Study Guide ISD Interim Test #3
MO Performance Standards 3A.1-4 and 4A.1

I can describe potential energy & kinetic energy, including gravitational potential energy.
I can explain and demonstrate how energy is transferred to or from an object as it moves.
I can describe the characteristics of waves.
I can explain how thermal energy is transferred from one place to another.
I understand the principles of physics.

Resources:

- **Discovery Education Techbook** http://www.discoveryeducation.com/?scrlybrkr
- **Flocabulary Assignments** https://www.flocabulary.com/
- **Links on Class Website** http://sites.isdschools.org/brian_stockdell

Big Ideas:

- *Energy is the ability to do work or cause change*
- *Energy can never be created or destroyed; it only changes forms (Law of Conservation of Energy).*
- *There are many types of energy and these can transform to other types.*
- *Humans don't create energy. We get energy from natural resources.*
- *Humans get energy from food, not from sleep.*
- *Remember the forms of energy by "KEEP'N CT" (Keeping Connecticut)*

Define and provide examples of the following terms (Emerging Towards Standard/Basic- Level 7):
energy-

kinetic energy-

electrical energy-

electromagnetic energy-

potential energy (gravitational)-

nuclear energy-

chemical energy-

thermal energy-

Law of Conservation of Energy-

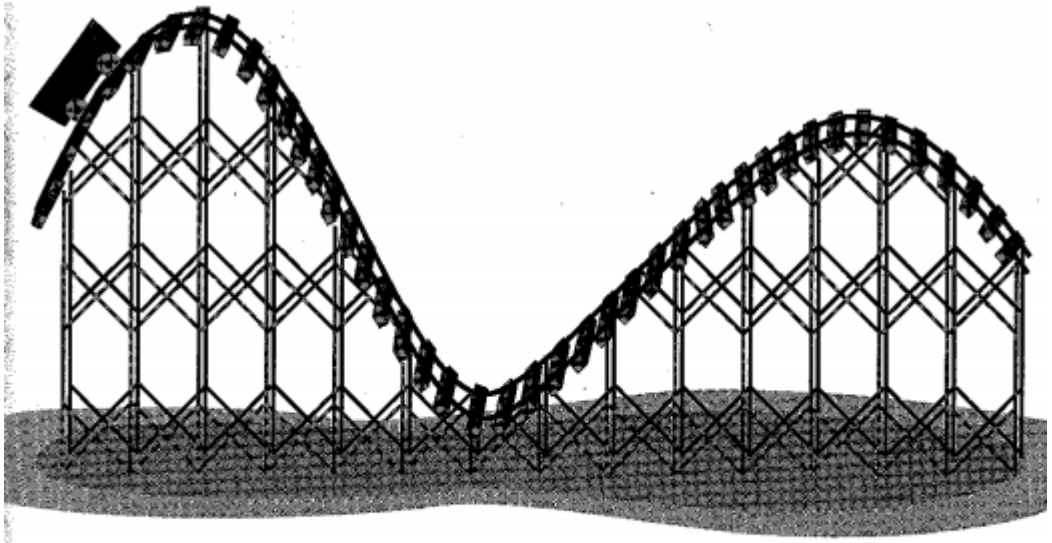
Identify Energy Transformations (Approaching Standard- Level 9)
These are only examples. You should be able to identify more examples to be proficient.

Energy transformation in a fan.

Energy transformation in an oven.

Energy transformation in a flashlight.

Describe Energy Transformations (Meets Standard- Level 10)
Create your own example of energy transformations. Your example must not be one from above and must have three forms of energy (two transformations total). In addition to identifying the energy transformations you must identify what is happening in the example i.e. kicking a soccer ball.

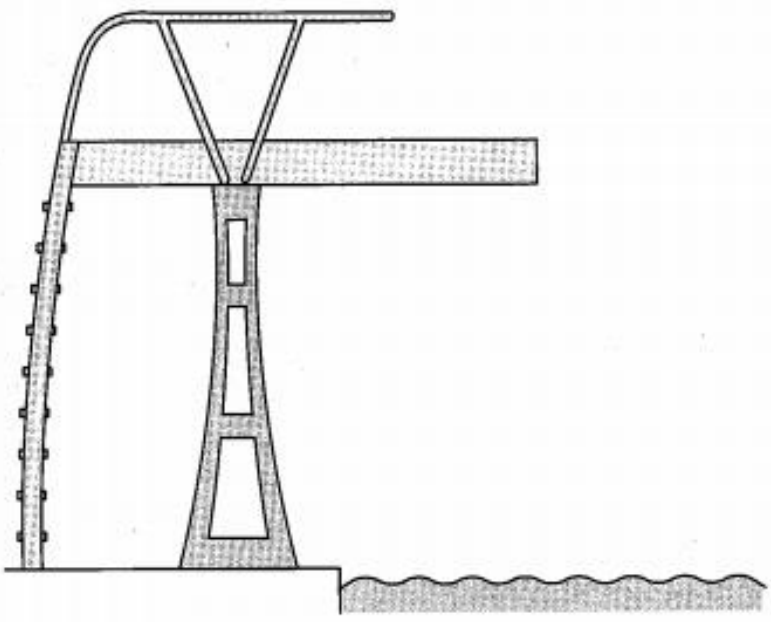


► ***At which point on the track will the car's gravitational potential energy be the greatest? Label this point "GPE."***

