Coordinated Science Credit Recovery

Semester 2

Student Name: _____
Student ID: _____

Climate and Energy

Select the best answer for each question on the following pages. The following are suggested resources you could use to support your work. Please note that you can use others to support your learning.

Khan Academy:

The following Khan Academy courses contain videos and readings that could support your knowledge building related to energy. Click into each course and review the course summaries on the left. Click on the course summary titles that seem most relevant.

- Energy
  - https://www.khanacademy.org/science/physics
  - *NOTE – there are just a few videos that support energy within the physics course.*

PBS Learning Media:

The following PBS Learning Media sites contain videos that could support your knowledge building related to climate and energy. Click into each site and review the concept list on the left. Click on the concepts and videos that seem most relevant.

- Earth and Space Science (climate)
  - https://kcts9.pbslearningmedia.org/subjects/science/earth-and-space-science/
- Physical Science (energy)
  - https://kcts9.pbslearningmedia.org/subjects/science/physical-science/

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Climate

_____1. Which of the following is an example of a feedback loop?

A. Cooling climate causes an ice age which causes animals to migrate further south.
B. A volcanic eruption sends ash in the air which falls on the land making it better for growing crops.
C. Plants take in CO_2 and water which is changed through photosynthesis to sugar and oxygen.
D. Warming increases snow and ice melt, leading to less reflection, causing more warming.

_____2. Which one best explains why coastal city San Diego, California is warmer than Seattle?

A. San Diego is closer to the equator than Seattle.
B. San Diego is at a higher elevation than Seattle.
C. San Diego is a larger city than Seattle.
D. San Diego more directly by water.

_____3. Why does the earth have seasons?

A. The distance between the earth and the sun varies.
B. The orbital speed of the earth fluctuates.
C. The sun's energy output changes.
D. The earth's axis is tilted and the earth orbits the sun.

_____4. As climate cools, ice sheets grow larger and more ice reflects more solar radiation, so the earth absorbs less heat, so the earth cools, so more ice forms. This is an example of:

A. the Coriolis Effect.
B. the Greenhouse Effect.
C. a climate proxy.
D. a feedback loop.

_____5. Why do the poles receive less solar energy than the equator?

A. The poles are closer to the sun.
B. The poles are farther from the sun.
C. The poles receive less direct sunlight than the equator.
D. The poles receive more direct sunlight than the equator.

_____6. What do the earth's orbit and axis variations (Milankovitch Cycles) cause?

A. The global climate to go in and out of ice ages.
B. The global temperature to increase at a steady rate.
C. The global climate to experience a decrease in oxygen.
D. The global temperature to stay steady for the last million years.

_____7. Which of the following four statements best describes ocean water's effect on climate?

A. Ocean water transfers heat from the equator to the higher latitudes.
B. Ocean water reduces the salinity of colder areas of the ocean.
C. Ocean water transfers heat from the higher latitudes to the equator.
D. Ocean water has no effect on the transfer of heat.

_____8. Three of the following gases are considered greenhouse gases. Which one is NOT?

A. water vapor (H_2O)
B. carbon dioxide (CO_2)
C. oxygen (O2)
D. methane (CH_4)

_____9. Which of the following statements about carbon dioxide in the atmosphere and global temperatures is supported by evidence?

A. An increase in CO2 (carbon dioxide) causes an increase in temperature.
B. An increase in CO_2 (carbon dioxide) causes a decrease in temperature.
C. An increase in temperature causes a decrease in CO_2 (carbon dioxide).
D. There is no relationship between CO_2 (carbon dioxide) and temperature.

