If you are a student that **HAS** access to technology, this is not the packet for you. This packet is for students who pick up and drop off their work at the front office every week. If you have access to technology, please go back to your teacher's website and complete the correct assignment.

Name: _____ Period: _____ Teacher: _____

Distance Learning Week 2
April 13th – April 17th

Assignment 2.1 – Having the quaranTIME of your life?!
Just wanted to check in with you guys and see how quarantining/distance learning is going ☺ Please answer the questions below.

1. Quarantining can be challenging, what's one positive thing that has come out of your extended time with your family/at your house?

2. What's the best Tik Tok or meme you've seen to come out of this coronavirus/quarantine time so far?

3. What's one support I can give you that you're not currently getting that you feel like might help you be more successful with distance learning?

4. Have you developed any new hobbies or found a great new show to binge-watch?

5. Any additional questions/comments/concerns you'd like to share with me?

Assignment 2.2 – The Greenhouse Effect

1. Read the following explanation of the greenhouse effect.

The greenhouse effect is a process that occurs when gases in Earth's atmosphere trap the Sun's heat. This process makes Earth much warmer than it would be without an atmosphere. The greenhouse effect is one of the things that makes Earth a comfortable place to live.

As you might expect from the name, the greenhouse effect works … like a greenhouse! A greenhouse is a building with glass walls and a glass roof. Greenhouses are used to grow plants, such as tomatoes and tropical flowers.

A greenhouse stays warm inside, even during the winter. In the daytime, sunlight shines into the greenhouse and warms the plants and air inside. At nighttime, it's colder outside, but the greenhouse stays pretty warm inside. That's because the glass walls of the greenhouse trap the Sun's heat.

The greenhouse effect works much the same way on Earth. Gases in the atmosphere, such as CO_2, trap heat just like the glass roof of a greenhouse. These heat-trapping gases are called greenhouse gases.

The atmosphere allows most of the visible light from the Sun to pass through and reach Earth's surface. As Earth's surface is heated by sunlight, it radiates part of this energy back toward space as infrared radiation. This radiation, unlike visible light, tends to be absorbed by the greenhouse gases in the atmosphere, raising its temperature. The heated atmosphere in turn radiates infrared radiation back toward Earth's surface.

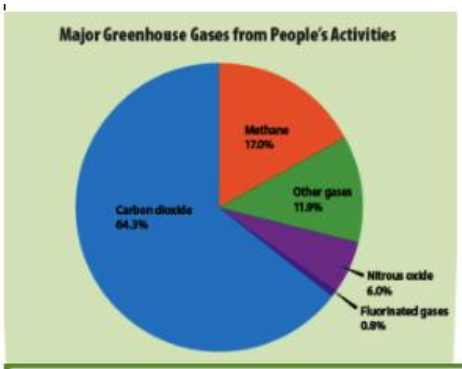
During the day, the Sun shines through the atmosphere. Earth's surface warms up in the sunlight. At night, Earth's surface cools, releasing heat back into the air. But some of the heat is trapped by the greenhouse gases in the atmosphere. That's what keeps our Earth a warm and cozy 58 degrees Fahrenheit (14 degrees Celsius), on average.

Human activities are changing Earth's natural greenhouse effect. Burning fossil fuels like coal and oil puts more carbon dioxide into our atmosphere.

NASA has observed increases in the amount of carbon dioxide and some other greenhouse gases in our atmosphere. Too much of these greenhouse gases can cause Earth's atmosphere to trap more and more heat. This causes Earth to warm up.

Although the greenhouse effect is a naturally occurring phenomenon, it is possible that the effect could be intensified by the emission of greenhouse gases into the atmosphere as the result of human activity. From the beginning of the Industrial Revolution through the end of the 20th century, the amount of carbon dioxide in the atmosphere increased by roughly 30 percent and the amount of methane more than doubled. A number of scientists have predicted that human-related increases in atmospheric carbon dioxide and other greenhouse gases could lead by the end of the 21st century to an increase in the global average temperature of 0.3 to 4.8 °C (0.5 to 8.6 °F) relative to the 1986–2005 average. This global warming could alter Earth's climates and thereby produce new patterns and extremes of drought and rainfall and possibly disrupt food production in certain regions.

2. People are adding several types of greenhouse gases to the atmosphere, and each gas's effect on climate change depends on three main factors: how much? How long? How powerful? To better understand two of the main greenhouse gases, review the following graph and explanations about the greenhouse gases and complete the table:



Carbon dioxide

close

Where does it come from?

