

Heat Transfer

SCIENCE HOMEWORK MENU

Choose 2 of the following activities to complete this week using the vocabulary words below.

One activity is due by **Tuesday** (Dec 8th), the second activity is due by **Thursday** (Dec 10th). You may not do the same activity twice this week, have fun with these and be creative! All vocabulary words are required for every activity!!

Your vocabulary words this week are:

temperature	convection
thermal energy	conduction
heat	radiation

Activity Options:

Draw a picture to represent each word. (Be sure to label your pictures!)	Create a comic strip about <u>heat transfer</u> . Be sure to include all vocabulary words
Write a question for each word where the word is the answer. Ex: If the word is dog: What has four legs and barks? A dog	Write each word using letters cut out of magazines, newspapers, food packaging & find a picture to that represents the word in some way.
Write a story using each of the words. (Be sure to use complete sentences! And be creative.	Make flash cards for each word (word on one side of index card, the definition on the other)

Note:

Students began working on this in class Friday.

Key Concept Summaries

Temperature, Thermal Energy, and Heat

What Determines the Temperature of an Object?

Temperature is a measure of how hot or cold something is with respect to a reference point. Matter is made up of tiny particles that are always moving, so these particles have kinetic energy. **Temperature is related to the average kinetic energy of the particles in an object.** As an object heats up, its particles move faster. As a result, both the average kinetic energy of the particles and the temperature increase.

The Fahrenheit scale is most common; water freezes at 32°F and boils at 212°F. Most other countries use the Celsius scale; water freezes at 0°C and boils at 100°C. Scientists usually use either the Celsius scale or the Kelvin scale. The Kelvin scale is divided into kelvins (K). A temperature change of 1 K is the same temperature change as 1°C.

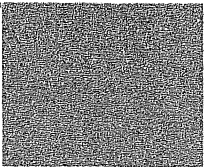
Absolute zero is the lowest temperature possible; it is 0 K. At absolute zero, the kinetic energy of individual particles is zero.

There are three common scales for measuring temperature. In the United States, the Fahrenheit

What Is Thermal Energy?

Temperature, thermal energy, and heat are closely related, but they are not the same thing. **Thermal energy is the total energy of all the particles in an object.** Thermal energy depends on the temperature of an object, the number of particles in the object, and how those particles are arranged. Thermal energy can transfer from one object to another; it always moves from a warmer object to a cooler object. The transfer of thermal energy is called **heat**. Heat is measured in the unit of energy—joules.

Temperature Scales				
Fahrenheit	Celsius	Kelvin		
212	100	373	Boiling point of water at sea-level	
194	90	363		
176	80	353		
158	70	343		
140	60	333		
122	50	323		
104	40	313		
86	30	303		
68	20	293		Average room temperature
50	10	283		
32	0	273	Melting (freezing) point of ice (water) at sea-level	
14	-10	263		
-4	-20	253		
-22	-30	243		
-40	-40	233		
-58	-50	223		
-76	-60	213		
-94	-70	203		
-112	-80	193		
-130	-90	183		-89°C (-129°F) Lowest recorded temperature. Vostok, Antarctica July, 1983
-148	-100	173		



Key Concept Summary

The Transfer of Heat

How Is Heat Transferred?

Whenever the temperature of an object or substance changes, heat is being transferred. It travels only in one direction and by three different methods. **Heat is transferred from warmer areas to cooler areas by conduction, convection, and radiation.**

Conduction is the transfer of heat from one particle of matter to another without the matter moving. The fast-moving particles in a warm object collide with the slow-moving particles in a cooler object, and the particles in the cooler object speed up. Objects or particles must be in direct contact for conduction to occur.

Convection occurs only in fluids, such as water and air. As the fluid is heated, its particles speed up and move farther apart, so it becomes less dense and rises. Cooler fluid flows into its place, is also heated, and rises. Meanwhile, the previously heated fluid cools down, sinks, and the cycle repeats. This flow creates a circular motion called a **convection current**.

Radiation is the transfer of energy by electromagnetic waves. It is the only form of heat transfer that does not require matter. Energy from the sun travels through empty space to Earth in the form of radiation.