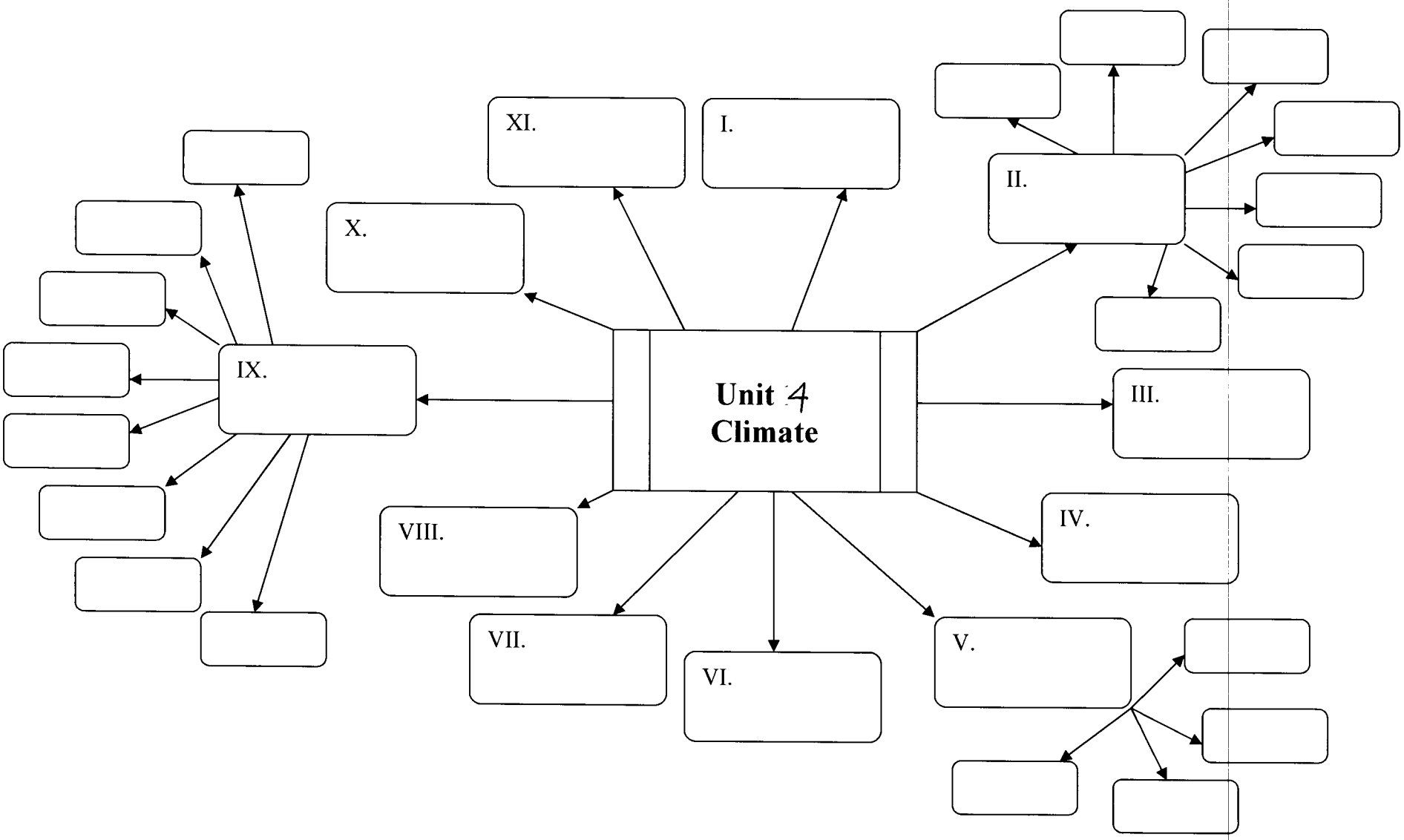
