Earth’s Changing Climates Answer Key

1. What do the colors indicate about the change in average temperature over time from 1880 to 2012?
   The colors show that the average temperature increased between 1880 and 2012.

2. In the past 50 years, where has the temperature changed the most?
   In the past 50 years, the temperature has changed the most in the northern hemisphere, particularly in the Arctic.

3. Describe the average temperature change from 1880 to 2010.
   The average temperature increased about 0.8°C between 1880 and 2012.

4. Why is the curve relatively flat between 1950 and 1980?
   The curve is relatively flat between 1950 and 1980 because this time period forms the reference temperature. The change in temperature is measured from the 1950-1980 baseline.

5. The green bars are called “error bars.” They indicate the range of uncertainty that scientists have about the data on the graph. (Note: Not all error bars are shown.) Why do you think these error bars are smaller near the year 2000 than in the 1890s?
   The error bars are smaller near the year 2000 than in the 1890s because the measurement instruments were more accurate in the recent past than in the distant past.

6. Why is the black line so much more variable than the red line? What’s the difference between the data they show?
   The black line is more variable than the red line because the black line shows annual data while the red line shows the 5-year average. Year-to-year, the temperature can be more variable than it is over a longer period of time. The longer period of time smooths out extreme weather events.

7. Take a snapshot of the graph, and then draw your prediction on the graph.
   My prediction shows a temperature increase in the future.
8. Explain why you drew the prediction curve as you did.

I drew the prediction curve with increasing temperature because it follows the recent trend.

9. How certain are you about your prediction based on your explanation?

Answers will vary.

10. Explain what influenced your certainty rating.

Answers will vary.

11. Why do you think the winter layers are darker than the summer layers in the ice core?

The winter layers are darker than the summer layers because little snow falls in the winter. The snow that does fall is mixed in with particulate matter that blows in from around the world. The summer layers are lighter because the snow that falls in the summer is cleaner; there are fewer particles caught in the snowfalls.

12. The trend in the graph shows short warm periods between long periods of highly variable cold climate. Which statement is supported by the information in the graph?

The graph shows that the temperature for the past 10,000 years, compared with the previous 400,000 years, has been getting warmer.

13. Describe how current climate trends (from 1880 to 2012) might change the pattern of warming and cooling shown on the Vostok ice core graph.

Current climate trends (from 1880 to 2012) have shown temperatures increasing. If temperatures continue to increase, there will not be a period of cooling that follows the periods of warming shown in the Vostok ice core records. It may get too warm to be able to get so cold in the same pattern that happened over the past 450,000 years.

14. Explain how scientists can be both fairly certain that Earth is warming and still actively researching the unknown factors.

Scientists can be fairly certain that Earth is warming because recent temperature data show warming. But they don’t know all of the reasons that Earth is warming; there are many factors that can interact to change Earth’s temperature. So they have to continue their research to learn how all of those factors interact with each other to be able to predict future warming with more accuracy.