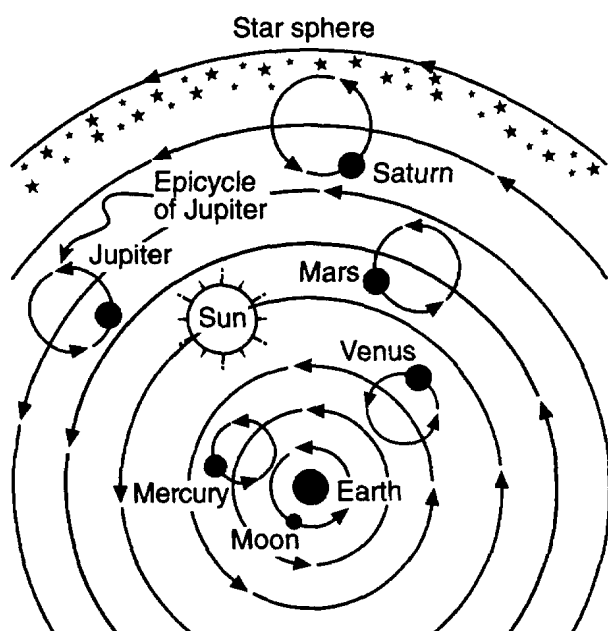


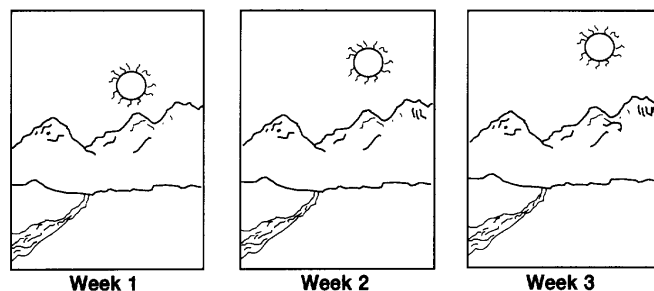
1. The diagram below shows one model of a portion of the universe.



What type of model does the diagram best demonstrate?

- A) a heliocentric model, in which celestial objects orbit Earth
 - B) a heliocentric model, in which celestial objects orbit the Sun
 - C) a geocentric model, in which celestial objects orbit Earth
 - D) a geocentric model, in which celestial objects orbit the Sun
2. Approximately how many degrees does the Earth rotate on its axis in 1 hour?
- A) 1° B) 15° C) 24° D) 360°
3. If the Earth's rate of rotation decreased, which of the following would increase?
- A) The length of the seasons.
 - B) The Sun's angle of insolation at noon.
 - C) The number of observable stars at night.
 - D) The length of time for one Earth day.

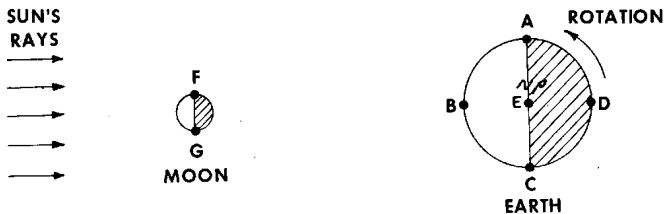
4. At 5:00 every Saturday afternoon for three weeks, a student draws the view from her bedroom window, which faces west. The drawings are shown below.



What can you correctly conclude from the drawings?

- A) It did not rain on any of the three Saturdays.
 - B) The student lives far from an ocean.
 - C) The days were getting longer.
 - D) The days were getting shorter
5. On which two dates could all locations on Earth have equal hours of day and night?
- A) September 23 and December 21
 - B) December 21 and March 21
 - C) March 21 and June 21
 - D) March 21 and September 23

6. Base your answer to the following question on the diagram below. The diagram represents the Earth, Moon, and Sun on a particular day as viewed from a point in space. Positions A through D are located along the Earth's Equator and E is at the North Pole. Positions F and G are located on the surface of the Moon.