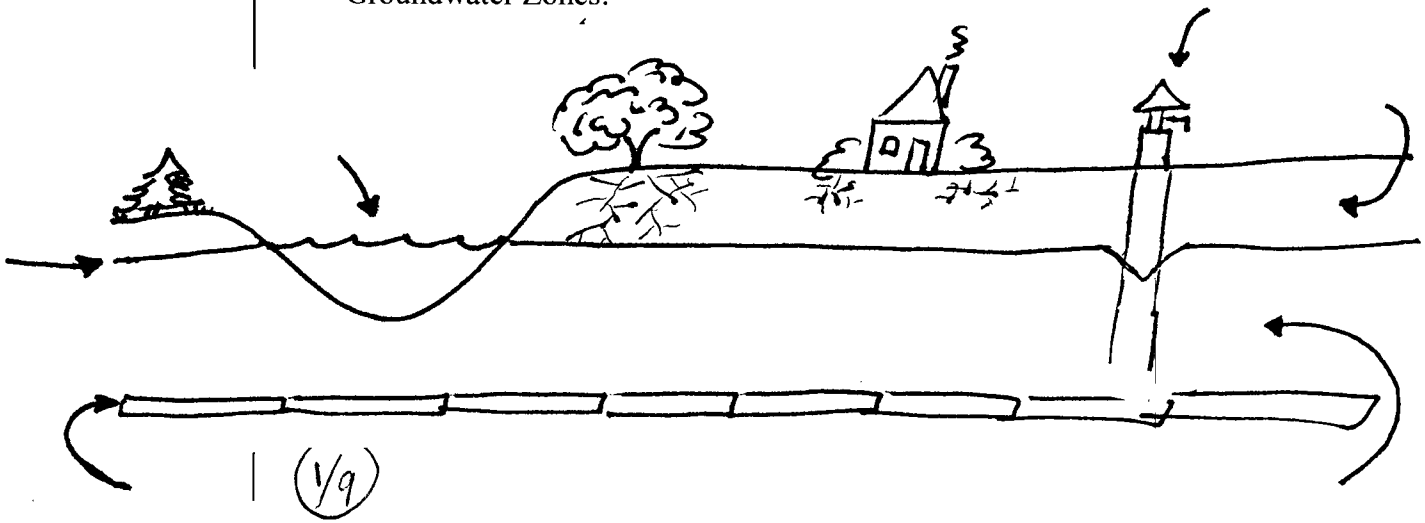
Name _____
Date _____
Period _____

