

Cross-Curricular Discussion

Directions: The following list of discussion questions is provided to help you take notes, brainstorm ideas and test your thinking in order to be more actively engaged in class discussions related to this article.

BIOLOGICAL SCIENCES

- 1a. What are some strategies for coral reproduction listed in the article? List those you find and include the pros and cons for each. Think about the potential results of combining the microfragment technique and the selective breeding strategies mentioned in the article. Would the results be beneficial? Are there ethical considerations to creating “super coral”?
- 1b. What are the pros and cons of corals reproducing sexually versus asexually (cloning)? Why would it be best to have more genetic variation in the population?
- 1c. Write the general chemical equation for photosynthesis and cellular respiration. Use this information to explain the symbiotic relationship between algae and coral.

EARTH SCIENCE AND PHYSICAL OCEANOGRAPHY

- 2a. List some greenhouse gases (including the names and any chemical formulas you know).
- 2b. Why are some gases named “greenhouse gases”? What effect are they having on the Earth?
- 2c. How does carbon dioxide, a common greenhouse gas, react with water? Try to write out the chemical reaction of carbon dioxide and water. Explain how this reaction affects the pH of ocean water.
- 2d. How does the presence of an acid affect the solubility of calcium carbonate? Write the equilibrium expression and use it as evidence to support your answer.

PHYSICAL SCIENCE AND EARTH AND SPACE

- 3a. What factors influence the concentration of light reaching the coral reefs? Which of those might be affected by human activity?
- 3b. What happens to light as it enters water?
- 3c. What is fluorescence? Why might fluorescent proteins exist in coral? What other animals can you think of that fluoresce?
- 3d. In terms of light energy, compare fluorescence and photosynthesis.

ENGINEERING AND EXPERIMENTAL DESIGN

- 4a. What are some local threats to corals?
- 4b. What are specific communities doing to minimize their negative impact on the reefs?

- 4c. Are all reef-adjacent communities facing similar challenges?
- 4d. What are foundations and organizations, such as Reef Check, doing to help educate local populations and support them in finding solutions that protect local reefs?
- 4e. How can communities develop a coral bleaching response plan?
- 4f. What oceanic conditions would the tent structure developed by Peter Harrison have to withstand? How would it be transported to the desired location and then secured in place? What challenges could you anticipate when designing a structure with the same goal?
- 4g. Find an experiment that was described in this article. What hypothesis was tested? Can you identify the variables (dependent, independent or extraneous)? Was the hypothesis validated or disproved?
- 4h. How did the scientists use their results to continue their research or experimentation?
- 4i. Can you think of another hypothesis that could be tested to add information to reef-rebuilding efforts? Identify the variables (dependent, independent or extraneous) and explain how you might measure them.