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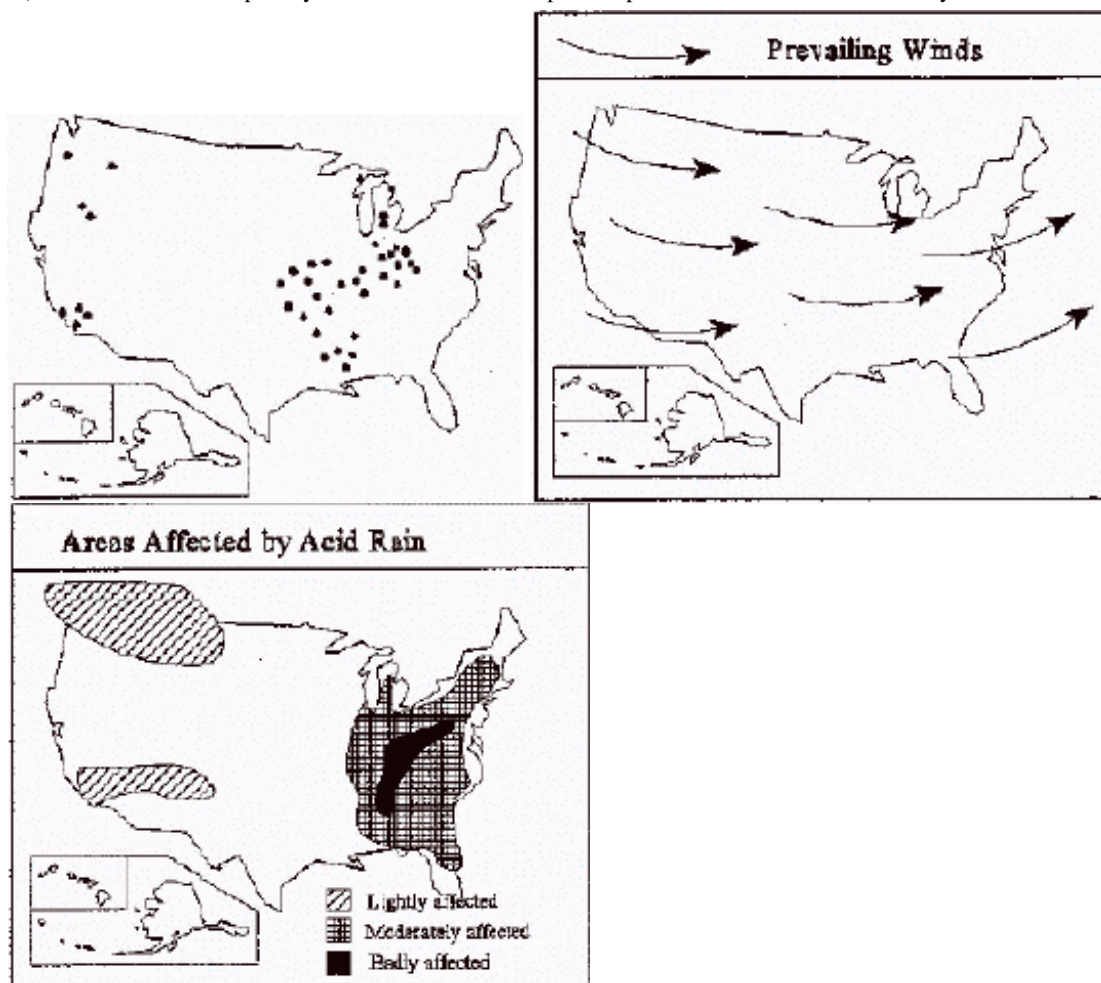
1) Why is it important to know terms such as geosphere, biosphere, and hydrosphere?

- A. You cannot understand the concepts with them
- B. It is a convenient and short way to describe a concept
- C. Scientists have a code that they use, and you must know it to know science
- D. Terms like these are commonly used in daily life

2) In the carbon cycle, how does carbon enter living organisms?

- A. Decomposers release carbon dioxide
- B. Photosynthesis by plants
- C. Humans burn coal
- D. Respiration by animals

3) What relationship do you see between the power plants and areas affected by acid rain



- A. there does not appear to be a relationship
- B. areas of heavy emission always have the most badly affected area
- C. SO₂ emissions are usually located north of the damage they do
- D. that areas badly affected are close to many sources of heavy SO₂ emissions

4) Plants are mainly composed of carbon, hydrogen and oxygen. Many people believe that plants get their carbon from the soil and hydrogen and oxygen from water. Where do plants get the elements they use for growth?

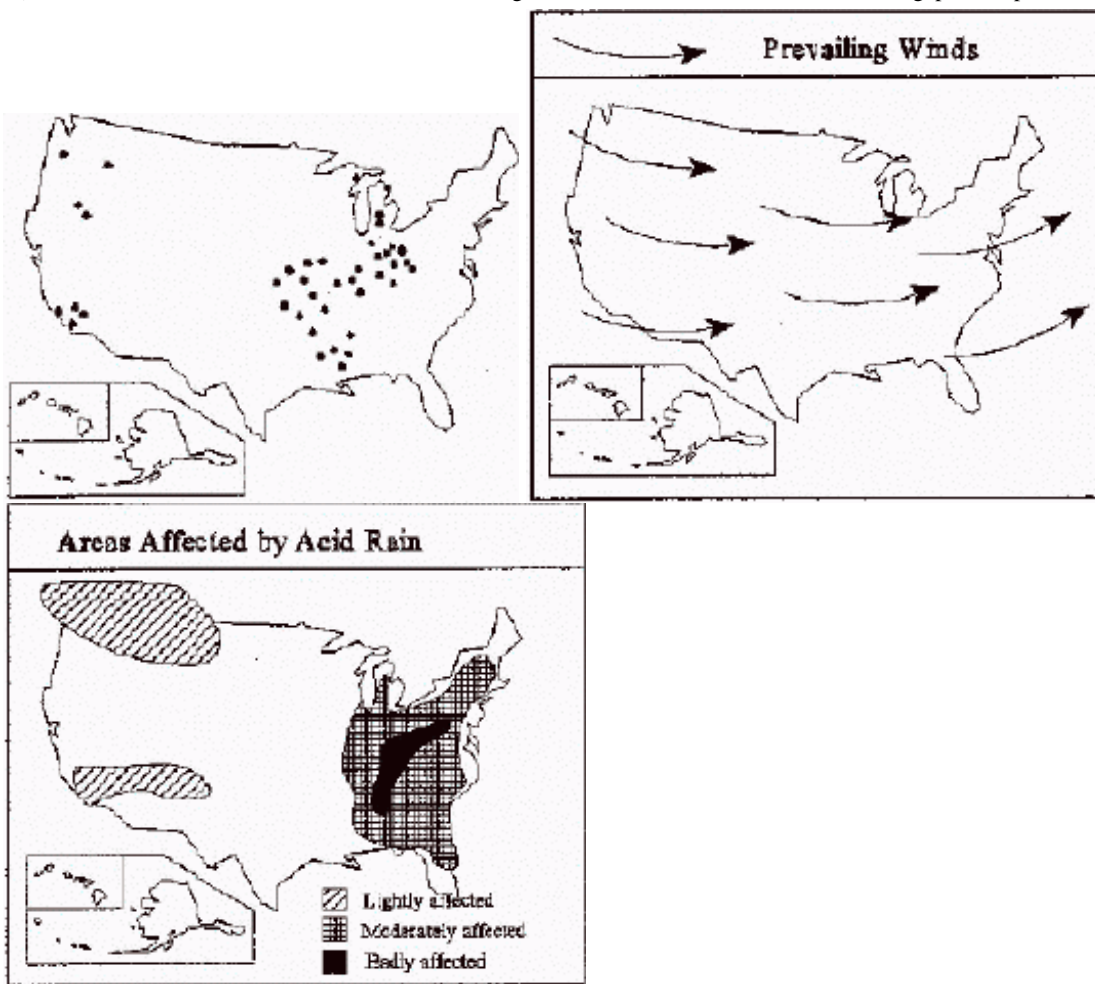
- A. Plants get all three elements, carbon, oxygen and hydrogen, from the soil.
- B. Plants get carbon from soil, and the water provides hydrogen and oxygen.
- C. Plants get carbon from nutrients in the soil and oxygen and hydrogen from the air.
- D. Plants get carbon and oxygen from the air and hydrogen from water.

5) Which of the following would be the best title for the above list?

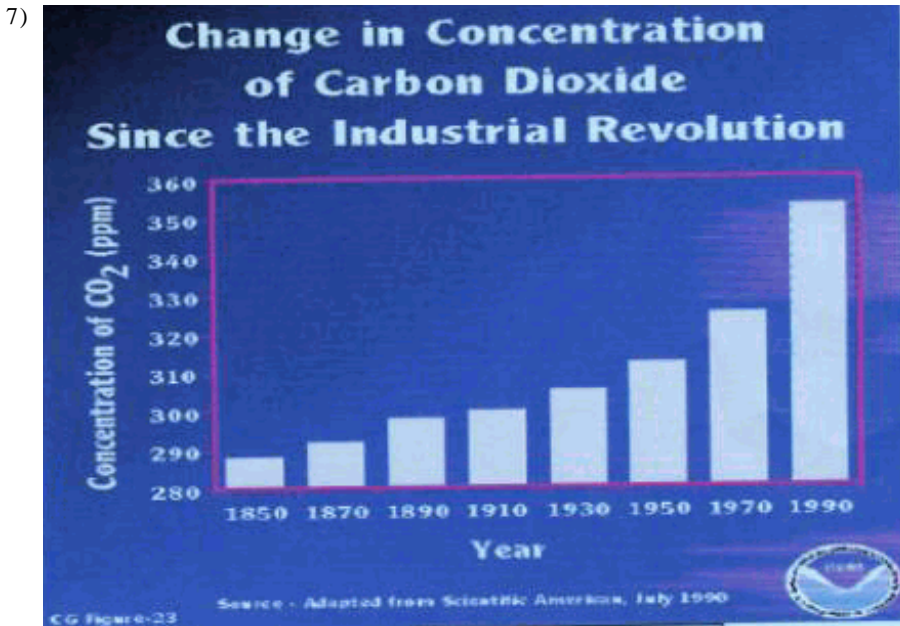
- Burning fossil fuels.
- Removal and/or burning of forests.
- Production and use of fertilizers.
- Loss of soil nutrients.
- Land clearing for crops.
- Draining wetlands.
- Cultivation of plants that host nitrogen fixing bacteria.

- A. Human Influences on the Carbon and Nitrogen Cycles
- B. The Benefits of Using Land for Agriculture
- C. Natural Causes of Change in the Atmosphere
- D. Atmospheric Problems Caused by Human Activities

6) Which area of North America has the highest concentration of coal burning power plants?



- A. northern area
- B. eastern area
- C. southern area
- D. western area

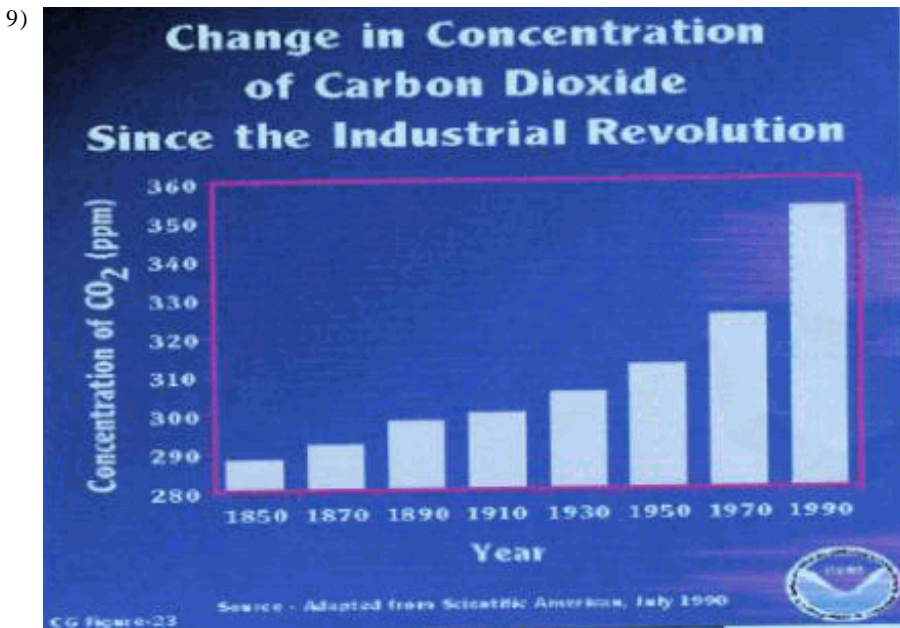


What is the cause of increased atmospheric levels of carbon dioxide in terms of the carbon cycle?

- A. More carbon is being stored in plant and animal tissue
- B. Carbon is being added to the atmosphere faster than it is being removed
- C. The carbon cycle is unaffected because the number of carbon atoms on Earth remains the same
- D. Ocean organisms will have to remove more carbon from the atmosphere in order to keep the cycle in balance

8) Nitrates and sulfates emitted by cars and industry can combine in the atmosphere with water vapor to form

- A. Ozone
- B. Acid rain
- C. Smog
- D. Fog



Which of the following is the best explanation for the increase of carbon dioxide concentrations in the atmosphere since 1850?

- A. There are many more cows now than in 1850
- B. Since 1850, the burning of fossil fuels has increased
- C. The age of dinosaurs is past so carbon is no longer being stored in coal beds
- D. There is more pollution, which keeps carbon dioxide from being removed from the atmosphere

10) Which item below best explains why animal manure can be used as a fertilizer for crops and gardens? The plant uses the

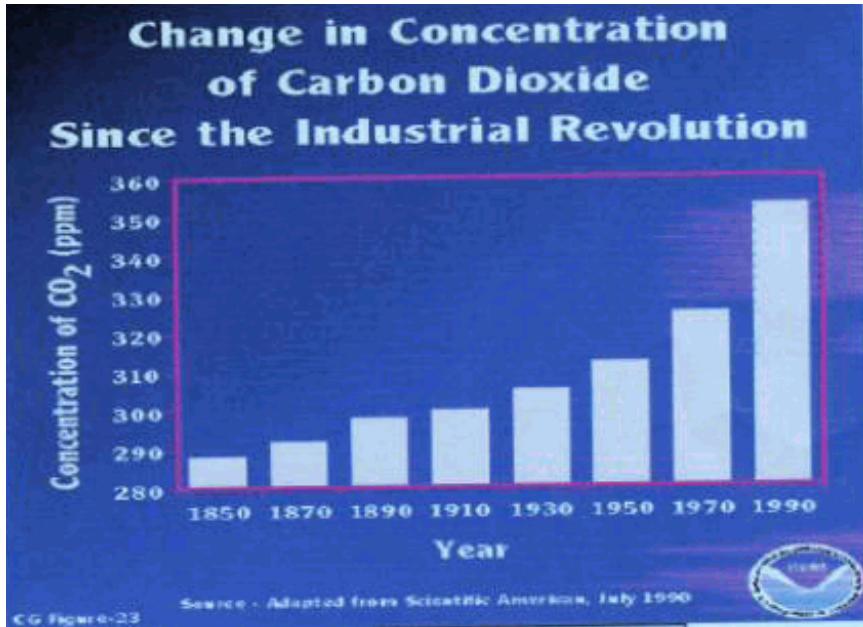
- A. carbon from the dead plant matter to make sugar
- B. nitrogen to make proteins and DNA
- C. oxygen for cellular respiration

D. hydrogen to form carbohydrates

11) Common human activities have a dramatic effect on the carbon cycle. How have recent changes in the carbon cycle affected human life?

- A. The carbon cycle traps carbon that could be used for human respiration.
- B. Increases in global temperature affect climate, agriculture and rainfall patterns.
- C. The amount of available oxygen will decrease due to the increase in carbon dioxide levels.
- D. The carbon cycle has no direct effect on human life because it deals mostly with plants.