Unit 4 Notepacket
Climate
E. Science



I. The Water Cycle

- Also called the _____ cycle
- It is the recycling of water between the oceans, atmosphere, and the land.
- The Earth has a _____ supply of water.
- Approximately _____ of the Earth's surface is covered with water (salt water).
- The amount of precipitation that seeps into the ground or runs off is influenced by climate, slope, soil type, rock type, vegetation, land use, and degree of saturation.
- _____ returns water to the land and oceans.
- _____ returns water to the atmosphere.
- _____ is the evaporation of water from vegetation, this also returns water to the atmosphere.
- _____ is water soaking into the ground
    - This water becomes stored in the soil as _____.
- _____ is water flowing along the surface of the Earth.
    - This occurs when:
        - The ground is already _____.
        - There is too great of a _____ to allow water to soak in.
        - It is too _____ outside.
        - When there is a _____.
- _____ is water below the water table.
- Groundwater is _____as it moves through the rock and soil
- Groundwater Zones:



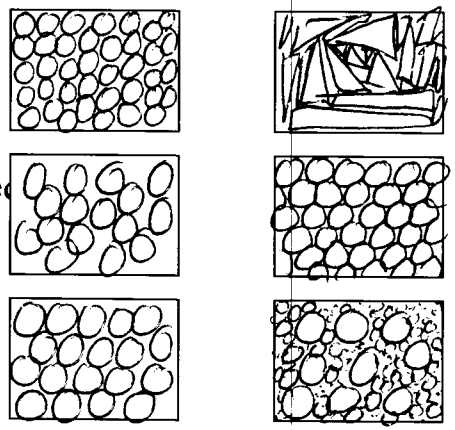
II. Factors Affecting Water Movement

A. _____ of the land. The steeper the slope, the _____ infiltration.

B. Degree of _____. The more saturated, the _____ infiltration.

C. _____ is the percentage of open space (pores and cracks) in a material compared to its total volume.

- The greater the porosity, the _____ the infiltration
- These things affect porosity:
  - _____- well-rounded particles have greater porosity than angular or plate-shaped particles
  - _____ - the more closely packed the particles, the lower the porosity.
  - _____ - If all the particles in a material are about the same size, they are said to be sorted. The more sorted the particles, the _____ the porosity.



D. _____ is the ability of a material to allow fluids such as water to pass through it.

- This depends of the:
  - _____ of the pores
  - how well they are connected
  - if the rock is _____ together
  - how well the particles are sorted.
- _____ means that the water can not flow through.

E. _____ is an attractive force between water molecules and the soil or rock surrounding it.

- This works _____ gravity and moves water upwards to the plant roots.
- The smaller the soil/rock particle, the _____ the capillarity.

F. _____ are the plants, shrubs, trees, and grass growing on the ground.

- The more vegetation, the _____ infiltration.

G. _____ is how the land is used by people

- Roads, parking lots, and building cover the ground and water can not _____.

(2/a)

III. Runoff and Stream Discharge

- Surface runoff can occur when:
  - The rate of precipitation _____ the permeability rate.
  - The pore spaces of loose material or rock is _____ with water.
  - The _____ of the surface is too great to allow infiltration to occur.
  - The water on the surface has not _____.
- Most runoff will eventually flow into a stream.
- The greater the runoff, the _____ the amount of stream discharge there is.
- _____ is the volume of water flowing past a certain spot in a stream in a specific amount of time (cubic meters per second).
- _____ occurs when:
  - a stream overflows from its normal channel
  - when the rate of precipitation _____ the rate of infiltration
  - there is a storm surge from a hurricane
  - coastal storms
  - rising sea level or sinking land
  - tides moving water onto the land
- Flooding safety: move to higher ground and have a citywide evacuation plan.

IV. Insolation

Means **IN**coming **SOL**ar radi**ATION**

- It means the same thing as _____.
- It is the sun's electromagnetic energy that reaches the Earth.
- This type of energy has relatively short wavelengths (_____ - wave).
- Energy from insolation is transferred to the atmosphere and the Earth's surface.
  - This energy transfer is influenced by cloud cover, rotation, mountain ranges and oceans.
- See the Electromagnetic Spectrum Chart on page 14 of your reference tables
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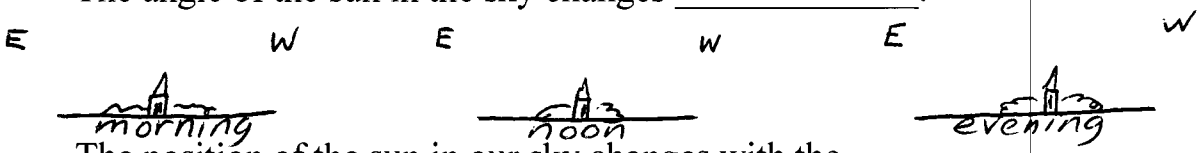
V. Intensity of Insolation Depends upon the following:

A. The _____ of the sun in the sky has an effect the intensity of insolation.
- The more perpendicular the sun is to the earth (the higher in the sky, ___° angle above the horizon), the greater the intensity.
- The angle of the sun in the sky changes _____.



- The position of the sun in our sky changes with the _____.

