each year. Pāua farmers worry that falling pH could affect their young pāua.**

6. Describe how the physical pump moves $CO_2$ from the air into the deep ocean.

7. Explain how the biological pump removes carbon from surface water.

8. Using equations, explain how dissolving $CO_2$ lowers the pH of seawater.

9. Explain why young pāua may grow weaker shells as the ocean takes up more $CO_2$.

## Fix the mistake

10. Correct this statement: "Ocean acidification means the sea is now an acid with a pH below 7."

11. Correct this statement: "A fall of 0.1 in pH is too small to matter."

12. Correct this statement: "Extra $CO_2$ gives shellfish more carbonate to build shells with."

13. Correct this statement: "Warm tropical water absorbs the most $CO_2$ because it has the most plankton."