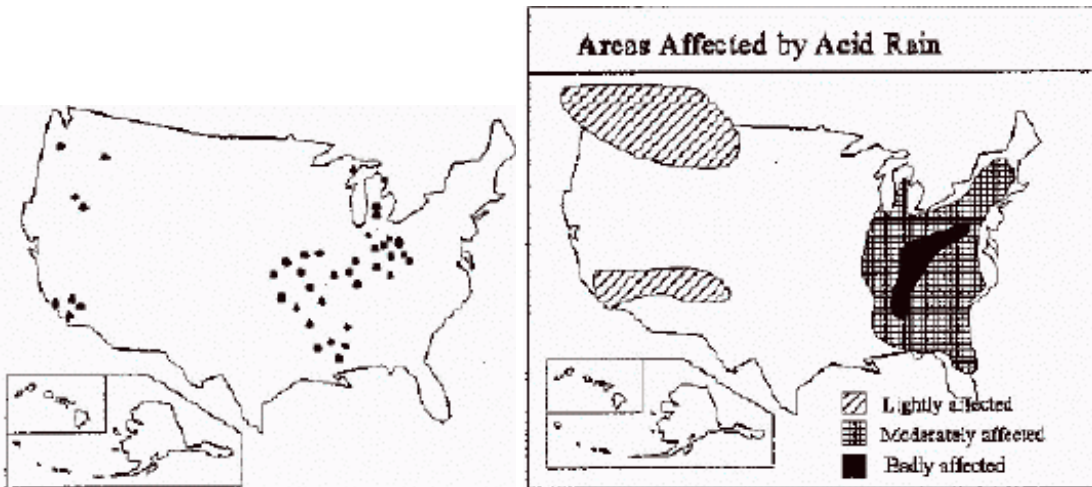
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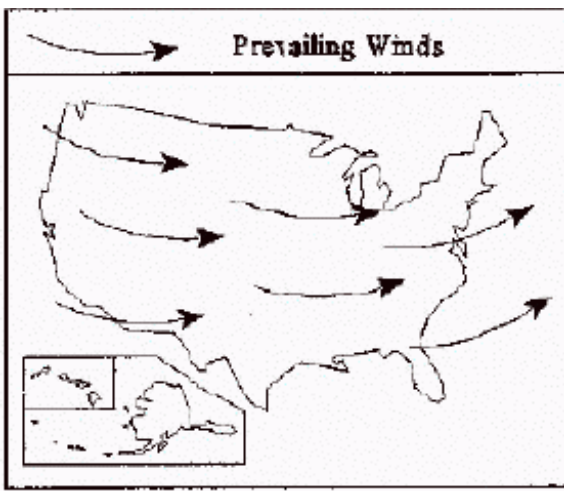


What is the most likely effect of the increase in carbon dioxide levels in the atmosphere?

- A. warmer atmosphere
- B. tropical rainforest destruction
- C. ozone depletion
- D. acid rain

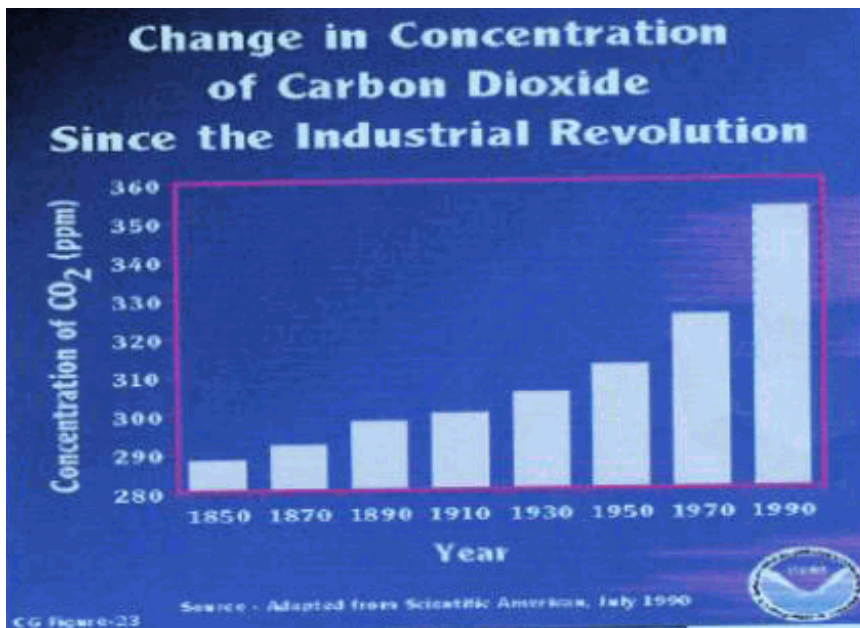
13) The map of prevailing winds is included to show:





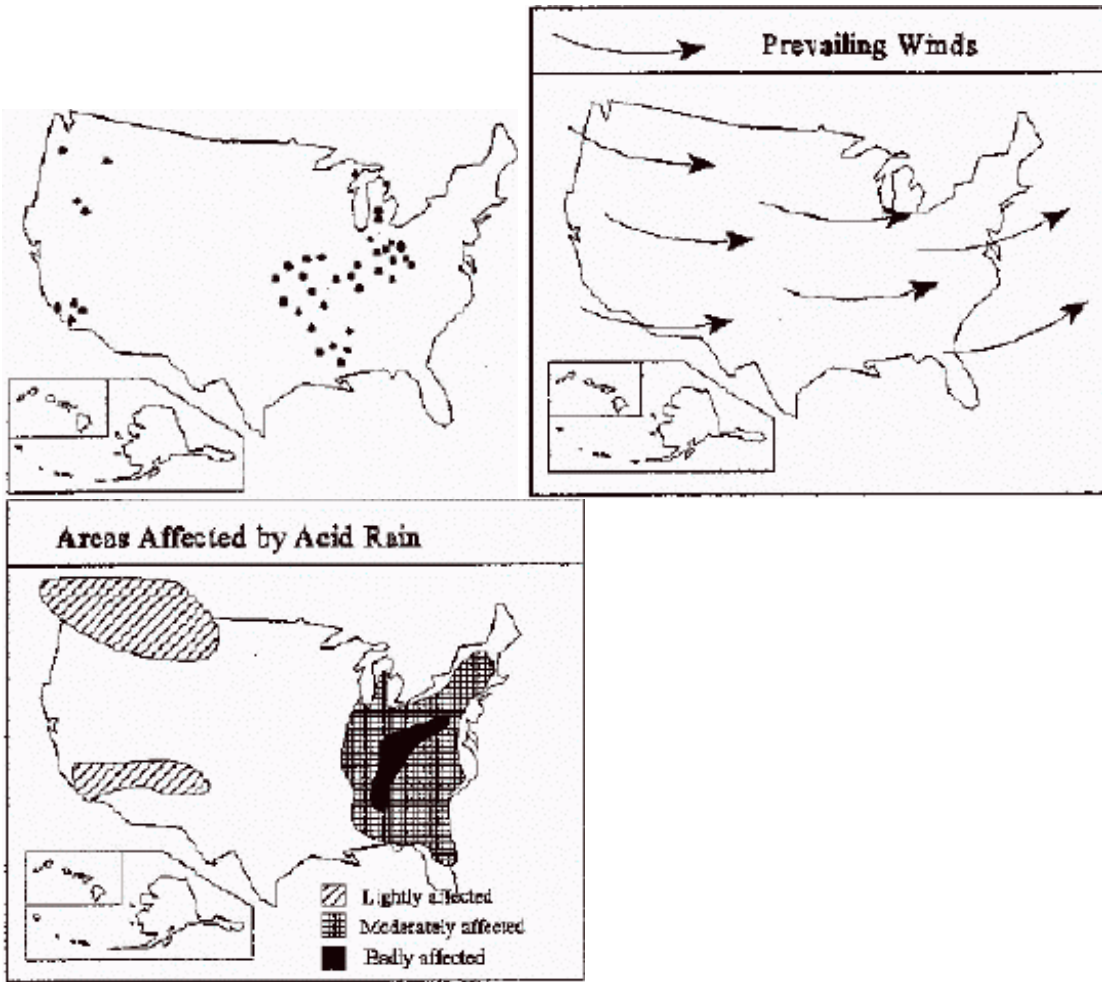
- A. that the weather is very changeable over most of the USA
- B. that sulfur emissions make the wind blow
- C. that acid rain cannot travel
- D. that wind may be carrying sulfur away from its source

14)



According to the graph, which of the following statements best describes the concentration of carbon dioxide in the atmosphere?

- A. It has increased since the Industrial Revolution
 - B. It has decreased since the Industrial Revolution
 - C. It has remained the same since the Industrial Revolution
 - D. There is no carbon dioxide in the atmosphere
- 15) Burning fossil fuels adds carbon dioxide to the atmosphere. If we continue to add carbon dioxide to the atmosphere at the current rate, how will this affect the carbon cycle?
- A. The number of carbon atoms on Earth will increase
 - B. The number of carbon atoms on Earth will decrease
 - C. The number of carbon atoms in the atmosphere will increase
 - D. The number of carbon atoms in the atmosphere will decrease
 - E. The carbon cycle will be unaffected
- 16) The reaction of chemical pollutants with one another in sunlight produces:
- A. Acid rain
 - B. Nitrogen
 - C. Less pollution
 - D. Photochemical smog
- 17) Which is a major pollutant produced by coal burning power plants
-



- A. Carbon dioxide
- B. Freon
- C. Nitrates
- D. Sulfur dioxide

18) Which of the following is an example of an ethical question raised by science that science cannot answer?

- A. Should the government require people to buy cars that release less carbon dioxide?
- B. Can companies make cars that release less carbon dioxide?
- C. Are the levels of carbon dioxide increasing in the upper atmosphere?
- D. How does carbon dioxide trap the sun's ultra violet rays?

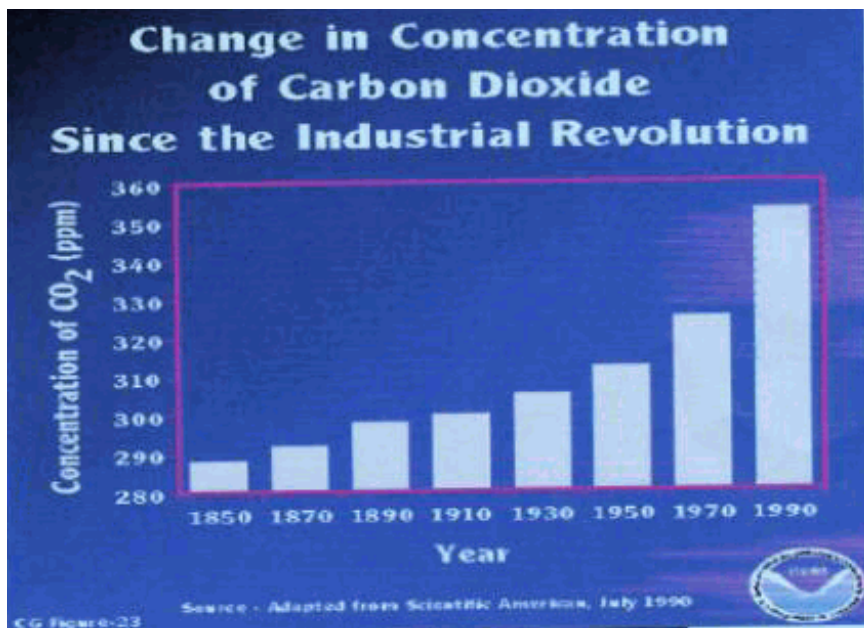
19) Which of the following removes CO₂ from the atmosphere?

- A. rainforest trees
- B. cars
- C. burning coal
- D. spraying aerosol cans

20) Which of the following is an ethical question raised by science that science cannot answer by itself?

- A. Does burning fossil fuels alter the carbon cycle?
- B. How has the carbon cycle changed because of the loss of rain forests?
- C. Should there be regulations about human activities that alter the carbon cycle?
- D. How does the level of carbon dioxide change the carbon cycle?

21)



Based on the graph above, which of the following statements is an inference?

- A. The concentration of carbon dioxide is measure in ppm
- B. There was more carbon dioxide added to the atmosphere in 1970 than in 1910
- C. In 1950, the atmosphere had a carbon dioxide concentration of approximately 311 ppm
- D. The destruction of rainforests has contributed to the rise in carbon dioxide levels in the atmosphere

22) In photosynthesis plants get carbon from the air and hydrogen from water. Choose the formula that supports this fact.

- A. $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
- B. $\text{CH}_2 + \text{H}_2\text{O} \rightarrow \text{CH}_2\text{O}$
- C. $\text{C} + \text{O}_2 + \text{H} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
- D. $\text{CH} + \text{O}_2 \rightarrow \text{CHO}_2$

23) Which of the following is NOT an effect of acid rain?

- A. Disintegration of buildings, statues, tombstones
- B. Death and stunting of trees
- C. Increase in temperature
- D. Loss of aquatic life in rivers and streams

24) For millions of years the carbon cycle has been in equilibrium. Climatologists are concerned because data indicates we are seeing the amount of carbon in the air increase. Which theory best explains this loss of atmospheric equilibrium?

- A. CFAs have created a hole in the ozone.
- B. Society has increased the burning of fossil fuels.
- C. Environmentalists have increased the size of rain forests.
- D. Our society has recognized the danger of nuclear fission.

25) Why is the use of fossil fuels decreasing slightly?

- A. Alternative sources of power, such as hydroelectric power, are becoming more available and efficient.
- B. Automobiles are using less gasoline because of the increasing price of oil.
- C. Available fossil fuels in the earth are just about gone.
- D. Global warming decreases our need to burn fuel for heat in cold weather.

26) Two neighbors live by a nearby pond. They have noticed some changes in the pond and have decided to conduct investigations to find out what is causing the changes.

Neighbor #1 plans to investigate the relationship between the amount of fertilizer used by area residents and the nitrogen levels of the nearby pond.

Neighbor #2 plans to investigate the relationship between the nitrogen levels of the nearby pond and the changes in the amount and types of plant life.

Which of the following best describes the importance of these investigations?

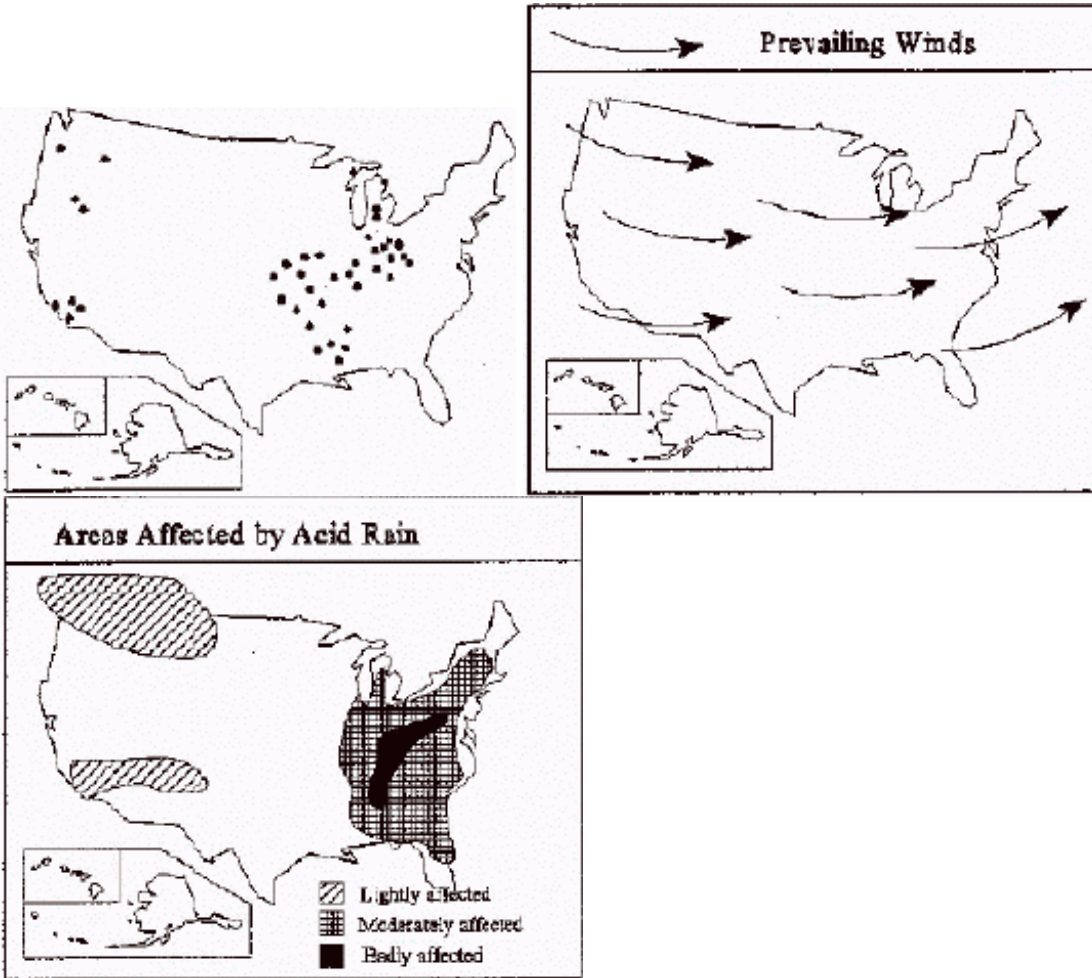
- A. The information gathered will be of great importance to local scientists.
- B. The information collected can be used to inform residents of changes in the pond.

- C. The information gathered can be used to stop neighbors from using the pond.
- D. The information collected should be used to create local laws concerning pollution.

27) The concentration of carbon dioxide gases has increased due to fossil fuel use. Although car emission systems have been improved, the concentration of carbon dioxide has not significantly decreased. In response to this information, automobile manufacturers and dealers are being asked to outline car fuel usage and emission details for consumers. Which of the following best describes why fuel usage and emission detail information should be made available to the consumer?