► ***At which point on the track will the car's kinetic energy be the greatest? Label this point "KE."***

APPLY THE CONCEPT Imagine once again that you are on the platform of a high dive. On the diagram below, draw and label your position in the following three places:

1. ***gravitational potential energy greatest, kinetic energy least***
2. ***gravitational potential energy and kinetic energy about equal***
3. ***gravitational potential energy least, kinetic energy greatest***



► ***Describe the energy change that takes place as you dive off the platform.***

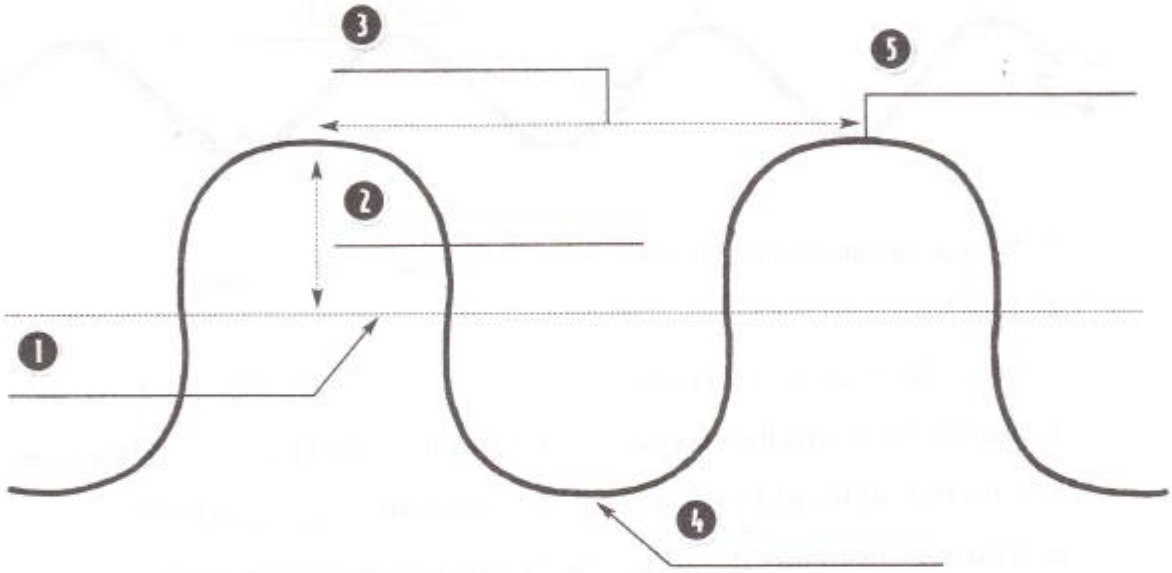
Characteristics of Waves

Name _____ Date _____

Diagram of a Wave

Both light and sound travel in waves. Use the terms in the word box to label the parts of a wave.

amplitude	wavelength	crest	equilibrium	trough



Match each term in the word box above to its description.

6 _____ This is a measure from a point on one wave to the corresponding point on the next wave.

7 _____ This is the lowest point on a wave.

8 _____ This is the highest point on a wave.

9 _____ This is the distance a wave rises or falls from its equilibrium.

10 _____ This describes when the wave is at a rest position.

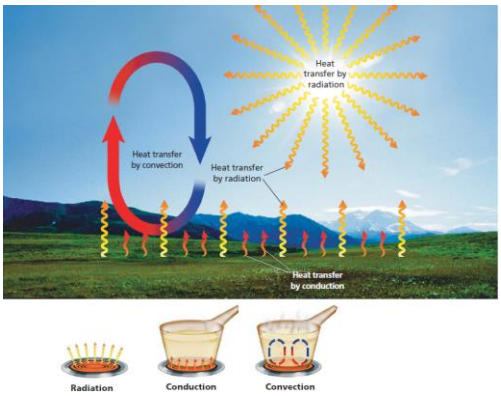
Thermal Energy "Heat" Transfer

Heat *is a measure of the flow of thermal energy from one object or substance to another. Thermal energy typically flows from a warmer material to a cooler material.* Generally, when thermal energy is transferred to a material, the motion of its particles speeds up and its temperature increases. There are three methods of thermal energy transfer: conduction, convection, and radiation.

Conduction *transfers thermal energy through direct contact*. If two objects are placed in contact with each other, thermal energy flows from the warmer object (with faster-moving particles) to the cooler object (with slower-moving particles). When the faster particles collide with the slower particles, they transfer some of their energy to the slower particles. For example, when a hot pan is placed on a counter, the counter increases in temperature as the faster-moving molecules of the pan collide with and increase the motion of the molecules of the counter. As they lose thermal energy, the molecules of the pan slow down, and the temperature of the pan drops. Some materials such as metals are good conductors of thermal energy, while other materials such as glass, wood, plastic, and air are not. Materials that are not good at transferring thermal energy by conduction are known as *insulators*.

