

AMERICAN LANGUAGE COURSE

UNIT 2409

OUTLINE AND STUDY OBJECTIVES

READING: HEAT

QUESTIONS ON THE READING

QUESTIONS ON WORKBOOK

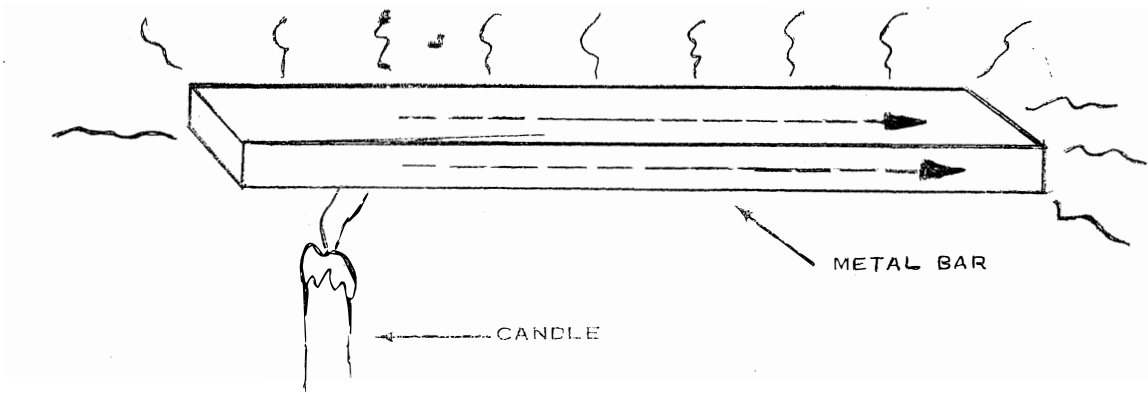
DICTATION

WORD STUDY

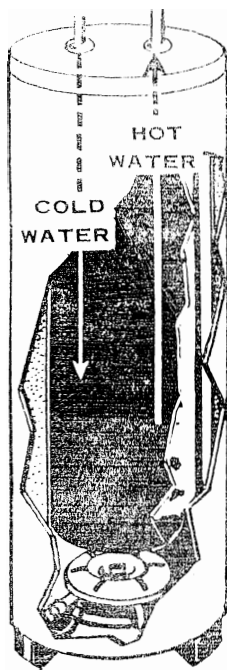
GENERAL ENGLISH USAGE

TAPE 2409A

TAPE 2409B

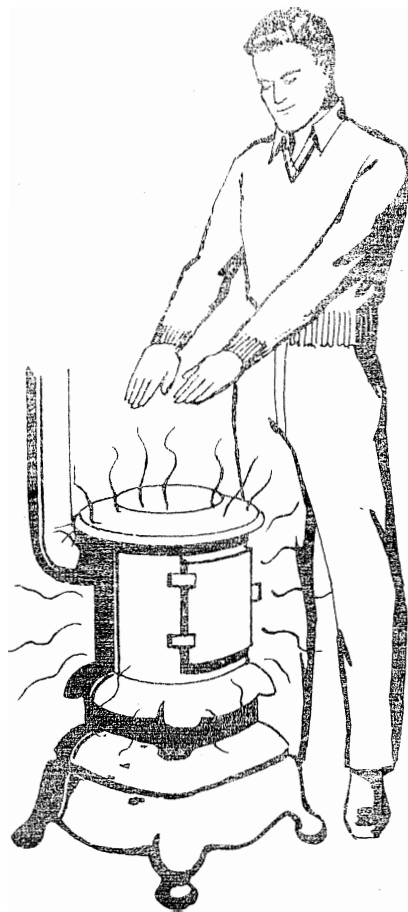


CONDUCTION



WATER HEATER

CONVECTION



STOVE

RADIATION

UNIT 2409

READING

HEAT

We *heard* (listened to) a good *lecture* (speech) on heat this morning. I thought the speech was going to be *dull* (uninteresting) when the speaker began to talk about *conduction* (transmission), *convection* (transfer of heat by moving masses of matter) and *radiation* (emission) of heat energy. However, the instructor made his subject interesting by using many familiar examples to explain those big words. In this part of his lecture, he explained the three ways in which heat travels.