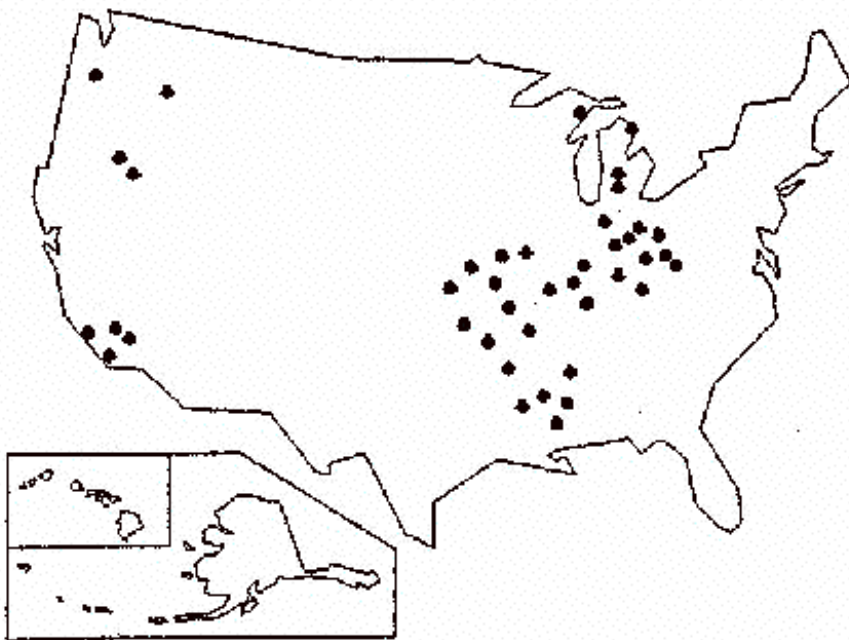
- A. Consumers can use this information to make an informed decision.
- B. Consumers want to know what scientists recommend when purchasing a car.
- C. Without this information, consumers will be unable to judge the price of a car.
- D. Emissions and fuel usage is not related to carbon dioxide concentration in the atmosphere.

28) What do areas most affected by acid rain have in common?



- A. they are downwind from a source of sulfur
- B. they are in states where high amounts of sulfur produced
- C. they are in states with bad weather
- D. they are all in the northern states

29) Which area of North America has the highest concentration of coal burning power plants?



- A. northern area
- B. southern area
- C. western area
- D. eastern area

30) What physical symptoms are associated with a reduction of ozone in the upper atmosphere?

- A. fever
- B. nagging cough
- C. difficult breathing
- D. skin cancer

31) During the winter months Utah newspapers and news programs announce burn days in which it is illegal to burn fires for home heating. According to the graph, which type of pollutant are the authorities trying to reduce?

This table lists the major air pollutants found in our society today.

Pollutant	Description	Sources	Effects
Carbon Monoxide (CO)	Odorless, colorless, poisonous gas. It is produced by burning fossil fuel	Cars, trucks, busses, small engines	Does not allow blood to carry oxygen. It can cause death. It can cause headaches and stress in traffic.
Nitrogen oxides (NO _x)	Is a result from extremely hot fires, which exceed 538 degrees C	NO _x comes from burning fuels in trucks, power plants and steel mills.	NO _x can cause respiratory infections, lung disease and cancer. Can lead to acid rain, which can cause metal corrosion and fading fabrics.
Sulfur dioxide (SO ₂)	Produced when sulfur and oxygen combine chemically in a fire	SO ₂ is released from petroleum refineries, smelter and coal burning power plants.	SO ₂ is a major contributor to acid rain, which damages, lakes forests and stone.
Particulate	Smoke, soot ash dust and other small particles	Particulates may come from burning wood, automobile exhaust (especially diesel) construction and agriculture	Particulates can form clouds that reduce visibility and cause a variety of respiratory problems.

- A. carbon monoxide
- B. nitrogen oxides
- C. sulfur dioxide
- D. particulates

32) Jill and Holly wanted to design an experiment that tested the gasses that cause acid rain. They obtained an indicator solution that was clear, but turned red in acids. The stronger the acid became, the redder the solution. They then filled four balloons with gasses collected from a bike pump, a propane bottle, a car and a diesel truck. They bubbled the gasses in the balloons through the solutions with a straw, exposing the indicator to the gas in the balloons. Then they compared the color of the solutions.

According to the data collected, which gas causes the greatest amount of acid rain?

SOURCE OF GAS	COLOR CHANGE
Bike pump	No color change
Propane	No color change
Car exhaust	Dark red
Diesel truck exhaust	Light red

- A. bike pump
- B. propane
- C. car exhaust
- D. diesel truck exhaust

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According to the data collected, which conclusion is best supported by the data gathered in the experiment?

SOURCE OF GAS	COLOR CHANGE
Bike pump	No color change
Propane	No color change
Car exhaust	Dark red
Diesel truck exhaust	Light red

- A. Cars that run on propane do not create acid rain.
- B. Diesel trucks do not cause acid rain.
- C. There is no acid in the air
- D. Cars and trucks both cause acid rain.

34) Acid precipitation, global warming, and ozone depletion are problems that are a direct result of air pollution. Because air pollution is difficult to control, government agencies and scientists have met to discuss ways to reduce global air pollution.

Which of the following best describes why global discussions of air pollution issues are important?

- A. Air pollution problems affect people living on every continent.
- B. Government agencies are mostly at fault for not decreasing air pollution.
- C. Scientists have required that governments take action to decrease air pollution.
- D. Science findings have indicated that these problems are mostly caused by the greenhouse effect.

35) According to this chart, which type of air pollution can be deadly in a very short period of time?

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- A. carbon monoxide
- B. nitrogen oxides
- C. sulfur dioxide
- D. particulate

36) What harmful effect is associated with the "ozone hole"?

- A. skin cancer
- B. heart attacks
- C. ocean saltiness
- D. loss of hair

37) World leaders are struggling to form a global policy concerning the release of greenhouse gases. Which of the following best describes the role science should play in forming public policy?

- A. Scientific data should be used to inform public policy makers
- B. Only scientific data should be considered when making public policy
- C. Science has no role in the formation of public policy
- D. Policy issues are too value laden to include science

38) Because of the recent shortages of electrical energy, the governor has proposed building more coal-fired generating plants in Utah. If that happens, according to this chart, which type of air pollution will likely increase in Utah?

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- A. carbon monoxide
- B. nitrogen oxides
- C. sulfur dioxide
- D. particulate

39) What does the ozone layer protect living things from?

- A. ultraviolet rays
- B. meteors and meteorites
- C. bad weather
- D. excessive heat

40) Which of the following resources would provide the most accurate and least biased information on the carbon cycle?

- A. National Geographic
- B. Astronomy Today
- C. Sierra Club Infoletter
- D. Local Newspaper

41) Why do most climatologists now accept the theory that there is a hole in the ozone?

- A. Companies that produce CFCs told them so.
- B. It is easy to detect just by looking towards the sky at sunset.
- C. There is data to support it from more than one source.
- D. The president of the United States mandated their agreement.

42) (1) In the early 1970s, scientists first proposed that chlorofluorocarbons (CFCs) could destroy the ozone layer. (2) Since then, scientists have confirmed that CFCs destroy ozone molecules by breaking up the chemical bonds in the ozone molecule. (3) In the mid-1980s, atmospheric studies identified an extremely thin area of ozone over Antarctica as well as a global thinning of the ozone layer. (4) The thinning of the ozone is significant because this layer filters and absorbs harmful ultraviolet radiation that influences crop production and causes eye and skin damage.

Which sentence has relevant data to support the argument that CFCs contribute to the thinning of the ozone?

- A. 1
- B. 2
- C. 3
- D. 4

43) Which substance is considered the main cause of the "ozone hole"?

- A. carbon dioxide
- B. chlorofluorocarbons
- C. methane
- D. water vapor

44) Which of the following is a question that science alone cannot answer?

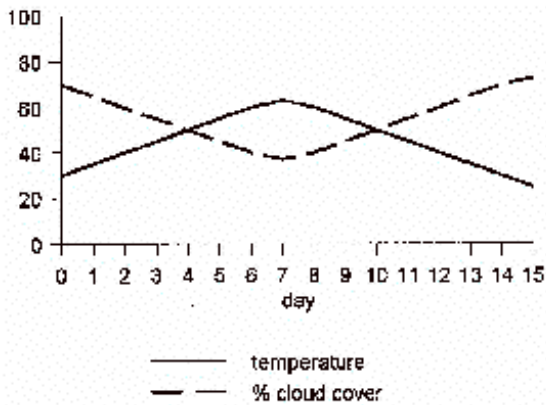
- A. Should the government pass a mandatory carpool law to decrease air pollution?
- B. Do wood burning stoves make a significant contribution to air pollution?
- C. Can filters decrease the pollutants put into the atmosphere by refineries?
- D. What health risks are increased by daily inhalation of air pollutants?

45) The data table above shows the consumption of fossil fuels since 1000 AD. What probably accelerated the use of fossil fuels since 1900?

	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
% available	92%	92%	91%	91%	90%	89%	88%	87%	86%	83%	67%	60%	?

- A. Increase of available fossil fuels in Earth
- B. Better procedures for extracting coal from the earth.
- C. Importance of coal and oil to our society
- D. Industrial Revolution.

46)



How do cloud cover and temperature appear to be related in the graph?

- A. when temperature rises, cloud cover increases
 - B. when temperature rises, clouds stay the same
 - C. there appears to be no relationship
 - D. when temperature rises, cloud cover decreases
- 47) As air rises into the atmosphere it expands and cools. Warm air can hold more water vapor than cold air. So as air rises it is unable to hold its water vapor, causing the water vapor to condense. Dewpoint is reached when the air can hold no more water vapor. The air is saturated with water vapor. The following information was taken as warm air rose and cooled.

According to this graph, where would clouds form?

Elevation	Air Temperature	Dewpoint
1000 m	10 degrees C	10 degrees C
500 m	15 degrees C	11 degrees C
0	20 degrees C	12 degrees C

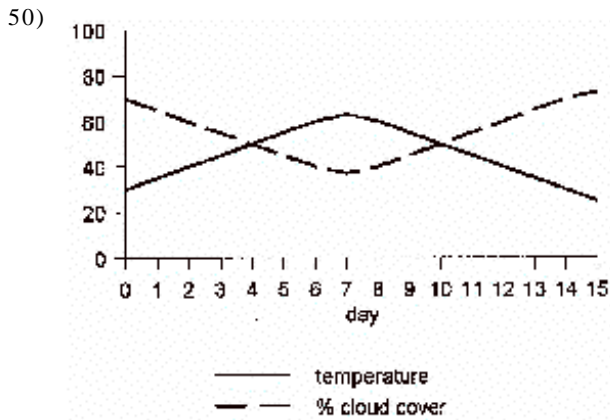
- A. 1000 m
 - B. 500 m
 - C. 0 m
 - D. nowhere
- 48) Weather conditions can cause problems for aircraft. Pilots must have continuous weather data to keep the aircraft safe. The ASOS (Automated Surface Observing System) transmits data to pilots at one minute intervals, much faster than the human observers it was designed to replace. Opponents of the new ASOS say that humans were replaced by the new system only to cut down on costs, not because the system is more accurate.

Which of the following describes how science influenced the development of this new technology?

- A. Scientists were meeting the demands of pilots that refused to fly without the development of a new weather system.
- B. Scientists were encouraged to find a way to deliver weather data more efficiently than using human observers.

- C. Scientists were asked to research ways to control the weather to decrease problems for aircraft.
- D. Scientists were invited to study the impact of the new system on the observers who had lost their jobs.

- 49) The ocean water near the equator absorbs more heat throughout the year than ocean water near the North Pole. Which of the following **best** explains this difference?
- A. The equator is closer to the Sun.
 - B. The equator has higher sea levels.
 - C. The equator receives more direct sunlight.
 - D. The equator rotates more quickly on Earth's axis.



What might best explain the results in the graph?

- A. when it is cloudy, the clouds trap the heat and temperature increases
 - B. when it is cloudy, it rains more and temperature goes up
 - C. when the sky is clear, more sun can reach the earth and the temperature rises
 - D. when the sky is clear, more heat escapes
- 51) Worldwide weather forecasting has been made more accurate by the use of:
- A. thermometers
 - B. satellites
 - C. sling psychrometer
 - D. rockets
- 52) The barometric pressure increases from 28.4 inches to 31 inches the night before your wedding reception that is to be held outside. What happens to your plans?
- A. You move all plans to inside due to fog
 - B. Your plans are the same, all is well
 - C. You need to order raincoats
 - D. Barometric pressure has no effect on weather
- 53) As air rises into the atmosphere it expands and cools. Warm air can hold more water vapor than cold air. So as air rises it is unable to hold its water vapor, causing the water vapor to condense. Dewpoint is reached when the air can hold no more water vapor. The air is saturated with water vapor. The following information was taken as warm air rose and cooled.

Ground fog is a cloud that forms at low altitude. According to this graph, at what conditions would form fog at the 0 meter elevation?

- A. A dew point of 10 degrees C
 - B. A dew point of 12 degrees C
 - C. A temperature of 20 degrees C
 - D. A temperature of 12 degrees C
- 54) Lydia designs an experiment to examine the relationship between barometric pressure and temperature. She measures the temperature and the barometric pressure on Monday and Tuesday. She writes up her report and turns it in on Wednesday, the day it's due. Below are her data and conclusion.

Day	Temperature	Barometric Pressure
Monday	27°C	1011 millibars
Tuesday	28°C	1123 millibars

Conclusion: A rise in temperature causes a rise in barometric pressure.

Which of the following statements most accurately evaluates the validity of her conclusion?

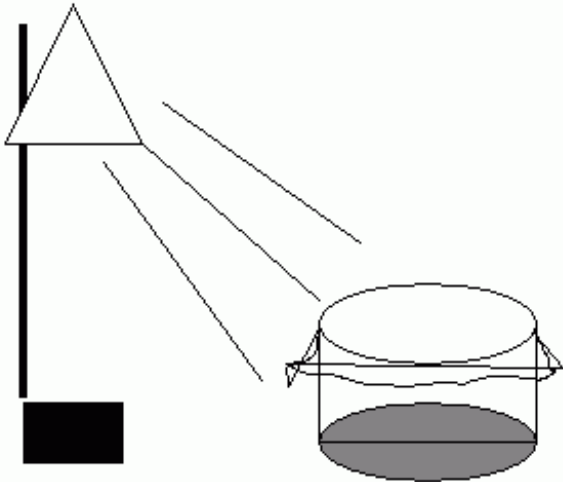
- A. Her conclusion is valid because she organized the data into a table correctly
- B. Her conclusion is valid because she measured temperature and pressure carefully and used metric units
- C. Her conclusion is invalid because it is impossible to determine the relationship between temperature and pressure experimentally
- D. Her conclusion is invalid because nothing in her experiment tests if a change in temperature causes a change in pressure

55) How has technology changed scientists' ability to predict the weather?

- A. Satellites produce images that allow scientists to track weather systems
- B. Scientists better understand the relationship between warm air fronts and thunderstorms
- C. Doppler radar enables scientists to communicate with each other
- D. The invention of television makes it possible to broadcast weather predictions to the public
- E. A rising barometer indicates a storm is approaching

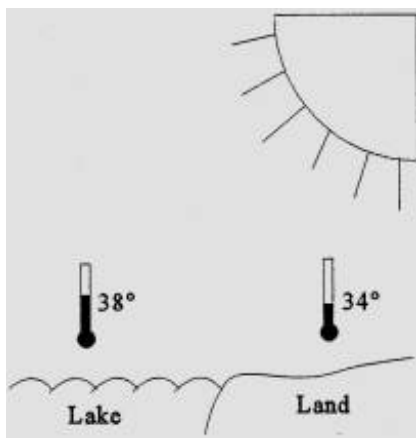
56) If this model were compared to Earth, what would the plastic wrap represent?

The light is shining on an empty container covered with plastic wrap.



- A. the solid surface
- B. the waters of the ocean
- C. the atmosphere
- D. the clouds

57) Use the diagram to answer the following questions. Consider the diagram as a closed system.



According to this diagram, what causes air movement?

- A. The hotter air above water rises
- B. The hotter air above land rises
- C. The hotter air above water descends
- D. The hotter air above land descends
- E. The air does not move

58) What is the primary energy source that drives all weather events, including precipitation, hurricanes, and tornados?

- A. the Sun
- B. the Moon

- C. Earth's gravity
- D. Earth's rotation

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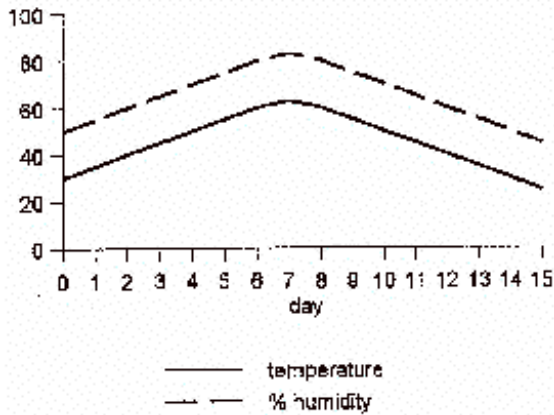
Which of the following would improve Lydia's experimental design?

