Air Masses and Fronts

Date:

SWBAT: Identify the 4 types of air masses, where they originate, and their characteristics. Identify the fronts associated with the movement of these air masses

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| Wind | * Wind is the movement of air from places of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ pressure to places of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pressure
* Wind moves in large masses called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ **Air masses also move from areas of high pressure to areas of low pressure**
* These air masses retain the characteristics of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 |
| Describing Air Masses | Humidity\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (dry air) vs. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (moist air)* Depending on if the air mass forms over land or water depends on if it carries a lot of moisture
 | Temperature\_\_\_\_\_\_\_\_\_ (warm air) vs. \_\_\_\_\_\_\_\_\_ (cold air) vs. \_\_\_\_\_\_\_\_ (coldest air)* The temperature of the air mass depends on if it formed closer to the equator or closer to the poles
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|  | **Humidity** |
| Continental | Maritime |
| **Temperature** | Tropical |  |  |
| Polar |  |  |
| Arctic |  |  |

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| Front | Definition:* **Along a front, warmer, less dense air is always forced upwards**
* 4 types of fronts
 |
| **Type of Front** | **Map Symbol** | **Associated Weather** | **Characteristics** |
| Warm Front |  | * Marked by long and steady rain
 | * A warm front occurs when warm air \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into an area covered by cooler air.
* Takes a long time for warm air to displace colder air
 |
| Cold Front |  | * **Marked by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ precipitation/thunderstorms for a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of time**
 | * A cold front forms when cold, dense air quickly moves into an area occupied by warm air
* Compared to speed of warm front, cold fronts move very fast
 |
| Stationary Front |  | * Mild precipitation can occur on a stationary front
 | * **If fronts are not moving towards each other, but rather \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a stationary front occurs.**
 |
| Occluded Front |  | * This will force the warm front up into the air, which will lead to heavy rain
 | * Cold fronts move faster than warm fronts
* **When an active \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, an occluded front forms**
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Thunderstorms and Tornadoes

Date:

SWBAT: Describe the stages of thunderstorm formation, define lightning and thunder, and describe the necessary conditions for tornado development.

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| Term | Description |
| Thunderstorms | **Definition:*** There are ~ 4,000 thunderstorms per day worldwide
 | **Thunderstorms form when warm, humid air rises into colder air in an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  |
| Cold Front Thunderstorms | Cause: | * Strong and last for:
* Can also have tornadoes and hail.
 | Occur in: |
| Warm Air Thunderstorms | Cause: | * Less violent and last:
 | Occur in: |
| Three Stagesof a Thunderstorm | CumulusStrong \_\_\_\_\_\_\_\_\_\_ blow \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ air higher until the vapor condenses, forming a cumulus clouds | Mature\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, warm air forming \_\_\_\_\_\_\_\_\_\_\_\_\_\_ clouds* Updrafts continue and downdrafts begin as rain starts to fall
* Thunder and lightning begin
 | DissipatingStrong \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ stop warm, moist air currents from rising.* Water vapor supply suddenly decreases so the cell dies down
 |
| Lightning | * Negative charges near the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and positive charges near the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Negative charges will rush toward ground and positive charges near ground rise toward cloud
 | http://00.edu-cdn.com/worksheet-image/214140/lightning-diagram-earth-science-fifth.gif |
| Thunder | * The extreme heat from lightning causes air to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ resulting in a loud noise
* The air expands faster than speed of sound and creates a sonic boom.
 |
| Tornado | Definition:**The center of a tornado is characterized by its** **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | Tornado Intensity: EF0- EF5**Measured on:** * Measures how much damage is done by the tornado and wind speed
 |
| Tornado Alley | Location: | Air Mass Interaction: |
| Tornado Warning System | **Watch** | **Warning** |
| * Conditions are conducive to the development of tornadoes in and close to the watch area.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ area
* Can last 3-5 hours
 | * A tornado has been sighted by spotters or indicated on radar and is occurring or imminent in the warning area.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ area
* Can last 30 min – 1 hour
 |

Hurricanes

Date:

SWBAT: Identify the ingredients for hurricane formation and describe the rating scale.