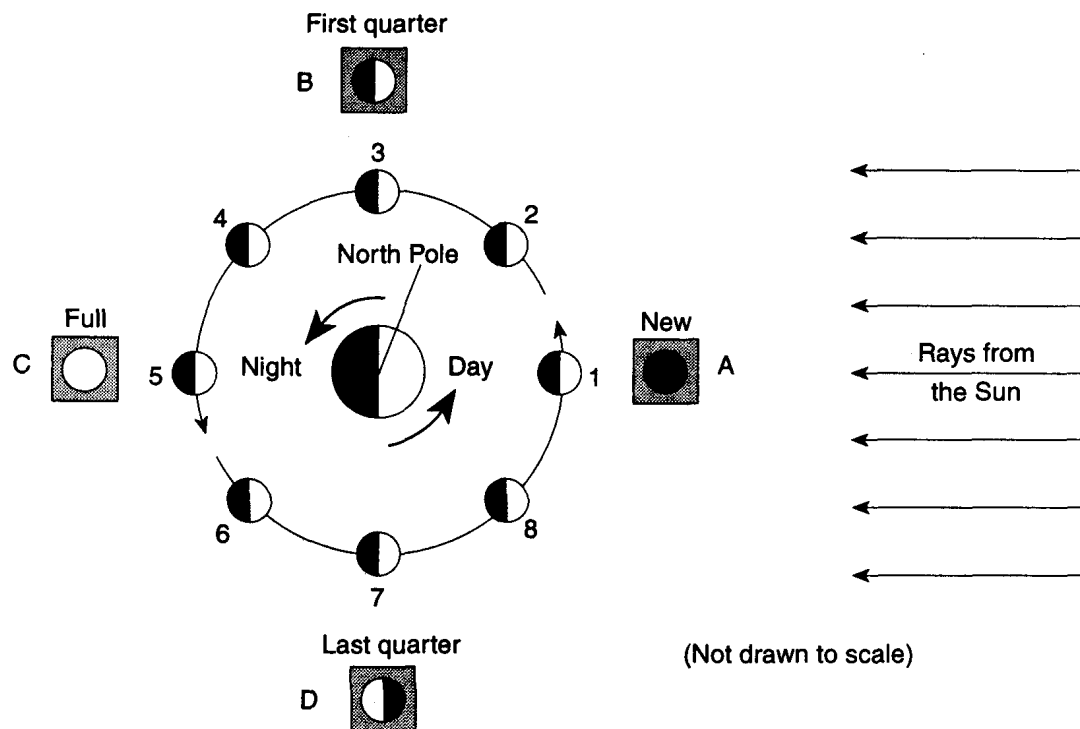


(NOT TO SCALE)

At the time of year represented by the diagram, rays of the Sun would strike perpendicular to the Earth's surface at

- A) the North Pole
- B) the Equator
- C) $23\frac{1}{2}^{\circ}$ North of the Equator
- D) $23\frac{1}{2}^{\circ}$ South of the Equator

Base your answers to questions 7 and 8 on the diagram below. The diagram represents a model of the Earth-Moon system as viewed from above the North Pole. The numbers 1 through 8 represent positions of the Moon as it revolves around Earth. The parts of the diagram lettered A through D show how the Moon's phases appear to an observer.



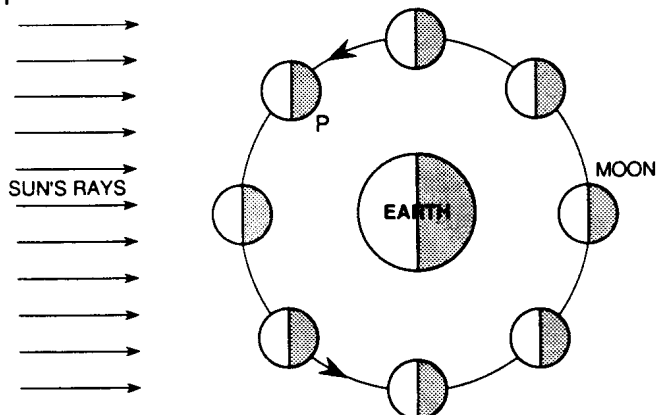
7. Which motion causes the Moon to show phases when viewed from Earth?

- | | |
|-------------------------|---------------------------|
| A) rotation of Earth | B) revolution of Earth |
| C) rotation of the Moon | D) revolution of the Moon |

8. As the Moon's phase changes from first quarter to last quarter, the visible portion of the Moon as observed from Earth will

- | | |
|----------------------------|----------------------------|
| A) decrease, only | B) increase, only |
| C) decrease, then increase | D) increase, then decrease |

9. The diagram below shows the relative positions of the Earth, Moon, and Sun for a 1-month period.



Which diagram best represents the appearance of the Moon at position P when viewed from the Earth?