- A. Test another variable as well
 - B. Collect data for more days
 - C. Use a mercurial barometer
 - D. Measure temperature in Fahrenheit
 - E. Use data from another geographic region as a control
- 60) What is the principle cause of the Coriolis Effect?
- A. isolation
 - B. winds
 - C. ocean currents
 - D. Earth's rotation

61) A low-pressure system entering an area means:

- A. clear, sunny weather
- B. much warmer weather
- C. no real changes in weather
- D. cloudy sky, may precipitate

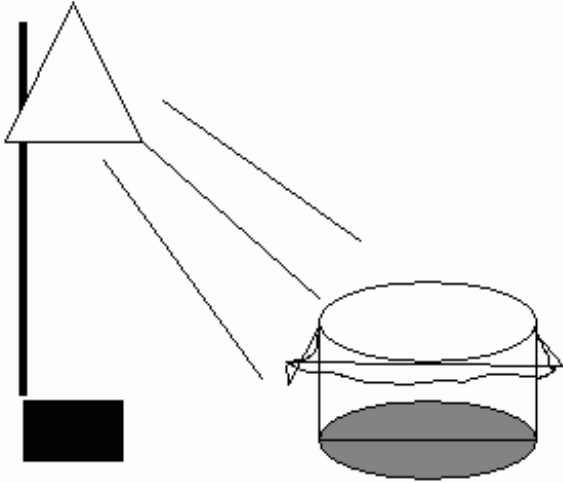
62)



How do the temperature and humidity appear to be related in the graph?

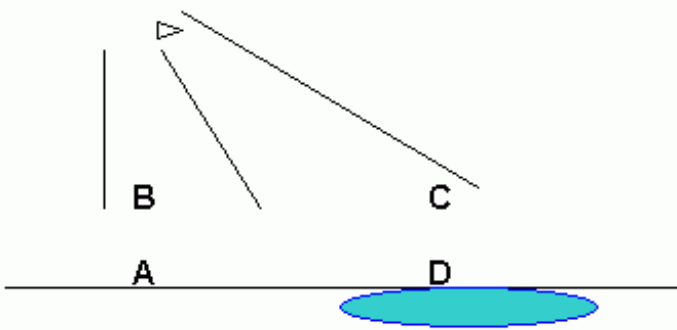
- A. when one goes up the other goes up
 - B. when one goes up the other goes down
 - C. they are opposites
 - D. there is no relationship
- 63) You call a psychic hotline and are told that if you wash your car it will rain. You test the prediction by washing your car in the morning. It rains in the afternoon. Was the psychic's prediction scientifically accurate?
- A. Yes, washing cars will cause it to rain
 - B. Yes, the psychic's prediction was tested and proven correct
 - C. No, psychics are not scientists
 - D. No, the test would have to be done for many more days to assess its scientific validity
 - E. No, the scientific method is used appropriately only on science things like rocks, plants, and animals. It is not for use on car washing
- 64) What would you expect the temperature of the air inside the container to be when compared to the outside?

The light is shining on an empty container covered with plastic wrap.



- A. warmer
- B. cooler
- C. the same
- D. more humid

65) In this diagram of the Sun shining on land and a lake, where would you expect to find the warmest temperature?

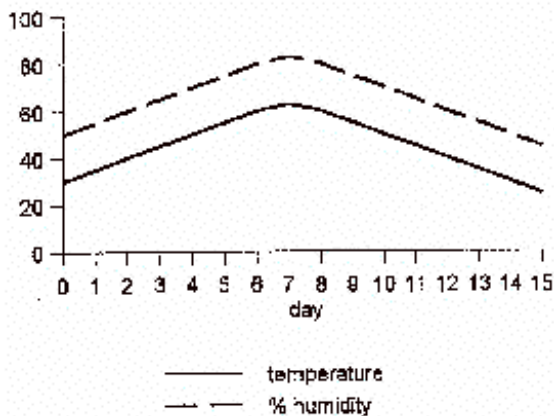


- A. A
- B. B
- C. C
- D. D

66) Which of the following statements most accurately describes the role of science in predicting weather?

- A. Scientists can control weather
- B. Scientists can predict whether or not it is likely to rain next week
- C. Scientists can determine whether or not it will rain on next year's Fourth of July parade
- D. Scientists can predict the exact location of tornadoes
- E. Scientists can determine how weather affects human relationships

67)



Which explanation best fits the graph?

- A. as temperature goes up, more water evaporates, raising humidity
- B. as temperature goes down, more water evaporates, raising humidity
- C. as temperature goes up, less water evaporates making humidity lower
- D. as temperature goes down, humidity raises due to more rainfall

68) Why does the Pacific Ocean current along the west coast of the United States influence the weather in Utah?

- A. It brings cool water coming from the north, which cools the air
- B. It brings cool water coming from the south, which cools the air
- C. It brings warm water coming from the north, which warms the air
- D. It brings warm water coming from the south, which warms the air

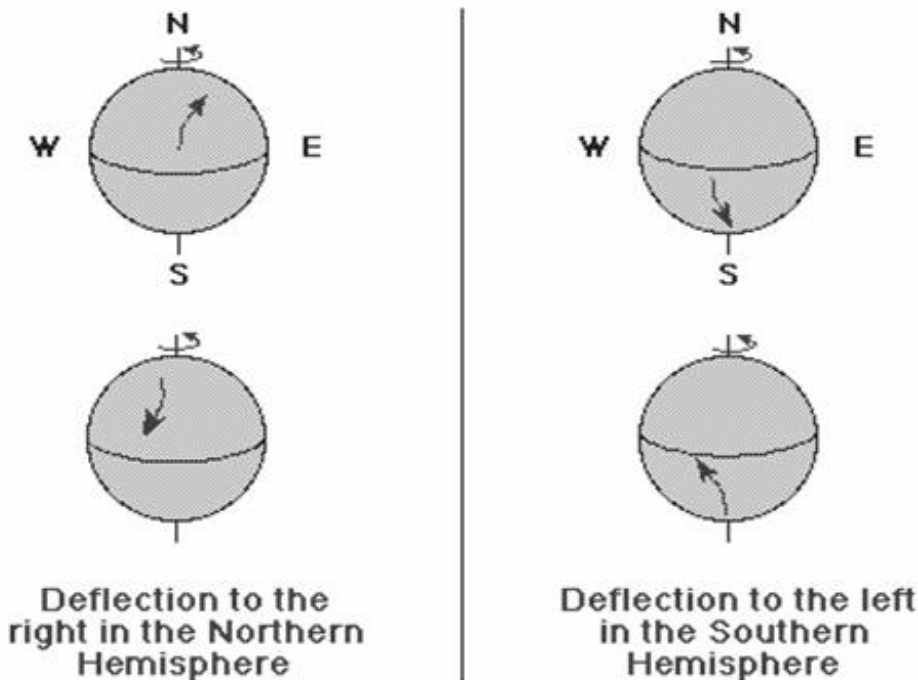
69) In the late 1980s the Governor of Utah spent millions of tax dollars to build pumps to lower the level of the Great Salt Lake to protect surrounding property and roads. However the pumps were not greatly used because the lake receded by drought conditions. Understanding droughts is part of which discipline?

- A. weather
- B. meteorology
- C. astronomy
- D. climatology
- E. engineering

70) Why do we experience winter in the months of November through March in Utah?

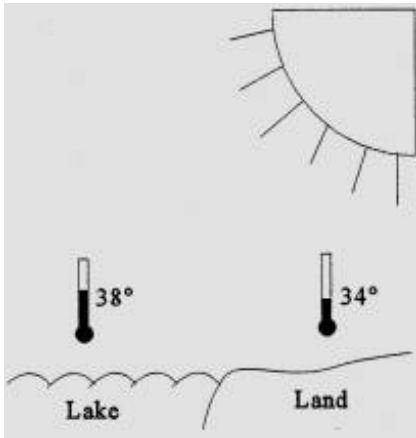
- A. The sun is farther from the earth
- B. The sun is closer to the earth
- C. The movement of warm maritime air masses from the pacific
- D. The calendar is on an equinox
- E. The angle of incidence of the sun's rays is more indirect

71) Which of the following is the best title for this chart?



- A. Wind and Ocean Patterns
- B. The Coriolis Effect
- C. Patterns of Global Winds
- D. Patterns of Ocean Currents

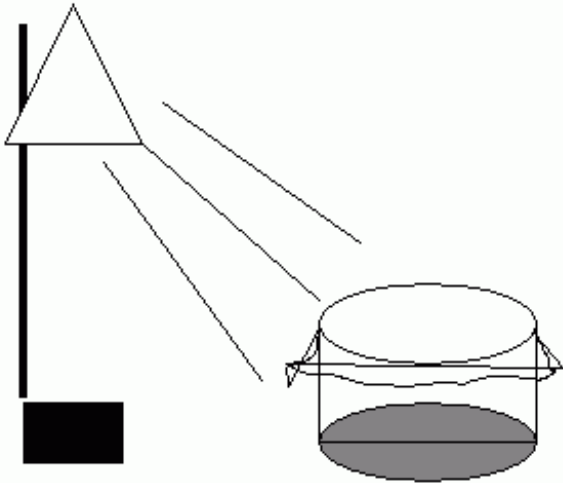
72) Use the diagram to answer the following questions. Consider the diagram as a closed system.



Given the weather conditions illustrated, in which direction will the wind blow?

- A. toward land
 - B. toward water
 - C. upward from lake
 - D. downward towards land
 - E. there is no wind
- 73) You are conducting research on changes in global convection currents in the atmosphere and in the oceans. Where would you go to find the most current information?
- A. National Oceanographic and Atmospheric Administration website.
 - B. World Book encyclopedia entry on conduction currents.
 - C. Sierra Club newsletter article on changes in currents.
 - D. An article in the local newspaper on conduction in the Great Salt Lake.
- 74) Air in a bicycle tire can be expanded and contracted. If the air is let out of the tire it is expanding. How would you expect the air to feel?
- A. hot
 - B. warm
 - C. cold
 - D. the same as the temperature of surrounding air
- 75) If temperatures were taken both inside and outside the container, what would this apparatus model?

The light is shining on an empty container covered with plastic wrap.

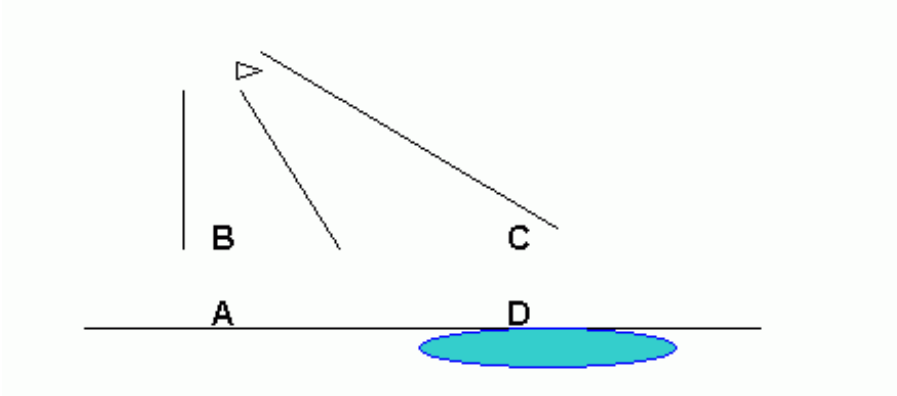


- A. how solar radiation is produced
 - B. the effect of light on air
 - C. the greenhouse effect
 - D. the formation of clouds
- 76) Which of the following best describes how technology has influenced what we know about climate change?
- A. Computers improve accurate collection of long term weather information.

- B. Satellites are able to give more current weather conditions.
- C. Doppler radar provides accurate weather warnings and watches.
- D. Severe weather warnings are detailed by computer systems.

77) If you were standing in position "A," from which direction would you expect to find wind blowing?

This is a diagram of the Sun shining on land and a lake :



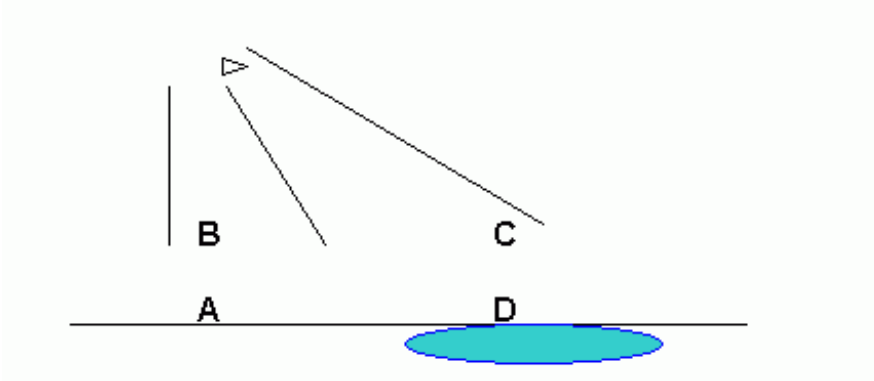
- A. from A
- B. from B
- C. from C
- D. from D

78) Weather conditions can cause problems for aircraft. Pilots must have continuous weather data to keep the aircraft safe. The ASOS (Automated Surface Observing System) transmits data to pilots at one minute intervals, much faster than the human observers it was designed to replace. Opponents of the new ASOS say that humans were replaced by the new system only to cut down on costs, not because the system is more accurate.

Which of the following is an ethical question raised by science that science cannot answer?

- A. Is the ASOS system more accurate than human observers?
- B. How does the ASOS system deliver data to pilots at one minute intervals?
- C. Should the ASOS system be used to cut down on the cost of human observers?
- D. What weather conditions cause problems for aircraft pilots?

79) Using this diagram of the Sun shining on land and a lake, how could El Nino be explained?



- A. Convection currents in the air affect ocean currents
- B. Air moves because of solar radiation
- C. Water in the sea forms layers with cold on top
- D. The sun heats water and air equally

EarthT4

!!!!!!!ANSWER KEY!!!!!!!

(Do not photo copy)

79 Question(s)

Test ID: 298295

1) Why is it important to know terms such as geosphere, biosphere, and hydrosphere?

- A. You cannot understand the concepts with them
- ✓ It is a convenient and short way to describe a concept
- C. Scientists have a code that they use, and you must know it to know science
- D. Terms like these are commonly used in daily life

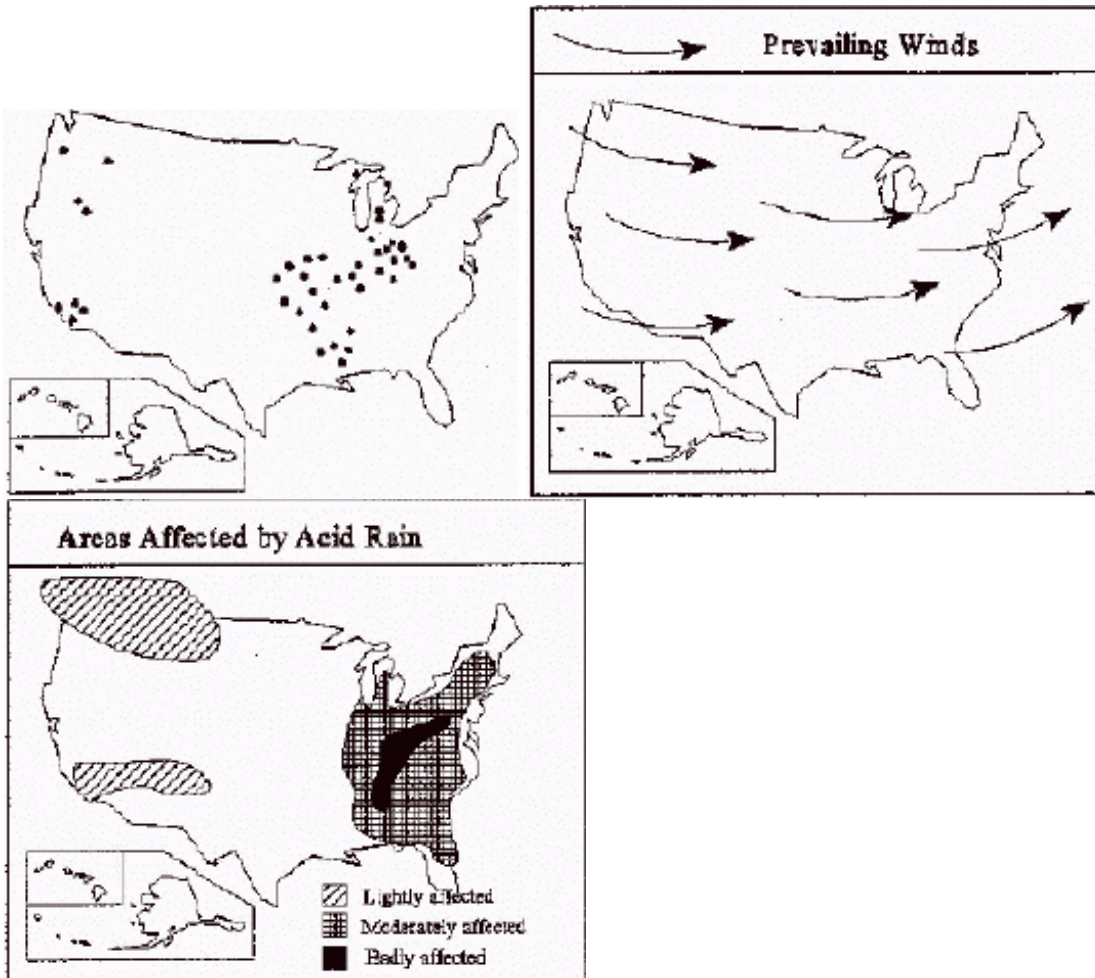
[ILOs ESS, B, C, & P:4 - SC:ES:5:1]

2) In the carbon cycle, how does carbon enter living organisms?