_____10. Which of the following activities will reduce the amount of carbon dioxide added to the atmosphere?

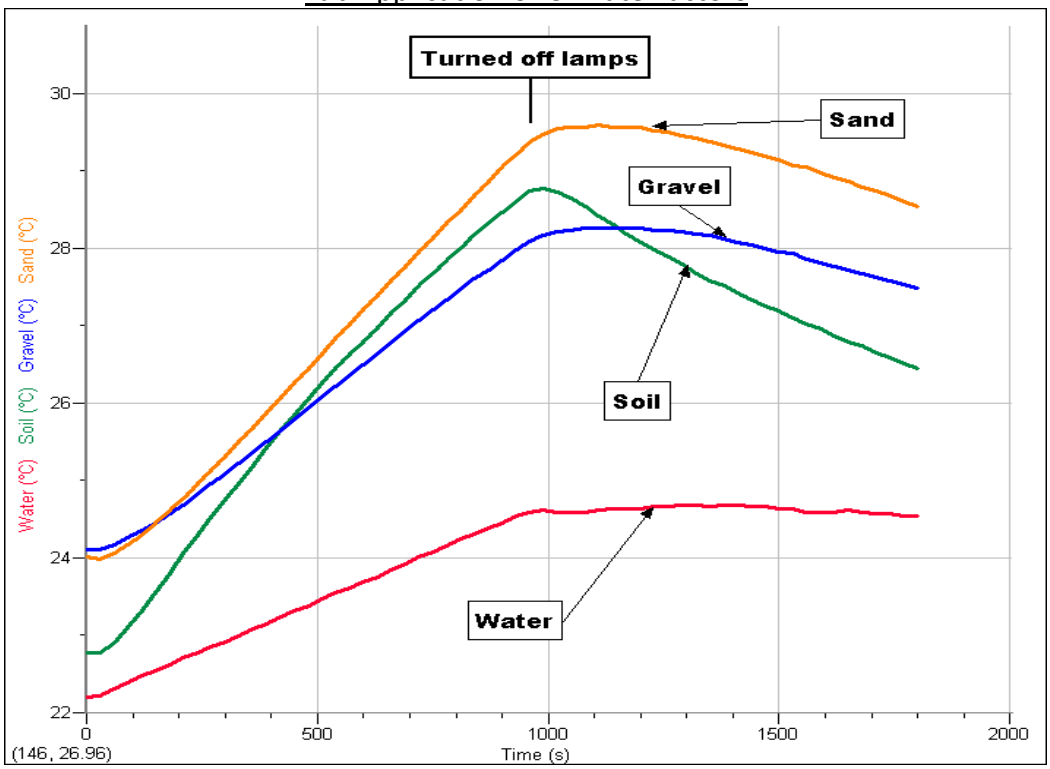
A. Planting trees
B. Buying a car that uses fewer gallons of gasoline per mile driven
C. Walking or bicycling to school instead of driving
D. All of the above.

_____11. What is the carbon cycle?

A. Layers of CO_2 gas found in ice cores.
B. The amount of CO_2 absorbed by plants.
C. A circular carbon formation found in sedimentary rocks.
D. The movement of carbon atoms over time through different reservoirs.

Read the following experiment and answer question 12.

Lab Application of Climate Factors



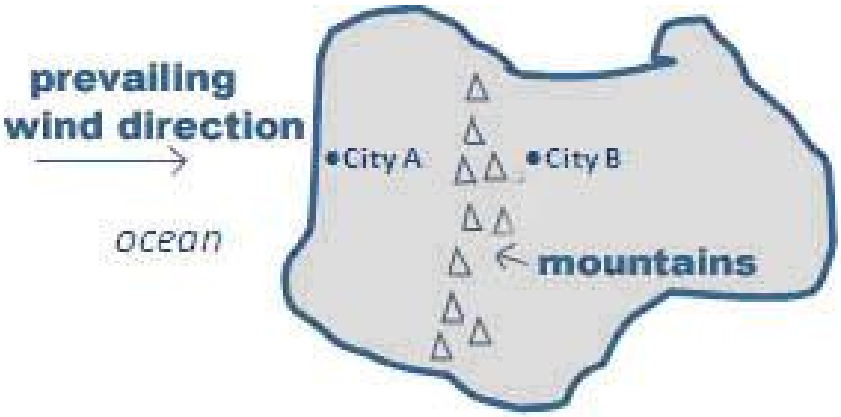
Jack and Anna live in different parts of the United States; they have been discussing the differences of the climate in their regions. Anna lives on the coast of California and Jack lives in New Mexico, which is surrounded by desert. They decide to perform an experiment to compare the heating and cooling of materials they find around them. They decide to test the heating and cooling rates of water, sand, soil, and gravel.

They put 50 ml of each substance in a separate beaker and placed the beakers 1 foot away from the light source. A thermometer was placed in each container to record the temperatures. They turned the light on and recorded the temperatures each minute for 15 minutes. They turned the light off and again recorded the temperatures each minute for 15 minutes. A graph of her data is shown above.

_____12. Apply the experiment (above) to climate factors. If we compared two cities at the same latitude and elevation, which city would have the most extreme temperature changes during the course of a year?

A. a coastal location
B. an inland location in a desert
C. a location in a temperate rain forest
D. location on the Greenland ice sheet

Look at the map below for Questions 22-23. City A is next to the ocean. City B is in the middle of the continent. Mountains separate the two cities. The cities are at the same latitude and elevation.



_____13. Which of the following is true?

A. City A would have warmer summers and cooler winters than City B.
B. City A would have cooler summers and warmer winters than City B.
C. City A and City B would have the same climates year-round.
D. The climates of the two cities cannot be compared with the information in the map.

_____14. Which city would probably have the most rainfall per year?

A. City A
B. City B
C. City A and City B would have the same amount of rainfall
D. It cannot be determined from the map which city has the most rainfall.

_____15. Increased levels of greenhouse gases in the atmosphere result in:

A. greater reflection of ultraviolet radiation (light energy) back into space.
B. greater absorption of infrared radiation (heat energy) by the atmosphere.
C. destruction of the atmosphere.
D. destruction of the ozone layer.

