Benchmark Study Guide S6E4 Weather Review

Name __________________________________________ Date__________________________

S6E4 Students will understand how the distribution of land and oceans affects climate and weather.

a. Demonstrate that land and water absorb and lose heat at different rates and explain the resulting effects on weather patterns.

1. Land absorbs and loses heat _________________ than sea water.

2. Complete column 4 based on the temperatures listed in the data table

<table>
<thead>
<tr>
<th>Time</th>
<th>Sea Temperature (°F)</th>
<th>Land Temperature (°F)</th>
<th>Type Breeze</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>81</td>
<td>83</td>
<td>sea breeze</td>
</tr>
<tr>
<td>B</td>
<td>78</td>
<td>88</td>
<td>sea breeze</td>
</tr>
<tr>
<td>C</td>
<td>82</td>
<td>81</td>
<td>land breeze</td>
</tr>
</tbody>
</table>

3. Along coastal areas, cool air usually blows inland during the ___ day _______ and out to sea at ___ night _________.

4. In the troposphere (layer of atmosphere where all weather occurs), a convection current forms when __________ cool (high pressure) __________ air sinks (falls), and __________ warm (low pressure) __________ air rises.

5. Heat transfer

a. Radiation Heat transfer through space

b. Conduction Heat transfer by touching (physical contact)

c. Convection Heat transfer in a liquid or gas ___________
S6E4 Students will understand how the distribution of land and oceans affects climate and weather.

. Relate unequal heating of land and water surfaces to formation of large global wind systems and weather events such as tornados and thunderstorms.
. Relate how moisture evaporating from the oceans affects the weather patterns and weather events such as hurricanes.

What causes winds?

Major wind patterns are controlled by two factors:

- the unequal heating of Earth by the Sun
- Earth's rotation on its axis

Cool air in the polar regions sinks and moves toward the equator.
Warm air near equator rises and moves toward Earth's poles.

Earth's Major Wind Patterns -

- Trade winds - flow between the equator and the tropics
- Prevailing westerlies - flow between 30° north and 60° north latitudes and 30° south and 60° south latitudes
- Polar easterlies blow between the poles and 60° north and south latitudes

What is necessary to turn an ordinary thunderstorm into a tornado?

- A northerly flow of mT air from the Gulf of Mexico that is humid and has temperatures at the ground in excess of 75°F
- A cold, dry air mass (cP) moving down from Canada or out from the Rocky Mountains at speeds in excess of 50 mph
- Jet-stream winds racing east at speeds in excess of 150 mph
A hurricane is a storm of the tropics. Heat builds up in the tropics during long, hot summers, and hurricanes are one means of exporting excess tropical heat to the mid-latitudes. Before a hurricane develops, several requirements should be met:

- Seawater should be at least 80°F (27°C) in the upper 200 ft (60 m) of the ocean
- Air must be unstable, warm, and humid
- Upper-level winds should be weak and preferably blowing in the same direction the developing storm is moving

Causes of Unequal Heating of Earth’s Surface

- tilt (angle of insolation, seasons)
- rotation (day/night)
- revolution (seasons shown above)
- land/water
- latitude

Water Cycle S6E6.a

% of salt water on Earth 97 %

% of freshwater on Earth 3% total 2% or freshwater frozen

Most water in atmosphere comes from Oceans

% of water consumable by humans’ 0.5%
How do ocean currents affect climate? Ocean currents make climates along coast line more moderate.

### Fronts:

<table>
<thead>
<tr>
<th>Cold Front</th>
<th>Warm Front</th>
</tr>
</thead>
<tbody>
<tr>
<td>A cold front develops when a warm air mass invades a cold air mass. The cold air forces the warm air rapidly upward along a steep incline. The kinds of clouds that tend to form along a cold front are cumulus and cumulonimbus. These produce thunderstorms, from which tornadoes can form.</td>
<td>A warm front develops when a warm air mass meets a cold air mass. The warm air is less dense and slides up over it. Precipitation in the form of rain or snow may be produced.</td>
</tr>
</tbody>
</table>
Occluded Front
An occluded front develops when two cold air masses merge, forcing the warm air to rise. This type of front generally brings wind and precipitation.

Stationary Front
A stationary front develops when either a cold front or a warm front stops moving. This could remain in place for several days and often brings precipitation across the region.

1. Clouds that tornadoes form from - produce precipitation, thunder and lightning **cumulonimbus**
2. Warm, wet air mass **maritime tropical (mP)**
3. Front that forms when warm air is trapped between cold air masses and the warm air is forced to rise **Occluded**
4. Rapidly rotating funnel cloud that may form when cold air mass collides with warm air mass **tornado**
5. Determines the amount of solar energy an area receives **tilt of Earth on axis and latitude**
6. Front that is formed when a warm air mass slides over a cold air mass **warm front**
7. Thunderstorms form when **warm, moist air is forced up rapidly by cold air (cold front)**
8. Air mass that forms over Canada **continental Polar (cP)**
9. Occurs when plants lose water **transpiration**
10. Causes clouds to form **condensation**
11. Air mass that forms over water **maritime**
12. When water forms on mirror or bottle **condensation**
13. Layer of atmosphere where weather takes place **troposphere**
14. Heat transfer in a gas or liquid **convection**
15. Created by differences in air pressure **wind**
16. Rain, snow, sleet, and hail **precipitation**
17. Main source of energy on Earth **sun**
18. If it is winter in northern hemisphere then it is **summer** in southern hemisphere.
19. Movement of solar energy through space **Radiation**
20. Cool air moves under warm and **cold front**
21. Breeze that blows from ocean to land **sea breeze**
22. Cold front forms when warm, moist air mass is forced rapidly upward by cold air mass
23. Severe storms that develop from cold fronts thunderstorm and tornadoes
24. Hurricanes form over warm oceans
25. Calm, low pressure center of a hurricane eye
26. Parts of the water cycle evaporation, condensation, and precipitation
27. Warm air over land rises, cool air from over water rushes in to take its place sea breeze
28. Air moves from area of high pressure to area of low pressure
29. Phenomenon that causes air to curve Coriolis effect
30. Describe how Earth's atmosphere and surface is heated. Radiant energy from the sun moves through space by process of radiation. Earth’s surface absorbs the radiant energy and it changes to heat energy. The air touching Earth’s surface is heated by conduction. The warmed air rises and warms the rest of the atmosphere by convection.
31. How do winds form? Warm, low pressure air rises. When this happens, cold, high pressure air rushes in to replace the rising warm air. A convection current, called wind is created.