

# Read It! Station Instructions

Each member of the group will read the passage and answer the questions from the task cards on the lab sheet in the Read It! section.

It is important to remember that the answers will come directly from the reading passage.

A circular label with a yellow, jagged, sunburst-like border. Inside the circle, the words "INPUT" and "STATION" are written in a bold, black, sans-serif font, stacked vertically.

**INPUT  
STATION**

# Sunscreen and Radiation

Have you ever gotten a sunburn on a hot summer day? The sun is constantly releasing **electromagnetic energy** – energy that is a combination of electrical and magnetic fields – in the form of **waves**. These waves cover a wide range of sizes and speeds, and this range is called the electromagnetic spectrum. We can see some portions of this spectrum as visible light. However, not all of the sun's energy can be detected by the naked eye, and these invisible waves can be dangerous.

The Sun is constantly bombarding you with invisible waves called **radiation**. Ultraviolet (UV) radiation is the form of radiation that travels faster than the light we can see, and there are two basic types: UVA and UVB. Scientists differentiate between these waves by their **wavelength**: the measure of the distance between two identical points in back-to-back waves. Ultraviolet A (UVA) travels more slowly and has a longer wavelength than Ultraviolet B (UVB).

Your body tries to protect itself from radiation through the production of melanin: a dark pigment that determines your skin color. After a summer of exposure to the sunshine, you may notice that you have developed a tan – the production of extra melanin over time. However, your skin's melanin cannot completely shield you from damage.

Over time, UVB radiation can cause your skin to burn, which causes redness and pain. UVA radiation penetrates deeper into your skin, which means it causes aging and wrinkling. Unfortunately, both forms of **ultraviolet light** can damage the DNA in your skin cells. Over time, this can lead to genetic mutations that cause skin cancer.

The good news is that you can enjoy the sunshine while limiting your risk of skin damage! Sunscreen can be applied to the skin in the form of sprays or lotions, and it protects your skin by reflecting or scattering light away from your skin. Sunscreens are rated by Sun Protection Factor (SPF), which describes how well they protect against UVB rays. No sunscreen can block 100% of UVB rays, but an SPF30 sunscreen can protect you from about 97% of UVB rays.

Theoretically, the SPF number on a sunscreen bottle compares your skin's protection with the sunscreen to your normal, bare skin. This means that an SPF50 sunscreen, when applied correctly, should allow you to stay in the sun 50 times longer without damage than you could without the sunscreen. However, this can all vary from person to person, depending on many factors: your skin's fairness, how much sunscreen remains after you've been sweating or exposed to water, and how well the sunscreen was applied.

# Sunscreen and Radiation

Have you ever gotten a sunburn? The sun is constantly releasing **electromagnetic energy** in the form of **waves**. This energy is a combination of electrical and magnetic fields. These waves have different sizes and speeds, and this range is called the electromagnetic spectrum. We can see some portions of this spectrum as visible light. However, not all of the sun's energy is visible, and these invisible waves can be dangerous.

The Sun is constantly bombarding you with invisible waves called **radiation**. Ultraviolet (UV) radiation travels faster than the light we can see. There are two basic types: UVA and UVB. Ultraviolet A (UVA) travels more slowly and has a longer **wavelength** than Ultraviolet B (UVB). Wavelength is the measure of the distance between two identical points in back-to-back waves.

Your body tries to protect itself from radiation by producing melanin. This is the dark pigment that determines your skin color. After lots of sun, you may develop a tan – the production of extra melanin over time. However, your skin's melanin cannot completely protect you from the sun. Over time, UVB radiation can cause your skin to burn. Sunburn makes your skin red and painful.

UVA radiation goes deeper into your skin and causes aging and wrinkling. Unfortunately, both forms of **ultraviolet light** can damage the DNA in your skin cells. Over time, this can lead to genetic mutations that cause skin cancer.