_____16. Which of the following sample source allows us to study the oldest paleoclimates?

A. tree rings
B. thermometers
C. ice core samples
D. crop growing records

_____17. Which of the following is a way that atmospheric carbon is removed from the atmosphere?

A. respiration of plants and animals
B. cutting down trees in forests
C. photosynthesis by plants
D. volcanic eruptions

_____18. Which of the following is a factor that causes ice ages?

A. phases of the moon
B. changes in Earth's orbit
C. the number of sunspots
D. the number of near-Earth asteroids

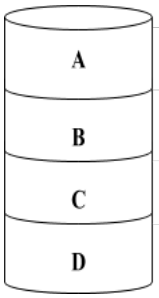
_____19. Which of the following statements about global temperatures is true?

A. Global temperature has cooled and warmed several times over the past 400,000 years.
B. Global temperature has been warming steadily for the past 400,000 years.
C. Global temperature has been cooling steadily for the past 400,000 years.
D. Global temperature has only started changing in the past 400,000 years.

_____20. Which of the following processes release carbon dioxide to the air?

A. photosynthesis
B. ocean absorption.
C. burial in sediment (dirt)
D. burning of fossil fuels

A Pollen Core Sample was collected from a nearby lake. Layer A was at the top of the sample, nearest the lake surface.



_____21. Which layer is composed of the oldest sediment?

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

_____22. Why is pollen useful for determining past climate?

A. Different types of pollen come from different types of climates.
B. If temperature changes, plants change the type of pollen they produce.
C. Pollen is microscopic so people won't destroy the evidence.
D. If temperature changes, plants change the amount of pollen they produce.

Energy

_____23. Which of the following is an energy transformation found in a **hydroelectric** power plant?

A. Mechanical energy from the steam to mechanical energy in the turbines
B. Mechanical energy from the turbine to electrical energy in the generator
C. Electrical energy from the generator to mechanical energy in the penstock
D. Gravitational potential energy from the turbine to electrical energy in the generator

_____24. Which of the following is an energy transformation found in a **coal power** plant?

A. Sound energy in the generator to electrical energy in the turbine
B. Thermal energy from the fire to thermal energy in the water
C. Gravitational potential energy to mechanical energy in the water
D. Chemical potential energy in the coal to thermal energy in the coal

_____25. What energy resource generates the most electricity in Washington?

A. fossil fuels (coal, natural gas, oil)
B. hydroelectric power (dams)
C. nuclear power
D. wind

_____26. What energy resource generates the most electricity in the US?

A. fossil fuels (coal, natural gas, oil)
B. hydroelectric power (dams)
C. nuclear power
D. wind

_____27. In a generator, _____ energy is the input and _____ energy is the output.

A. Electrical, mechanical
B. Chemical, electrical
C. Mechanical, electrical
D. Electrical, chemical

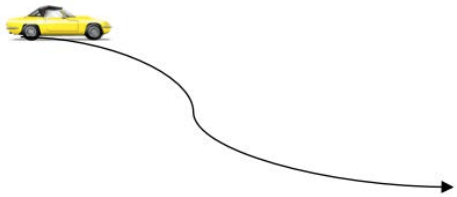
_____28. In a motor, _____ energy is the input and _____ energy is the output.

A. Electrical, mechanical
B. Chemical, electrical
C. Mechanical, electrical
D. Electrical, chemical

_____29. Electrical current is the movement of which of the following?

A. Atoms
B. Electrons
C. Protons
D. Neutrons

A toy car is set on a track at the top of a hill and released. It moves down the hill and then stops at the bottom.



_____30. At the **top** of the hill, the car's motion energy is…
- A. equal to the car's gravitational potential energy
- B. highest and the car's gravitational potential energy is lowest
- C. lowest and the car's gravitational potential energy is highest
- D. transformed into thermal energy

_____31. When is the car's gravitational potential energy the lowest?
- A. in the middle of the hill
- B. at its highest point
- C. resting on the ground
- D. halfway down the hill

_____32. Which statement is true when the car is halfway down the track?
- A. The car has only kinetic energy
- B. The car has only gravitational potential energy
- C. The car has lost half of its energy
- D. The car has both kinetic energy and gravitational potential energy.

_____33. Which of the following is **disadvantage** of <u>both</u> wind & solar power?
- A. They are both expensive to build & maintain
- B. They are both unreliable (the power source is not available all the time)
- C. They are non-renewable
- D. They take a long time to build

_____34. Which of the following is true about renewable resources?
- A. They can be replaced, faster that we can use them.
- B. They are formed slowly by geologic processes.
- C. They can only be used in sunny, tropical regions.
- D. They provide most of the world's energy resources.

_____35. Which of the following energy resources does NOT produce carbon dioxide?
- A. Coal
- B. Biomass
- C. Natural Gas
- D. Nuclear

_____36. Which of the following is a nonrenewable resource?
- A. Hydroelectric
- B. Geothermal
- C. Wind
- D. Coal