- A. Decomposers release carbon dioxide
- ✓ Photosynthesis by plants
- C. Humans burn coal
- D. Respiration by animals

[SC:ES:5:1 - ILOs ESS, B, C, & P:3]

3) What relationship do you see between the power plants and areas affected by acid rain



- A. there does not appear to be a relationship
- B. areas of heavy emission always have the most badly affected area
- C. SO₂ emissions are usually located north of the damage they do
- ✓ that areas badly affected are close to many sources of heavy SO₂ emissions

[SC:ES:5:1 - ILOs ESS, B, C, & P:1]

4) Plants are mainly composed of carbon, hydrogen and oxygen. Many people believe that plants get their carbon from the soil and hydrogen and oxygen from water. Where do plants get the elements they use for growth?

- A. Plants get all three elements, carbon, oxygen and hydrogen, from the soil.

- B. Plants get carbon from soil, and the water provides hydrogen and oxygen.
- C. Plants get carbon from nutrients in the soil and oxygen and hydrogen from the air.
- ✓ Plants get carbon and oxygen from the air and hydrogen from water.

[SC:ES:5:1 - ILOs ESS, B, C, & P:4]

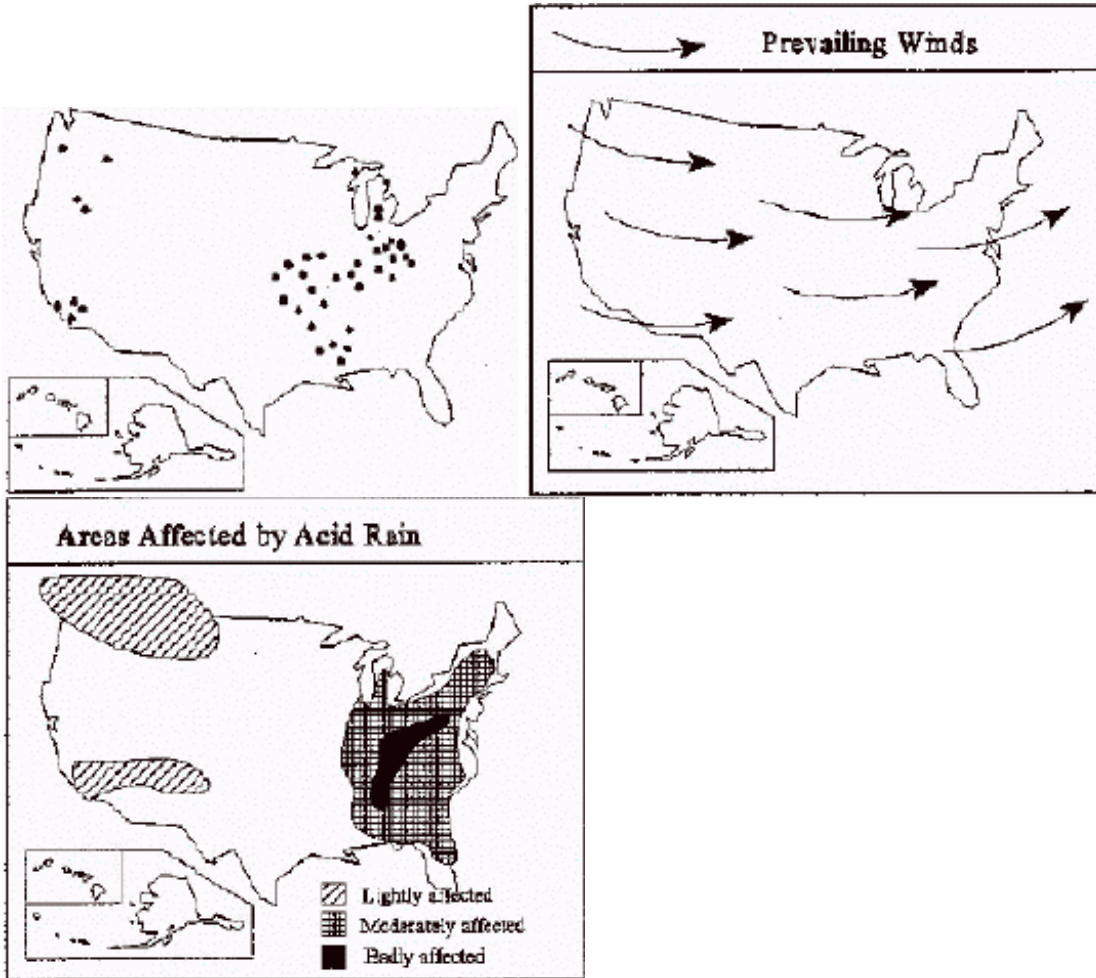
5) Which of the following would be the best title for the above list?

- Burning fossil fuels.
- Removal and/or burning of forests.
- Production and use of fertilizers.
- Loss of soil nutrients.
- Land clearing for crops.
- Draining wetlands.
- Cultivation of plants that host nitrogen fixing bacteria.

- ✓ Human Influences on the Carbon and Nitrogen Cycles
- B. The Benefits of Using Land for Agriculture
- C. Natural Causes of Change in the Atmosphere
- D. Atmospheric Problems Caused by Human Activities

[ILOs ESS, B, C, & P:4 - SC:ES:5:1]

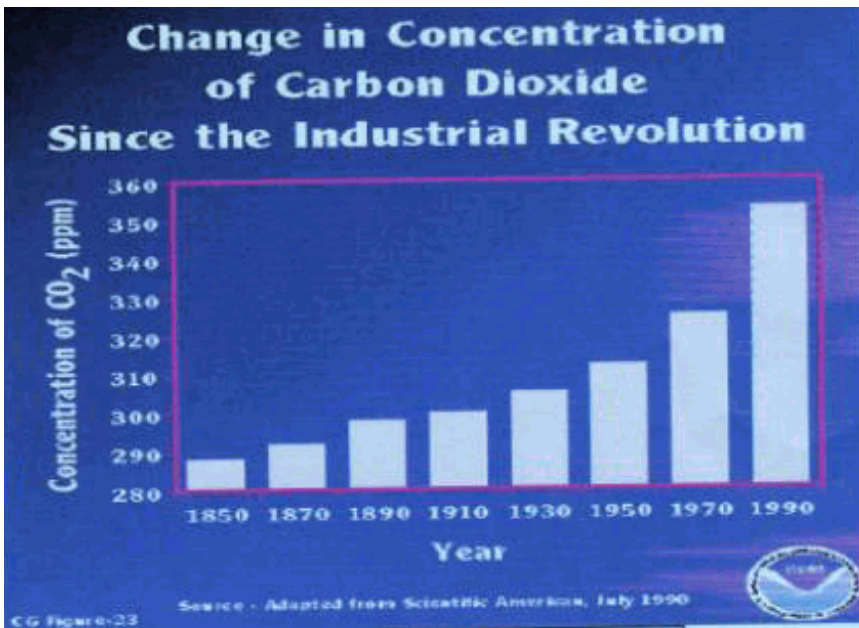
6) Which area of North America has the highest concentration of coal burning power plants?



- A. northern area
- ✓ eastern area
- C. southern area
- D. western area

[ILOs ESS, B, C, & P:1 - SC:ES:5:1]

7)



What is the cause of increased atmospheric levels of carbon dioxide in terms of the carbon cycle?

- A. More carbon is being stored in plant and animal tissue
- ✓ Carbon is being added to the atmosphere faster than it is being removed
- C. The carbon cycle is unaffected because the number of carbon atoms on Earth remains the same
- D. Ocean organisms will have to remove more carbon from the atmosphere in order to keep the cycle in balance

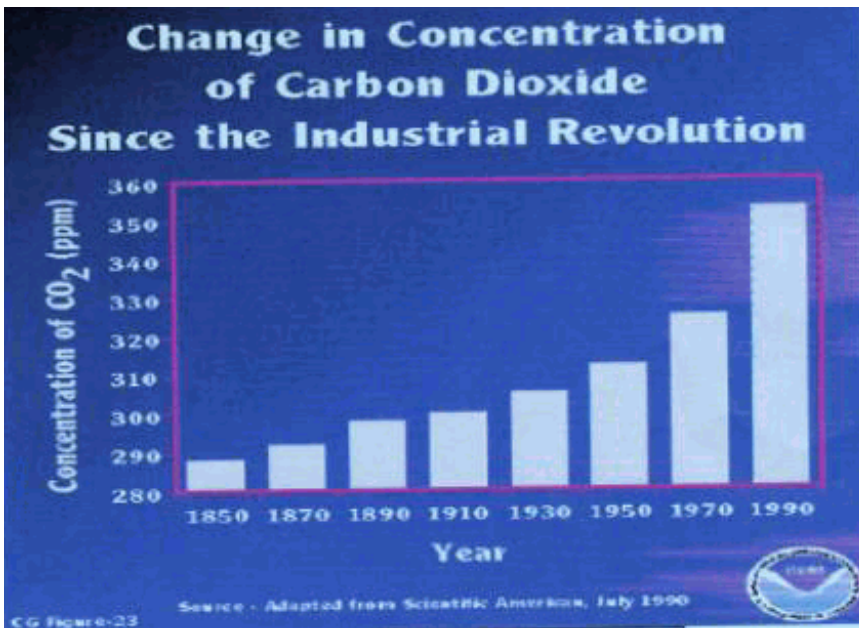
[SC:ES:5:1 - ILOs ESS, B, C, & P:3]

8) Nitrates and sulfates emitted by cars and industry can combine in the atmosphere with water vapor to form

- A. Ozone
- ✓ Acid rain
- C. Smog
- D. Fog

[SC:ES:5:1 - ILOs ESS, B, C, & P:3]

9)



Which of the following is the best explanation for the increase of carbon dioxide concentrations in the atmosphere since 1850?

- A. There are many more cows now than in 1850
- ✓ Since 1850, the burning of fossil fuels has increased
- C. The age of dinosaurs is past so carbon is no longer being stored in coal beds
- D. There is more pollution, which keeps carbon dioxide from being removed from the atmosphere

[SC:ES:5:1 - ILOs ESS, B, C, & P:1]

10) Which item below best explains why animal manure can be used as a fertilizer for crops and gardens? The plant uses the

- A. carbon from the dead plant matter to make sugar
- ✓ nitrogen to make proteins and DNA
- C. oxygen for cellular respiration
- D. hydrogen to form carbohydrates

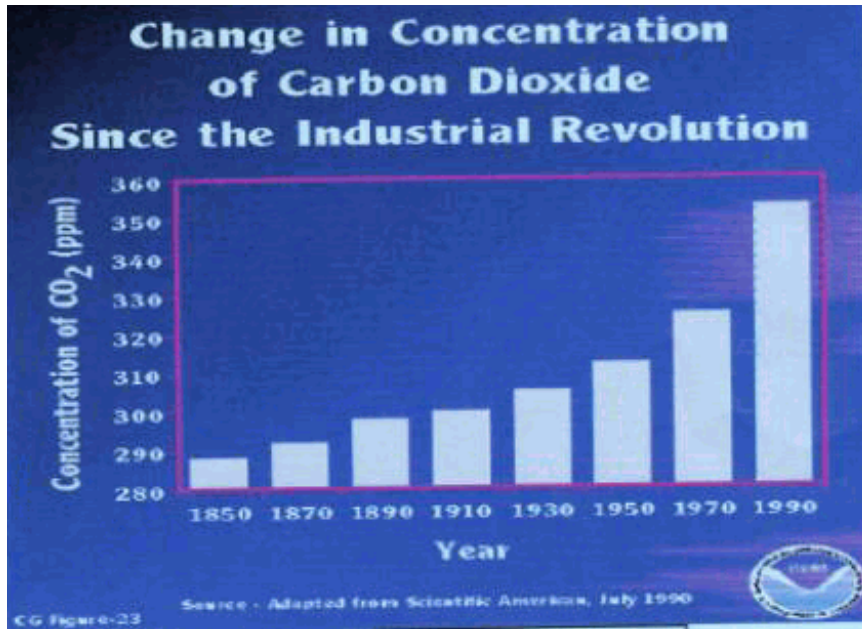
[ILOs ESS, B, C, & P:3 - SC:ES:5:1]

11) Common human activities have a dramatic effect on the carbon cycle. How have recent changes in the carbon cycle affected human life?

- A. The carbon cycle traps carbon that could be used for human respiration.
- ✓ Increases in global temperature affect climate, agriculture and rainfall patterns.
- C. The amount of available oxygen will decrease due to the increase in carbon dioxide levels.
- D. The carbon cycle has no direct effect on human life because it deals mostly with plants.

[SC:ES:5:1 - ILOs ESS, B, C, & P:3]

12)

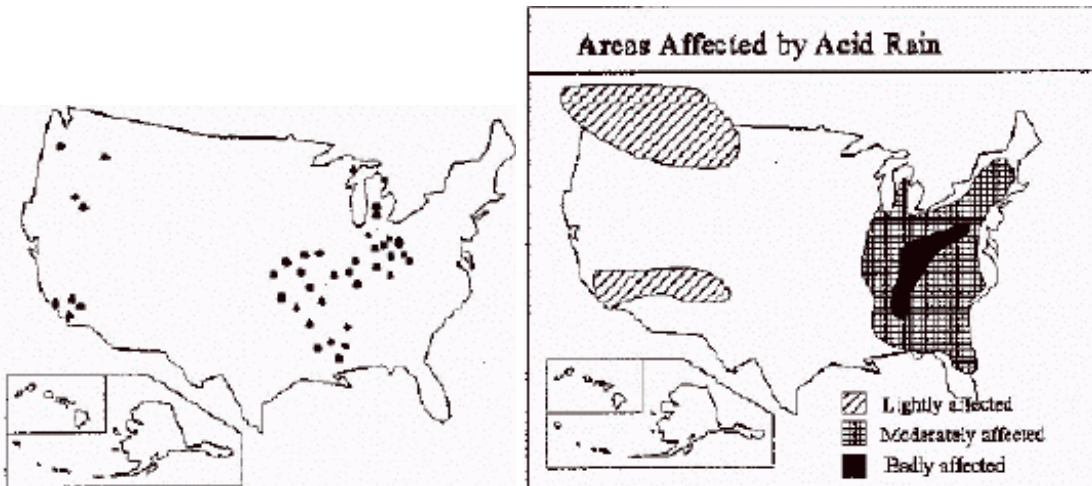


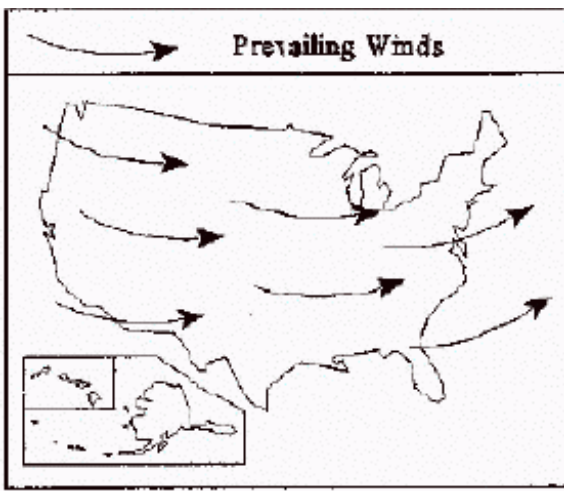
What is the most likely effect of the increase in carbon dioxide levels in the atmosphere?

- ✓ warmer atmosphere
- B. tropical rainforest destruction
- C. ozone depletion
- D. acid rain

[ILOs ESS, B, C, & P:3 - SC:ES:5:1]

13) The map of prevailing winds is included to show:

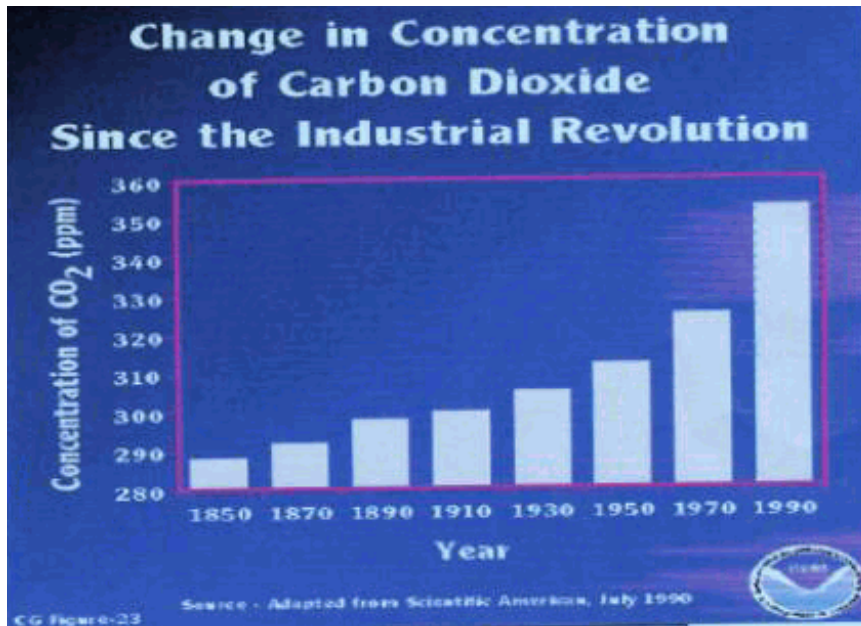




- A. that the weather is very changeable over most of the USA
- B. that sulfur emissions make the wind blow
- C. that acid rain cannot travel
- ✓ that wind may be carrying sulfur away from its source

[ILOs ESS, B, C, & P:3 - SC:ES:5:1]

14)



According to the graph, which of the following statements best describes the concentration of carbon dioxide in the atmosphere?

