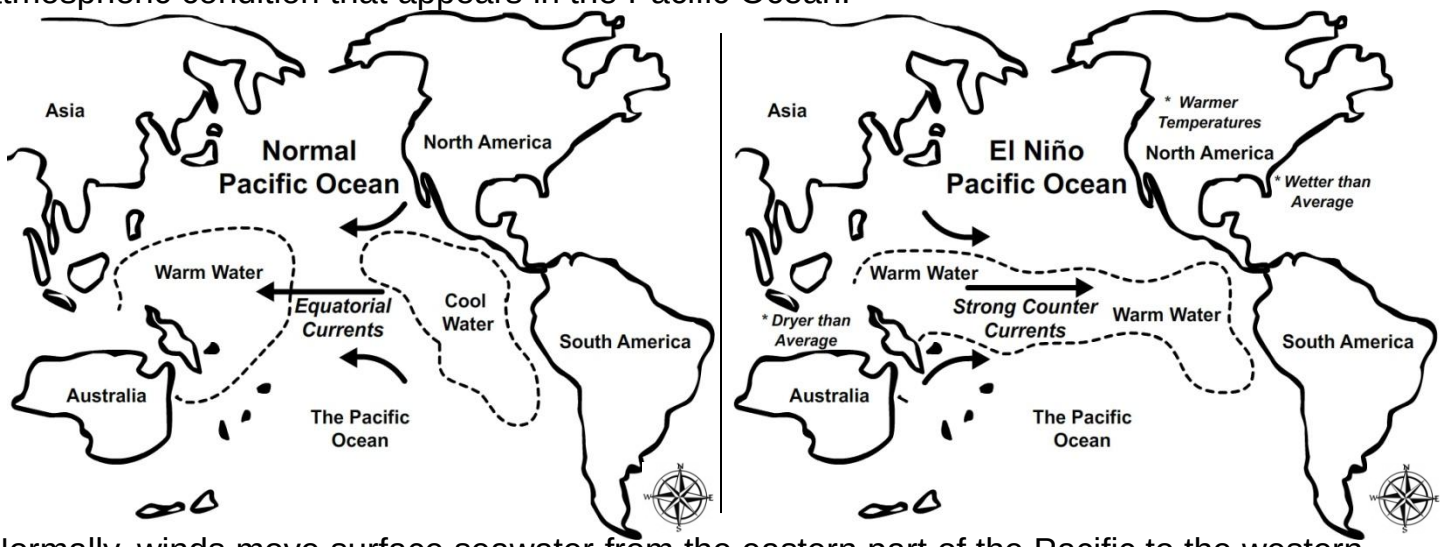
El Niño: *Introduction*: Name_____

Read the information below. Then complete the "Fill-Ins".

Mudslides in Ecuador, wildfires in Australia, and extreme California rainstorms. Is it possible that all these events are related? Yes, they can be. They are all affected by changes in the ocean and atmosphere. Scientists have studied these phenomena and have linked them to the El Niño. The El Niño, also known as the El Niño-Southern Oscillation (ENSO) is an ocean and atmospheric condition that appears in the Pacific Ocean.



Normally, winds move surface seawater from the eastern part of the Pacific to the western Pacific Ocean. Because the surface water is moving west, cold deep water comes to the surface in the eastern Pacific near Central America and South America in a process called *upwelling*. The warm water in the western Pacific creates *low* pressure causing wet weather in the region. The eastern Pacific experiences *high* pressure from the cooler water causing dry conditions. However, every few years the atmosphere and ocean change during the El Niño. During an El Niño year, the warm water is driven east by strong counter currents along the equator. Parts of North America experience warmer temperatures and wetter than average winters which can cause flooding. Western Pacific countries, such as Australia, experience dryer than normal weather which can lead to drought and crop failures.

