

The Tale of Three Colors

Work Sheet 2

(You can either use Work Sheet 1 or Work Sheet 2 for this activity.)

Radiation is the transfer of heat energy by electromagnetic waves such as ultraviolet waves, visible waves, infrared waves, and microwaves. Therefore, radiation does not require any certain material to go through like conduction and convection heat transfer does. It is heat that can go through anything—outer space, air, bricks, wood, soil, and metal just to name a few. Many people think that radiation radiates only downward because heat radiated from the sun appears to radiate down. Radiation heat transfer actually radiates heat out in all directions from the energy source. Examples of radiation energy sources are the sun, fire, toaster, microwaves, heat lamps, ovens, light bulbs, space heaters, and embers in a fire after the flames are gone. In other words, anything that gives off heat is radiation heat transfer. So anytime you put your hand near something that giving off heat and you can feel that heat, it is radiation heat transfer. Also, any object that has more heat energy than another object radiates heat to the cooler object. This is the reason a room heats up quickly when it is filled with hot student bodies.

Experiment One

1. Get a piece of black, white, and any other color construction paper. Cut out a 4" x 8" piece from each color. Put tin foil around the any other color construction paper. Put a thermometer on top of each flat paper. Read the beginning temperatures of each thermometer and record them.

Black flat paper beginning temperature: _____

White flat paper beginning temperature: _____

Tin foil flat paper beginning temperature: _____

2. Put the three papers under a heat lamp. After 10 minutes read the final temperatures of each thermometer and record them. On the second line, write the temperature change.

Black flat paper final temperature: _____ (1)

White flat paper final temperature: _____ (2)

Tin foil flat paper final temperature: _____ (3)

Experiment Two

1. Get a piece of black, white, and any other color construction paper. Put tin foil around the any other color paper. Make boxes out of the three pieces of construction paper. Put a thermometer into each box. Read the beginning temperatures of each thermometer and record them.

Black box beginning temperature: _____

White box beginning temperature: _____

Tin foil box beginning temperature: _____

2. Put the three boxes under a heat lamp. After 10 minutes read the final temperatures of each thermometer and record them. On the second line, write the temperature change.

Black box final temperature: _____ (4)

White box final temperature: _____ (5)

Tin foil box final temperature: _____ (6)

Experiment Three

1. Get a piece of black, white, and any other color construction paper. Put tin foil around the any other color paper. Make envelopes out of the three pieces of construction paper. Put a thermometer into each envelope. Read the beginning temperatures of each thermometer and record them.

Black envelope beginning temperature: _____

White envelope beginning temperature: _____

Tin foil envelope beginning temperature: _____

2. Put the three envelopes under a heat lamp. After 10 minutes read the final temperatures of each thermometer and record them. On the second line, write the temperature change.

Black envelope final temperature: _____ (7)

White envelope final temperature: _____ (8)

Tin foil envelope final temperature: _____ (9)

Rerecord each of the temperatures change below so we can compare the three different temperatures of the three paper constructions with each other.

Black paper final temperatures

Black flat paper final temperature change: _____ (1)

Black box final temperature change: _____ (4)

Black envelope final temperature change: _____ (7)

White paper final temperatures

White paper final temperature change: _____ (2)

White box final temperature change: _____ (5)

White envelope final temperature change: _____ (8)

Tin foil final temperature

Tin foil paper final temperature change: _____ (3)

Tin foil box final temperature change: _____ (6)

Tin foil envelope final temperature change: _____ (9)

1. What do you see that is different between each of the temperatures of each of the paper constructions?
2. What is your conclusion of what you discovered?
3. What is a real world connection to this experiment?