- ✓ It has increased since the Industrial Revolution
- B. It has decreased since the Industrial Revolution
- C. It has remained the same since the Industrial Revolution
- D. There is no carbon dioxide in the atmosphere

[SC:ES:5:1 - ILOs ESS, B, C, & P:1]

15) Burning fossil fuels adds carbon dioxide to the atmosphere. If we continue to add carbon dioxide to the atmosphere at the current rate, how will this affect the carbon cycle?

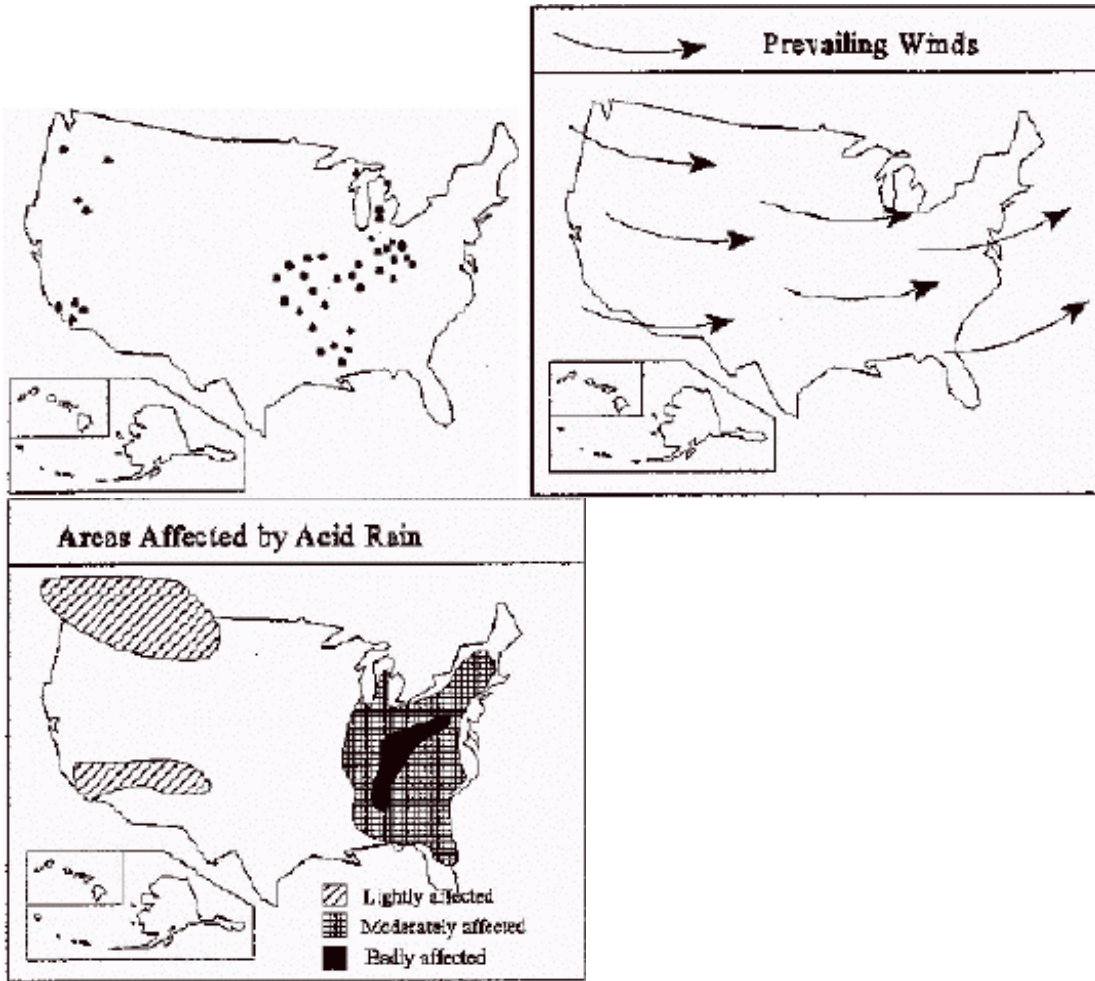
- A. The number of carbon atoms on Earth will increase
- B. The number of carbon atoms on Earth will decrease
- ✓ The number of carbon atoms in the atmosphere will increase
- D. The number of carbon atoms in the atmosphere will decrease
- E. The carbon cycle will be unaffected

[SC:ES:5:1 - ILOs ESS, B, C, & P:1]

16) The reaction of chemical pollutants with one another in sunlight produces:

- A. Acid rain
- B. Nitrogen
- C. Less pollution
- ✓ Photochemical smog

17) Which is a major pollutant produced by coal burning power plants



- A. Carbon dioxide
- B. Freon
- C. Nitrates
- ✓ Sulfur dioxide

18) Which of the following is an example of an ethical question raised by science that science cannot answer?

- ✓ Should the government require people to buy cars that release less carbon dioxide?
- B. Can companies make cars that release less carbon dioxide?
- C. Are the levels of carbon dioxide increasing in the upper atmosphere?
- D. How does carbon dioxide trap the sun's ultra violet rays?

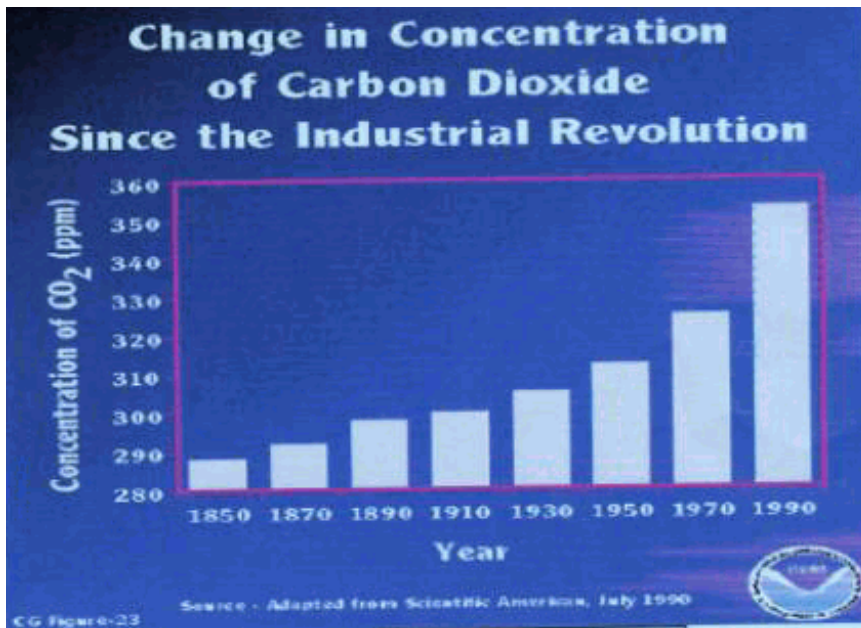
19) Which of the following removes CO₂ from the atmosphere?

- ✓ rainforest trees
- B. cars
- C. burning coal
- D. spraying aerosol cans

20) Which of the following is an ethical question raised by science that science cannot answer by itself?

- A. Does burning fossil fuels alter the carbon cycle?
- B. How has the carbon cycle changed because of the loss of rain forests?
- ✓ Should there be regulations about human activities that alter the carbon cycle?
- D. How does the level of carbon dioxide change the carbon cycle?

21)



Based on the graph above, which of the following statements is an inference?

- A. The concentration of carbon dioxide is measure in ppm
- B. There was more carbon dioxide added to the atmosphere in 1970 than in 1910
- C. In 1950, the atmosphere had a carbon dioxide concentration of approximately 311 ppm
- ✓ D. The destruction of rainforests has contributed to the rise in carbon dioxide levels in the atmosphere

[ILOs ESS, B, C, & P:1 - SC:ES:5:1]

22) In photosynthesis plants get carbon from the air and hydrogen from water. Choose the formula that supports this fact.

- ✓ A. $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
- B. $\text{CH}_2 + \text{H}_2\text{O} \rightarrow \text{CH}_2\text{O}$
- C. $\text{C} + \text{O}_2 + \text{H} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
- D. $\text{CH} + \text{O}_2 \rightarrow \text{CHO}_2$

[SC:ES:5:1 - ILOs ESS, B, C, & P:4]

23) Which of the following is NOT an effect of acid rain?

- A. Disintegration of buildings, statues, tombstones
- B. Death and stunting of trees
- ✓ C. Increase in temperature
- D. Loss of aquatic life in rivers and streams

[SC:ES:5:1 - ILOs ESS, B, C, & P:3]

24) For millions of years the carbon cycle has been in equilibrium. Climatologists are concerned because data indicates we are seeing the amount of carbon in the air increase. Which theory best explains this loss of atmospheric equilibrium?

- A. CFAs have created a hole in the ozone.
- ✓ B. Society has increased the burning of fossil fuels.
- C. Environmentalists have increased the size of rain forests.
- D. Our society has recognized the danger of nuclear fission.

[SC:ES:5:1 - ILOs ESS, B, C, & P:5]

25) Why is the use of fossil fuels decreasing slightly?

- ✓ A. Alternative sources of power, such as hydroelectric power, are becoming more available and efficient.
- B. Automobiles are using less gasoline because of the increasing price of oil.
- C. Available fossil fuels in the earth are just about gone.
- D. Global warming decreases our need to burn fuel for heat in cold weather.

[SC:ES:5:1 - ILOs ESS, B, C, & P:5]

- 26) Two neighbors live by a nearby pond. They have noticed some changes in the pond and have decided to conduct investigations to find out what is causing the changes.
 Neighbor #1 plans to investigate the relationship between the amount of fertilizer used by area residents and the nitrogen levels of the nearby pond.
 Neighbor #2 plans to investigate the relationship between the nitrogen levels of the nearby pond and the changes in the amount and types of plant life.
 Which of the following best describes the importance of these investigations?

- A. The information gathered will be of great importance to local scientists.
- ✓ B. The information collected can be used to inform residents of changes in the pond.
- C. The information gathered can be used to stop neighbors from using the pond.
- D. The information collected should be used to create local laws concerning pollution.

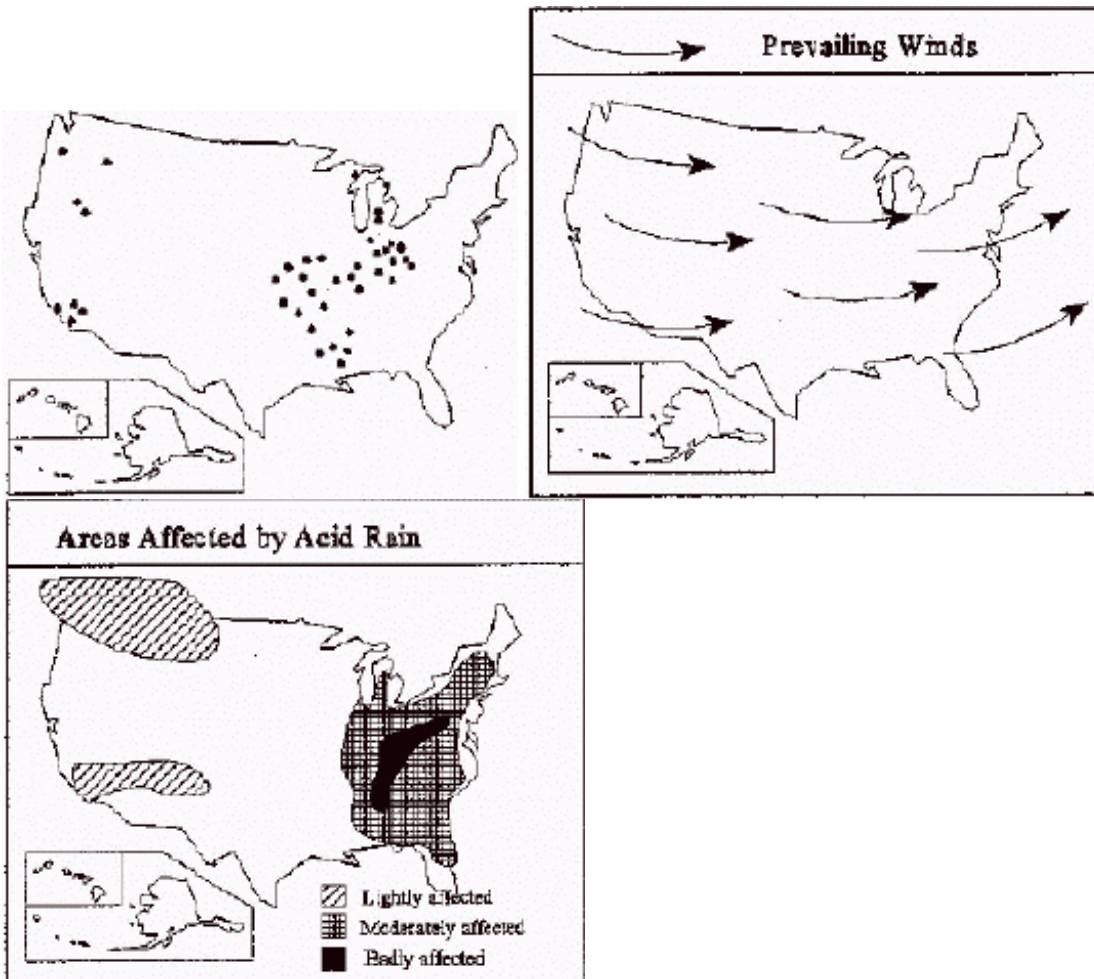
[ILOs ESS, B, C, & P:6 - SC:ES:5:1]

- 27) The concentration of carbon dioxide gases has increased due to fossil fuel use. Although car emission systems have been improved, the concentration of carbon dioxide has not significantly decreased. In response to this information, automobile manufacturers and dealers are being asked to outline car fuel usage and emission details for consumers.
 Which of the following best describes why fuel usage and emission detail information should be made available to the consumer?

- ✓ A. Consumers can use this information to make an informed decision.
- B. Consumers want to know what scientists recommend when purchasing a car.
- C. Without this information, consumers will be unable to judge the price of a car.
- D. Emissions and fuel usage is not related to carbon dioxide concentration in the atmosphere.

[SC:ES:5:1 - ILOs ESS, B, C, & P:6]

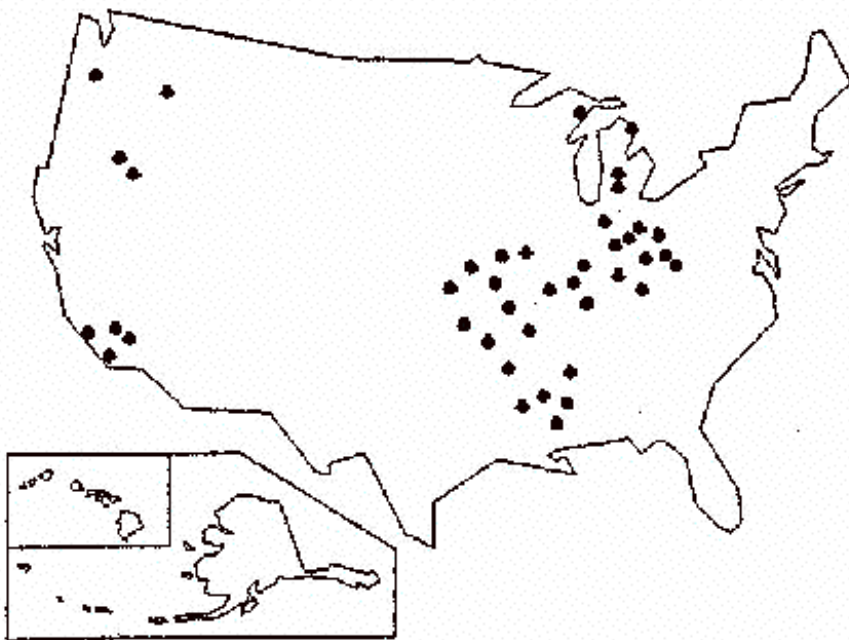
- 28) What do areas most affected by acid rain have in common?



- ✓ A. they are downwind from a source of sulfur
- B. they are in states where high amounts of sulfur produced
- C. they are in states with bad weather
- D. they are all in the northern states

[ILOs ESS, B, C, & P:1 - SC:ES:5:1]

- 29) Which area of North America has the highest concentration of coal burning power plants?