Although El Niño is often in the news, the opposite extreme can also lead to global weather changes. The phenomenon known as La Niña is an extreme cooling of the Pacific Ocean. During the La Niña, cooler water stretches across the Pacific Ocean all the way to Australia. Both El Niño and La Niña events can have far-reaching effects such as; intense rainstorms, flooding, extreme droughts, and increased number of winter storms in many areas of the world.

Complete the "Fill-In" questions below using information from above.

1 – _____ is the oceanic occurrence of warming the Pacific Ocean.

2 – ENSO stands for _____.

3 – El Niño occurs in the _____ Ocean.

4 – Normally, Pacific Ocean equatorial currents flow in a _____ direction.

5 – _____ is the process of bringing cooler water up to the ocean surface.

6 – During an El Niño year, parts of North America experience _____ temperatures.

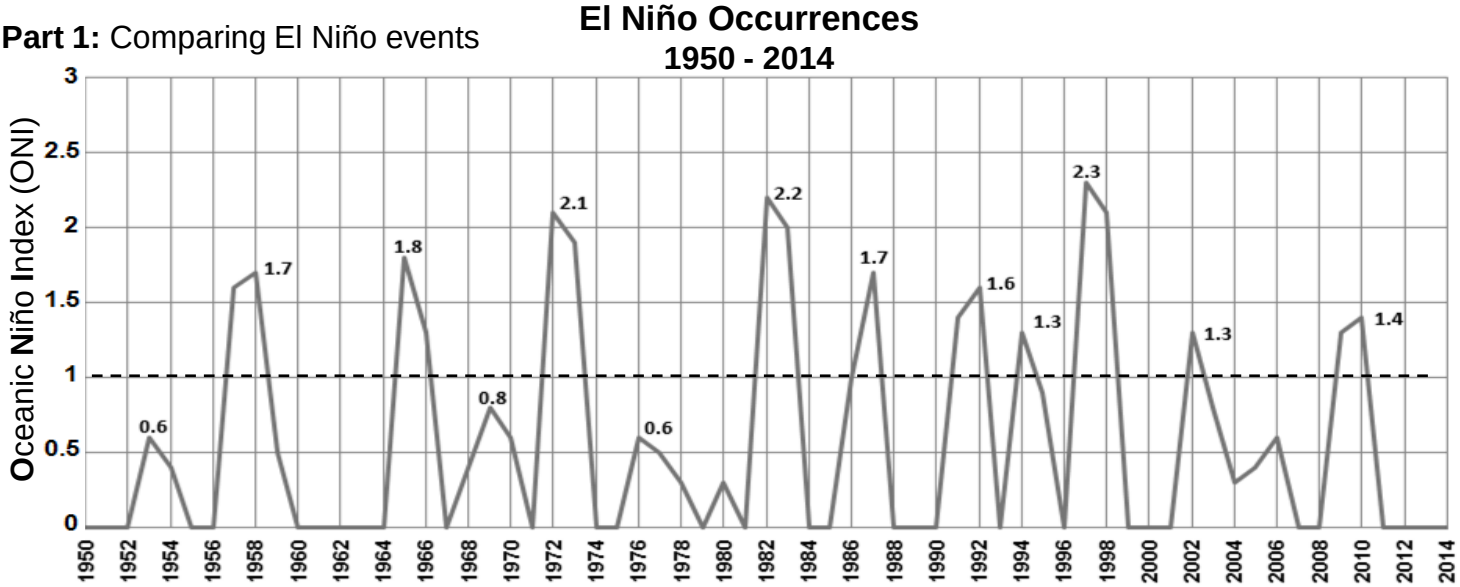
7 – During an El Niño year, Australia may experience _____ that can cause crop failure.

8 – The opposite of El Niño is known as _____.

El Niño: *Lab Investigation*: Name_____

Use the graph and data below to complete the questions.

Part 1: Comparing El Niño events



*__Note__: Only years with an Oceanic Niño Index 1 or higher is considered an El Niño year.

