Insulating You, Insulating Earth
Answer Key

Your Group		
Time	**A. Towel Temp.**	**B. Towel + Mylar Blanket Temp.**
Lap	***28°C***	***26°C***
[illegible]minutes	***29°C***	***28°C***
[illegible]minutes	***29°C***	***29°C***
3 minutes	***29°C***	***30°C***
4 minutes	***30°C***	***31°C***
5 minutes	***30°C***	***32°C***

Student answers will vary, sample data shown

A. Towel Difference

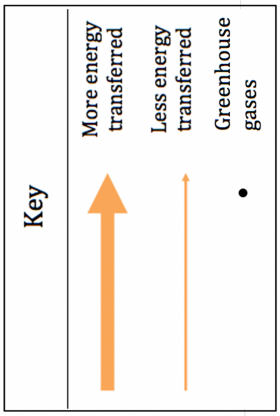
30 °C − ***28*** °C = ***2*** °C
5 min. Lap Difference

B. Towel + Mylar Blanket Difference

32 °C − ***26*** °C = ***6*** °C
5 min. Lap Difference

Whole Class		
Group	**A. Towel Difference**	**B. Towel + Mylar Blanket Difference**
Group 1	***2°C***	***6°C***
Group [illegible]	***4°C***	***6°C***
[illegible]	***1°C***	***5°C***
Group 4	***3°C***	***4°C***
Group 5	***2°C***	***7°C***
Group 6	***0°C***	***3°C***
Group 7	***1°C***	***4°C***
Group 8	***5°C***	***7°C***
Mean	***2.3°C***	***5.3°C***

Student answers will vary, sample data shown



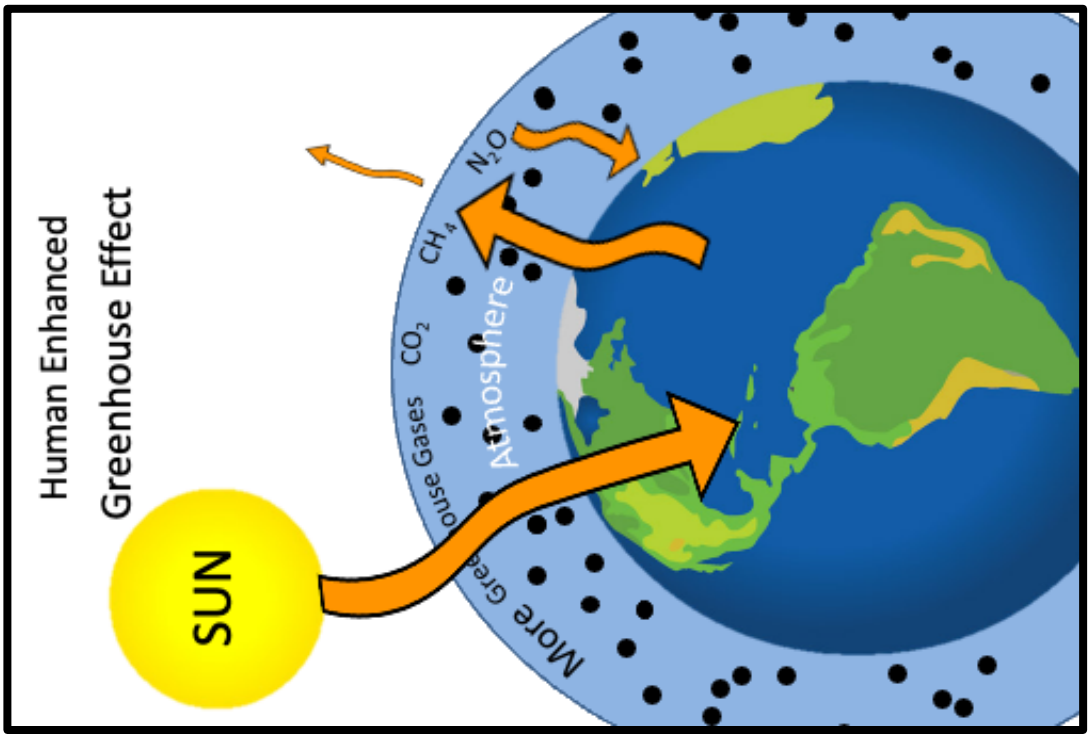


Figure 2.