- A)  B)  C)  D) 

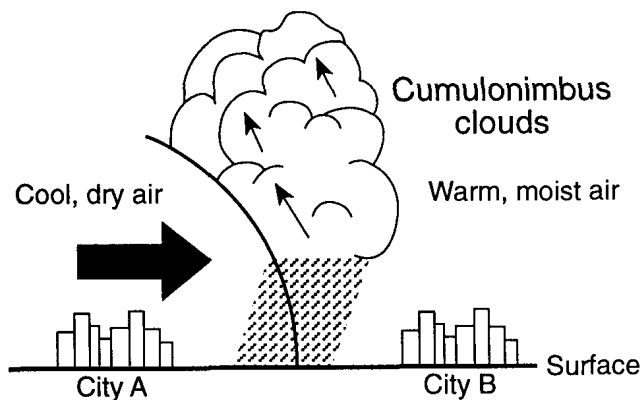
10. As a person climbs a mountain the pressure of the air around him

- A) increases B) decreases
C) stays the same

11. Weather along most fronts is usually cloudy with precipitation because the warm air along most fronts is usually

- A) sinking and cooling, causing water to evaporate
B) sinking and warming, causing water to evaporate
C) rising and cooling, causing water vapor to condense
D) rising and warming, causing water vapor to condense

12. The cross section below shows a weather front. The large arrow shows the direction of the movement of the cool air mass.



Which type of weather front is shown?

- A) warm front B) cold front
C) occluded front D) stationary front

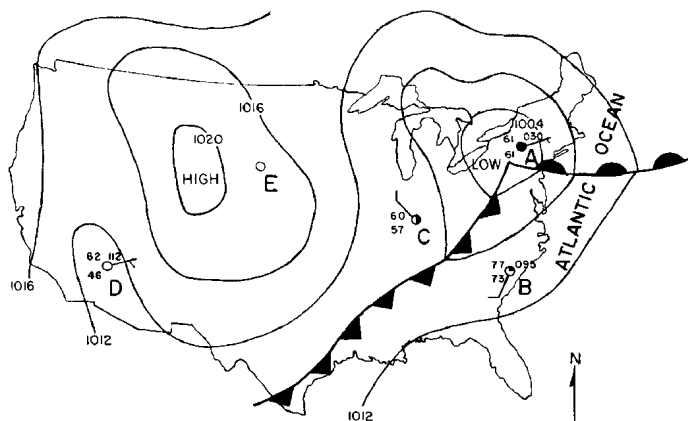
13. A mT air mass would most likely originate over which type of Earth surface?

- A) cold and moist B) warm and moist
C) cold and dry D) warm and dry

14. On a weather map, an air mass that is very warm and dry would be labeled

- A) mP B) mT C) cP D) cT

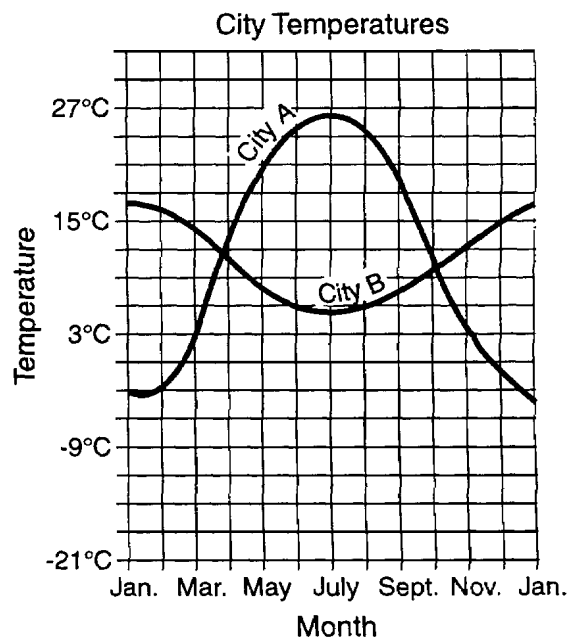
15. Base your answer to the following question on the surface weather map shown below. The map shows weather systems over the United States and weather station data for cities A, B, C, and D. Note that part of the weather data for city C and all of the weather data for city E are missing. The pressure field (isobars) on the map has been labeled in millibars.



Which city is probably experiencing a slow, steady rain?

