



# ARM

CLIMATE RESEARCH FACILITY

## Education and Outreach Lesson Plan

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**Grade levels 9–12**  
Rate of Coral Growth

# Rate of Coral Growth



## Approximate Time

One hour

## Objective

The objective of this activity is to investigate and understand the fact that the growth of coral depends on water depth and the effect of sea level changes on corals.

## Key Points to Understand

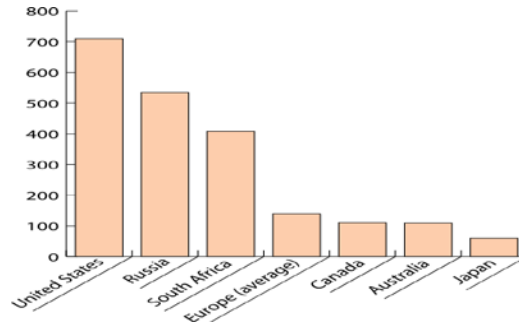
- If the greenhouse effect occurs, its effects will be global, both on land and in the sea.
- The information given in the following table shows the rate of growth (in millimeters per year) of coral patch reefs in different depths of water along the Great Barrier Reef, Australia. As we all are aware, many islands in the Pacific region are coral islands so information on coral growth is important.

<b>Depth (m)</b>	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5
<b>Growth (mm y-1)</b>	8.9	10.3	16.2	9.2	12.1	10.6	9.9	7.8
<b>Depth (m)</b>	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5
<b>Growth (mm y-1)</b>	5.8	8.4	7.8	8.7	9.3	9.4	9.4	9.3

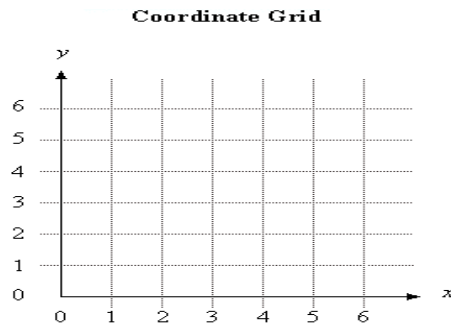
- It is necessary to point out that no concentration has been given to increase water temperatures in this exercise. Also, the amount of local coral still alive, and therefore able to respond to growth, is a matter of conjecture and will vary from place to place.

## Key Vocabulary

- **Bar graph or bar chart:** a chart with rectangular bars with lengths proportional to the values that they represent. The bars can be plotted vertically or horizontally. A vertical bar chart is sometimes called a column bar chart. See example below:



- **Greenhouse effect:** Atmospheric heating caused by solar radiation being readily transmitted inward through the earth's atmosphere but long wave radiation less readily transmitted outward, due to absorption by certain gases in the atmosphere.
- **Horizontal axis and Vertical axis:** These lines are commonly referred to as the x and y-axes where the **x-axis** is taken to be horizontal and the **y-axis** is taken to be vertical. The point where the axes meet is taken as the origin for both, thus turning each axis into a number line. This can also be called a coordinate plane, used for plotting points of data. See example below:



### Materials

Each student or group of students will need the following:

