Name: _____   Date: _____

Cloud Opacity Experiment

Required materials:

- 3 thermometers*
- pencil
- 3 identical, clear, food containers with the lids off* (large enough to hold a thermometer inside)
- Tape
- 1 bag of cotton balls (to represent clouds)
- 3 pieces of black construction paper large enough to fit under each container*
- 1 stopwatch or timer

Fahrenheit Thermometer

*Alternatives: You may use a desk lamp with an incandescent light bulb. Energy efficient light bulbs will not work.*
If materials are limited, you may opt to use 1 food container and 1 thermometer, testing the models individually.

Setup:

1. Find a sunny area outside.
2. Measure and record the air temperature_____°F
3. Remove the lids on all of the containers and turn the containers upside down.
4. Tape a thick layer of cotton balls to ½ of the outside of one of the containers. These will represent cumulus clouds.
5. Pull apart a few cotton balls and tape them in a very thin layer across ½ of the outside of the second container. These will represent cirrus clouds.
6. Leave the third food container as is. This will represent a clear sky.
7. Sketch a picture to represent each of the containers you made in the chart.
8. Lay down the black paper and place the food containers with the tops removed upside down on the paper.
9. Place a thermometer underneath each of the containers where the clouds produce a shadow.
10. Position the containers so each will receive an equal amount of sunlight.
11. Record the starting temperature for all 3 containers in the data table. All of the thermometers should read the same temperature.
12. Complete the remainder of the data table, recording the temperature in each container every minute for 6 minutes. When checking the temperature, gently lift the container and quickly take a reading.

Cumulus Clouds side view
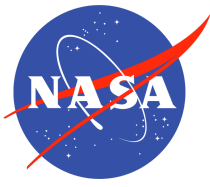*Note that the cotton balls are on top of the thermometer bulb*
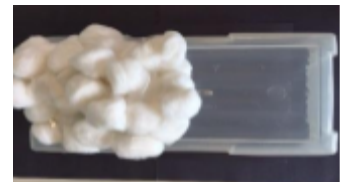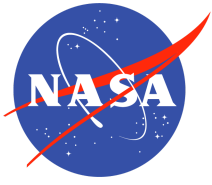
Cumulus Clouds top view

Cirrus Clouds top view

This activity was modified from the original NASA EPDC Badging - Earth Cloud Experiment.

Name: _____   Date: _____

	Temperature Measurements in ^{0}F							Temperature difference ^{0}F *final temperature − starting temperature*
	0 minutes	**1 minute**	**2 minutes**	**3 minutes**	**4 minutes**	**5 minutes**	**6 minutes**	
#1 Clear container *Clear sky*								
#2 Cloudy container *Cumulus clouds*								
#3 Cloudy container *Cirrus clouds*								

Name: _____   Date: _____

<u>Draw Conclusions:</u>

1. Identify 3 similarities and 3 differences between the tubs you tested.

2. Which cloud conditions, scenario 2 or 3, resulted in the higher temperatures?

3. Why do you think this happened?

4. Which scenario resulted in the lowest temperatures?

5. How are the different temperatures related to the opacity of the clouds?