We can understand radiation, as the speaker *explained* (pointed out), by thinking about how the earth receives its heat from the sun, or how things in a room are warmed by a stove. As I understand it, the sun and the stove *send out* (emit) heat waves in all directions. These radiated heat waves move just as water waves spread outward when a stone is thrown into a *body* (mass) of water. Heat waves coming from the sun *furnish* (supply) most of the heating of the earth and its atmosphere. The *uneven* (irregular) way in which this heating takes place is the cause of most weather.

Then he explained the *process* (method) of heating by conduction. We learned that there isn't any movement of *portions* (parts) of matter in conduction. This is not like water *moving* (flowing) through a pipe. Instead, the molecules *hit against* (strike) each other and *pass* (transmit) heat energy from one to another. A familiar example used by the instructor was an iron bar which conducts heat to parts that are not directly in contact with fire. We also learned that those *substances* (kinds of matter) which are good conductors of electricity are also good conductors of heat. Copper, *for instance* (for example), is a good conductor, and wood is a poor conductor. Among the liquids, mercury is the only good conductor.

The transfer of heat by conduction and convection is somewhat similar in that the substances heated are in contact with the source of heat. The instructor used the heating of water as an example of heat transfer by convection. When a *pan* (pot) of water is placed over fire, portions of water near the bottom become *less dense* (lighter) than the other parts. The warmer, lighter water moves upward. The colder, denser portions of the water move downward.

The process of convection is very important in the study of weather. An understanding of the process makes it easier for us to explain wind movements. The last part of the instructor's lecture was on the sources of heat and what heat does.

QUESTIONS ON THE READING

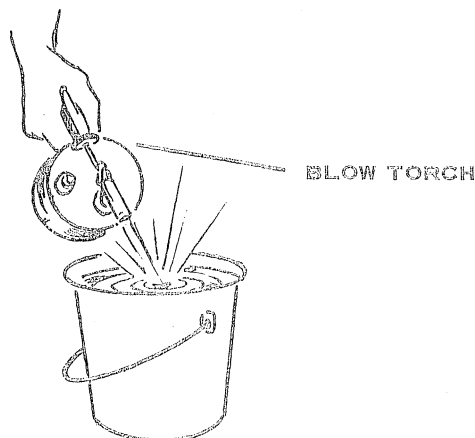
In most instances, students should answer each question with a complete sentence rather than with a word or phrase. This will give students more practice in structure.

1. Why did the writer think the lecture was going to be boring?
2. How did the speaker make his speech interesting?
3. Which factors of heat did he discuss first?
4. What is the name of the process by which the earth receives its heat?
5. What is the cause of most weather?
6. Explain how heat is transferred in a piece of metal.
7. Name some good and some poor conductors of heat.
8. Explain how a vessel of water is heated. What is the process called?
9. Explain how heat affects the density of water.
10. Why is the process of convection important?

QUESTIONS ON WORKBOOK UNIT 2409

1. What does the sun give to the earth?
2. How does heat move through space?
3. Why is a white shirt cooler than a black shirt?
4. How is heat transmitted in metal?
5. Is metal the only thing that transmits heat?
6. Why does cold air or water move downward?
7. Why does hot air or water move upward?
8. What is radiation?
9. What is conduction?
10. What is convection?
11. What is the difference between *reflect* and *absorb*?

12. What are the three ways heat is transmitted?
13. Is it true that heat can move through solids, liquids, and space? Give your reasons for your answers.
14. In the picture below, why would it be very difficult to heat water with a blow torch?