Convection *transfers thermal energy through the movement of fluids or gases in circulation cells called convection currents.* A pot of water heated on a stove provides an example. The pot itself, and then water at the bottom, becomes heated by conduction. When water is heated, it expands, becomes less dense, and rises up through the surrounding cooler water. The cooler, denser water then sinks to the bottom of the pot where it, in turn, is heated. The convection current—the circulating path of hot water rising and cold water sinking—transfers thermal energy by actually moving the warmer water to a new area. It also forces the warmer water to mix with the cooler water and promotes further conduction by bringing the cooler water to the bottom of the pot.

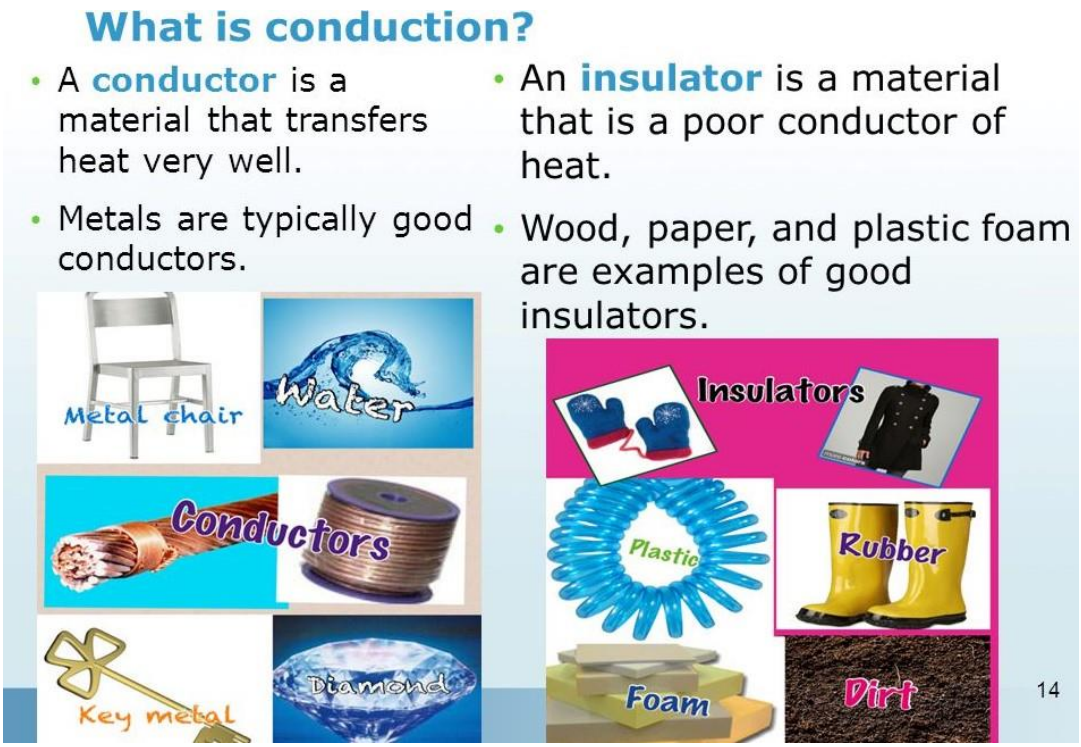
Radiation *transfers energy by electromagnetic waves, a method that operates even in the absence of matter (through outer space, for example).* When electromagnetic radiation strikes an object, the energy carried by the electromagnetic wave is transferred to the object, causing the particle motion within the object to increase. A microwave oven, for example, emits microwave radiation to transfer thermal energy to food. Similarly, the reason that you can feel the warmth of an object at a distance, such the Sun or a light bulb, is because of transfer of thermal energy by radiation. While all matter emits and absorbs electromagnetic radiation, some materials are better at absorbing radiation than others; shiny surfaces, for example, tend to reflect rather than absorb radiation.



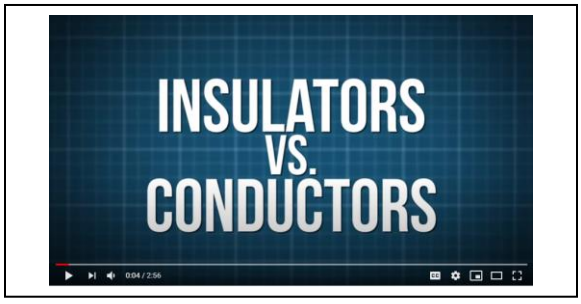
1. Can you explain why you feel warm when you are standing near a campfire?

2. Why does a carpeted floor feel warmer to bare feet than tile or wood even though all surfaces are the same temperature?

3. What information would you need in order to predict whether transfer of thermal energy would occur when two objects or materials interact?



Click on the pictures below for videos on conductors and insulators:



- Why is it when a turkey baking in a foil pan in the oven is taken out and remains hot for over 20 minutes, but the sides of the foil pan are cool enough to touch after only a minute?