

**Questions 1 through 30 are science questions. Read each question carefully. Choose the best answer and then go on to the next question. Do not skip any questions.**

**1. In the atmosphere, warm air tends to rise and cool air tends to sink. When a sinking mass of cool air covers a rising mass of warm air, heat is transferred through the air masses by convection currents.**

**What dangerous events can be caused by convection currents in the atmosphere?**

- A. tornadoes
- B. earthquakes
- C. tsunamis
- D. landslides

**2. Mr. Sloan lifted a hammer and placed it on a high shelf.**

**How was energy transformed in this example?**

- A. Chemical energy was transformed into solar energy.
- B. Solar energy was transformed into chemical energy.
- C. Kinetic energy was transformed into potential energy.
- D. Potential energy was transformed into kinetic energy .

**Use the food chain below to answer questions 3, 4, and 5.**

**Sun → Grass → Mouse → Snake → Hawk**

**3. In order for energy to flow through this food chain from the Sun to the hawk, the hawk must \_\_\_\_\_.**

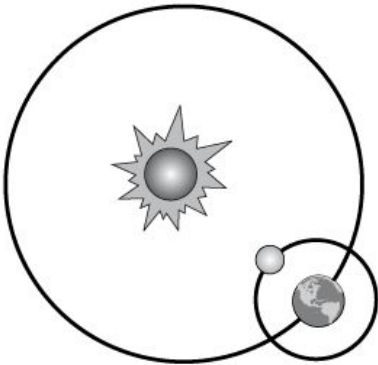
- A. go through photosynthesis
- B. live in a warm area
- C. eat only grass
- D. eat mice or snakes

**4. Which of these is the producer in the food chain?**

- A. sun
- B. grass
- C. mouse
- D. snake

**5. What would be likely to happen first if most of the snakes disappeared?**

- A. There would be a decrease in grass.
- B. There would be an increase in hawks.
- C. There would be an increase in mice.
- D. There would be a decrease in mice.



**6. What phase of the Moon occurs when the Sun, Moon, and Earth are in this position?**

- A. first quarter moon
- B. full moon
- C. last quarter moon
- D. new moon

**7. Which phrase describes the tides that occur when the Sun, Moon, and Earth are in this position?**

- A. not much difference between high and low tides
- B. high tides are very high, low tides are very low
- C. high tides and low tides remain normal at average levels
- D. high tides remain normal at average levels, low tides are very low

**8. What phase of the Moon occurs about 14 days later, when the Moon is on the opposite side of Earth, away from the Sun?**

- A. new moon
- B. full moon
- C. crescent moon
- D. gibbous moon

**9. In many places, the wind blows from a certain direction most of the time. These winds are called prevailing winds and are caused, in part, by the difference in atmospheric pressure over the equator and the poles.**

**What causes this difference in pressure in the atmosphere?**

- A. More precipitation falls from the atmosphere over the equator than falls from the atmosphere over the poles.
- B. Less precipitation falls from the atmosphere over the equator than falls from the atmosphere over the poles.
- C. More energy from the Sun reaches the atmosphere over the equator than reaches the atmosphere over the poles.
- D. Less energy from the Sun reaches the atmosphere over the equator than reaches the atmosphere over the poles.

Use the map below to answer questions 10 and 11.

The map below shows weather fronts and conditions for some cities in the United States.



10. Which cities are likely to have rain in their weather forecast?

- A. Los Angeles and New York
- B. Seattle and Los Angeles
- C. New Orleans and New York
- D. Seattle and Nashville

11. One city has the following weather forecast:

There will be partly cloudy skies and temperatures in the lower 70s. An approaching cool front will keep temperatures unusually low for this time of year over the next 24 to 48 hours.

Which city is likely to have this forecast?

- A. Chicago
- B. New Orleans
- C. Los Angeles
- D. New York

**12. The picture below shows the relationship between the Sun and Earth during a certain season in the Northern Hemisphere. During this season, the Northern Hemisphere is tilted away from the Sun.**



**What season occurs in the Northern Hemisphere when the Sun and Earth are in the positions shown?**

- A. winter
- B. spring
- C. summer
- D. fall

**13. Some stars appear brighter in the sky than others. Some of these stars appear brighter because they are larger than other stars.**

**What is another reason that some stars appear brighter than others?**

- A. Those brighter stars have fewer planets than the other stars.
- B. Those brighter stars have more planets than the other stars.
- C. Those brighter stars are farther from Earth than the other stars.
- D. Those brighter stars are closer to Earth than the other stars.

**14. One rotation of Earth takes about a \_\_\_\_\_.**

- A. day
- B. month
- C. week
- D. year

**15. Which biome contains grass and a few trees that are adapted to a long season of hot, dry weather followed by a shorter season of very wet, rainy weather?**

- A. tundra
- B. rainforest
- C. savanna
- D. taiga

**16. Some ocean currents are caused in part by the temperature differences in ocean waters. These temperature differences affect a certain physical property of water and drive the currents.**

**Which of these physical properties is most involved in driving currents caused by temperature differences?**

- A. density
- B. odor
- C. conductivity
- D. color

**Use the information below to answer questions 17, 18 and 19.**

**Jorge is conducting an experiment by placing equal volumes of warm water and cold water in 2 identical ice cube trays. He measures the temperature of the water in each ice cube tray before he puts them in the freezer. Jorge records the amount of time it takes the water in the trays to freeze.**

**17. What is Jorge trying to find out from his experiment?**

- A. He wants to find out if his thermometer is working correctly.
- B. He wants to find out if cold water freezes faster than warm water.
- C. He wants to find out if water will freeze faster in ice cube trays than in plastic bags.
- D. He wants to find out if a large amount of water freezes faster than a small amount.

