EarthT1

55 Question(s)
Test ID: 298290

Name:_____ Date:_____

1) Which of the following statements is the best reason the big bang is an accepted scientific theory?

A. A group of people met together and decided to make it a theory
B. There is no other way to explain the formation of the universe
C. Distant galaxies were observed to be moving away from Earth
D. Edwin Hubble was an honest man

2) Why was the discovery of moons orbiting Jupiter a significant event?

A. we discovered life on another world
B. it proved that not everything revolved around the earth
C. we discovered geological activity on another world
D. it proved that astronomy was a useful science

3) In the early 1900's, V.M. Slipher studied faint, cloud like objects in the sky. He noted that most of the objects had red shifts and that the fainter the object, the larger the red shift. Before 20 years had passed, astronomers determined that these objects were galaxies similar to the Milky Way. Edwin Hubble and Milton Humason published what is now known as the Hubble law. This law describes the relationship between red shift and the distance of the object being measured.
Which of the following statements best describes the relationship between Slipher, Hubble and Humason?

A. Scientists usually work in direct competition with each other.
B. Scientists often build upon the evidence gathered by other scientists.
C. Scientists work individually and do not usually interact with each other.
D. Scientists each have jobs where they study completely different areas of science.

4) A prediction made in the Big Bang Theory is that the entire universe should be filled with left-over radiation. This radiation, referred to as Cosmic Microwave Background Radiation, was measured by the 1989 Cosmic Background Explorer (COBE) satellite. The success of this satellite prompted the development of a more sophisticated mission. The Wilkinson Microwave Anisotropy Probe (WMAP) satellite, launched in 2001, allowed scientists to take a closer look at the variations in data from COBE – providing a more detailed map of the most ancient light in the universe and supplying additional evidence that is consistent with the Big Bang Theory.
Why are technological developments like the COBE and WMAP satellites important?

A. Technology has influenced the advancement of science by providing new data on the Big Bang Theory.
B. The Big Bang Theory is less controversial in light of the new data that has been collected.
C. The technology used for these studies was so expensive that the data collected on these missions had to be reported to the general public.
D. The two satellites conducted the same research but led to completely different conclusions.

5) Red shift and blue shift measurements were recorded for a group of stars and a group of galaxies. Using the collected data shown below, explain how they support the idea that the universe is expanding.

Galaxy	% Red Shift	% Blue Shift
1	25%	
2	5%	
3	3%	
4	15%	
5	18%	
6	5%	
7	7%	
8	9%	
9	11%	

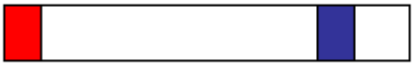
_____

Star	% Red Shift	% Blue Shift
A	2%	
B	0%	0%
C		2%
D		1%
E		.5%
F		.125%
G	.5%	
H	.125%	
I	0%	0%

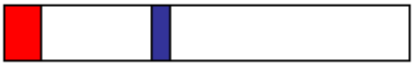
A. The stars showing a blue shift suggest the universe is expanding
B. The red shift in all the galaxies suggests the universe is expanding
C. The blue shifted stars suggest the universe is not expanding
D. The 0 shift in stars B and I suggest the universe is not expanding

6) Scientists use spectrographs to determine the composition of distant stars and galaxies. The spacing of dark lines on the spectrum is unique to each element. Relative motion of these stars and galaxies can be studied by observing the location of the dark lines.

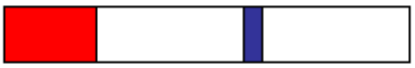
Below are examples of hydrogen spectra from four different galaxies. Choose the sequence that places the galaxies in order of furthest away from Earth to nearest.



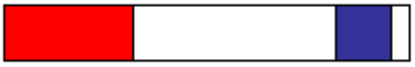
Galaxy W



Galaxy X



Galaxy Y



Galaxy Z

A. from furthest to nearest, Z W Y X
B. from furthest to nearest, W Z Y X
C. from furthest to nearest, Y X Z W
D. from furthest to nearest, X Y W Z

7) Why is the Big Bang Theory the most accepted theory of how the universe was formed?

A. It is the simplest explanation of the current scientific data
B. It is based on a combination of scientific and religious facts
C. It has not been revised or changed by scientists for many years
D. It has been proven correct by using mathematical models

8) What is the following: "The universe began in a gigantic explosion called the 'Big Bang.'"

A. Theory
B. Law
C. Observation
D. Fact
E. Superstition

9) Scientists examine the light spectra from distant stars to determine if the size of the universe is changing. Why do astronomers believe the size of the universe is changing?