1 – How many El Niño years (*ONI* above 1) are represented on the graph above? _____

2 – List the 3 most extreme El Niño years: _____ - _____ - _____

3 – What was the most extreme ONI value during an El Niño year? _____

4 – Which two El Niño years occurred closest together? _____ _____

5 – Which two El Niño years had the most time in between each event? _____ _____

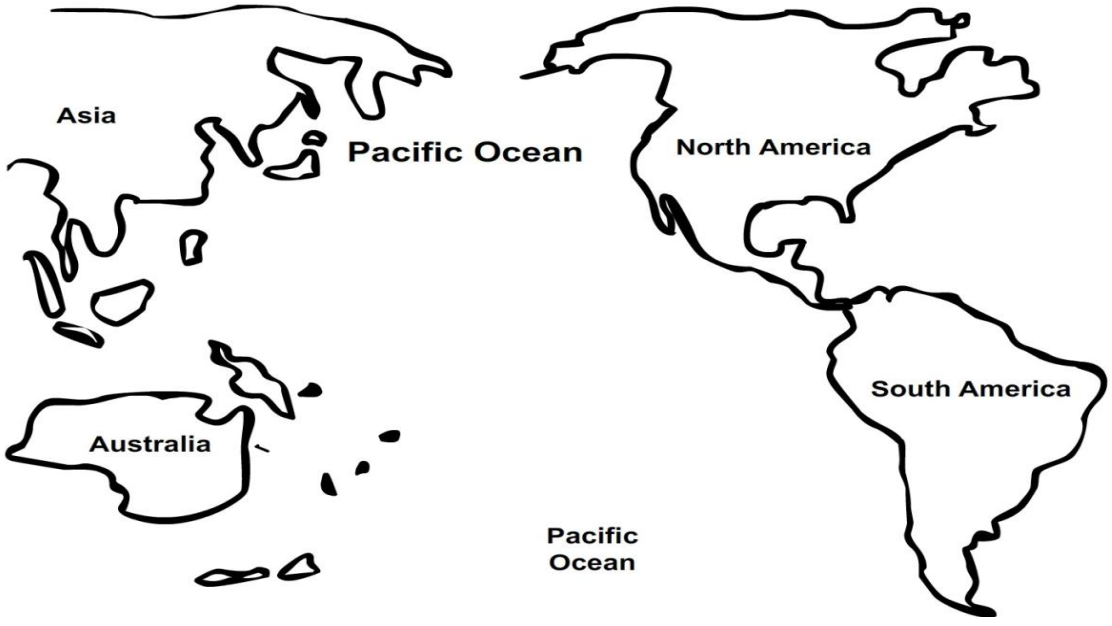
6 – What is the Oceanic Niño Index of the 2010 El Niño event? _____

7 – What decade had the most El Niño years? _____

8 – What are the Oceanic Niño Index for the years 1953 and 1976? _____

Part 2: La Niña Map

As you have read about El Niño, the warming of the Pacific Ocean, you have also been introduced to La Niña, the cooling of the Pacific Ocean. Use Red and Blue colored pencils to color the map below to represent a **La Niña** event in the equatorial region of the Pacific Ocean.