B. _____ of insolation is the length of time that the sun appears in the sky.
- The longer the sun shines, the _____ the temperature.
- We (in the Northern Hemisphere) have the greatest duration of insolation on _____.
- We have the least duration of insolation on _____.

C. <u>Absorption of insolation</u>
- Higher energy radiations (gamma, x) are absorbed by ozone, carbon dioxide, and water vapor in the atmosphere.
- Visible light readily penetrates the Earth's surface.
- At the surface, visible light is _____, _____, and _____.
- Water heats up (and cools down) slower than land does because:
  - Water has a higher _____ heat.
    - _____ is the amount of energy it takes to raise one cubic centimeter on degree Celius.
    - Water reflects light more than land does.
    - Since light can penetrate into a depth of water, it is heating a greater _____ of water than it is of land.

(4/a)

D. Reflection of Insolation

- Clouds reflect _____% of insolation.
- Clouds can also absorb _____ % of insolation
- The lower the angle of insolation, the _____ the reflection.
- More reflection occurs when the land is light in color or covered by snow or ice.

VI. Terrestrial Radiation

- It is the energy that the Earth gives off.
- The part of the Earth that has _____ receives more energy than it gives off.
- The part of the Earth that has _____ gives off more energy than it receives.
- This type of energy given off from the Earth has relatively _____ wavelengths.
- It is called _____ radiation.

VII. The Greenhouse Effect

- The gases in the atmosphere (_____ and _____) let the short-wave radiation of the sun pass through but trap the long-wave radiation of the Earth near the surface.

- The greenhouse effect happens all over the Earth and makes the Earth a _____ place to live.
- Some scientists think that there may become too much CO_2 in the atmosphere and that the temperatures on Earth will become higher.
- Why would there be too much Carbon Dioxide?

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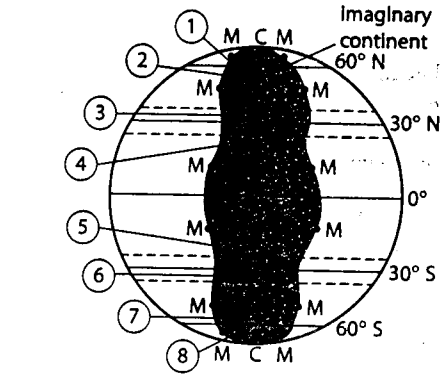
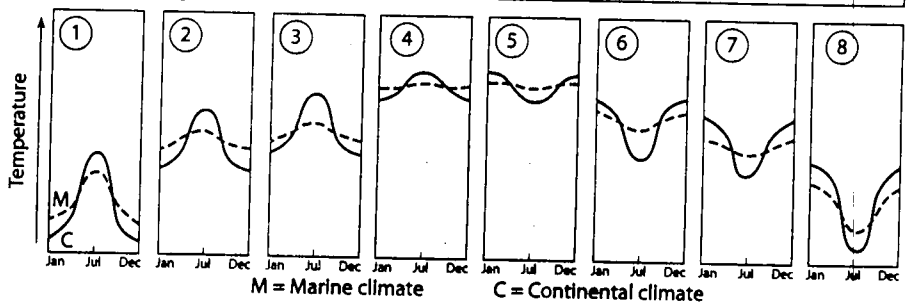
VIII. Climate

- _____ is the atmosphere conditions for a large area over a large period of time.
- Can be classified by looking at the _____ and _____.
  - How much water coming down to the Earth compared to the amount of water going back up into the atmosphere.
- The average temperature on Earth is the result of the total amount insolation absorbed and the amount of long-wave radiation radiating back out into space.
- Global climate is _____ by the interaction of solar energy with the Earth's surface and atmosphere.