A. The red shift indicates that distant galaxies are moving away from each other

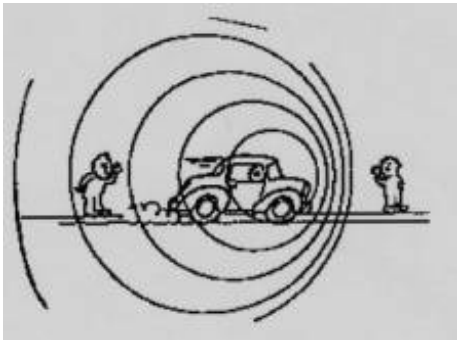
B. The red shift indicates that distant galaxies are moving towards each other
C. The blue shift indicates that distant galaxies are moving away from each other
D. The blue shift indicates that distant galaxies are moving towards each other

10) A Belgian priest, Georges Lamaître, was the first to develop a “big bang” theory. In 1927, after studying red shifts of galaxies, he proposed that the universe began with an immense infusion of pure energy into space.
Later, Edwin Hubble discovered that the speed of a galaxy moving away from Earth was proportional to its distance. This relation was predicted by Lamaître’s theory.
Then, in 1964, Arno Penzias and Robert Wilson discovered the cosmic background radiation, which was also predicted by Lamaître's theory.
Which of the following best describes the work of these scientists and the development of the Big Bang Theory?

A. Scientific theories are the cumulative result of evidence from many scientists.
B. Scientific theories are rarely confirmed so scientists try to provide more evidence.
C. Georges Lemaître should be given credit as the one who developed the Big Bang theory.
D. Because of the work of these scientists, the Big Bang should now be a fact instead of a theory.

11) Measurements of light from 7 nearby stars were made. Doppler analysis was performed and red shift was observed in all the measurements. What does this evidence suggest about the stars?

A. All the stars measured are moving away from the Earth
B. All the stars measured are moving toward the Earth
C. Four of the stars measured are moving away from the Earth
D. All of the stars are not moving relative to the Earth

12) 

In the drawing above two observers are hearing the sound of the car. However, the sound is higher pitched to one observer and lower pitched to the other observer. Which observer hears the sound as a higher pitch and why?

A. The observer on the left - becasue each wave hits his ear less quickly than the observer on the right.
B. The observer on the right - because each wave hits his ear more quickly than the observer on the left
C. The observer on the right - because each wave hits his ear less quickly than the observer on the left
D. The observer on the left - because each wave hits his ear more quickly than the observer on the right

13) Scientists are able to look at distant galaxies and planets due to technological advances. Which instrument has helped them look the farthest into the universe?

A. Space Probes
B. Space Shuttle
C. Hubble Telescope
D. Ground-based Observatories

14) Which of the following is an example of technology?

A. the Moon's gravitational constant
B. chemical composition of Moon rocks
C. the moon's orbit
D. Hubble photographs of the Moon
E. phases of the Moon

15) In the 1600's Copernicus and Galileo believed that the earth and other planets orbited the sun. Why were their ideas not accepted at first?

A. They had no good research to support their claims
B. People did not study the night sky in the 1600's
C. Their books were not published until after their deaths
D. Their claims could not be verified by the instruments of the time
E. Their claims contradicted those of the prevailing churches

16) Data from a Doppler analysis of the sun show a red shift on the west side of the sun and a blue shift on the east side. What does that data suggest about the sun?

A. The sun is the center of the solar system

B. The sun is near the end of its life cycle
C. The sun is a smaller, less massive star
D. The sun is spinning on its axis

17) Why has NASA, in the last 20 years, sent probes, instead of manned missions, to places like the moon and Mars?

A. They have not found people willing to risk their lives to go to the moon or Mars
B. The public doesn't want to spend money for more expensive manned missions
C. People could not survive the long trip to Mars
D. People are too unreliable for space travel
E. Probes can more easily handle the unexpected situations that may arise during such missions

18) Which of the following events that can occur in a star will also happen to our sun?

A. It will become a red giant
B. It will become a neutron star
C. It will go supernova
D. It will become a black hole

19) Why is the back side of the Moon more heavily cratered than the front?

A. the back side has a thicker atmosphere
B. the front side has less gravity
C. craters on the front side have been obliterated by lava flows
D. the back side is closer to the sun
E. erosion has covered up ore of the front side's craters

20) Why does the earth experience day and night?

A. the earth rotates on its axis
B. the earth revolves around the sun
C. the moon revolves around the earth
D. the earth is tilted on its axis
E. the earth is an inner planet

21) If science accepts the conclusion that heavy elements found on earth were formed in stars, what are they assuming is true?

A. Stars and planets have similar sizes and life cycles.
B. Planets are constantly collecting heavy elements from nearby stars.
C. Heavy metals are the first elements created in stars so they stay massive.
D. Nuclear fusion in stars occurs in the same way it happens on earth.

22) Studying star clusters is essential to understand stars because individual stars change at such a slow rate. Studying these clusters allows scientists to observe stars that are similar in age, composition and distance but different in size. It also provides information that scientists would not be able to observe about one star because of the length of its life cycle. What does this information explain about the nature of science?

A. Science findings are based upon observation and evidence.
B. Scientific information needs to be studied in a group.
C. Scientific knowledge takes a long period of time to change.
D. Science has contributions from numerous scientists.

23) Which answer below best describes the future of models of the life cycles of stars?