The good news is that you can enjoy the sunshine while limiting your risk of skin damage! Sunscreen can be used as a spray or lotion. It protects your skin by reflecting or scattering sunlight away from your skin. Sunscreens are rated by Sun Protection Factor (SPF). This describes how well they protect against UVB rays. No sunscreen can block 100% of UVB rays, but an SPF30 sunscreen can protect you from about 97% of UVB rays. A sunscreen's SPF number is meant to compare the sunscreen to your normal skin. This means that an SPF50 sunscreen should allow you to stay in the sun 50 times longer than you could without the sunscreen. However, this can all vary from person to person. Sunscreen is less protective if you are naturally paler, or if you are sweating or swimming while wearing sunscreen. Additionally, sunscreen is less protective when incorrectly applied.

**Input:  
Read  
It!**

1 of 4

1. Which statement is true about radiation?

- A. Radiation is the transfer of heat through electromagnetic waves
- B. Radiation is the transfer of heat through direct contact.
- C. Radiation is more dangerous than conduction.
- D. Radiation is the transfer of heat through liquids and gases.

**Input:  
Read  
It!**

3 of 4

3. Which is true about SPF ratings?

- A. The highest rating is 100% effective
- B. The rating number means it will protect you that many times longer than without sunscreen
- C. SPF ratings are only good in the summer
- D. SPF doesn't matter after 1pm.

**Input:  
Read  
It!**

2 of 4

2. Which is true about UVA and UVB rays?

- A. Both rays can be blocked 100% by sunscreen
- B. UVA protects the surface, UVB protects beneath the surface
- C. UVB rays cause burning, UVA rays cause premature aging
- D. UVA rays cause burning, UVB rays cause premature aging

**Input:  
Read  
It!**

4 of 4

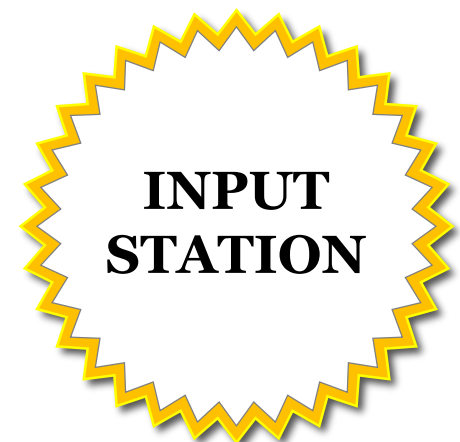
4. There are vocabulary words on your answer sheet. Use the space around them to jot down notes or drawings to help you remember their meanings from the reading.

# Watch It! Station Instructions

Each member of the group will go to the website listed on task card #1

Complete the task cards in order.

Every student will answer the questions from the task cards on the lab sheet in the Watch It! section of the lab sheet.



**Input:  
Watch  
It!**

1 of 4

Visit "Study Jams: Heat",  
<http://studyjams.scholastic.com/studyjams/jams/science/energy-light-sound/heat.htm>

Click Play on the video.

Answer questions from cards #2-4 on your lab sheet.

**Input:  
Watch  
It!**

2 of 4

1. What is heat?

**Input:  
Watch  
It!**

3 of 4

2. After watching the examples in the video of radiation, list 2 other examples that you come up with on your own.

**Input:  
Watch  
It!**

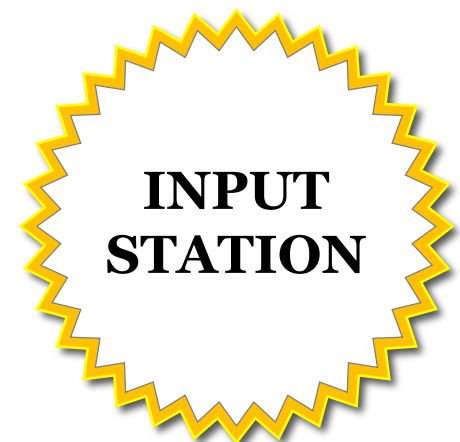
4 of 4

3. Explain what convection is and provide an example.

# Explore It! Station Instructions

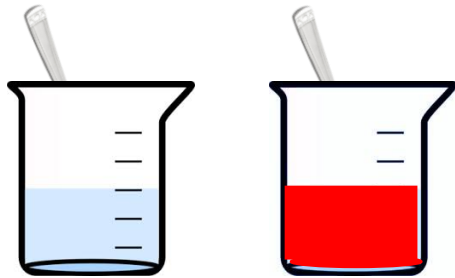
One member of the group will read the task cards in order. The group will be responsible for completing each of the tasks that are being read.