DICTATION

Procedure for Dictation

1. Instruct the students to close their books and to have paper and pencil ready.
2. Read the dictation exercise at normal speed. Students listen.
3. Give the instruction to students: "Now write."
4. Read the first sentence of the dictation *in normal pause groups*.
5. Read the first sentence of the dictation paragraph again, this time without pausing.
6. Follow procedure in 3, 4, and 5 for the remaining sentences.
7. Read the entire paragraph again. Have students check their work.
8. Collect papers and make necessary corrections.

HEAT

We can understand radiation, as the speaker pointed out, by thinking about how the earth receives its heat from the sun, or how things in a room are warmed by a stove. As I understand it, the sun and the stove emit heat waves in all directions. These radiated heat waves move just as water waves spread outward when a stone is thrown into a mass of water. Heat waves coming from the sun supply most of the heating of the earth and its atmosphere. The irregular way in which this heating takes place is the cause of most weather.

WORD STUDY

Substitution Exercise

First, practice repeating the following sentences after the instructor. Books closed.
Then, practice the sentences by substituting the italicized words. Books closed.

1. I thought the lecture was going to be uninteresting (*dull*).
2. The speaker pointed out (*explained*) three ways in which heat travels.
3. The sun emits (*sends out*) heat waves in all directions.
4. We saw a large body (*mass*) of water to the right.
5. The atmosphere is heated unevenly (*irregularly*).
6. I understand the process (*method*) of heating by conduction.
7. Molecules of heated metals hit (*strike*) against each other.
8. Heat energy is passed (*transmitted*) from molecule to molecule.
9. Copper, for instance (*for example*), is a good conductor of electricity.
10. A pan (*pot*) of water was placed over the fire.

Practice-Forming Questions

Read the sentence; then rearrange the sentence into a question.

1. Some metals *absorb* heat much faster than others.
2. An open window *admits* hot air. An open valve *admits* fuel.
3. The temperature *alternated* between hot and cold.
4. The transfer of heat *was* continuous.
5. Heat energy can be *converted* to mechanical power.
6. The engine was *designed* to be air-cooled.
7. The system was *equipped* with a thermostat.
8. The thermostat *regulates* the amount of heat.
9. The temperature was *reduced* from 180° to 120° F.
10. Temperature is *expressed* in degrees – Fahrenheit or centigrade.

GENERAL ENGLISH USAGE

Two-Word Verbs (Separable)

Here are some two-word verbs which are used frequently. Study the two-word verbs and the near equivalents.

1. look over = (review, examine)
2. pick out = (select)
3. take up = (discuss, introduce)
4. take over = (assume control)
5. carry out = (completely accomplish)
6. pass on = (give to another person)
7. cross out = (remove by drawing a line through)
8. bring up = (introduce, present)

Exercise 1.

Read the sentence twice, once with the regular verb and once with the two-word verb.

Example: Inspect the brake system carefully.
 (Look over) the brake system carefully.

1. Did he select *(pick out)* a blue tie?
2. The instructor discussed *(took up)* a new subject yesterday.
3. The new commander is going to assume control *(take over)* next week.
4. We must accomplish *(carry out)* the assignment.
5. Give *(pass on)* the paper to the next student.
6. Please draw a line through *(cross out)* the next sentence.
7. I'll introduce *(bring up)* the matter of two-word verbs tomorrow.

Now the instructor may ask you to substitute the italicized word after he reads the sentences. Books closed.

Exercise 2.

Students will read the following sentences to each other. The students who are listening will have their books closed. Also they will have to repeat what they hear. If a student does not understand, he will ask the student who is reading to repeat the sentence.