- Burning fossil fuels to produce electricity and heat buildings.
- Burning gasoline and other fossil fuels to run vehicles.
- Cutting down and burning trees or other vegetation.
- Some industrial and manufacturing processes, like producing cement and certain chemicals.

How long does it stay in the atmosphere?
Anywhere from 50 to thousands of years.

Methane

close

Where does it come from?

- Raising livestock. Certain animals—especially cows and sheep—produce methane as they digest food. Manure also releases methane when it decays.
- Landfills. As trash in a landfill breaks down over time, it releases methane.
- Producing and transporting natural gas. Natural gas is made mostly of methane, which is released if there are even small leaks in gas pipes.
- Mining coal. Methane is often found underground with coal and can be released during mining.

How long does it stay in the atmosphere?
About 12 years.

How much heat does it trap?
Over 20 times more heat than the same amount of carbon dioxide

Greenhouse Gas	How much produced? (%)	How long in the atmos.?	Which is more "powerful"?	Sources
CO_2				
CH_4				

3. Based on your understanding from the readings, answer the following summary questions in your own words in complete sentences on a separate sheet of paper and attach to this packet.

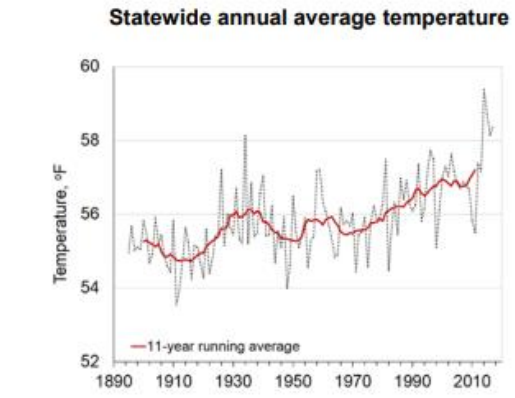
A. **What is the greenhouse effect?**

B. **What are the main gases that cause the greenhouse effect?**

C. **What happens when more greenhouse gases are added to the atmosphere (also known as the enhanced greenhouse effect)?**

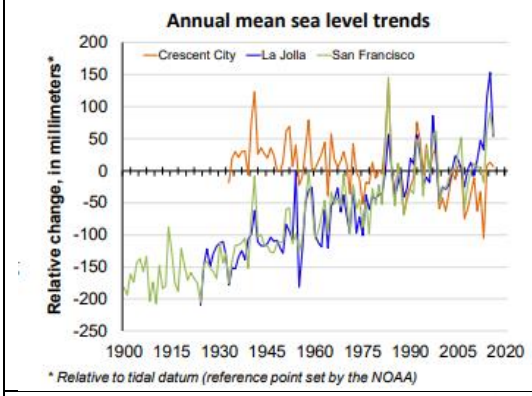
Assignment 2.3: Data Analysis
Part 1: Effects of Climate Change in California

Instructions: Use the graphs below to answer each of the following questions, in complete sentences. Return your answers with the packet to the front office.



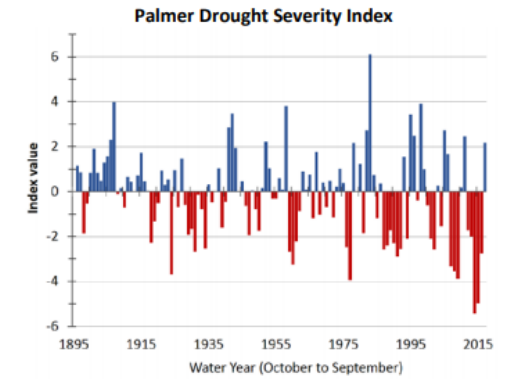
1. How many years of temperature change in California does this graph show?

2. Explain, using data from the graph, how the temperature has changed since 1890 to 2010.



1. How many cities were used to show sea level height in this graph?

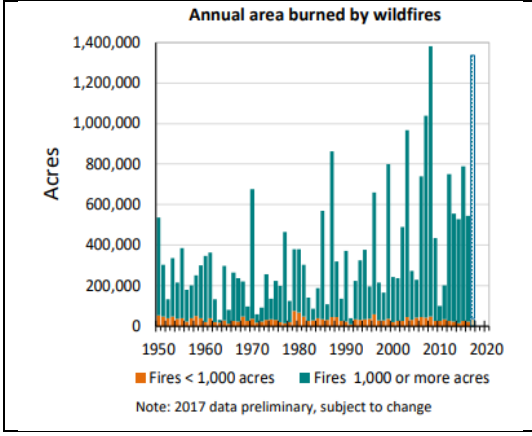
2. What is the overall trend in sea level over the last 100 years?



