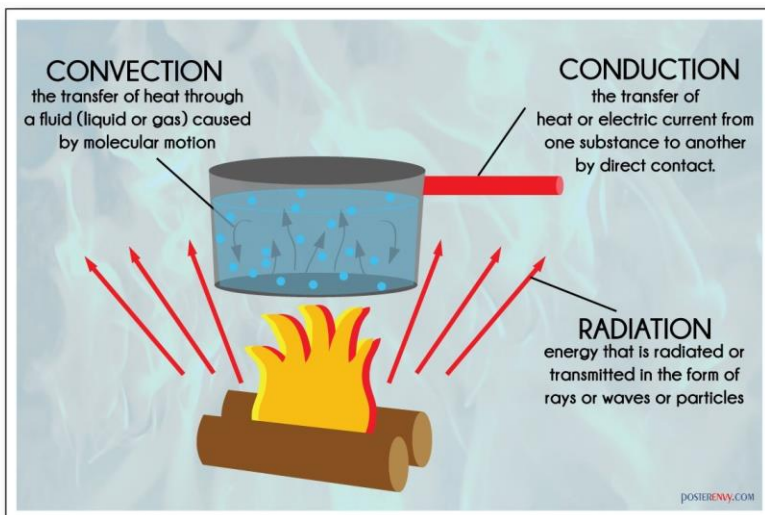
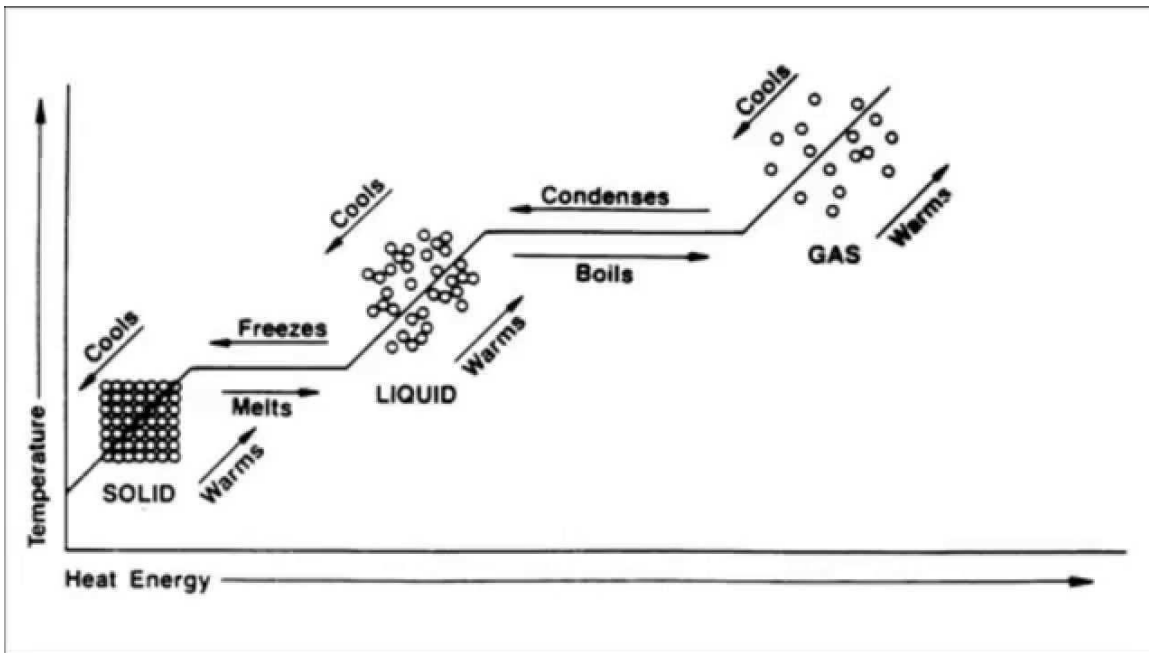


Practice Packet

Topic 7.5: Energy



Vocabulary: _____

Heat Transfer: _____

Properties of Water: _____

Specific Heat: _____

EM Spectrum: _____

Regents Questions: _____

Name: _____

PRACTICE PACKET: TOPIC 7.5 Energy

VOCABULARY

For each word, provide a short but specific definition from YOUR OWN BRAIN! No boring textbook definitions. Write something to help you remember the word. Explain the word as if you were explaining it to an elementary school student. Give an example if you can. Don't use the words given in your definition!