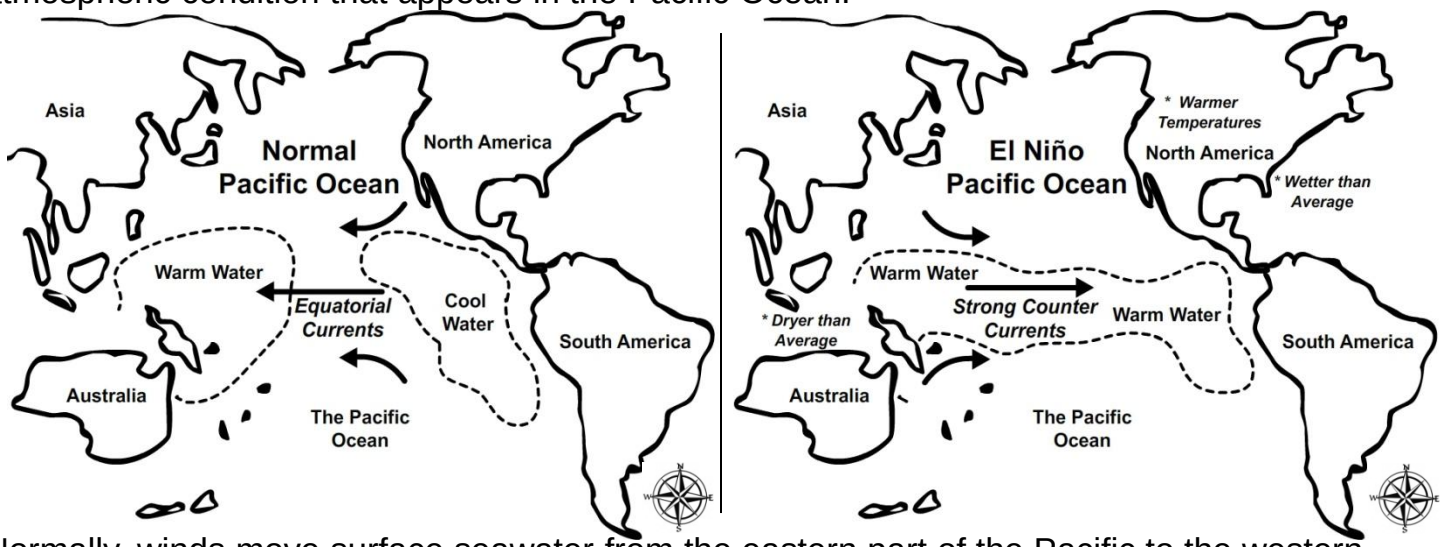


El Niño: *Introduction*:

MASTER KEY

Read the information below. Then complete the "Fill-Ins".

Mudslides in Ecuador, wildfires in Australia, and extreme California rainstorms. Is it possible that all these events are related? Yes, they can be. They are all affected by changes in the ocean and atmosphere. Scientists have studied these phenomena and have linked them to the El Niño. The El Niño, also known as the El Niño-Southern Oscillation (ENSO) is an ocean and atmospheric condition that appears in the Pacific Ocean.



Normally, winds move surface seawater from the eastern part of the Pacific to the western Pacific Ocean. Because the surface water is moving west, cold deep water comes to the surface in the eastern Pacific near Central America and South America in a process called *upwelling*. The warm water in the western Pacific creates *low* pressure causing wet weather in the region. The eastern Pacific experiences *high* pressure from the cooler water causing dry conditions. However, every few years the atmosphere and ocean change during the El Niño. During an El Niño year, the warm water is driven east by strong counter currents along the equator. Parts of North America experience warmer temperatures and wetter than average winters which can cause flooding. Western Pacific countries, such as Australia, experience dryer than normal weather which can lead to drought and crop failures.

Although El Niño is often in the news, the opposite extreme can also lead to global weather changes. The phenomenon known as La Niña is an extreme cooling of the Pacific Ocean. During the La Niña, cooler water stretches across the Pacific Ocean all the way to Australia. Both El Niño and La Niña events can have far-reaching effects such as; intense rainstorms, flooding, extreme droughts, and increased number of winter storms in many areas of the world.

Complete the "Fill-In" questions below using information from above.

1 – _ El Niño __ is the oceanic occurrence of warming the Pacific Ocean.

2 – ENSO stands for ___ El Niño-Southern Oscillation _____.

3 – El Niño occurs in the ___Pacific___ Ocean.

4 – Normally, Pacific Ocean equatorial currents flow in a __Westward__ direction.

5 – __Upwelling__ is the process of bringing cooler water up to the ocean surface.

6 – During an El Niño year, parts of North America experience __Warmer__ temperatures.

7 – During an El Niño year, Australia may experience __Drought__ that can cause crop failure.