**18. The experimental variable in Jorge's experiment is the condition that is not the same for both trays of water.**

**Which of these is the experimental variable?**

- A. the temperature at which the water freezes
- B. the amount of water in the trays
- C. the temperature of the freezer
- D. the starting temperature of the water

**19. Which tool would be unnecessary in Jorge's experiment?**

- A. ruler
- B. thermometer
- C. measuring cup
- D. timer

**20. Which of these transforms chemical potential energy into heat and light?**

- A. bicycle
- B. green plant
- C. campfire
- D. windmill

**21. Which of these is an abiotic factor in a tropical rainforest?**

- A. fungi
- B. rain
- C. bacteria
- D. fruit

**22. Which of these would be a poor conductor of electricity?**

- A. rubber band
- B. salt water
- C. silver ring
- D. iron nail

**23. During an eclipse of the Sun, \_\_\_\_\_.**

- A. Earth is between the Sun and the Moon
- B. the Moon is between the Sun and Earth
- C. Earth is completely dark
- D. the Sun is between Earth and the Moon

**24. Adrianne heated a pan containing 100 ml of water to 100 °C. She removed the pan from the heat source; after letting it sit for 1 hour, she measured the temperature of the water, which was 30 °C.**



**Adrienne concluded that in one hour, the energy necessary to raise the temperature of the water by 70° left the pan of water and entered the environment as heat.**

**Which law(s) provide the greatest support for this conclusion?**

- A. Law of Universal Gravitation
- B. Law of Conservation of Energy
- C. Newton's Laws of Motion
- D. Boyle's Gas Laws

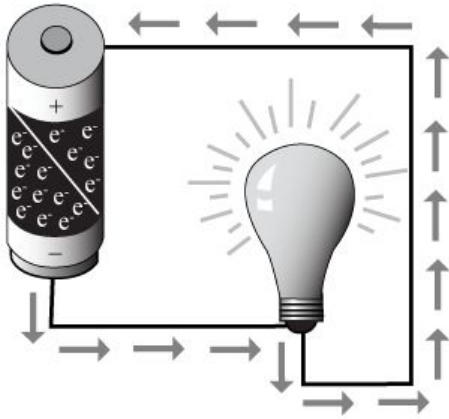
**25. Heliothis caterpillars can damage cotton crops. A plan that uses several approaches to controlling this pest includes a genetically engineered variety of cotton. This variety was developed with genes taken from bacteria that cause the cotton plants to produce a protein that is toxic to Heliothis caterpillars.**

**What type of product is this bioengineered cotton?**

- A. recycled
- B. native
- C. adaptive
- D. abiotic

**Use the information below to answer questions 26 and 27.**

**A simple circuit is shown below.**



**26. What transfers energy through the circuit?**

- A. chemicals
- B. molecules
- C. atoms
- D. electrons

**27. The light bulb connects to the circuit through a base made of metal because**

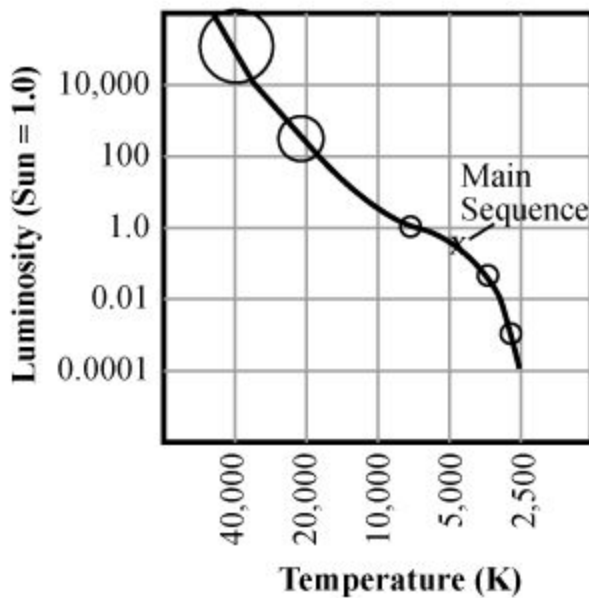
\_\_\_\_\_.

- A. light cannot travel through metal
- B. metal is an inexpensive material
- C. heat passes slowly through metal
- D. metal easily conducts electricity

**28. What kind of energy is present in a new, unused battery?**

- A. gravitational potential energy
- B. elastic potential energy
- C. chemical potential energy
- D. magnetic potential energy

Use the Hertzsprung-Russell diagram below to answer questions 29 and 30.



The diagram shows the relationship between the temperature and brightness of main sequence stars.

Brightness is measured as luminosity by astronomers.

29. What does the graph show about temperature and luminosity in stars?

- A. There is not a relationship between temperature and luminosity in the largest stars.
- B. The temperature of a star has no relationship to the star's luminosity.
- C. The lower the temperature of a star, the greater is its luminosity.
- D. The higher the temperature of a star, the greater is its luminosity.

**The diagram shows the relationship between the temperature and brightness of main sequence stars.**

**Brightness is measured as luminosity by astronomers.**

**30. What conclusion can be drawn from the diagram about stars that are similar to the Sun?**

- A. They are neither the hottest nor the brightest stars in the universe.
- B. They are the hottest but not the brightest stars in the universe.
- C. They are the brightest but not the hottest stars in the universe.
- D. They are the hottest, brightest stars in the universe.