Conduction: _____

Convection: _____

Radiation: _____

Absorbed: _____

Reflected: _____

Refracted: _____

Specific Heat: _____

Melting: _____

Freezing: _____

Vaporization: _____

Condensation: _____

Lesson 1 -How does heat energy travel

Objective:

- I can name & explain the three types of heat transfer
- I can use the Electromagnetic Spectrum Chart in the ESRT
- I can name the type of surface that would absorb or reflect energy the best
- I can explain Specific Heat & use the chart on the ESRT
- I can label the phase change chart

The energy that heats the Earth comes from the Sun and is called insolation. 90% of insolation is in the form of visible light (short-wave). Heat always flows from source (hot) to sink (cold). Insolation travels from place to place in one of three ways:

- **Convection**- heat transfer caused by differences in density (LIQUID/GAS)
- **Conduction**- heat flow resulting from contact between two substances (SOLID)
- **Radiation**- heat flow in the form of waves through space (NO MEDIUM REQUIRED)

As insolation travels through the Earth's atmosphere, some passes through to the surface, some is reflected back to space, some is scattered throughout the atmosphere, and some is refracted, or bent.

Dark, rough surfaces absorb high amounts of energy, while **light, smooth surfaces reflect**.

PRACTICE PACKET: TOPIC 7.5 Energy

Need to Know:

1. What is the energy that heats the Earth called? _____
2. How does heat energy always flow? _____
3. What is convection? _____
4. What type of material is needed for convection? _____
5. What is conduction? _____
6. What type of material is needed for conduction? _____
7. What is radiation? _____
8. What type of material is needed for radiation? _____
9. What type of surface absorbs energy the best? _____
10. What type of surface absorbs energy the best? _____

Properties of Water

Water is the only substance that can be found in nature as a solid, liquid or gas. Solid water (ice) has molecules that are tightly packed, liquid water molecules are still bound together but allows it to flow easily. As in any gas, the molecules of water vapor are not bound together and flow freely. In order to change from one phase to another, energy needs to be added (gained) or removed (released). The amount of energy required is dependent on which phase water is in. For example, it takes much more energy to evaporate water than it does to melt the same amount of ice. As a phase change is taking place all of the energy is being used to change phase. This is called latent heat.

Need to know:

1. What is the only substance that can be found in nature in any state of matter? _____
2. Describe how the molecules are packed in each of the following states of matter:
Solid - _____
Liquid - _____
Gas - _____
3. What does a substance need in order to change phase? _____
4. Which takes more energy, melting ice or evaporation of water? _____
5. What is it called when all of the energy added or released is being used to change the phase of water? _____

"Properties of Water" Earth Science Reference Tables - Front Cover

6. How much energy is gained during melting? _____

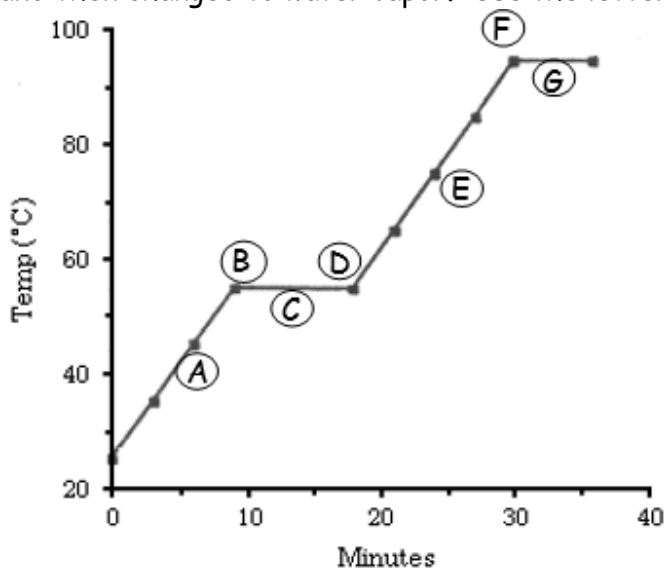
PRACTICE PACKET: TOPIC 7.5 Energy

7. How much energy is gained during vaporization? _____
8. How much energy is released during freezing? _____
9. How much energy is released during condensation? _____
10. Which two changes in phase need to **gain** energy to occur?
 _____ and _____
11. Which two changes in phase need to **lose** energy to occur?
 _____ and _____

Show all calculations for questions 12 through 15.

12. How many Joules of energy are required to melt 5 grams of ice?
13. How many Joules of energy are required to melt 100 grams of ice?
14. How many Joules of energy are released when freezing 200 grams of water?
15. How many Joules of energy are released when condensing 200 grams of water vapor?

The following image shows the change in temperature of a block of ice that was heated until it melted and then changed to water vapor. Use the letters to answer the following questions.



