WEEK #3

- *Biodiversity*=> df The sum of the genetically based variety of all organisms in the biosphere.
- *Autotrophs*=> df Organisms that can capture the energy from sunlight or from chemicals and use that energy to produce food.
- *Heterotrophs*=> df Organisms that rely on other organisms for their energy and food.

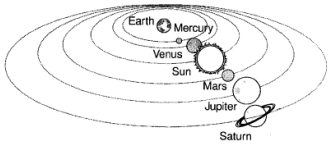
H - 16

Multiple Choice

1. Einstein's theory of relativity states that matter with mass cannot exceed the speed of light. What would happen to the theory if certain particles exceeded the speed of light?
   - **A.** The theory would stay the same.
   - **B.** Another theory would take its place.
   - **C.** The theory of relativity would no longer exist.
   - **D.** The theory would need to be reexamined and revised.

Multiple Choice

2. The diagram shows Ptolemy's view of the solar system.



What was the major shift from Ptolemy's model to the model used today?

- **F.** Saturn's orbit is beyond Jupiter's.
- **G.** Planets, including Earth, orbit the Sun.
- **H.** The appearance of sunspots proves that the Sun spins.
- **I.** The Moon shows the same face to the same part of Earth.

H - 17

READ INQUIRE EXPLAIN

1. Although there are bigger telescopes on Earth, the Hubble Telescope is the best instrument for deep-sky observations. What makes space instruments like the Hubble better for some astronomers than land-based telescopes?

READ INQUIRE EXPLAIN

2. Kathy wants to test the theory of momentum. The theory states that objects in motion remain in motion unless acted on by an outside force. She gets a ball and rolls it on the ground. After a couple of seconds, the ball comes to a complete stop. Because the ball stopped, Kathy assumes that the theory is false. Is her assumption valid? Explain your answer.

H - 18

The student understands the importance of a sense of responsibility, a commitment to peer review, truthful reporting of the methods and outcomes of investigations, and making the public aware of findings.

A scientist is doing a study on the relationship between the presence of a gene and criminal behavior. The scientist was able to locate four subjects with the gene who are presently in the criminal justice system for varying offenses. What should the scientist do with his findings?
A) Announce to the public that criminal behavior has a genetic component so that the information can be used to shape public policy.
B) Issue findings based on his study subjects, together with his personal views on nature vs. nurture.
C) Report his data to other scientists studying the same question for further study, as not enough information has been gathered to verify the scientist's hypothesis of a genetic component to criminal behavior.
D) Try to find data from studies relating genetics to aggressive behavior. Data from the aggression studies can be combined with the scientist's own data to form a larger data set from which conclusions on the genetic makeup of criminals could be drawn.

WEEK #3

- *Trophic level*=> df Each step in a food chain or food web.
- *Biotic factors*=> df The biological influences in ecosystems. These factors include all the living organisms with which an organism might interact.
- *Abiotic factors*=> df The nonliving, or physical, factors that shape ecosystems.

H - 19

The student knows that scientists assume that the universe is a vast system in which basic rules exist that may range from very simple to extremely complex, but that scientists operate on the belief that the rules can be discovered by careful systematic study.

Height H	Time for ball to fall from height H	Time for box of books to fall from height H
10 m	1.4 s	1.4 s
20 m	2.0 s	2.0 s
30 m	2.5 s	2.5 s

What can be concluded from the experimental data?
A) The acceleration due to gravity decreases with height.
B) Heavier objects fall faster than lighter ones.
C) Air resistance must be taken into account when you calculate the time it takes any object to fall short distances near the Earth's surface.
D) Dense objects fall at the same rate near the Earth's surface.

H - 20

The student knows that performance testing is often conducted using small-scale models, computer simulations on analogous systems to reduce the chance of system failure.

In which of the following situations would a computer model be the best way to conduct a scientific study?
A) The risk of flooding in various cities during a hurricane is to be determined. Topographic information for Florida and data from past hurricanes is available.
B) The effect of a car crash on the front seat passenger of a new model Chevrolet is to be determined.
C) The effect of a new asthma medication on five-year-olds is to be studied.
D) The effectiveness of an imported beetle on the control of melaleuca trees in the Everglades is to be studied.

H - 21

The student knows that technological problems often create a demand for new scientific knowledge and that new technologies make it possible for scientists to extend their research in a way that advances science.

Light travels at a slower rate in solid transparent substances such as plastic than it does in air. As a result, light can be confined inside a thin plastic object. The short wavelength of light enables it to carry large amounts of information. These observations led to which technological advance?
A) fiber optic cables used in communication
B) X-rays used in medical diagnosis
C) lasers used in CD players
D) solar cells used to convert sunlight into electrical energy

WEEK #3

- *Niche* => df A niche consists of all the physical and biological conditions in which an organism lives and the way in which the organism uses those conditions.
- *Ecological succession* => df The series of predictable changes that occur in a community over time.
- *Biome* => df A complex of terrestrial communities that covers a large area and is characterized by certain solid and climate conditions and particular plants and animals.

H - 22

The student knows that scientists can bring information, insights, and analytical skills to matters of public concern and help people understand the possible causes and effects of events.

Scientists have done much research in order to better understand and predict earthquakes. What does the effort of data collection and research into earthquakes illustrate?

A) Earthquake research will render earthquakes harmless.
B) Earthquake research may lead to important discoveries with implications in all areas of science, and lead to advances in medicine, chemistry and behavioral science as well as Earth science.
C) Information gained by scientific research could improve people's lives by indicating how and where to build safely in earthquake prone areas. Knowledge of earthquakes could lead to ways to minimize injury and property damage.
D) Earthquake research will enable scientists to prevent earthquakes.

H - 23

The student knows that scientists assume that the universe is a vast system in which basic rules exist that may range from very simple to extremely complex, but that scientists operate on the belief that the rules can be discovered by careful systematic study.

A rocket is fired with an initial speed of 50 m/s. The distance from the place where the rocket is launched to the place where it lands is called the rocket's range. The range is measured for various launch angles. The launch angle is the angle that the rocket's velocity initially makes with the horizontal. The following data are collected.

Initial launch angle (degrees)	Range (m)
10	90
20	150
30	220
40	250
50	250
60	220
70	150
80	90

What can you conclude from the data collected in this experiment?

A) The greater the launch angle, the higher the maximum height achieved by the rocket.
B) The maximum possible range of the rocket occurs for launch angles of 40 degrees and 50 degrees.
C) The faster the launch speed, the farther the rocket lands from the place it was launched.
D) If the launch speed is constant then the range is greater for launch angles close to 45 degrees than for launch angles far from 45 degrees.

H - 24

The student knows that investigations are conducted to explore new phenomena, to check on previous results, to test how well a theory predicts, and to compare different theories.

A young scientist was told that sprinkling salt on a bird's tail would prevent it from flying. Try as he might, the boy could not get close enough to a bird to sprinkle salt on its tail. The boy decided to use the family's pet cat in the experiment instead of a bird. Salt was sprinkled on the cat's tail. The cat was then tossed into the air. It was determined after numerous trials that the cat could not fly. The boy concluded that a cat can not fly if salt is sprinkled on its tail. What element was missing from the boy's experiment?

A) The boy should have repeated the experiment with a dog.
B) The boy should have repeated the experiment with sugar.
C) A control cat was needed. The boy should have tried tossing a cat whose tail was not sprinkled with salt in order to determine whether the salt had any effect on the ability of the cat to fly.
D) The experiment should have been repeated with different cat breeds.