Unit 6, Lesson 12

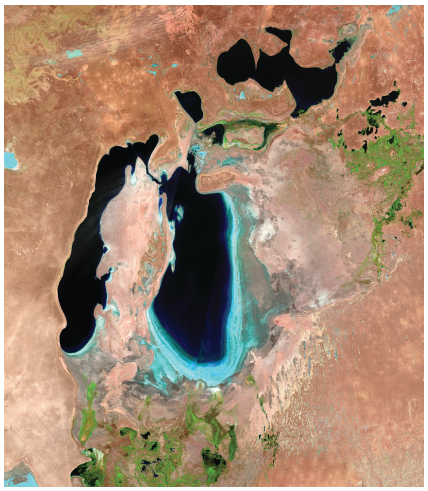
Changes on the Earth

Let's use percentages to make sense of changes on Earth.

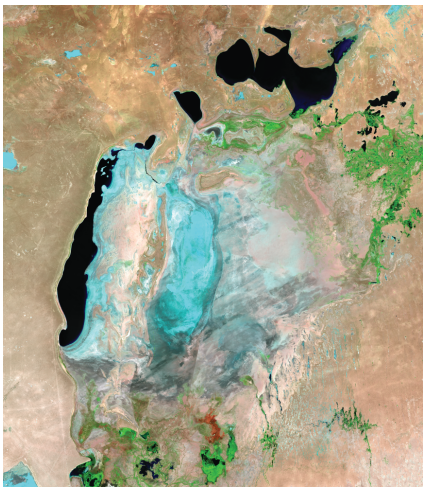
12.1 Satellite Images

1977

2006



2019



CC BY NC Illustrative Mathematics, based on IM 6–8 Math, CC BY Open Up Resources.

12.2 The Aral Sea

As more water was diverted to irrigate land, the Aral Sea got smaller and saltier. In 1986, the sea got so shallow that it was divided into two separate seas, the North Aral Sea and the South Aral Sea. In 2005, the Kok-Aral dam was constructed to stop water from leaving the North Aral Sea.

This table shows data that describes how the Aral Sea changed from 1950 to 2010.

	area of irrigated land (square kilometers)	area of the sea's surface (square kilometers)	water level (meters)	salinity (grams per liter)	fish catch (metric tons)
1950	30,910	65,607	52.9	10.7	48,000
1960	34,930	68,478	53.5	9.9	43,430
1970	39,440	60,692	51.4	11.2	17,460
1980	51,140	51,743	45.8	16.8	11,940
1990	74,000	35,349	north: 40.6 south: 38.3	north: 29 south: 30	0
2000	--	24,266	north: 40.7 south: 33.6	north: 30 south: 70	1,290
2010	78,960	14,280	north: 42 south: 27	north: 8 south: 130	3,010

Note: The fish catch of 48,000 metric tons was the reported maximum from 1957. No data could be found for 1950. Also, data could not be found for the area of irrigated land in 2000.

CC BY NC Illustrative Mathematics, based on IM 6–8 Math, CC BY Open Up Resources.

This table shows data that describes some health conditions of school-age children living around the Aral Sea.

	Kazalinsk district	Zhanakorgan district
distance from the Aral Sea	less than 200 kilometers	about 500 kilometers
prevalence of cough	8.1%	4.6%
prevalence of restrictive pulmonary dysfunction	10%	3%
prevalence of diarrhea	11.3%	5.6%
prevalence of hypercalciuria	38.6%	12.8%
sodium concentration in urine	3.54	2.89
calcium concentration in urine	0.75	0.33
sodium concentration in hair	738	471
bromine concentration in hair	9.57	6.22
nickel concentration in hair	1.61	0.85
mercury concentration in hair	1.31	0.88

Note: Units for urine concentrations are mmol uNa or uCA per mmol creatinine. Units for hair concentrations are µg of the element per g of hair.

Using the information in the tables, calculate at least 4 percentages of increase or decrease that describe the situation with the Aral Sea. For each percentage, write a sentence that clearly describes what the percent increase or percent decrease represents.

CC BY NC Illustrative Mathematics, based on IM 6–8 Math, CC BY Open Up Resources.

12.3 The Great Barrier Reef

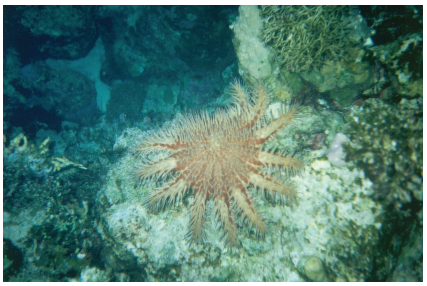
The Great Barrier Reef in Australia is the longest and largest coral reef in the world. Studies show that the amount of area that is actually covered by coral has been decreasing.

1. Find the percent decrease, and describe what this percentage represents.

year	area covered by coral (square meters)
1985	96,600
2012	47,610

2. One cause of the decrease in coral is the crown-of-thorns starfish that eat the coral polyps. Researchers predict that if these starfish were removed, the area covered by coral would increase by 0.89% each year.

   If the starfish had been removed when the coral coverage was 47,610 square miles, what would the area of coral coverage have been one year later?



Are you ready for more?

If removing the crown-of-thorns starfish, starting in 2012, is the only thing we did to reverse the decline, how many years would it take for the area covered by coral to return to its 1985 level?

Lesson 12 Summary

When we state a percent increase or percent decrease, it is important to be specific about what we are comparing. For example, coral coverage in the Great Barrier Reef was higher in 2022 than in earlier years.

year of report	percentage of coral coverage
2000	23.8
2007	18.9
2012	13.1
2019	20.0
2022	35.5

Here are several sentences that describe the increase:

- From 2019 to 2022, the percentage of coral coverage in the Great Barrier Reef increased by 77.5%.
- From 2012 to 2022, the percentage of coral coverage in the Great Barrier Reef increased by 171.0%.
- From 2000 to 2022, the percentage of coral coverage in the Great Barrier Reef increased by 49.2%.

All three of these sentences correctly describe the increased coral coverage for 2022. The percentages are different because each comparison uses a different year as the original value.

 CC BY NC Illustrative Mathematics, based on IM 6–8 Math, CC BY Open Up Resources.