1. Liquid water being heated _____
2. Ice starts to melt _____
3. Ice getting warmer _____
4. Solid changing to a liquid _____
5. What is the melting point? _____
6. What is the boiling point? _____
7. Vaporization is occurring _____
8. What letter indicates *only* solid is present? _____
9. What letter indicates *only* liquid is present? _____
10. What letter indicates both solid AND liquid are present? _____

PRACTICE PACKET: TOPIC 7.5 Energy

"Specific Heats of Common Materials" ESRT cover

Absorption of radiation: Specific Heat

- Specific heat is the amount of heat needed to raise the temperature of one gram of a substance one degree Celsius.
- Different materials absorb electromagnetic energy at different rates
- The higher the specific heat, the longer it takes to heat up and cool down.
- The lower the specific heat, the faster it heats up and cools down.

Circle the correct answers below.

1. If you are heating water on a stove, which heats up faster (the metal pan **or** the water)?
2. On a hot July afternoon it is 95°F. The pool water is about 85°F. At night the temperature drops quickly to 75°F. Does the pool water also drop 20°F? (yes **or** no)
3. Which cools down faster (air **or** water) ?
4. Look at the chart labeled located on the front cover of the ESRT
 - a. What is the specific heat of water? _____ Joules/gram·°C
 - b. What is the specific heat of copper? _____ Joules/gram·°C
 - c. The higher the specific heat, the (faster or slower) the material heats up.
 - d. The lower the specific heat, the (faster or slower) the material heats up.
 - e. What heats up faster, liquid water or copper (metal)? _____
5. Which material on the specific heat chart heats up the fastest? _____
6. Which material on the specific heat chart heats up the slowest? _____
7. Which material needs the most amount of energy to raise its temperature? _____
8. In each set below, circle the material that would heat up the fastest:

Water	Iron	Copper
Ice	Basalt	Granite
Lead	Water	Iron

Dry Air	Lead	Granite
Iron	Basalt	Water Vapor
Ice	Copper	Dry Air

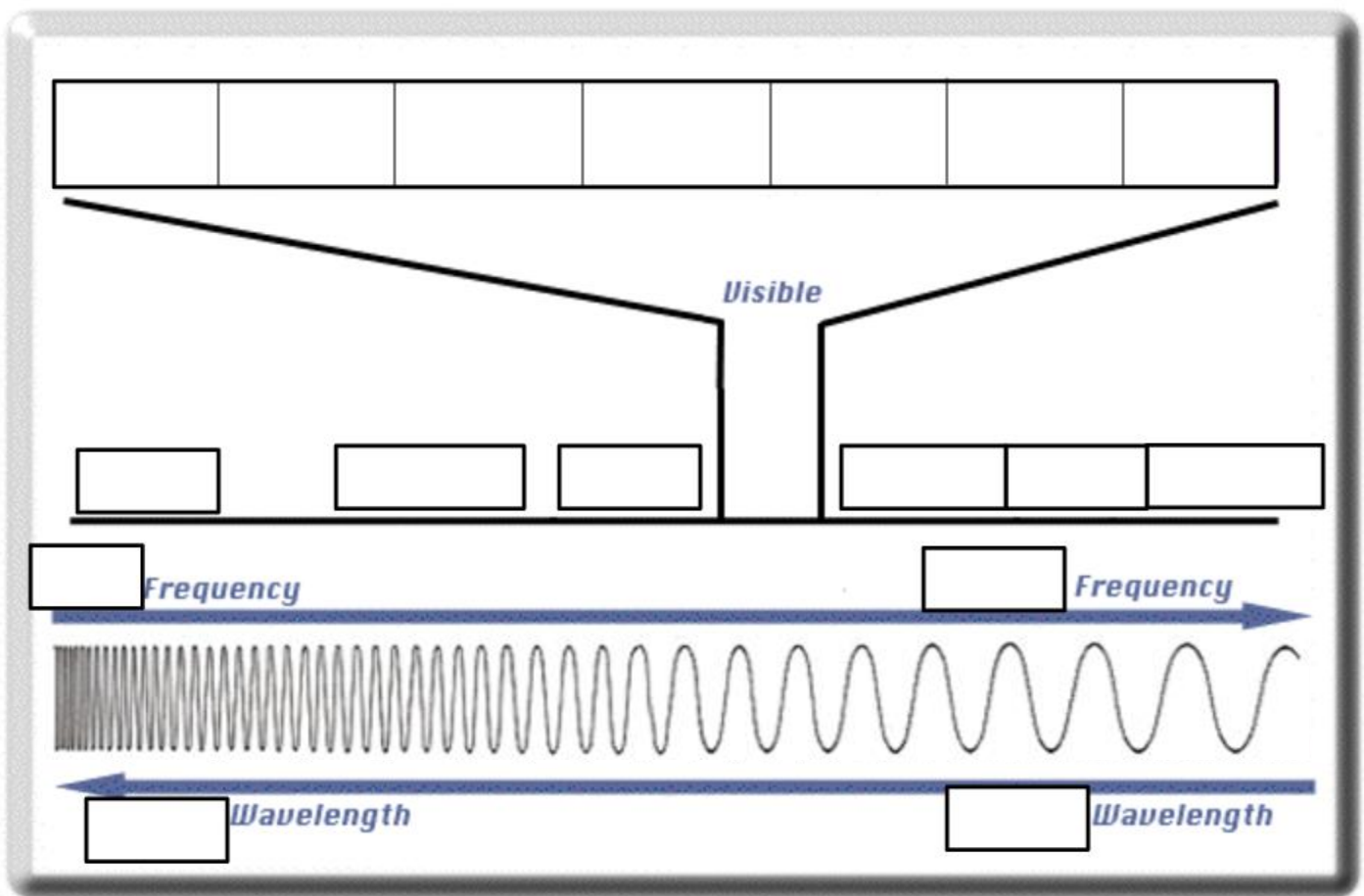
9. What is the specific heat of land? (use the value for granite) _____
10. State the relationship between specific heat and rate of heating. _____