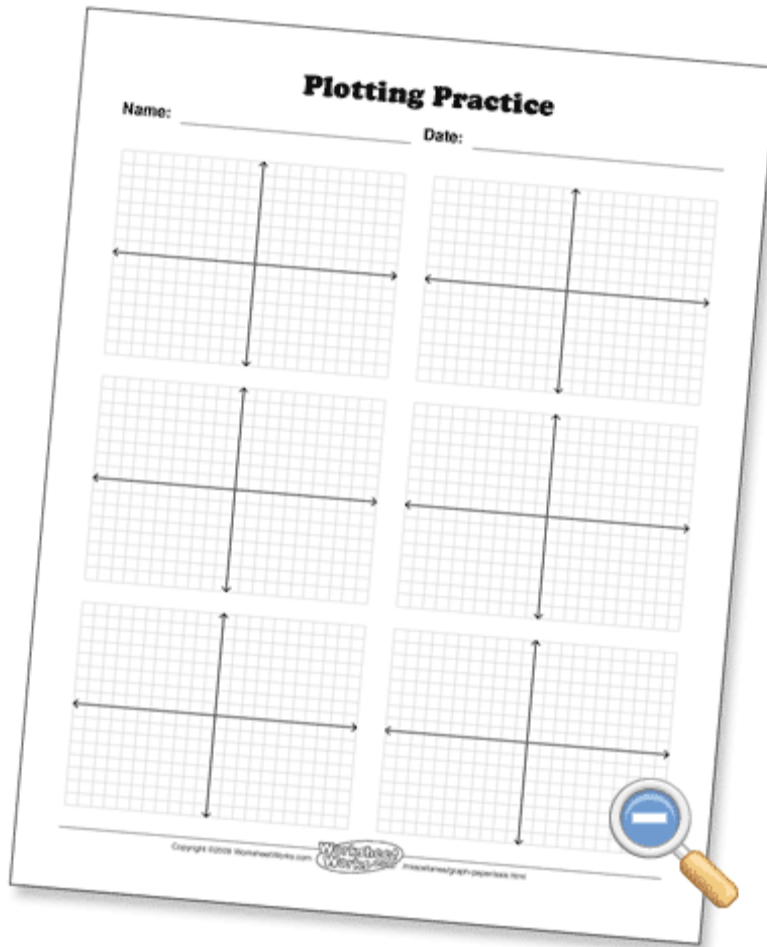
- Graph paper (2-3 pieces per student)
- Pen or colored pencils
- Ruler

### Preparation

Introduce or review how to graph data on a 1) coordinate grid using an **X-Y axis**, and 2) on a **bar graph** where the scale is determined by increments appropriate to the data.

### Management Tip

You may want to model the setup of a bar graph or X-Y axis during the lesson depending upon the familiarity with graphing students possess. Below are two samples found online at a graph paper generator: <http://www.softschools.com/custom/worksheets/graph.jsp>

The questions section can be done orally or with the attached student worksheet.

### Procedure

1. Study the data from the given table.
2. Plot the data on a graph paper, depth on **horizontal axis** and growth on the **vertical axis**. Now show the growth as a bar graph. Plot depth data on the bottom and growth data on the side so that the bars generated indicate coral growth per depth sample.
3. Identify the depths of fastest and slowest growth from the graph.
4. Student worksheet or cover the questions below orally.

### Questions

1. At what depth do these coral grow fastest?
2. At what depth do these coral grow slowest?
3. What can you infer from the graph when the water becomes deeper and deeper still?
4. At what depth will these coral grow fastest if the sea level rises half a meter?

5. Do you expect that these corals will be affected by sea level changes?
6. What other factors might influence coral growth?

### **Closure and Evaluation Questions**

Students will complete the student worksheet by responding to six questions relating to the graphing of the coral growth data. See worksheet below.

### **Suggested Follow-Up Activities**

1. Have students research and illustrate types of coral found in the Southern Hemisphere.
2. Students could also engage in an online search of research studies related to coral types, growth, the effects of coral reefs on the marine ecosystem, and the cause and rate of decline of coral reefs.
3. Students research the marine life that benefits from the formation and existence of coral reefs.

Creative contributions and adaptations by Steve Linn, 4<sup>th</sup> grade teacher at Cottonwood Elementary, Kennewick, Washington

**Worksheet page 1**

Name \_\_\_\_\_

Date \_\_\_\_\_

**Rate of Coral Growth**

**Research Question:** What conditions cause greater coral growth?

Depth (m)	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5
Growth (mm y-1)	8.9	10.3	16.2	9.2	12.1	10.6	9.9	7.8

Depth (m)	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5
Growth (mm y-1)	5.8	8.4	7.8	8.7	9.3	9.4	9.4	9.3

**Conclusion:**

Based on your two graphs reflecting the coral growth data, write a conclusion that supports why coral growth varied from sample to sample.

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**Answer the following questions using the data collected.**

1. At what depth do these coral grow fastest?

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2. At what depth do these coral grow slowest?

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**Worksheet page 2**

3. What can you infer from the graph when the water becomes deeper and deeper still?

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4. At what depth will these coral grow fastest if the sea level rises half a meter?

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5. What changes do you expect that these corals will experience by sea level changes?

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