Each member of the group will then write their conclusions down on the lab sheet in the Explore It! section.



Input:  
Explore  
It!

1 of 6



1. Touch the metal in the cold water and then touch the metal in the warm water. Make some observations on your lab sheet.

Input:  
Explore  
It!

2 of 6

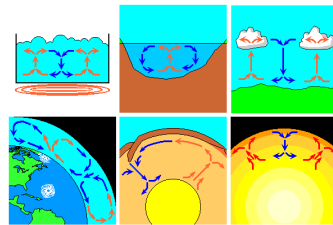
Heat always transfers from hotter objects to cooler objects.

When two objects are in direct contact with each other (touching), heat is able to transfer. This is called **conduction**.

2. Come up with two other examples of conduction on your lab sheet.

Input:  
Explore  
It!

3 of 6



3. Use the large diagram at the station to make some observations about how heat is transferring in each of these situations. Are there any similarities? What are they?

Input:  
Explore  
It!

4 of 6

When heat flows through a liquid or a gas it is called **convection**.

Earth's mantle, Earth's oceans, and Earth's atmosphere contain **convection currents**.

4. Come up with two other specific examples of convection on your lab sheet.



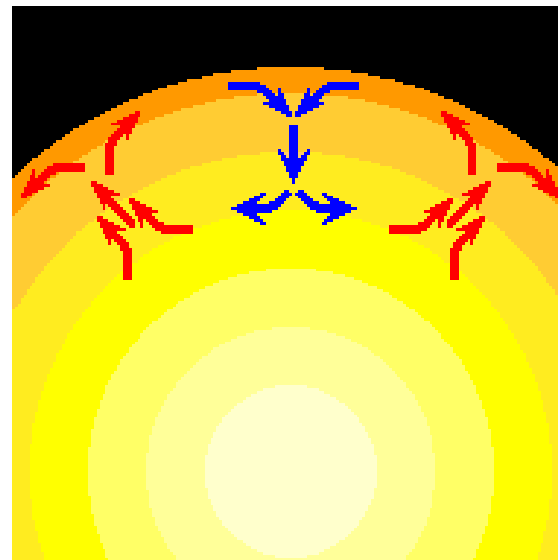
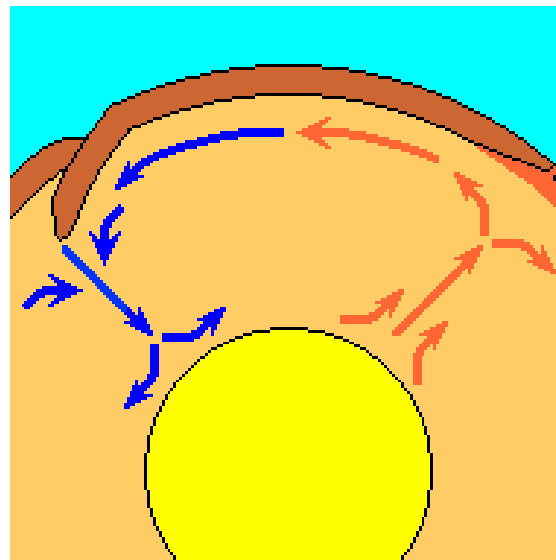
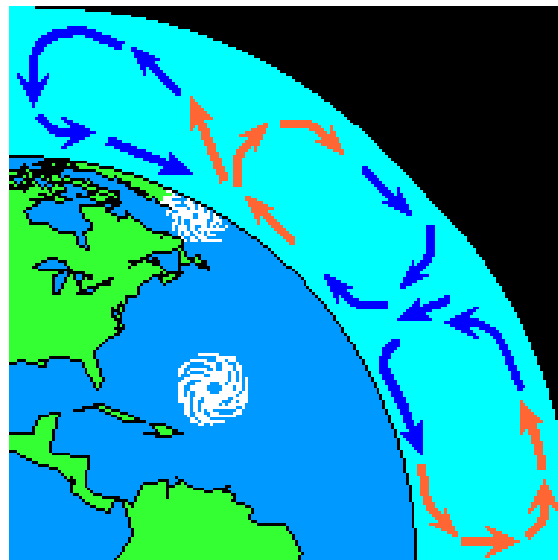
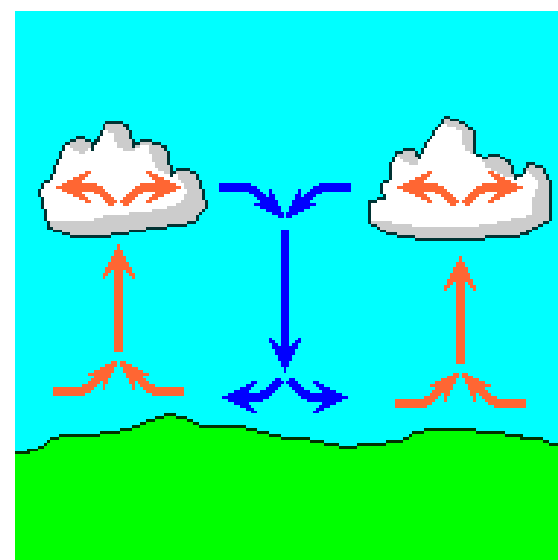
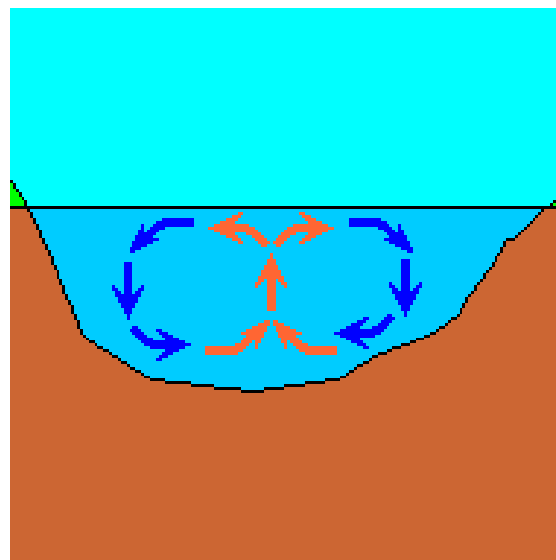
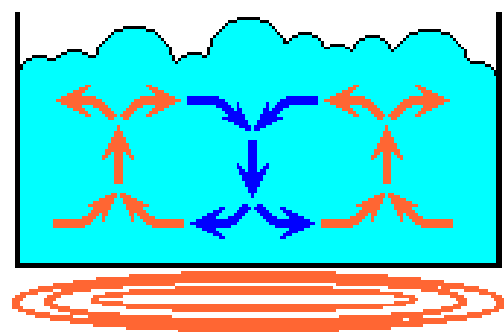


5. Look at the lamp at the station and make some observations about how heat flows from the lamp. You may place your hands close to the lamp, but do not touch it.

When heat is transferred through electromagnetic or radio waves it's called **radiation**.

The objects are not touching each other in the example of radiation.

6. Come up with two other examples of radiation on your lab sheet.

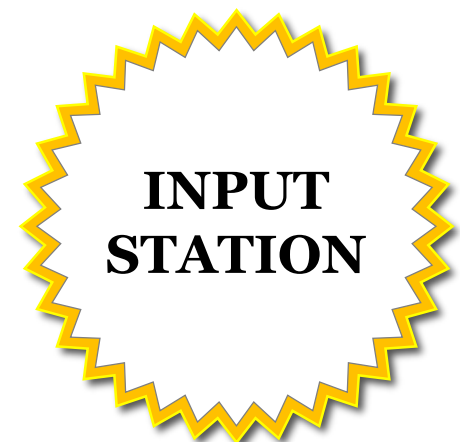


# Research It! Station Instructions

Each member of the group will go to the website listed on task card #1

Complete the task cards in order.

Every student will answer the questions from the task cards on the lab sheet in the Research It! section.