- A) A B) B C) C D) D

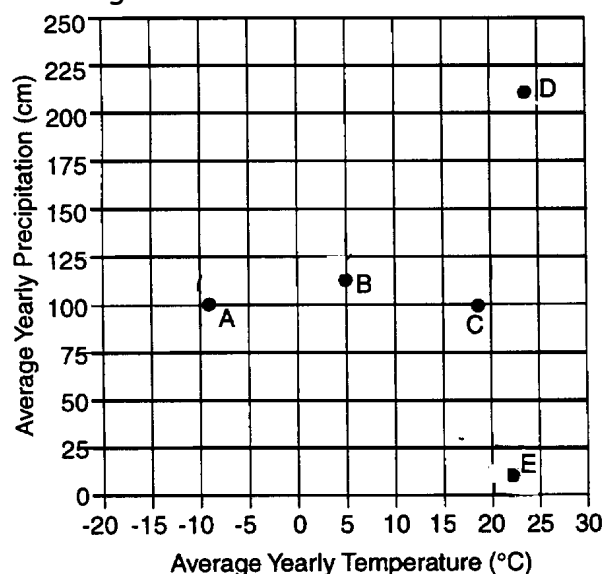
16. Base your answer to the following question on the graph below, which shows the average monthly temperature of two cities A and B.



Both cities have an average yearly temperature of 11°C, but city A has a much greater temperature range than city B has because city A most likely

- A) is closer to the Equator
 B) is farther from a large body of water
 C) has more rainfall
 D) has stronger prevailing winds

17. Base your answer on the graph below, which shows the average yearly temperature and average yearly precipitation for Earth locations A through E.



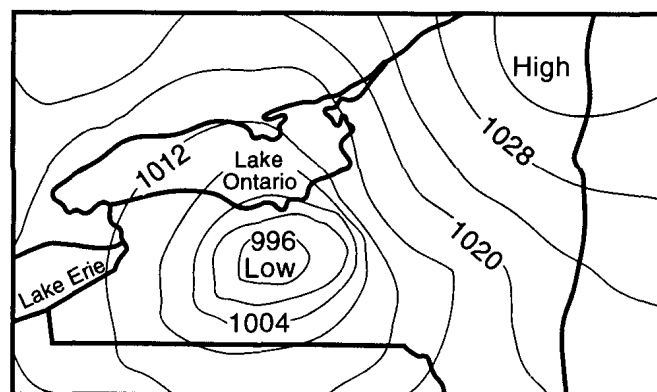
The climate indicated at location E on the graph would most likely be classified as

- A) cold and dry B) cold and humid
C) warm and dry D) warm and humid

18. When a strong wind is blowing from one location to another, the two locations most likely have a difference in

- A) elevation
B) cloud cover
C) dewpoint temperature
D) air pressure

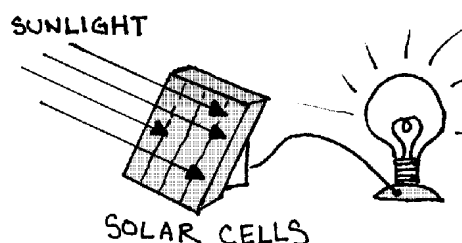
19. Base your answer to the following question on the weather map below. The map shows a low-pressure system that is influencing the weather conditions.



Wind velocity is probably greatest at which city?

- A) Buffalo B) Rochester
C) Syracuse D) Watertown

20. Solar cells can capture energy from our Sun and transfer this energy for many practical purposes.



List in the correct order the energy exchanges shown by the diagram above.

- A) Light → Electrical → Light
B) Light → Mechanical → Light
C) Electrical → Mechanical → Light
D) Light → Electrical → Mechanical

21. An electric car is powered by batteries. This is an example of conversion of

- A) chemical into electrical into mechanical energy
- B) electrical into chemical into mechanical energy
- C) nuclear into electrical into mechanical energy
- D) electrical into heat into mechanical energy

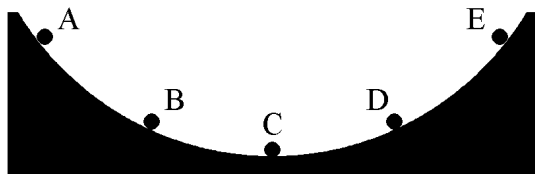
22. Identify the energy change(s) that take place when a match lights.

- A) mechanical to light
- B) heat to light
- C) mechanical to electrical
- D) chemical to heat and light

23. Which situation below has the least potential energy?

- A) a spring that is stretched for 1 cm.
- B) a spring that is stretched for 2 cm.
- C) a spring with a heavy weight hung on it
- D) a spring that is not stretched

Base your answers to questions 24 and 25 on the diagram below. A ball was released from point A.



