



CO₂ Tips the Climate Scales

How long can we “weight”?

Activity Guide

How fast is the amount of Carbon Dioxide (CO₂) increasing in the earth’s atmosphere?

Try This!

Get a feel for what’s going on in our atmosphere by “weighing the CO₂ over the years”:

Step 1: Set up the scale on a flat, hard surface. Turn the black knob on the back of the scale to set the tare to the 300 – 310 ppm level (top line on the scale readout). Now you are ready!

Step 2: Add enough of the 2.5 ppm CO₂ weights to increase the level of CO₂ to 320 ppm. What year is it now?

Step 3: Use the weights to keep count of how much CO₂ you are adding to reach the amount for each year shown.



Charles Keeling was a scientist who developed the Keeling Curve. The curve measures the progressive buildup of carbon dioxide, a greenhouse gas, in the atmosphere.

How many years did it take CO₂ to increase 10 ppm from 1960?

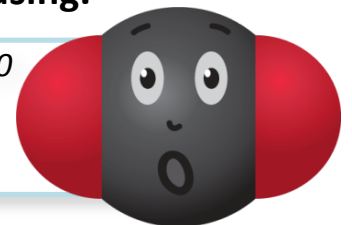
How many years did it take CO₂ to increase 10 ppm after 1980?

How much did the level of CO₂ increase between 2004 and 2010?

Climate Connection

Since the 1950’s carbon dioxide (CO₂) levels have been increasing at an alarming rate. Only recently have scientists been able to measure the amount of CO₂ in the atmosphere and how quickly the rate is increasing.

Up until 1950 the levels of atmospheric CO₂ were pretty steady at 300-310 ppm (that’s parts per million out of all the molecules in the air). As of 2010, atmospheric CO₂ is now at about 393 ppm!



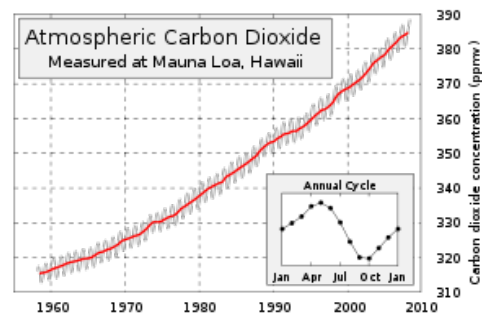
Turn the page over to learn more!

What's Happening?

How do we know that CO₂ levels are rising? How long has it been taking for CO₂ levels to rise by each 10 ppm to the 2010 level of about 393 ppm? One young graduate student started it all! Charles Keeling was looking for a chemistry project in the 1950s, when he got the idea of testing CO₂ levels in air and water. He went out into the California State parks and took air and water samples – even by getting out of his sleeping bag in the middle of the night to do it! Charles took the samples back to his graduate advisor's laboratory, where he separated the CO₂ molecules out of the air by freezing it at about -109°F/-78°C (very, very cold!). He then used a device similar to a mercury thermometer to measure the amount of CO₂ as he warmed it back to a gas.

Charles Keeling found that CO₂ levels were rising – even back then. Ever since Charles Keeling began taking air samples and measuring CO₂ levels, dozens of scientists have been taking air and water samples from all over the Earth to keep tabs on the CO₂ levels. The increasing CO₂ levels are plotted on a graph - called the Keeling Curve!

The Keeling Curve shows the concentration of CO₂ in the atmosphere in ppm. These CO₂ levels were recorded by Charles Keeling at Muana Loa, Hawaii.



Climate Detective Challenge

Has the rate of CO₂ in our Earth's atmosphere been the same during the past 60 years?

Find the answer to this question on the Activity Map!