**Input:  
Research  
It!**

1 of 4

Go to "WISC Online: Heat Transfer" <https://www.wisc-online.com/learn/abell/science/sce304/heat-transfer-conduction-convection-radiation>

1. On your lab sheet, describe how heat transfers from one object to another.

**Input:  
Research  
It!**

2 of 4

Click on the **Radiation** tab.

2. Read the radiation text and summarize the information on your lab sheet.

Play the animation

3. Click on examples and list 2 of them on your lab sheet.

**Input:  
Research  
It!**

3 of 4

Click on the **Conduction** tab.

4. Read the conduction text and summarize the information on your lab sheet.

Play the animation

5. Click on examples and list 2 of them on your lab sheet.

**Input:  
Research  
It!**

4 of 4

Click on the **Convection** tab.

6. Read the convection text and summarize the information on your lab sheet.

Play the animation

7. Click on examples and list 2 of them on your lab sheet.

# Organize It! Station Instructions

It is recommended that you have completed at least **two** of the following stations before working at this station.

- Read It!
- Explore It!
- Watch It!
- Research It!

Each group will organize the cards. Each of the cards will be used.

Please mix up the cards again before the next group arrives at this station.

A yellow, jagged-edged circular badge with a black outline. Inside the badge, the words "OUTPUT STATION" are written in a bold, black, sans-serif font.

## OUTPUT STATION

Do at least two  
input stations  
before this.

Radiation

Water in a boiling pot of  
macaroni

Siding down a hot metal  
slide in August

Currents deep within the Earth that  
cause tectonic plates to move

Conduction

Burning yourself with a  
curling iron

An ocean breeze

Convection

Microwave cooking food

Getting sunburned on a beach

Touching a hot car seat in the  
summer

# Illustrate It! Station Instructions

Each member of the group will draw a quick sketch on the lab sheet that shows they understand the concept being taught.

Use the colored pencils and markers that are provided.

The directions for the sketch are provided on the task card at the table.

Use the colored pencils to draw 3 different pictures that illustrate the concept of **convection, conduction, and radiation**.

Be sure to include labels for each of your images and a brief summary of what each term means.

A yellow starburst graphic with a jagged, sun-like border. Inside the starburst, the text "OUTPUT STATION" is written in a bold, black, sans-serif font.

## OUTPUT STATION

Do at least two  
input stations  
before this.

# Assess It! Station Instructions

It is recommended that you have completed at least **two** of the following stations before working at this station.

- Read It!
- Explore It!
- Watch It!
- Research It!

Each member will answer the questions from the task cards on the lab sheet in the Assess It! section.

A circular badge with a yellow, jagged, star-like border. Inside the badge, the text "OUTPUT STATION" is written in a bold, black, sans-serif font.

## OUTPUT STATION

Do at least two  
input stations  
before this.



**Output:  
Assess  
It!**

1 of 4

1. Which statement is true about heat transfer?

- A. Heat can only transfer when touching another object
- B. Heat always travels up
- C. Heat transfers from cooler to warmer objects
- D. Heat transfers from hotter to cooler objects

**Output:  
Assess  
It!**

2 of 4

2. Which situation best represents conduction?

- A. Heat from a campfire
- B. A hot air balloon taking off
- C. Touching a hot piece of metal
- D. Getting sunburned

**Output:  
Assess  
It!**

3 of 4

3. Which situation best represents convection?

- A. Heat from a campfire
- B. A hot air balloon taking off
- C. Touching a hot piece of metal
- D. Getting sunburned

**Output:  
Assess  
It!**

4 of 4

*Use the vocabulary words from "Read It" to complete the following sentences.*

Sound and light are both found as (4)\_\_\_\_\_, with a variety of (5)\_\_\_\_\_. The sun, a source of light waves specifically, releases a type of (6)\_\_\_\_\_. The sun emits invisible (7)\_\_\_\_\_. It can be found as UVA or UVB types. These lights give off different levels of (8)\_\_\_\_\_, some of which can be harmful.

# Write It! Station Instructions

It is recommended that you have completed at least **two** of the following stations before working at this station.

- Read It!
- Explore It!
- Watch It!
- Research It!

Answer each of the task card questions on the lab sheet in **complete sentences**.