Zones	Climate types
1,8	Polar Cold, humid to arid, with large temperature variation
2,7	Temperate or mid latitude Moderate temperatures, humid, with moderate temperature variation
3,6	Tropical desert Hot, arid
4,5	Tropical rainforest Hot, humid, with little temperature variation



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IX. Factors Affecting Climate

A. Latitude and Climate
- The lower the latitude, the _____ the temperature.
- The lower the latitude, the _____ the yearly range in temperature.
- The lower the latitude, the _____ the daily range in temperature.

B. Large Bodies of Water
- Large bodies of water _____ the climate.
- If a landmass is near a body of water its temperature will be _____ by the slow heating and cooling of water.
  - Water stays cooler longer (in the spring) so the land near it will be cooler.
  - Water stays warmer longer (in the fall) so the land near it will be warmer.

C. Prevailing Winds (also called planetary or global winds)
- _____ are movements of air over the Earth's surface that blow in the same direction most of the time.
- Make weather systems move from West to East across the U.S.
- The West Coast has a more _____ climate because they get winds coming from the ocean.
- These winds make us get lake effect snow coming from Lake Ontario and Lake Erie.
- Also causes _____ southern air to come our way in the summer.
- _____ are the weather changes caused by the seasonal shifts as the prevailing winds shift with the seasons. The are usually associated with the wet summers in Asia.

D. Surface Ocean Currents
- See the ocean current map in your reference table page 4.
- Currents flowing away from the equator carry warm water (and air) to the higher latitudes.

E. Elevation is the distance above sea level
- Higher elevations have _____ temperatures.
- Higher elevations have a _____ chance of precipitation.

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F. Mountains

- Can change the climate by affecting the wind patterns.

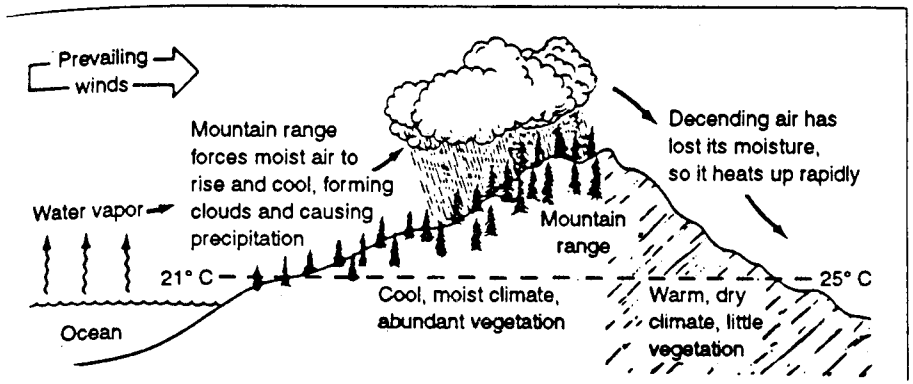

Figure 7-21. Climate differences on opposite sides of a mountain range. As air rises up the windward side of a mountain, condensation slows the adiabatic cooling of the air. But, on the leeward side, the dry air warms very quickly, making a hot desert climate.

G. Vegetation

- When rainforests are cut down, there is less water transpirating into the atmosphere and the area becomes hotter and _____.

H. Cloud Cover

- Areas with a lot of clouds (like the Equator) are _____ than areas without a lot of clouds (like the deserts at about 30 ° latitude).

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X. Climate and Change

- Periods of warmer and cooler temperatures suggest that the Earth had climate _____ that were probably caused by long period of heating imbalances.
- Average temperatures may have been significantly warmer at times in the _____ past.
- Throughout geologic time, ice ages occurred in the _____ latitudes.
- Human influences including deforestation, urbanization, and the production of greenhouse gases have changed our climate.

XI. Energy and Climate

- The Earth may be considered to be a huge machine that is driven by two engines.
  - An internal heat engine:
  - An external heat engine:
- Both heat engines convert heat energy into _____ energy.
- Energy is transferred between the Earth's surface and atmosphere by:
  - Radiation
  - Conduction
  - Convection
  - Evaporation
  - Condensation

9/a