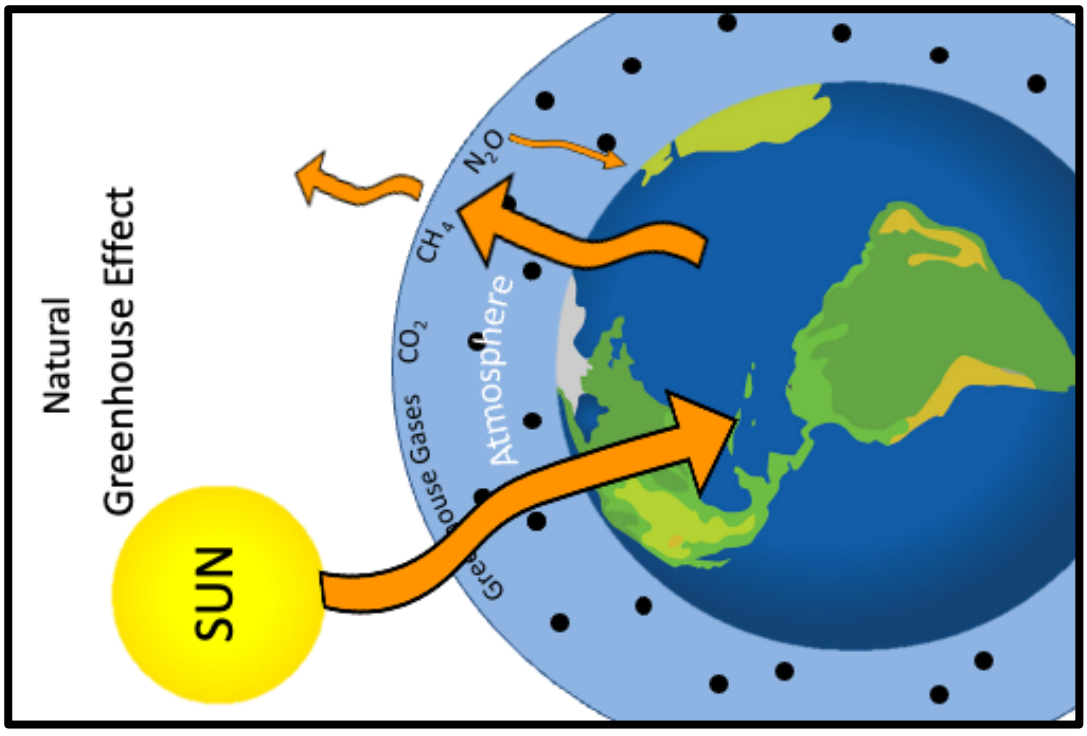


Figure 1.

Understanding the Model

1. Fill in the blanks below to indicate which component in model represents which component of the greenhouse effect (Circle one for each).

   Earth was modeled by the (Lap) / Towel / Mylar Blanket

   The atmosphere was modeled by the Lap / (Towel) / Mylar Blanket

   Additional carbon dioxide was modeled by the Lap / Towel / (Mylar Blanket)

Results

2. In your group, which trial had the greater temperature difference? (Circle one.)

   a. Towel

   b. Towel + Mylar blanket

   c. Same in both trials

   This is usually the case

3. In the whole class data, which trial had the greater mean difference? (Circle one.)

   d. Towel

   e. Towel + Mylar blanket

   f. Same in both trials

   This is usually the case

4. Review your answer to the results question #2. Looking at the trial that you circled, why do you think that it had a greater difference in temperature, or if it was the same, why do you think that occurred?
   The trial with the towel and the mylar blanket had a greater difference in temperature because adding the mylar blanket provided additional insulation, trapping more thermal energy.

Conclusions

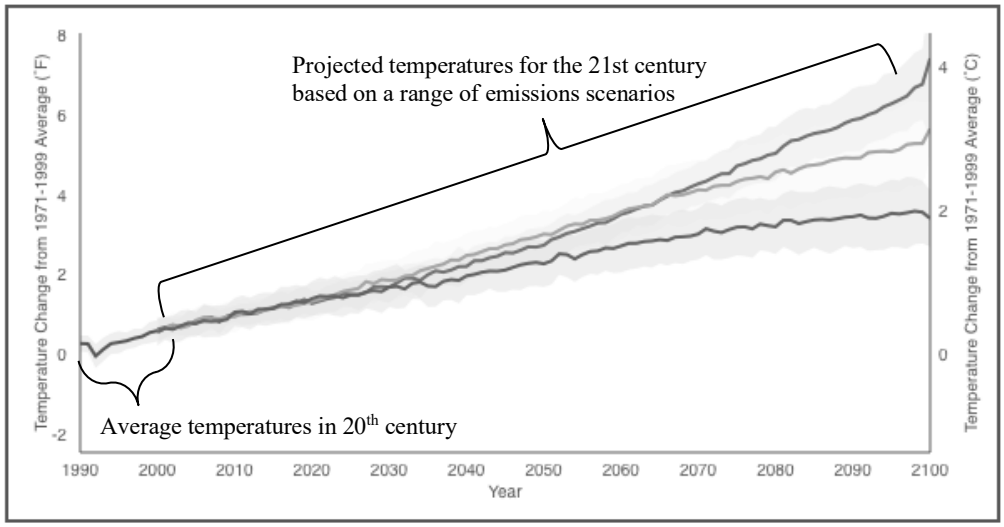
5. How do changes in the amount of greenhouse gases in the Earth's atmosphere affect surface temperatures?
   As carbon dioxide and other greenhouse gases are continually added to the atmosphere, more thermal energy will be trapped, causing a warming affect.

6. Think back to Climate Data Jam and Ready Set Grow. What are the expected impacts of climate change in New Mexico in the future? How is increased CO_2 related to increasing temperatures and changing precipitation patterns in New Mexico?
   Warming surface temperatures caused by increased atmospheric CO_2 levels leads to increased drought and unpredictable precipitation patterns in New Mexico.

7. What can you do to decrease the rate of climate change due to the enhanced greenhouse effect?
   Student answers will vary but should indicate an action that would decrease the amount of greenhouse gases released to the atmosphere.

Extension

Figure 3. Global Temperature Projections. The graph shows the average of a set of temperature simulations for the 20th century (single line), followed by projected temperatures for the 21st century based on a range of emissions scenarios (three lines). The shaded areas around each line indicate the statistical spread (one standard deviation) provided by individual model runs.
Source: www.climate.gov/news-features/understanding-climate/climate-change-global-temperature-projections



Use the Global Temperatures Projections graph (Fig. 3) to answer the following questions.

1. Examine the scenario with the warmest projected temperatures (top line). In the scenario with the warmest projected temperatures, approximately how much is the temperature projected to increase (in degrees Celsius) in the 21st century, from the year 2000 to the year 2100?

   Approximately 4 °C

2. Examine the scenario with the lowest projected temperatures (bottom line). In the scenario with the lowest projected temperatures, approximately how much is the temperature projected to increase (in degrees Celsius) in the 21st century, from the year 2000 to the year 2100?

   Approximately 2 °C