

Understanding and Responding to Climate Change: Highlights of National Academies Reports

Comprehension Questions (for use with *Understanding and Responding to Climate Change: Highlights of National Academies Reports*):

1. Use the text and figure 1 to explain the “greenhouse effect.”
2. Define Climate.
3. *What types of evidence did scientists consider when noting the rising temperatures since 1978? What were some explanations scientists considered to account for the increased temperatures?*
4. Describe radiative forcing.

Answer Key

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1. Use the text and figure 1 to explain the “greenhouse effect.” *[anno: Greenhouse gases, such as water vapor, carbon dioxide, methane, and other gases in Earth’s atmosphere, allow sunlight to enter but prevent some heat from escaping the atmosphere, keeping the Earth’s surface warmer than it would be if there were no atmosphere. The greenhouse effect is a natural phenomenon, but because of human activities, like burning fossil fuels, the greenhouse effect has been amplified and the Earth’s surface is warming at a faster rate than ever before in recorded history.]*
2. Define Climate. *[anno: Climate can be defined as the long-term average of weather conditions, such as temperature, cloudiness, and precipitation.]*
3. What types of evidence did scientists consider when noting the rising temperatures since 1978? What were some explanations scientists considered to account for the increased temperatures? *[anno: When scientists began noting the high rate of increase in temperatures, they also considered evidence of temperature increases based on ocean temperatures, shrinking mountain glaciers, and decreasing polar ice cover. They considered the possibilities that higher temperature readings were due to changes in the Sun, the “urban heat-island” effect, or flaws in surface temperature measurements, but each of these possibilities has been discounted as explaining the recent temperature increases.]*
4. Describe radiative forcing. *[anno: Radiative forcing is the change in the balance of radiation (heat and energy) coming into the atmosphere and the radiation going back out. Positive radiative forcings, such as excess greenhouse gases, tend to warm the Earth, while negative radiative forcings, such as volcanic eruptions and many human-produced aerosols, tend to cool the Earth.]*
5. Who are the IPCC? *[anno: The Intergovernmental Panel on Climate Change involves the scientific community in assessing the state of climate change science.]*

Comprehension Questions Answer Key (for use with *Understanding and Responding to Climate Change: Highlights of National Academies Reports*), continued:

6. What could the consequences of “freshening” North Atlantic water be? [*anno: “Freshened” water from melting ice caps could potentially trigger a climate change that would make it cooler in northern Europe. This is because “freshened” water would prevent the formation of chilled salty water and therefore disrupt the natural ocean circulation that brings warmer Gulf Stream waters to the north and cooler waters to the south.*]
7. What causes the yearly cycle in CO₂ concentrations as described in Figure 8? [*anno: The yearly up-and-down fluctuations reflect changes in CO₂ due to the seasonal increases and decreases in vegetation in the Northern Hemisphere. As plants grow during Northern Hemisphere’s spring and summer, they remove CO₂ from the atmosphere via photosynthesis. When plants decay during fall and winter, some CO₂ is released back into the atmosphere.*]
8. List the assumptions considered for Figure 10. Pick one and discuss your opinion of its impact on projected global temperatures? [*anno: Future population growth, Economic development, Energy use, Policy choices*]
9. Using Figure 11 to describe how climate change impacts health, agriculture, forest, water resources, coastal areas, species and natural areas. [*anno: Health: climate change can cause higher weather-related mortality, changes in the transmission of infectious diseases, and can affect air-quality related respiratory illnesses. Agriculture: climate change may cause changes in crop yields and could affect the level of irrigation needed. Forest: climate change may affect the composition, geographic ranges, and health and productivity of forests. Water resources: climate change may affect the supply and quality of water, which could cause competition for water resources. Coastal areas: climate change may affect beach erosion and the inundation of coastal lands, and could increase the cost of protecting coastal communities. Species and natural areas: climate change could cause loss of habitat and loss of biodiversity.*]
10. Respond to this book.