A circular badge with a yellow, jagged, star-like border. Inside the badge, the text "OUTPUT STATION" is written in a bold, sans-serif font.

## OUTPUT STATION

Do at least two  
input stations  
before this.

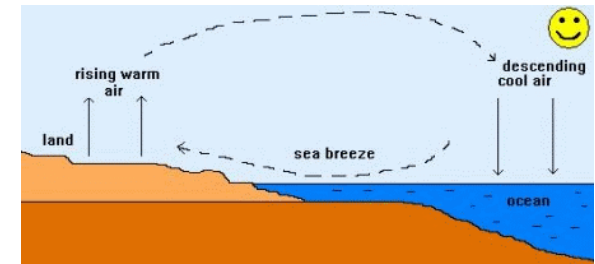
**Output:  
Write  
It!**

1 of 3

1. Explain the difference between conduction, convection, and radiation.

**Output:  
Write  
It!**

2 of 3



2. Explain what is happening in this diagram. Also, describe what heat transfer process is taking place.

**Output:  
Write  
It!**

3 of 3

3. Explain why it's much colder at the bottom of a pool than at the top. Also, describe what heat transfer process(es) is taking place.

# Challenge It! Station Instructions

All other stations must be completed before you begin this station.

Using the task cards provided, choose one or more challenge to complete.

Your completed challenge(s) will be checked by the teacher and/or attached to your answer sheet.

A yellow starburst graphic with a jagged, sun-like border, containing text about a bonus station.

## **BONUS STATION**

Do all the input  
and output  
stations first!

**Output:  
Challenge  
It!**

1 of 4

## FLASHCARDS

Select at least 10 vocabulary terms from this lab. Use index cards to create flashcards of the vocabulary terms and definitions.

**Output:  
Challenge  
It!**

3 of 4

## QUIZ

Write at least 10 quiz questions that could be used to test your classmates on the topics learned in this station lab.

**Don't forget to include an answer key!**

**Output:  
Challenge  
It!**

2 of 4

## COMIC STRIP

Create a comic strip with at least four panels that illustrate conduction, convection, and radiation. You must use all of the vocabulary words from "Read It" and at least one illustration per panel.

**Output:  
Challenge  
It!**

4 of 4

## COMPARE & CONTRAST

Create a chart that compares and contrasts: conduction, convection, and radiation. Attach your chart to your lab worksheet.

## Read It!

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. electromagnetic energy

waves

radiation

wavelength

ultraviolet light

## Conduction Convection Radiation Station Lab



Name \_\_\_\_\_ Date \_\_\_\_\_

## Research It!

1. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
5. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
6. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
7. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Watch It!

1. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Explore It!

1. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
5. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
6. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Challenge It!

(Do when ALL other stations are done)

☐ Checked by teacher. Initials: \_\_\_\_\_

☐ Attached

## Illustrate It!

## Assess It!

(use the Read It! words as your word bank for 4 - 8.)

- |          |          |
|----------|----------|
| 1. _____ | 4. _____ |
| 2. _____ | 5. _____ |
| 3. _____ | 6. _____ |
|          | 7. _____ |
|          | 8. _____ |

## Organize It!

Radiation

Conduction

Convection

## Write It!

1. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Read It!**

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_

4. electromagnetic energy

waves

radiation

**Conduction Convection Radiation Station Lab**



Name \_\_\_\_\_ Date \_\_\_\_\_

wavelength

ultraviolet light

**Watch It!**

- 2. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- 3. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- 4. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Explore It!**

- 1. \_\_\_\_\_  
\_\_\_\_\_
- 2. \_\_\_\_\_  
\_\_\_\_\_
- 3. \_\_\_\_\_  
\_\_\_\_\_
- 4. \_\_\_\_\_  
\_\_\_\_\_
- 5. \_\_\_\_\_  
\_\_\_\_\_
- 6. \_\_\_\_\_  
\_\_\_\_\_



## Illustrate It!

## Assess It!

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

Word Bank for 4 - 8:

- electromagnetic energy
- waves
- radiation
- wavelength
- ultraviolet light

## Organize It!

Radiation

Conduction

Convection

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_