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| Term | Description |
| Hurricanes | Definition:* Hurricanes go by different names in other parts of the world, these severe tropical storms can be called:
	+ **In the Pacific they are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
	+ In the Indian Ocean they are called cyclones
 |
| Parts of a Hurricane | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – center of the hurricane* Calmest and warmest part of the storm.
 | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – Thick clouds surrounding the eye with the most intense winds of the hurricane |
| Stages of a Hurricane | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:Is the first stage of consisting of a mass of thunderstorms that have only a slight wind circulation. | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:Whirling area of low pressure and storm activity with sustained winds up to 38 mph. | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: Sustained winds over 39 mph. This is the stage when the storm is given a name. | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: Winds over 74 mph |
| Storm Surge | * Greatest \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from hurricanes comes from the storm surge.
* Storm Surge - a combination of high tide and water that is pushed onshore by the strong winds of a hurricane; can produce surges 1-5.4+ meters.
* Most deaths from hurricanes are by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ due to the storm surge.
 |
| Hurricane Classifying | **Hurricanes are classified according to intensity using the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **Category** | **Sustained Winds (mph)** | **Surge (ft)** | **Damage** |
| 1 | 74-95 | 4-5 | Minimal |
| 2 | 96-110 | 6-8 | Moderate |
| 3 | 111-130 | 9-12 | Extensive |
| 4 | 131-155 | 13-18 | Extreme |
| 5 | 156+ | 19+ | Catastrophic |
| Hurricane Warning System |  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: issued several days before landfall | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: issued 24 hours before landfall |
| Hurricane Season | South East:* **The interaction between ocean \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ masses contributes to the formation of hurricanes during the late summer**
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Weather Maps and Forecasting

Date:

SWBAT: Use station models to interpret weather maps and identify tools meteorologists use to forecast the weather.

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| Term | Description |
| Station Models | * Meteorologists collect data from all over the country to help them predict the weather.
* The data is represented in a station model, which is comprised of symbols that stand for different things. The data represented includes:
 | plotstation.jpg |
|  |  |
|  |  |
|  |  |
| Weather Maps | Once you have collected data from all of your station models, you can put it together and form a weather map. |
| Isobars: * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ spaced = increased wind speed.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ spaced = calm winds.
* Closed circles = areas of high or low pressure.
 | http://web.gccaz.edu/~lnewman/gph111/topic_units/Images%20for%20online%20lecture_lab/iso12c.gifIsotherms: |
| Cold Front: | Warm Front: | Occluded Front: | Stationary Front: |
| Weather Instruments | What is it?What does it measure? | What is it?What does it measure? | What is it?What does it measure? | What is it?What does it measure? |
| What is it?What does it measure? | What is it?What does it measure? | What is it?What does it measure? |
| * These instruments typically measure conditions in the lower atmosphere.
* A radiosonde:
* Satellites can be used to determine weather conditions in the upper atmosphere.
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El Niño and La Niña

Date:

SWBAT: Identify the causes of El Niño and La Niña and the weather patterns they create.

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| Term | Description |
| Normal Conditions | Air Pressure: | Trade Winds: | Pacific warm pool on western side | Thermocline: | Upwelling: |
| El Niño-Southern Oscillation (ENSO) | Air Pressure: | Trade Winds: | Warm pool migrates eastward | Thermocline: | Downwelling* Lower \_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* Corals particularly sensitive to warmer seawater
 |
| Global consequences of El Niño | El Niño has global consequences and is both an atmospheric and oceanic phenomena |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in SE Asia and Australia | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and increased rainfall in S. America | Strong \_\_\_\_\_\_\_\_\_\_\_\_ on US West Coast | Northward displacement of Jet Stream | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_trade winds | Causes more winter rain in Texas, mild winter in Midwest |
| ENSO Events | Strong conditions influence global weather* **Flooding, drought, erosion, fires, tropical storms, harmful effects on marine life**
 |
| La Niña | Opposite of: | Surface temperatures in the eastern Pacific are\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_than average | Winter-lots of colder than normal air blows over the Pacific Northwest, but warms the rest of the US | Trade winds are especially \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Can also increase \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| ENSO Event | * El Niño warm phase about every 3 to 8 years
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Phases usually last 12 to 18 months
* Currently in an El Nino!
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