Electromagnetic Spectrum ESRT Pg 14

Use your ESRT to label the electromagnetic spectrum.

*Note that Frequency & Wavelength are opposites. *

PRACTICE PACKET: TOPIC 7 Earth's Atmosphere



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Regents Questions:

- Which process requires water to gain 334 Joules of energy per gram?
a. vaporization b. melting c. condensation d. freezing
- What is the latent heat of vaporization of water?
a. 334 J/g b. 540 J/g c. 2260 J/g d. 80 J/g
- During which phase change of water is the most energy released into the environment?
a. water freezing c. water evaporating
b. ice melting d. water vapor condensing
- What is the basic difference between ultraviolet, visible, and infrared radiation?
a. half-life b. wavelength c. temperature d. wave velocity
- Which of the following Earth surfaces usually reflects the most incoming solar radiation?
a. snow cover b. dark soil c. green grass d. lake water

PRACTICE PACKET: TOPIC 7 Earth's Atmosphere

6. A person in New York State worked outdoors in sunlight for several hours on a day in July. Which type of clothing should the person have worn to absorb the least electromagnetic radiation?
 - a. dark colored with a rough surface
 - b. light colored with a rough surface
 - c. dark colored with a smooth surface
 - d. light colored with a smooth surface
7. Short waves of electromagnetic energy are absorbed by Earth's surface during the day. They are later reradiated into space as
 - a. visible light rays
 - b. infrared rays
 - c. X-rays
 - d. ultraviolet rays
8. In which region of the electromagnetic spectrum is most of the outgoing radiation from Earth?
 - a. infrared
 - b. ultraviolet
 - c. visible
 - d. X-ray
9. Which method of energy transfer is primarily responsible for energy being lost from Earth into space?
 - a. conduction
 - b. solidification
 - c. convection
 - d. radiation
10. By which method is heat transferred by density differences?
 - a. Absorption
 - b. Convection
 - c. Conduction
 - d. Radiation

ASSESS YOURSELF ON THIS LESSON: _____/10

If you missed more than 3, do the Additional Practice. If not, go on to the next hw video!!!

1. What method of energy transfer requires no medium for transfer?
 - a. Conduction
 - b. Advection
 - c. Convection
 - d. Radiation
2. Which phase change requires water to gain 2260 Joules per gram?
 - a. solid ice melting
 - b. liquid water freezing
 - c. liquid water vaporizing
 - d. water vapor condensing
3. Which type of land surface would probably reflect the most incoming solar radiation?
 - a. light colored and smooth
 - b. dark colored and smooth
 - c. light colored and rough
 - d. dark colored and rough
4. During which process does water gain the most heat energy?
 - a. condensation
 - b. freezing
 - c. evaporation
 - d. melting
5. Radiation with the wavelength between blue and yellow is usually visible as what color?
 - a. violet
 - b. green
 - c. blue
 - d. yellow

ASSESS YOURSELF ON THIS ADDITIONAL PRACTICE: _____/5

If you missed more than 1 see me for extra help and/or re-watch the lesson video assignment.