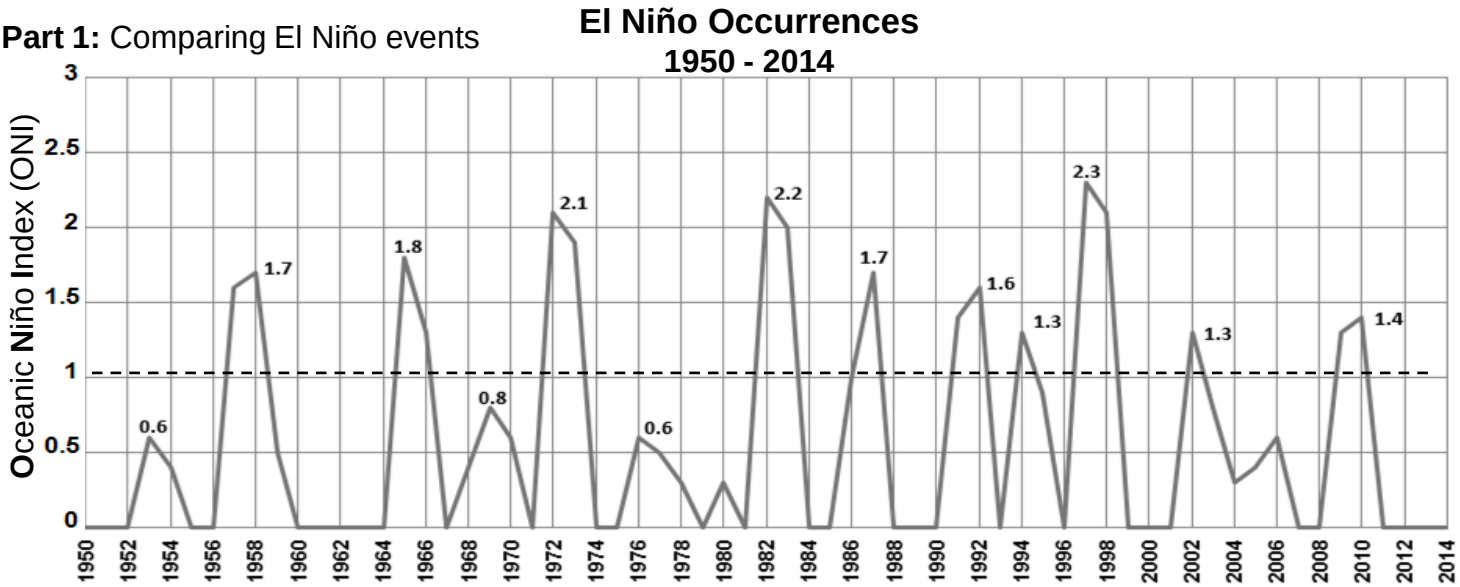
8 – The opposite of El Niño is known as ___ La Niña ____.

El Niño: *Lab Investigation*:

MASTER KEY

Use the graph and data below to complete the questions.

Part 1: Comparing El Niño events



*__Note__: Only years with an Oceanic Niño Index 1 or higher is considered an El Niño year.

1 – How many El Niño years (*ONI* above 1) are represented on the graph above? ____10____

2 – List the 3 most extreme El Niño years: __1972___ - __1982___ - __1997___

3 – What was the most extreme ONI value during an El Niño year? ___2.3__

4 – Which two El Niño years occurred closest together? __1992 __ _1994__

5 – Which two El Niño years had the most time in between each event? _1972_ _1982_

6 – What is the Oceanic Niño Index of the 2010 El Niño event? __1.4__

7 – What decade had the most El Niño years? _1990's_

8 – What are the Oceanic Niño Index for the years 1953 and 1976? ___0.6_____

Part 2: La Niña Map

As you have read about El Niño, the warming of the Pacific Ocean, you have also been introduced to La Niña, the cooling of the Pacific Ocean. Use Red and Blue colored pencils to color the map below to represent a **La Niña** event in the equatorial region of the Pacific Ocean.