BLUE lines going up from the middle indicate WET years .
RED lines going down from the middle indicate DRY years.

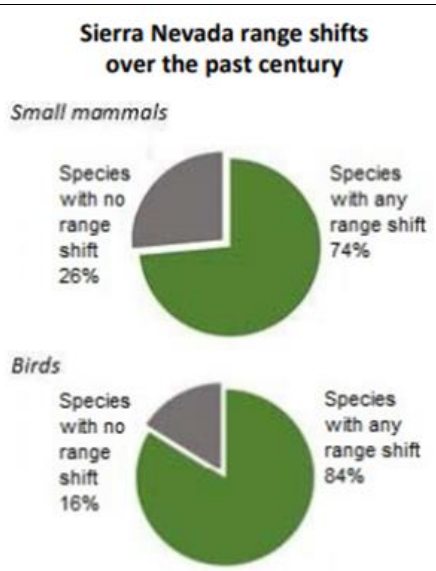
1. Are the dry years increasing or decreasing over time?

2. Does this data match what you've seen in Brentwood over the last few years? _____
   Explain→



1. Explain the trend in acres burned by wildfires over time.

2. Looking at the graph above, do the years of drought show increased wildfires? _____
   Why or why not?



A Range Shift is when animals have changed their habitat locations.

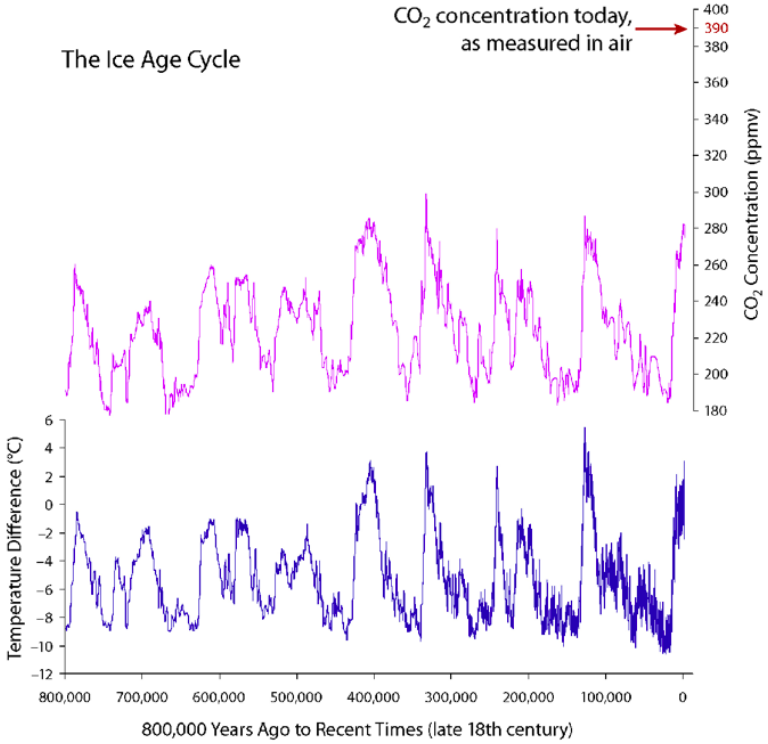
1. What change is happening to small animals and birds in regards to their range shift over the past century in the Sierra Nevada (Lake Tahoe area)?

2. Why do you think birds have a higher amount of range shift than small mammals?

Part 2: How do we know that climate change is being caused by human activities?

There are many pieces of evidence that show that climate change is happening—we have analyzed these pieces of evidence this week and last week. But how do we know that this is related to human activity? In this activity we will analyze graphs and draw conclusions about how human activities affect the temperature.

