

Name: _____ Period: _____ Date: _____

Open **peebedu.com** and navigate to **Ocean Acidification Simulator**. Read the introduction popup, which describes the chemistry of ocean acidification and how corals build their skeletons. Select the **Today (2026)** scenario to begin.

Free Response Questions

Question 1 — Conceptual Analysis

Simulation Task: Set the CO₂ Concentration slider to 280 ppm (1850 Pre-Industrial) and click Start. Record the pH Level and Carbonate Conc. readouts. Then slowly increase the slider to 600 ppm (2100 Worst Case) and observe how the pH Level, H⁺ Ions, and Carbonate Conc. change. Note the Coral Health indicator at each setting.

(A) (1 pt) **Describe** the relationship between atmospheric carbon dioxide concentration and ocean pH.

(B) (1 pt) **Explain** how deforestation can lead to a decrease in ocean pH.

(C) (1 pt) **Predict** what would happen to the Carbonate Conc. readout if the CO₂ Concentration were raised beyond the simulator's 600 ppm setting.

(D) (1 pt) **Justify** your prediction.

Question 2 — Analyze Model / Visual Representation

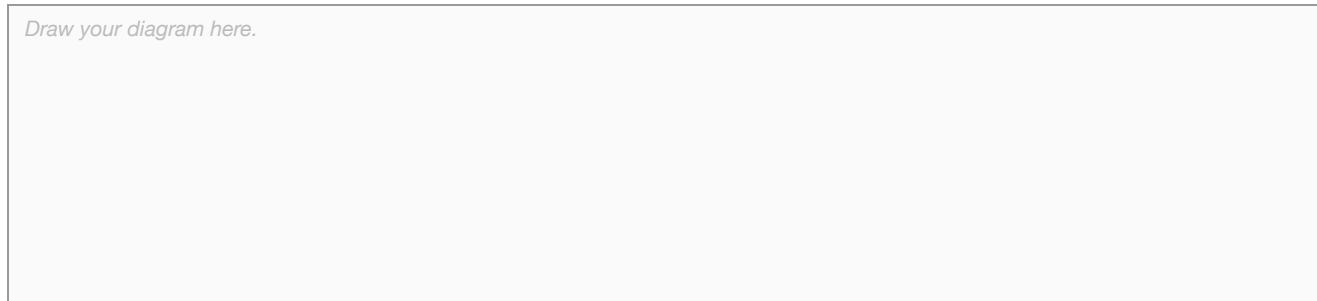
Simulation Task: Click Reset. Set Initial Carbonate Ions to the maximum value and Initial Calcium Ions to the maximum value. Click Start and observe coral growth at the default CO₂ level (425 ppm). Then increase CO₂ to 600 ppm and observe how Coral Height, Carbonate Conc., and Coral Health change over time. Use the Real-Time Tracking charts to compare conditions.

(A) (1 pt) **Describe** the relationship between ocean carbonate concentration and the growth of coral skeletons.

(B) (1 pt) **Explain** why the drop in Carbonate Conc. shown in the simulator slows the formation of coral skeletons ($\text{Ca}^{2+} + \text{CO}_3^{2-} \rightarrow \text{CaCO}_3$).

(C) (1 pt) **Represent** the process of ocean acidification and its effect on coral reef organisms. In the box below, draw a diagram that shows: (1) CO₂ entering the ocean from the atmosphere, (2) the chemical reactions that produce H⁺ ions and consume carbonate ions, and (3) the resulting effect on coral skeleton formation. Label all molecules and use arrows to show the direction of each reaction.

Draw your diagram here.



(D) (1 pt) **Explain** why a coral population that already contains a wide range of genetic variation is more likely to persist as ocean carbonate concentration falls.

8.7.C.1