1. Look over the brake system carefully.
Look it over carefully.
You'd better look over today's lesson again.
You'd better look it over again.
2. Pick out the longer of the two bolts.
Pick it out.
It is easy to pick out the key words.
It is easy to pick them out.
3. We'll take up straight and level flight tomorrow.
We'll take it up tomorrow.
The instructor took up a new subject today.
The instructor took it up today.
4. The flight leader took over the new flight.
He took it over.
Who is going to take over the next project?
Who is going to take it over?
5. If you carry out the assignment, you will be rewarded.
If you carry it out, you will be rewarded.
They carried out your orders.
They carried them out.
6. Please pass on the information to all the men.
Please pass it on to them.
Will you pass on the list to the next man?
Will you pass it on to him?
7. Cross out the misspelled words.
Cross them out.
Let's cross out the last sentence and rewrite it.
Let's cross it out.
8. Norman brought up an interesting point.
Norman brought it up.
Steve brought up an interesting question.
Steve brought it up.

TAPE 2409A

Listen.

There are three ways in which heat travels. The three ways are CONDUCTION, CONVECTION, and RADIATION. Radiation is most easily understood by thinking about how the earth receives heat from the sun. Heat is emitted by the sun, transmitted through space, and absorbed by the earth.

Listen and repeat.

There are three ways in which heat travels.

conduction	*	convection	*	radiation	*
Heat travels by conduction, convection, and radiation.					*

radiates	*	radiates	*	
Heat radiates from the sun.				*
Heat radiates from the sun.				*
The earth is heated by radiation.				*
The earth is heated by radiation.				*

Repeat when you hear * Answer the question when you hear **

In how many ways does heat travel?	**
Heat travels in three ways.	*

(Remember to answer when you hear two tones.)

Heat travels by conduction, convection, and radiation.	*
What are the three ways in which heat travels?	**
Heat travels by conduction, convection, and radiation.	*
Heat travels by conduction, convection, and radiation.	*

by radiation	*	by radiation	*	
The earth is heated by radiation.				*
The earth is heated by radiation.				*
How is the earth heated?				**
The earth is heated by radiation.				*
The earth is heated by radiation.				*

emitted	*	emitted	*	
Heat is emitted by the sun.				*
Heat is emitted by the sun.				*
What is emitted by the sun?				**
Heat is emitted by the sun.				*

transmitted	*	transmitted	*
Heat from the sun is transmitted through space.			*
Heat from the sun is transmitted through space.			*
What is transmitted through space?			*
Heat from the sun is transmitted through space.			*
Heat from the sun is transmitted through space.			*

Listen.

There are three ways in which heat travels. The three ways are conduction, convection, and radiation. Conduction of heat occurs when heat is transmitted by a conductor. If you stir hot coffee with a metal spoon, the spoon soon feels warm. The heat from the coffee is conducted to your fingers by the spoon. The metal spoon is a conductor. This transfer of heat is called conduction. Heat is conducted in the same manner that electricity is conducted—through a conductor. In fact, substances which are good conductors of electricity are also good conductors of heat. A metal spoon will conduct heat better than a wooden spoon because metal is a better conductor of heat than wood. Metal is also better than wood as a conductor of electricity.

Repeat when you hear one tone. Answer when you hear two tones.

In how many ways does heat travel?	**
in three ways	*
Heat travels in three ways.	*
Heat travels by conduction, convection, and radiation.	*
What are the three ways in which heat travels?	**
by conduction, convection, and radiation	*
Heat travels by conduction, convection, and radiation.	*
Heat is conducted by a conductor.	*
What is heat conducted by?	**
by a conductor	*
Heat is conducted by a conductor.	*
Conduction is one way in which heat is transmitted.	*
Electricity is conducted by a conductor.	*
What conducts electricity?	**
a conductor	*
A conductor conducts electricity.	*
Good conductors of electricity are also good conductors of heat.	*

The three ways in which heat is transmitted are conduction, convection, and radiation. Convection is transfer of heat by means of a moving mass of matter. This mass of matter may be a liquid or a gas. The process of convection is especially important in the study of weather. If you understand the process of heating by convection, you can more easily understand wind movements.

Repeat when you hear *. Answer when you hear **.