Evidence #1: Temperature vs CO_2 concentration

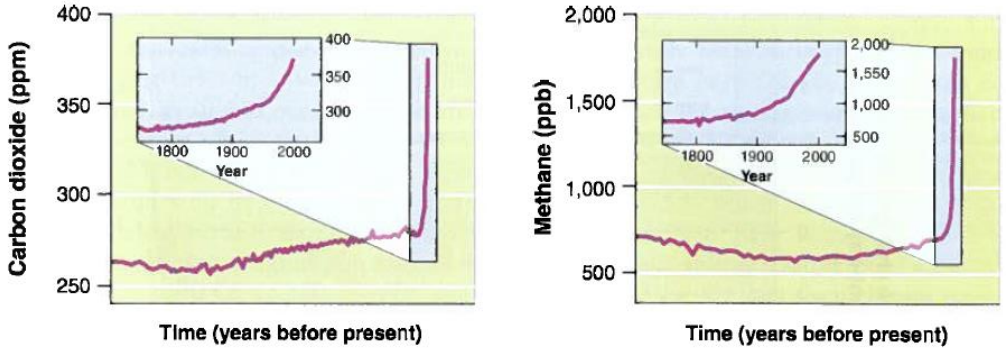


In this graph, we can see the temperature difference (bottom, blue line) and the CO_2 concentration in the atmosphere (top, purple line) over the last 800,000 years. At the far right where it says "0" is close to present day.

1. Do temperature and CO_2 concentration seem to be related? How can you tell?

2. How do CO_2 levels today compare to historic levels?

Evidence #2: Historic concentrations of CO_2 and Methane



The two graphs show concentrations of carbon dioxide (CO_2) and methane in the atmosphere over the past 10,000 years. The magnified sections shows the change in concentrations of these gases for the past 200 years (1800s to today).

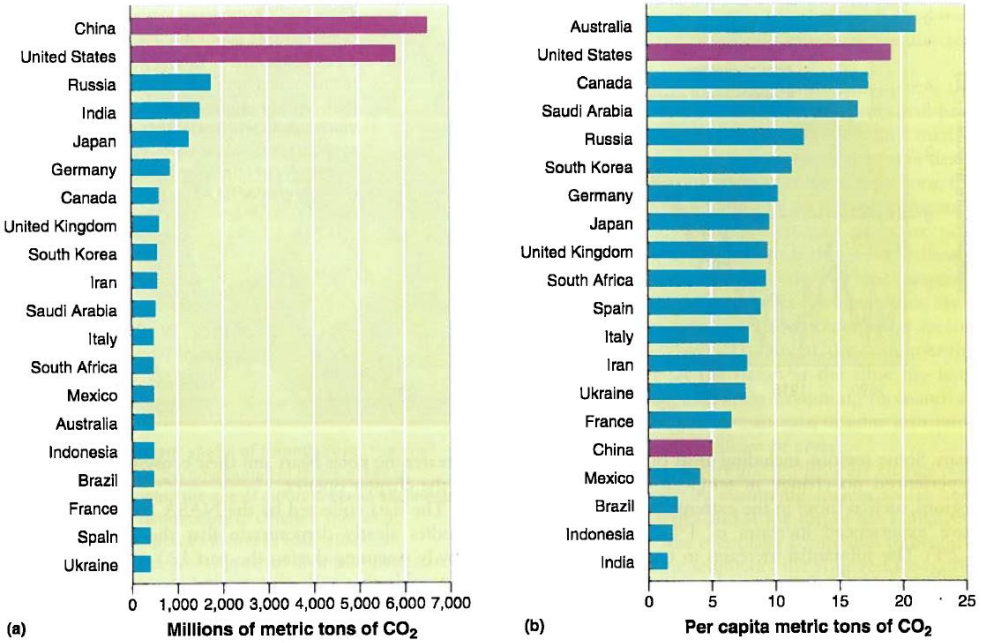
3. Are methane and carbon dioxide greenhouse gases?

4. What has happened to the concentration of these two gasses recently (the past 200 years)?

5. The start of the 1800s coincides with the beginning industrial revolution. How do you think the industrial revolution impacted greenhouse gas levels in the atmosphere? Why?

6. Make a prediction: how will global temperature change based on the increase in CO_2 concentration? Explain.

Evidence #3: Greenhouse Gas Production by Country



Countries with the largest population:

1. China
2. India
3. United States
4. Indonesia

The graphs above show how much CO_2 is produced by each country—this comes from things like cars, planes, power plants, and other sources. The graph measures in millions of metric tons of CO_2.

7. Using the chart on the left, which countries produce the most CO_2?

8. The chart on the right shows CO_2 production *per capita*—this means per person. Make a few observations—how did the placement of the countries change?

9. Look at the population information to the right of the charts. How does population relate to CO_2 production?

10. Predict: Why are Australia and Canada so high in per capita CO_2 emissions when they don't have the largest populations?