24. At which two points is the ball moving at the same speed?

- A) A and B
- B) A and C
- C) B and C
- D) B and D

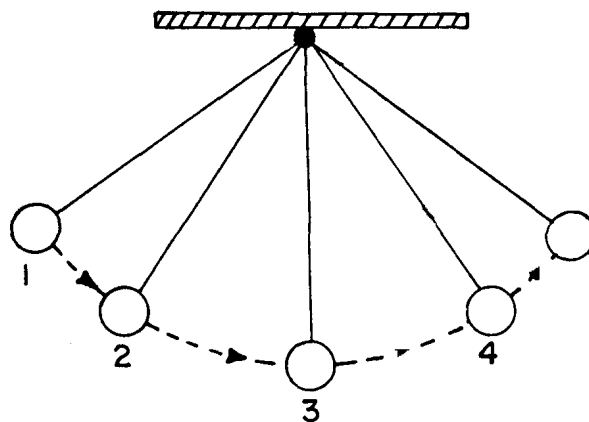
25. Where is the ball moving the fastest?

- A) A
- B) B
- C) C
- D) D
- E) E

26. As a pendulum moves from the bottom of its swing to the top of its swing, the

- A) kinetic energy of the pendulum increases
- B) kinetic energy of the pendulum remains the same
- C) potential energy of the pendulum decreases
- D) potential energy of the pendulum increases

27. Base your answer to the following question on the diagram below which represents a simple pendulum with a 2.0-kilogram bob and a length of 10. meters. The pendulum is released from rest at position 1 and swings without friction through position 4.



Compared to the sum of the kinetic and potential energies of the bob at position 1, the sum of the kinetic and potential energies of the bob at position 4 is

- A) less
- B) greater
- C) the same

28. A car travels at 84 kilometers per hour for 7 hours. How far did it travel?

- A) 12 km
- B) 84 km
- C) 91 km
- D) 588 km

29. The average velocity of an object can be determined by the formula

- A) $\text{distance} \times \text{time}$
- B) $\frac{\text{change in distance}}{\text{change in time}}$
- C) $\frac{\text{acceleration}}{\text{change in time}}$
- D) $\frac{\text{change in time}}{\text{change in distance}}$

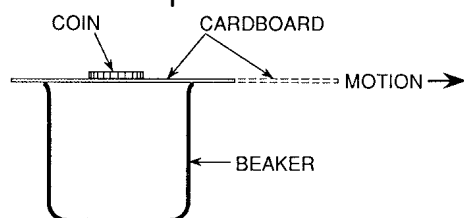
30. Ball bearings are used in bicycle wheels to

- A) balance the wheel.
- B) change the direction of force.
- C) reduce speed.
- D) reduce friction.

31. As the mass of an object decreases, its inertia will

- A) decrease
- B) increase
- C) remain the same

32. A copper coin resting on a piece of cardboard is placed on a beaker as shown in the diagram below. When the cardboard is rapidly removed, the coin drops into the beaker.



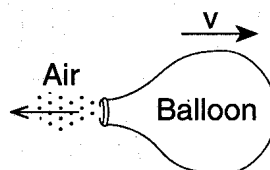
The two properties of the coin which best explain its fall are its weight and its

- A) temperature
- B) density
- C) volume
- D) inertia

33. A man weighing 800 newtons is standing on a chair. In order to support the man, the chair is exerting a force of

- A) less than 800 N
- B) greater than 800 N
- C) 800 N

34. As shown in the diagram below, an inflated balloon released from rest moves horizontally with velocity v .



The law that best explains this event is

- A) Newton's 1st Law
- B) Newton's 2nd Law
- C) Newton's 3rd Law
- D) The Law of Universal Gravity

35. The magnitude of the force that a baseball bat exerts on a ball is 50. newtons. The magnitude of the force that the ball exerts on the bat is

- A) 5.0 N
- B) 10. N
- C) 50. N
- D) 250 N

36. On the planet Gamma, a 4.0-kilogram mass experiences a gravitational force of 24 newtons. What is the acceleration due to gravity on planet Gamma?

- A) 0.17 m/s^2
- B) 6.0 m/s^2
- C) 9.8 m/s^2
- D) 96 m/s^2

37. What is the approximate weight of a 5.0-kilogram object at the surface of the Earth?

- A) 5.0 kg
- B) 25 N
- C) 50 N
- D) 50 kg