- A. northern area
- B. southern area
- C. western area
- ✓ eastern area

[ILOs ESS, B, C, & P:1 - SC:ES:5:1]

30) What physical symptoms are associated with a reduction of ozone in the upper atmosphere?

- A. fever
- B. nagging cough
- C. difficult breathing
- ✓ skin cancer

[SC:ES:5:2 - ILOs ESS, B, C, & P:5]

31) During the winter months Utah newspapers and news programs announce burn days in which it is illegal to burn fires for home heating. According to the graph, which type of pollutant are the authorities trying to reduce?

This table lists the major air pollutants found in our society today.

Pollutant	Description	Sources	Effects
Carbon Monoxide (CO)	Odorless, colorless, poisonous gas. It is produced by burning fossil fuel	Cars, trucks, busses, small engines	Does not allow blood to carry oxygen. It can cause death. It can cause headaches and stress in traffic.
Nitrogen oxides (NO _x)	Is a result from extremely hot fires, which exceed 538 degrees C	NO _x comes from burning fuels in trucks, power plants and steel mills.	NO _x can cause respiratory infections, lung disease and cancer. Can lead to acid rain, which can cause metal corrosion and fading fabrics.
Sulfur dioxide (SO ₂)	Produced when sulfur and oxygen combine chemically in a fire	SO ₂ is released from petroleum refineries, smelter and coal burning power plants.	SO ₂ is a major contributor to acid rain, which damages, lakes forests and stone.
Particulate	Smoke, soot ash dust and other small particles	Particulates may come from burning wood, automobile exhaust (especially diesel) construction and agriculture	Particulates can form clouds that reduce visibility and cause a variety of respiratory problems.

- A. carbon monoxide
- B. nitrogen oxides
- C. sulfur dioxide
- ✓ particulates

[SC:ES:5:2]

- 32) Jill and Holly wanted to design an experiment that tested the gasses that cause acid rain. They obtained an indicator solution that was clear, but turned red in acids. The stronger the acid became, the redder the solution. They then filled four balloons with gasses collected from a bike pump, a propane bottle, a car and a diesel truck. They bubbled the gasses in the balloons through the solutions with a straw, exposing the indicator to the gas in the balloons. Then they compared the color of the solutions.

According to the data collected, which gas causes the greatest amount of acid rain?

SOURCE OF GAS	COLOR CHANGE
Bike pump	No color change
Propane	No color change
Car exhaust	Dark red
Diesel truck exhaust	Light red

- A. bike pump
- B. propane
- ✓ car exhaust
- D. diesel truck exhaust

[SC:ES:5:2]

- 33) Jill and Holly wanted to design an experiment that tested the gasses that cause acid rain. They obtained an indicator solution that was clear, but turned red in acids. The stronger the acid became, the redder the solution. They then filled four balloons with gasses collected from a bike pump, a propane bottle, a car and a diesel truck. They bubbled the gasses in the balloons through the solutions with a straw, exposing the indicator to the gas in the balloons. Then they compared the color of the solutions.

According to the data collected, which conclusion is best supported by the data gathered in the experiment?

SOURCE OF GAS	COLOR CHANGE
Bike pump	No color change
Propane	No color change
Car exhaust	Dark red
Diesel truck exhaust	Light red

- A. Cars that run on propane do not create acid rain.
- B. Diesel trucks do not cause acid rain.
- C. There is no acid in the air
- ✓ Cars and trucks both cause acid rain.

[SC:ES:5:2]

- 34) Acid precipitation, global warming, and ozone depletion are problems that are a direct result of air pollution. Because air pollution is difficult to control, government agencies and scientists have met to discuss ways to reduce global air pollution.

Which of the following best describes why global discussions of air pollution issues are important?

- ✓ Air pollution problems affect people living on every continent.
- B. Government agencies are mostly at fault for not decreasing air pollution.
- C. Scientists have required that governments take action to decrease air pollution.
- D. Science findings have indicated that these problems are mostly caused by the greenhouse effect.

[ILOs ESS, B, C, & P:5 - SC:ES:5:2]

- 35) According to this chart, which type of air pollution can be deadly in a very short period of time?

This table lists the major air pollutants found in our society today.

Pollutant	Description	Sources	Effects
Carbon Monoxide (CO)	Odorless, colorless, poisonous gas. It is produced by burning fossil fuel	Cars, trucks, busses, small engines	Does not allow blood to carry oxygen. It can cause death. It can cause headaches and stress in traffic.
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Particulate	Smoke, soot ash dust and other small particles	Particulates may come from burning wood, automobile exhaust (especially diesel) construction and agriculture	Particulates can form clouds that reduce visibility and cause a variety of respiratory problems.

- ✓ carbon monoxide
- B. nitrogen oxides
- C. sulfur dioxide
- D. particulate

[SC:ES:5:2]

36) What harmful effect is associated with the "ozone hole"?

- ✓ skin cancer
- B. heart attacks
- C. ocean saltiness
- D. loss of hair

[SC:ES:5:2 - ILOs ESS, B, C, & P:3]

37) World leaders are struggling to form a global policy concerning the release of greenhouse gases. Which of the following best describes the role science should play in forming public policy?

- ✓ Scientific data should be used to inform public policy makers
- B. Only scientific data should be considered when making public policy
- C. Science has no role in the formation of public policy
- D. Policy issues are too value laden to include science

[ILOs ESS, B, C, & P:6 - SC:ES:5:2]

38) Because of the recent shortages of electrical energy, the governor has proposed building more coal-fired generating plants in Utah. If that happens, according to this chart, which type of air pollution will likely increase in Utah?

This table lists the major air pollutants found in our society today.

Pollutant	Description	Sources	Effects
Carbon Monoxide (CO)	Odorless, colorless, poisonous gas. It is produced by burning fossil fuel	Cars, trucks, busses, small engines	Does not allow blood to carry oxygen. It can cause death. It can cause headaches and stress in traffic.
Nitrogen oxides (NO _x)	Is a result from extremely hot fires, which exceed 538 degrees C	NO _x comes from burning fuels in trucks, power plants and steel mills.	NO _x can cause respiratory infections, lung disease and cancer. Can lead to acid rain, which can cause metal corrosion and fading fabrics.
Sulfur dioxide (SO ₂)	Produced when sulfur and oxygen combine chemically in a fire	SO ₂ is released from petroleum refineries, smelter and coal burning power plants.	SO ₂ is a major contributor to acid rain, which damages, lakes forests and stone.
Particulate	Smoke, soot ash dust and other small particles	Particulates may come from burning wood, automobile exhaust (especially diesel) construction and agriculture	Particulates can form clouds that reduce visibility and cause a variety of respiratory problems.

- A. carbon monoxide
- B. nitrogen oxides
- ✓ sulfur dioxide
- D. particulate

[SC:ES:5:2]

39) What does the ozone layer protect living things from?

- ✓ ultraviolet rays
- B. meteors and meteorites
- C. bad weather
- D. excessive heat

[SC:ES:5:2 - ILOs ESS, B, C, & P:3]

40) Which of the following resources could provide the most accurate and least biased information on the carbon cycle?

- ✓ National Geographic
- B. Astronomy Today
- C. Sierra Club Infoletter
- D. Local Newspaper

[SC:ES:5:2 - ILOs ESS, B, C, & P:4]

41) Why do most climatologists now accept the theory that there is a hole in the ozone?

- A. Companies that produce CFCs told them so.
- B. It is easy to detect just by looking towards the sky at sunset.
- ✓ There is data to support it from more than one source.
- D. The president of the United States mandated their agreement.

[SC:ES:5:2 - ILOs ESS, B, C, & P:6]

42) (1) In the early 1970s, scientists first proposed that chlorofluorocarbons (CFCs) could destroy the ozone layer. (2) Since then, scientists have confirmed that CFCs destroy ozone molecules by breaking up the chemical bonds in the ozone molecule. (3) In the mid-1980s, atmospheric studies identified an extremely thin area of ozone over Antarctica as well as a global thinning of the ozone layer. (4) The thinning of the ozone is significant because this layer filters and absorbs harmful ultraviolet radiation that influences crop production and causes eye and skin damage. Which sentence has relevant data to support the argument that CFCs contribute to the thinning of the ozone?

- A. 1
- B. 2
- C. 3
- D. 4

[SC:ES:5:2 - ILOs ESS, B, C, & P:4]

43) Which substance is considered the main cause of the "ozone hole"?

- A. carbon dioxide
- B. chlorofluorocarbons
- C. methane
- D. water vapor

[SC:ES:5:2 - ILOs ESS, B, C, & P:3]

44) Which of the following is a question that science alone cannot answer?

- A. Should the government pass a mandatory carpool law to decrease air pollution?
- B. Do wood burning stoves make a significant contribution to air pollution?
- C. Can filters decrease the pollutants put into the atmosphere by refineries?
- D. What health risks are increased by daily inhalation of air pollutants?

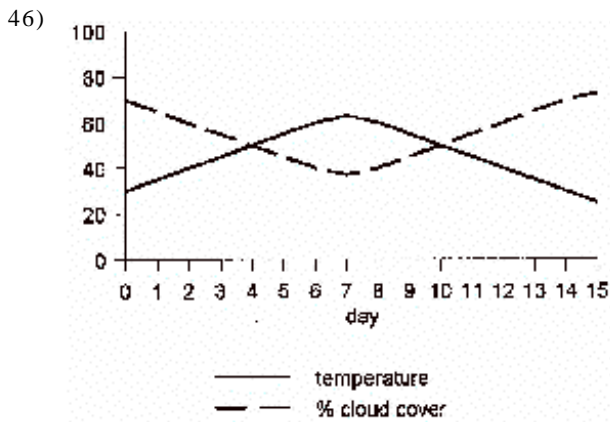
[SC:ES:5:2 - ILOs ESS, B, C, & P:6]

45) The data table above shows the consumption of fossil fuels since 1000 AD. What probably accelerated the use of fossil fuels since 1900?

	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
% available	92%	92%	91%	91%	90%	89%	88%	87%	86%	83%	67%	60%	?

- A. Increase of available fossil fuels in Earth
- B. Better procedures for extracting coal from the earth.
- C. Importance of coal and oil to our society
- D. Industrial Revolution.

[ILOs ESS, B, C, & P:5 - SC:ES:5:2]



How do cloud cover and temperature appear to be related in the graph?

- A. when temperature rises, cloud cover increases
- B. when temperature rises, clouds stay the same
- C. there appears to be no relationship
- D. when temperature rises, cloud cover decreases

[SC:ES:6:2 - ILOs ESS, B, C, & P:1]

47) As air rises into the atmosphere it expands and cools. Warm air can hold more water vapor than cold air. So as air rises it is unable to hold its water vapor, causing the water vapor to condense. Dewpoint is reached when the air can hold no more water vapor. The air is saturated with water vapor. The following information was taken as warm air rose and cooled.

According to this graph, where would clouds form?

Elevation	Air Temperature	Dewpoint
1000 m	10 degrees C	10 degrees C
500 m	15 degrees C	11 degrees C
0	20 degrees C	12 degrees C

- ✓ 1000 m
- B. 500 m
- C. 0 m
- D. nowhere

[SC:ES:6:2]

- 48) Weather conditions can cause problems for aircraft. Pilots must have continuous weather data to keep the aircraft safe. The ASOS (Automated Surface Observing System) transmits data to pilots at one minute intervals, much faster than the human observers it was designed to replace. Opponents of the new ASOS say that humans were replaced by the new system only to cut down on costs, not because the system is more accurate.

Which of the following describes how science influenced the development of this new technology?

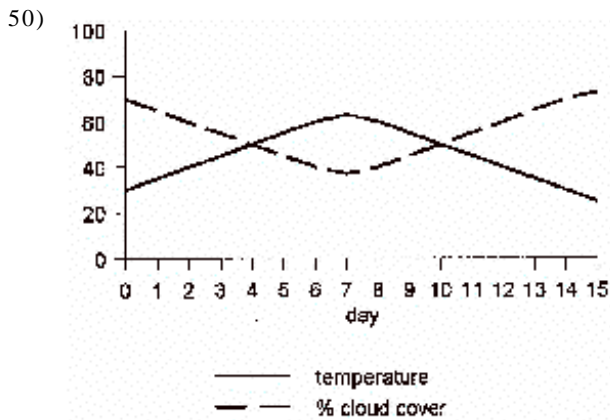
- A. Scientists were meeting the demands of pilots that refused to fly without the development of a new weather system.
- ✓ Scientists were encouraged to find a way to deliver weather data more efficiently than using human observers.
- C. Scientists were asked to research ways to control the weather to decrease problems for aircraft.
- D. Scientists were invited to study the impact of the new system on the observers who had lost their jobs.

[ILOs ESS, B, C, & P:5 - SC:ES:6:2]

- 49) The ocean water near the equator absorbs more heat throughout the year than ocean water near the North Pole. Which of the following **best** explains this difference?

- A. The equator is closer to the Sun.
- B. The equator has higher sea levels.
- ✓ The equator receives more direct sunlight.
- D. The equator rotates more quickly on Earth's axis.

[ILOs ESS, B, C, & P:3:a - SC:ES:6:2:C]



What might best explain the results in the graph?

- A. when it is cloudy, the clouds trap the heat and temperature increases
- B. when it is cloudy, it rains more and temperature goes up
- ✓ when the sky is clear, more sun can reach the earth and the temperature rises
- D. when the sky is clear, more heat escapes

[ILOs ESS, B, C, & P:1 - SC:ES:6:2]

- 51) Worldwide weather forecasting has been made more accurate by the use of:

- A. thermometers
- ✓ satellites
- C. sling psychrometer
- D. rockets

[SC:ES:6:2 - ILOs ESS, B, C, & P:5]

- 52) The barometric pressure increases from 28.4 inches to 31 inches the night before your wedding reception that is to be held outside. What happens to your plans?

- A. You move all plans to inside due to fog
- ✓ Your plans are the same, all is well
- C. You need to order raincoats
- D. Barometric pressure has no effect on weather

[ILOs ESS, B, C, & P:5 - SC:ES:6:2]

- 53) As air rises into the atmosphere it expands and cools. Warm air can hold more water vapor than cold air. So as air rises it is unable to hold its water vapor, causing the water vapor to condense. Dewpoint is reached when the air can hold no more water vapor. The air is saturated with water vapor. The following information was taken as warm air rose and cooled.

Ground fog is a cloud that forms at low altitude.

According to this graph, at what conditions would form fog at the 0 meter elevation?

- A. A dew point of 10 degrees C
- B. A dew point of 12 degrees C
- C. A temperature of 20 degrees C
- ✓ A temperature of 12 degrees C

[SC:ES:6:2]

- 54) Lydia designs an experiment to examine the relationship between barometric pressure and temperature. She measures the temperature and the barometric pressure on Monday and Tuesday. She writes up her report and turns it in on Wednesday, the day it's due. Below are her data and conclusion.

Day	Temperature	Barometric Pressure
Monday	27°C	1011 millibars
Tuesday	28°C	1123 millibars

Conclusion: A rise in temperature causes a rise in barometric pressure.

Which of the following statements most accurately evaluates the validity of her conclusion?

- A. Her conclusion is valid because she organized the data into a table correctly
- B. Her conclusion is valid because she measured temperature and pressure carefully and used metric units
- C. Her conclusion is invalid because it is impossible to determine the relationship between temperature and pressure experimentally
- ✓ Her conclusion is invalid because nothing in her experiment tests if a change in temperature causes a change in pressure

[ILOs ESS, B, C, & P:1 - SC:ES:6:2]

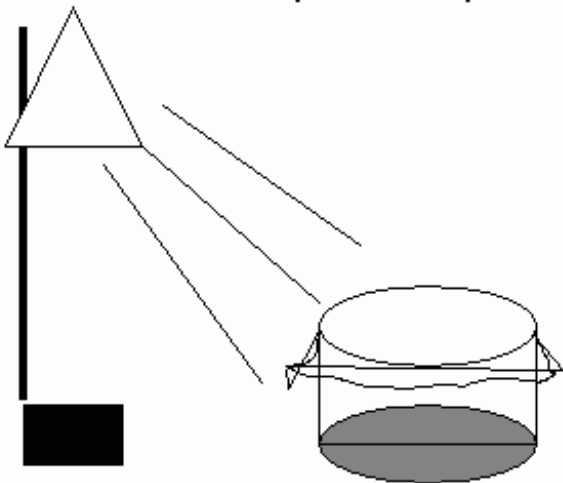
- 55) How has technology changed scientists' ability to predict the weather?

- ✓ Satellites produce images that allow scientists to track weather systems
- B. Scientists better understand the relationship between warm air fronts and thunderstorms
- C. Doppler radar enables scientists to communicate with each other
- D. The invention of television makes it possible to broadcast weather predictions to the public
- E. A rising barometer indicates a storm is approaching

[ILOs ESS, B, C, & P:5 - SC:ES:6:2]

- 56) If this model were compared to Earth, what would the plastic wrap represent?