Heat is transmitted by conduction, convection, and radiation. *

What are the three ways in which heat is transmitted? **

by conduction, convection, and radiation *

Heat is transmitted by conduction, convection, and radiation. *

by means of moving liquid or gas *

by means of moving liquid or gas *

Convection is transfer of heat by means of moving liquid or gas. *

Convection is transfer of heat by means of moving liquid or gas. *

What is convection? **

Convection is transfer of heat by means of moving liquid or gas. *

When air is heated it rises. *

What happens to air when it is heated? **

it rises *

When air is heated it rises. *

When water is heated it rises. *

What happens to water when it is heated? **

Water rises when it is heated. *

When a container of water is heated, the water level rises. *

convection current * convection current * convection current *

What is this movement of warm water called? **

a convection current *

This movement of warm water is called a convection current. *

When air is heated it rises. *

What does air do when it is heated? **

Air rises when it is heated. *

convection current * convection current *

This movement of warm air is called a convection current. *

What is a movement of warm air called? **

A movement of warm air is called a convection current. *

Listen.

Temperature is the degree of hotness or coldness measured on a certain scale. The instrument which is used to measure temperature is the thermometer. Temperature is usually measured by one of two scales – the centigrade scale or the Fahrenheit scale. The temperature at which water freezes is a reference point on both scales. Water freezes at zero degrees centigrade and 32 degrees Fahrenheit. The temperature at which water boils is another reference point. Water boils at 100 degrees centigrade or 212 degrees Fahrenheit.

Answer when you hear **. Give a complete answer. This time do not repeat the answer.

What instrument measures temperature? **

The thermometer measures temperature.

Thermometers usually use one of two temperature scales. What are these two scales? **

The two scales are the centigrade scale and the Fahrenheit scale. At what degree centigrade does water freeze? **

Water freezes at zero degrees centigrade. At what temperature centigrade does water boil? **

Water boils at 100 degrees centigrade. At what degree Fahrenheit does water boil? **

Water boils at two hundred twelve degrees Fahrenheit. At what degree Fahrenheit does water freeze? **

Water freezes at 32 degrees Fahrenheit.

Listen and answer.

In how many ways does heat travel? **

Heat travels in three ways. What are these three ways? **

Heat travels by conduction, convection, and radiation. By what means is the earth heated? **

The earth is heated by radiation. If you stir hot coffee with a metal spoon, the spoon soon feels warm. What kind of heat transfer is this? **

This type of heat transfer is called conduction.

Another type of heat transfer involves a moving mass of matter such as water or air. What is the name of this type of heat transfer? **

Convection. Convection is transfer of heat by means of a moving mass of matter.

2409B

Listen.

Two-word verbs are used very frequently in English. Usually two-word verbs consist of a verb plus a preposition. Two-word verbs are used idiomatically, and many times the meaning of the combination is difficult to find in the dictionary. Let's look at an example – PUT OUT. Put out means the same as EXTINGUISH. For example, we might say — “The fireman extinguished the fire.” or “The fireman PUT OUT the fire.” Two-word verbs are very important in English for two reasons. First, they are used very frequently and secondly, two-word verbs have idiomatic meanings and consequently are difficult to find in the dictionary. Let's practice some of the two-word verbs. LOOK OVER means to review or examine.

For example: “Did you examine the car?” “Did the mechanic examine the car?”
 “Yes, I looked over the car.” “Yes, he looked over the car.”

Listen to the following questions. Pay close attention to the forms of the verb – LOOK OVER and LOOKED OVER.

Answer the questions. Use one of these forms in your answer.

For example, you will hear the question: “Did you look over the car?” **
 You should answer: “Yes, I looked over the car.”

LOOK OVER * LOOKED OVER *
 LOOK OVER * LOOKED OVER *

Did you look over the car? **
 Yes, I looked over the car. *

Did he examine the car? **
 Yes, he looked over the car. *

Did he look over the book? **
 Yes, he looked over the book. *

Will you please look over the tires? **
 Yes, I will look over the tires. *

Did you look over the report? **
 Yes, I looked over the report. *

PICK OUT means to choose or select.

