

# Contour Maps and Sea Level Rise Analysis Worksheet

## Student Handout

### CONTOUR MAPS

---

Using the topographic map, answer the following questions:

1. What do the contour lines on the map represent?

---

2. What is the contour interval (distance between) that each line represents?

---

3. What is the elevation of the city of Buena Park?

---

4. Which city is higher in elevation, Lynwood or Orange?

---

5. Using a colored pencil, fill in the areas of the map that would be affected if the sea level were to rise 5 meters. How many cities would be affected?

---

### SEA LEVEL RISE

---

Scientists have determined that the global sea level has risen on the average of 2 mm per year. Using this estimate, make the following predictions:

6. How high will the sea level rise during the 21<sup>st</sup> century? Convert your answer to inches.

7. Using the year you were born, calculate how much the sea level will rise by the year 2050. Convert your answer to inches.



## Contour Maps and Sea Level Rise Analysis Worksheet

### Teacher's Guide

#### CONTOUR MAPS

---

Using the topographic map, answer the following questions:

10. What do the contour lines on the map represent?

changes in elevation above mean sea level

11. What is the contour interval (distance between) that each line represents?

5 meters

12. What is the elevation of the city of Buena Park?

20 meters

13. Which city is higher in elevation, Lynwood or Orange?

Orange

14. Using a colored pencil, fill in the areas of the map that would be affected if the sea level were to rise 5 meters. How many cities would be affected?

14 cities total (including Emerald Bay)

#### SEA LEVEL RISE

---

Scientists have determined that the global sea level has risen on the average of 2 mm per year. Using this estimate, make the following predictions:

15. How high will the sea level rise during the 21<sup>st</sup> century? Convert your answer to inches.

*Answer: 100 years x 2 mm = 200 mm / 25.4 mm/inch = 7.87 inches*

16. Using the year you were born, calculate how much the sea level will rise the year 2050. Convert your answer to inches.

*Answer: [2050 - (year student's birth year)] x 2mm = X / 25.4 mm/inch = correct answer*

17. We know that roughly 97% of the water on Earth is in the ocean and 2% is in the polar ice caps, with the average depth of the ocean around 3800 m. Given this information, calculate how much sea level could rise if all the polar ice caps melted (Antarctica and Greenland).

*Answer: To obtain a rough estimate of potential sea level rise, you can calculate 2% of 3800 m.  $3800 \text{ m} \times 0.02 = 76 \text{ m}$ . This is a very rough estimate, however it shows that sea level can rise about 250 feet.*

18. Using a colored pencil, fill in the areas of the map that would be affected. How many cities would be underwater?

*Answer: 35 cities total*

## **EXTENTIONS**

---

### **Grades 9 -12**

Have the students answer the following questions. Assume that the ocean basins are like a bathtub – vertical sides and a flat bottom. The surface area of the sea is  $325 \times 10^6 \text{ km}^2$ .

3. The ocean basins contain  $1.4 \times 10^9 \text{ km}^3$  of water. Glacial and polar ice contains  $2.8 \times 10^7 \text{ km}^3$  of water. If this polar ice melts as a result of global warming, about how much sea level rise (in meters) should we expect?

*Answer: sea level rise increase = (volume of water in glacial and polar ice)/(surface area of the sea) =  $2.8 \times 10^7 \text{ km}^3 / 325 \times 10^6 \text{ km}^2 = 0.086 \text{ km}$  or 86 meters*

4. During the last glacial maximum, sea level dropped by about 100 meters. About how much ice (in  $\text{km}^3$ ) was tied up in continental glaciers during this period?

*Answer:  $0.1 \text{ km} = (x)/(325 \times 10^6 \text{ km}^2)$*

*Multiply both sides by the surface area,  $325 \times 10^6 \text{ km}^2$*

*$325 \times 10^5 \text{ km}^3 = x$*