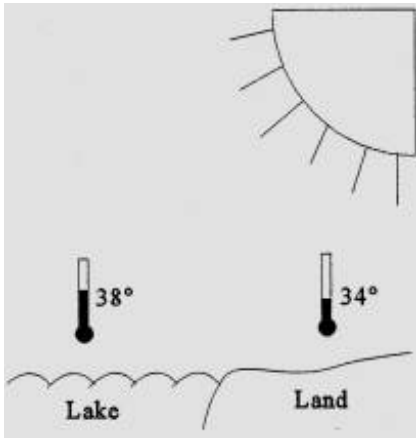
The light is shining on an empty container covered with plastic wrap.



- A. the solid surface
- B. the waters of the ocean
- ✓ the atmosphere
- D. the clouds

[SC:ES:6:2]

57) Use the diagram to answer the following questions. Consider the diagram as a closed system.



According to this diagram, what causes air movement?

- A. The hotter air above water rises
- B. The hotter air above land rises
- C. The hotter air above water descends
- D. The hotter air above land descends
- E. The air does not move

[SC:ES:6:2 - ILOs ESS, B, C, & P:1]

58) What is the primary energy source that drives all weather events, including precipitation, hurricanes, and tornados?

- A. the Sun
- B. the Moon
- C. Earth's gravity
- D. Earth's rotation

[SC:ES:6:2 - ILOs ESS, B, C, & P:3]

59) Lydia designs an experiment to examine the relationship between barometric pressure and temperature. She measures the temperature and the barometric pressure on Monday and Tuesday. She writes up her report and turns it in on Wednesday, the day it's due. Below are her data and conclusion.

Day	Temperature	Barometric Pressure
Monday	27°C	1011 millibars
Tuesday	28°C	1123 millibars

Conclusion: A rise in temperature causes a rise in barometric pressure.

Which of the following would improve Lydia's experimental design?

- A. Test another variable as well
- B. Collect data for more days
- C. Use a mercurial barometer
- D. Measure temperature in Fahrenheit
- E. Use data from another geographic region as a control

[ILOs ESS, B, C, & P:1 - SC:ES:6:2]

60) What is the principle cause of the Coriolis Effect?

- A. isolation
- B. winds
- C. ocean currents
- D. Earth's rotation

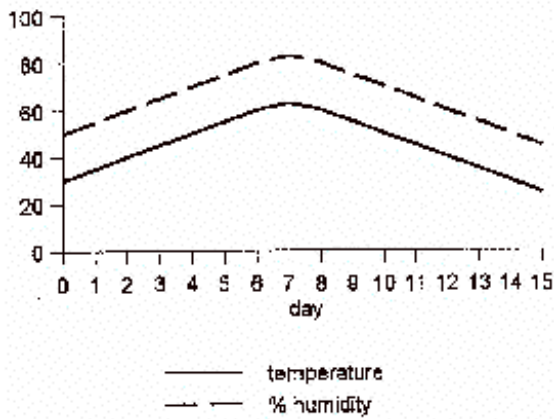
[SC:ES:6:2 - ILOs ESS, B, C, & P:3]

61) A low-pressure system entering an area means:

- A. clear, sunny weather
- B. much warmer weather
- C. no real changes in weather
- D. cloudy sky, may precipitate

[SC:ES:6:2 - ILOs ESS, B, C, & P:3]

62)



How do the temperature and humidity appear to be related in the graph?

- A. when one goes up the other goes up
- B. when one goes up the other goes down
- C. they are opposites
- D. there is no relationship

[ILOs ESS, B, C, & P:1 - SC:ES:6:2]

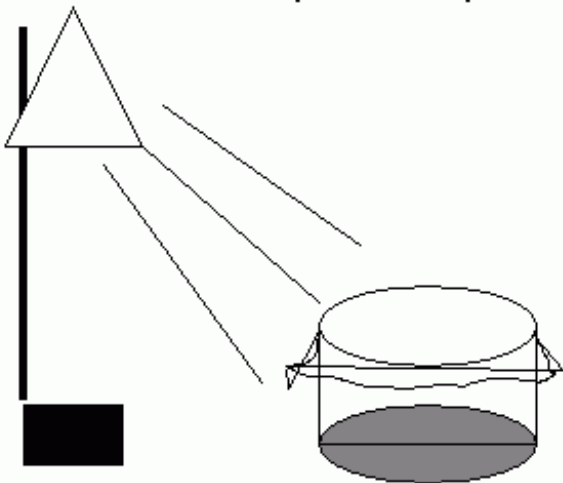
63) You call a psychic hotline and are told that if you wash your car it will rain. You test the prediction by washing your car in the morning. It rains in the afternoon. Was the psychic's prediction scientifically accurate?

- A. Yes, washing cars will cause it to rain
- B. Yes, the psychic's prediction was tested and proven correct
- C. No, psychics are not scientists
- D. No, the test would have to be done for many more days to assess its scientific validity
- E. No, the scientific method is used appropriately only on science things like rocks, plants, and animals. It is not for use on car washing

[SC:ES:6:2 - ILOs ESS, B, C, & P:6]

64) What would you expect the temperature of the air inside the container to be when compared to the outside?

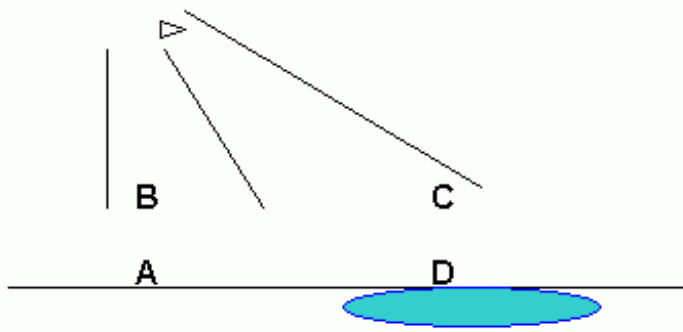
The light is shining on an empty container covered with plastic wrap.



- A. warmer
- B. cooler
- C. the same
- D. more humid

[SC:ES:6:2]

65) In this diagram of the Sun shining on land and a lake, where would you expect to find the warmest temperature?



- ✓ A
- B. B
- C. C
- D. D

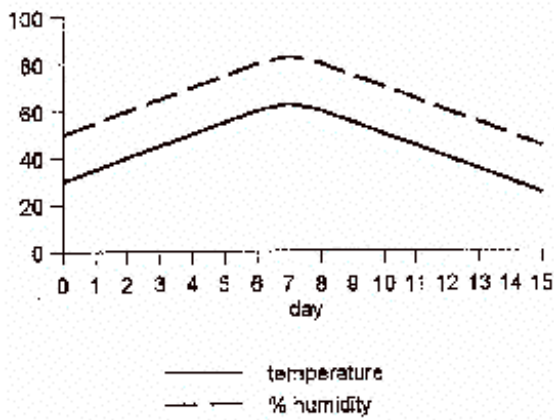
[SC:ES:6:2]

66) Which of the following statements most accurately describes the role of science in predicting weather?

- A. Scientists can control weather
- ✓ Scientists can predict whether or not it is likely to rain next week
- C. Scientists can determine whether or not it will rain on next year's Fourth of July parade
- D. Scientists can predict the exact location of tornadoes
- E. Scientists can determine how weather affects human relationships

[ILOs ESS, B, C, & P:6 - SC:ES:6:2]

67)



Which explanation best fits the graph?

- ✓ as temperature goes up, more water evaporates, raising humidity
- B. as temperature goes down, more water evaporates, raising humidity
- C. as temperature goes up, less water evaporates making humidity lower
- D. as temperature goes down, humidity raises due to more rainfall

[SC:ES:6:2 - ILOs ESS, B, C, & P:1]

68) Why does the Pacific Ocean current along the west coast of the United States influence the weather in Utah?

- ✓ It brings cool water coming from the north, which cools the air
- B. It brings cool water coming from the south, which cools the air
- C. It brings warm water coming from the north, which warms the air
- D. It brings warm water coming from the south, which warms the air

[SC:ES:6:2 - ILOs ESS, B, C, & P:3]

69) In the late 1980s the Governor of Utah spent millions of tax dollars to build pumps to lower the level of the Great Salt Lake to protect surrounding property and roads. However the pumps were not greatly used because the lake receded by drought conditions. Understanding droughts is part of which discipline?

- A. weather
- B. meteorology
- C. astronomy
- ✓ climatology
- E. engineering

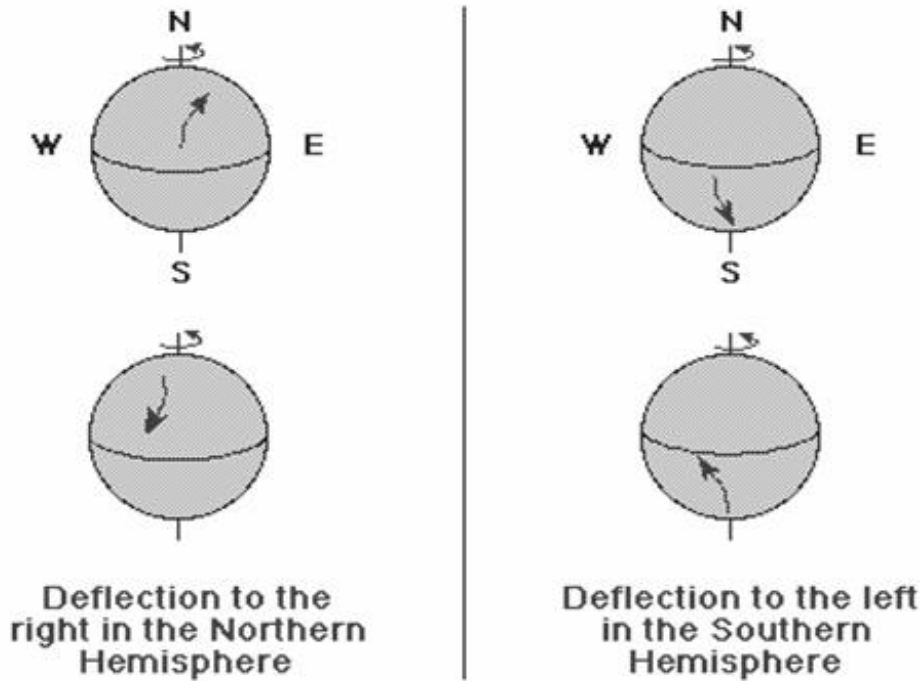
[SC:ES:6:2 - ILOs ESS, B, C, & P:3]

70) Why do we experience winter in the months of November through March in Utah?

- A. The sun is farther from the earth
- B. The sun is closer to the earth
- C. The movement of warm maritime air masses from the Pacific
- D. The calendar is on an equinox
- ✓ E. The angle of incidence of the sun's rays is more indirect

[SC:ES:6:2 - ILOs ESS, B, C, & P:3]

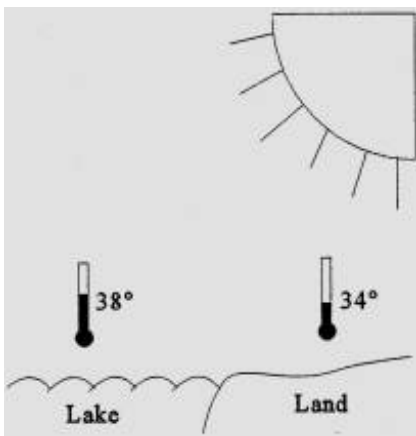
71) Which of the following is the best title for this chart?



- A. Wind and Ocean Patterns
- ✓ B. The Coriolis Effect
- C. Patterns of Global Winds
- D. Patterns of Ocean Currents

[ILOs ESS, B, C, & P:4 - SC:ES:6:2]

72) Use the diagram to answer the following questions. Consider the diagram as a closed system.



Given the weather conditions illustrated, in which direction will the wind blow?

- A. toward land
- ✓ B. toward water
- C. upward from lake
- D. downward towards land
- E. there is no wind

[SC:ES:6:2 - ILOs ESS, B, C, & P:1]

73) You are conducting research on changes in global convection currents in the atmosphere and in the oceans. Where would you go to find the most current information?

- ✓ National Oceanographic and Atmospheric Administration website.
- B. World Book encyclopedia entry on conduction currents.
- C. Sierra Club newsletter article on changes in currents.
- D. An article in the local newspaper on conduction in the Great Salt Lake.

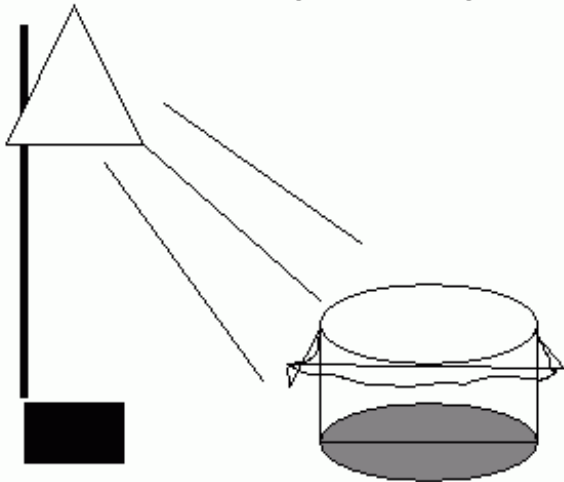
[ILOs ESS, B, C, & P:4 - SC:ES:6:2]

- 74) Air in a bicycle tire can be expanded and contracted. If the air is let out of the tire it is expanding. How would you expect the air to feel?
- A. hot
 - B. warm
 - ✓ cold
 - D. the same as the temperature of surrounding air

[SC:ES:6:2]

- 75) If temperatures were taken both inside and outside the container, what would this apparatus model?

The light is shining on an empty container covered with plastic wrap.



- A. how solar radiation is produced
- B. the effect of light on air
- ✓ the greenhouse effect
- D. the formation of clouds

[SC:ES:6:2]

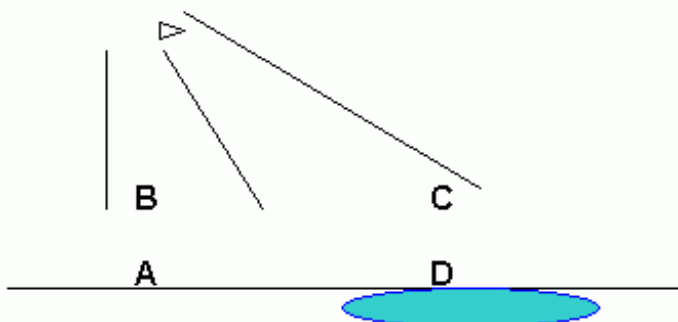
- 76) Which of the following best describes how technology has influenced what we know about climate change?

- ✓ Computers improve accurate collection of long term weather information.
- B. Satellites are able to give more current weather conditions.
- C. Doppler radar provides accurate weather warnings and watches.
- D. Severe weather warnings are detailed by computer systems.

[ILOs ESS, B, C, & P:5 - SC:ES:6:2]

- 77) If you were standing in position "A," from which direction would you expect to find wind blowing?

This is a diagram of the Sun shining on land and a lake :



- A. from A

- B. from B
- C. from C
- ✓ from D

[SC:ES:6:2]

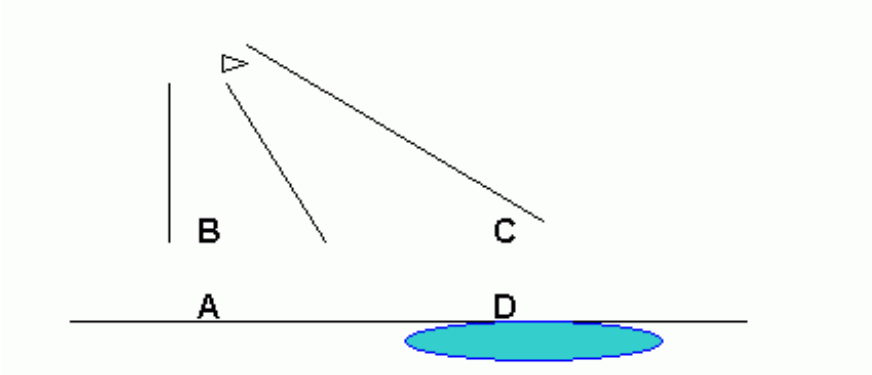
- 78) Weather conditions can cause problems for aircraft. Pilots must have continuous weather data to keep the aircraft safe. The ASOS (Automated Surface Observing System) transmits data to pilots at one minute intervals, much faster than the human observers it was designed to replace. Opponents of the new ASOS say that humans were replaced by the new system only to cut down on costs, not because the system is more accurate.

Which of the following is an ethical question raised by science that science cannot answer?

- A. Is the ASOS system more accurate than human observers?
- B. How does the ASOS system deliver data to pilots at one minute intervals?
- ✓ Should the ASOS system be used to cut down on the cost of human observers?
- D. What weather conditions cause problems for aircraft pilots?

[SC:ES:6:2 - ILOs ESS, B, C, & P:6]

- 79) Using this diagram of the Sun shining on land and a lake, how could El Nino be explained?



- ✓ Convection currents in the air affect ocean currents
- B. Air moves because of solar radiation
- C. Water in the sea forms layers with cold on top
- D. The sun heats water and air equally

[SC:ES:6:2]