For example: “Did you choose a blue tie?” “Did you select a grey suit?”
 “Yes, I picked out a blue tie.” “Yes, I picked out a grey suit.”

Answer the following questions. Use PICK OUT or PICKED OUT in your answer. Repeat the correct answer.

PICK OUT	*	PICKED OUT	*
PICK OUT	*	PICKED OUT	*

Did you pick out a blue tie?	**
Yes, I picked out a blue tie.	*

Did you pick out a grey suit?	**
Yes, I picked out a grey suit.	*

Did he pick out a tape?	**
Yes, he picked out a tape.	*

Did she pick out a dress?	**
Yes, she picked out a dress.	*

Did you pick out the correct answer?	**
Yes, I picked out the correct answer.	*

TAKE UP means to discuss or introduce something.

For example, your instructor might say: "Tomorrow we will TAKE UP a new subject."

Answer the following questions. Use TAKE UP or TOOK UP in your answer.

TAKE UP	*	TOOK UP	*
TAKE UP	*	TOOK UP	*

Will we take up a new subject tomorrow?	**
Yes, we'll take up a new subject tomorrow.	*

Did you take up a new subject yesterday?	**
Yes, we took up a new subject yesterday.	*

Did he take up the subject of verbs?	**
Yes, he took up the subject of verbs.	*

Did they take up a new subject?	**
Yes, they took up a new subject.	*

Did he take up the subject of fuel?	**
Yes, he took up the subject of fuel.	*

TAKE OVER means to assume control.

For example: If the Commander is transferred, the Deputy Commander will TAKE OVER for a while.

Answer the following questions. Use TAKE OVER or TOOK OVER in your answer.

TAKE OVER	*	TOOK OVER	*
TAKE OVER	*	TOOK OVER	*

Did the operator take over the controls?	**
Yes, the operator took over the controls.	*

Did he take over the controls?	**
Yes, he took over the controls.	*

Did a new colonel take over the squadron?	**
Yes, a new colonel took over the squadron.	*

Will the new commander take over the school soon?	**
Yes, the new commander will take over the school soon.	*

Will you take over the controls?	**
Yes, I will take over the controls.	*

CARRY OUT means to completely accomplish something.

For example: When you receive military orders, you must CARRY OUT the orders.
 You must follow the orders.
 You must obey the orders.

Answer the following questions using CARRY OUT or CARRIED OUT in your answer.

CARRY OUT	*	CARRIED OUT	*
CARRY OUT	*	CARRIED OUT	*

Did he carry out the orders?	**
Yes, he carried out the orders.	*

Did they carry out the orders?	**
Yes, they carried out the orders.	*

Did you carry out the plans?	**
Yes, I carried out the plans.	*

Will he carry out the orders? **
Yes, he will carry out the orders. *

Will you carry out the orders? **
Yes, I will carry out the orders. *

CROSS OUT means to remove something by drawing a line through it.

For example: "He ~~CROSSED OUT~~ the misspelled word."

Answer the following questions using ~~CROSS OUT~~ or ~~CROSSED OUT~~.

~~CROSS OUT~~ * ~~CROSSED OUT~~ *
~~CROSS OUT~~ * ~~CROSSED OUT~~ *

Did he cross out the misspelled word? **
Yes, he crossed out the misspelled word. *

Did you cross out the incorrect answer? **
Yes, I crossed out the incorrect answer. *

Did he cross out the sentence? **
Yes, he crossed out the sentence. *

Will you please cross out this word? **
Yes, I will cross out this word. *

Will you please cross out my name? **
Yes, I will cross out your name. *

BRING UP means to introduce or present.

For example: Your instructor ~~BRINGS UP~~ new subjects every day.

Answer the following questions using ~~BRING UP~~ or ~~BROUGHT UP~~.

~~BRING UP~~ * ~~BROUGHT UP~~ *
~~BRING UP~~ * ~~BROUGHT UP~~ *

Do they bring up new subjects? **
Yes, they bring up new subjects. *