A. Models will probably stay the same because scientists do not enjoy creating new models.
B. Models will probably stay the same because scientists have learned all there is to know about the life cycle of stars.
C. Models will probably change because scientists like to make changes.
D. Models will probably change because new technology will provide better information about the life cycle of stars.

24) Evaluate the statement: “The key to the past is the present.” How is this evident in scientific knowledge?

A. Past scientists had to predict the future to understand their data.
B. Present day knowledge is gathered and evaluated without any connection to past evidence.
C. Present evidence is used to form hypotheses about what has happened in the past.
D. Evidence shows that the natural laws of science were different in the past than in the present.

25) Which of the following is the most appropriate title for this chart?

Shape of the Solar System	Planet Types
▪ Disk shaped. ▪ Orbits in similar planes. ▪ Rotation and revolution of planets in the same direction. ▪ Gravity and angular momentum describe the force and the motion in the system.	▪ Inner: Terrestrial, high density. ▪ Outer: Mostly gaseous, low density, ring systems for most.

A. Theories of Solar System Formation
B. Characteristics of the Solar System
C. Differences in Planet Types
D. Astronomical Theory of the Planets

26) Scientists have recently discovered planets orbiting other stars. Evidence shows that the current hypothesis of how our solar system formed may not accurately describe how these newly discovered systems formed.
Which of the following best describes what should be done with the current hypothesis?

A. Ignore all of the old evidence and create a completely new hypothesis.
B. Make careful revisions to the current hypothesis based upon the new evidence.
C. Make no changes to the current hypothesis because it is already accepted by scientists.
D. Conduct further research to disprove the new evidence that does not complement the current hypothesis.

27) Consider the following two statements:
1.The orbits of the planets lie in nearly the same plane and they all revolve around the sun in the same direction.
2.A characteristic of the bodies in the solar system is that they are similar in age. Dating techniques show that the Earth is no more than 4.6 billion years old. Thus it seems that our solar system took shape about 4.6 billion years ago.
Which of the following is true about the two statements?

A. Statement #1 is fact, #2 is an inference.
B. Statement #1 is an inference, #2 is fact.
C. Both statements are fact.
D. Both statements are inferences.

28) What produces energy in a nuclear reaction?

A. Radioactive atoms move more rapidly than others
B. The splitting or fusing of atomic nuclei
C. Electricity running through the radioactive atoms
D. Burning of uranium or other radioactive substances
E. Light from atoms as they change

29) Why does a comet's ion tail always point away from the sun?

A. galactic gravity pulls it out toward space
B. solar wind pushes it outward
C. the comet moves faster than the tail
D. it is still in the Oort Cloud
E. comets move slowly when they are close to the sun

30) What is the relationship between the mass of a star and the relative mass of elements produced?

A. As more massive stars are examined, temperature and pressure are seen to be greater, and heavier elements are produced
B. As more massive stars are examined, temperature and pressure are seen to be less, and lighter elements are produced
C. As less massive stars are examined, temperature and pressure are seen to be greater, and lighter elements are produced
D. As less massive stars are examined, temperature and pressure are seen to be less, and heavier elements are produced

31) Why does the Moon only have 1/6 of the earth's gravity?

A. it is so far away from the earth
B. it has no atmosphere
C. it is not as massive as Earth
D. it is made of basalt
E. it has cooled over time to be completely solid

32) Which of the following planets has a very hot atmosphere and is about the same size as our earth?

A. Jupiter
B. Mars
C. Pluto

D. Venus

33) Why would a red giant star be brighter than a white dwarf?

A. the giant is hotter
B. the giant has more surface area
C. the giant is closer to the earth
D. the dwarf is cooler
E. the dwarf is surrounded by gas

34) Which of the following most accurately explains the origin of heavy elements on Earth?

A. Formed by nuclear reactions in massive, ancient stars
B. Formed by radioactive decay deep within Earth's core
C. Formed by black holes scattered throughout the galaxy
D. Formed by comets and asteroids falling to the Earth

35) Which two factors combine together to cause an object to remain in a stable orbit?

A. gravity and inertia
B. mass and magnetism
C. fusion and fission
D. heat and electricity
E. temperature and luminosity

36) “Elements heavier than iron were created by rapid nuclear reactions that can only occur when a massive star explodes.” Which of the following would be the best question to use when choosing a reference source for this statement?

A. How do nuclear reactions occur?
B. How does a massive star explode?
C. How are heavy elements created in stars?
D. How many elements are heavier than iron?

37) Consider the claim “The process that formed the heavy elements on Earth continues today.” What would be at least one thing that would have to happen for this claim to be called a theory?

A. At least fifty scientists would have to prove the claim to be true.
B. Some theories would have to be rejected by science investigations.
C. New planets would need to be discovered and studied in other solar systems.
D. The claim would need to have support from the data of repeated experiments.

38) What causes the earth's seasons?

A. the distance to the sun
B. the tilt of the earth's axis
C. the elliptical orbit of the earth
D. the sun is brighter in the summer
E. the closeness of the moon to the earth

39) You are assigned to prepare a presentation on the life cycle of stars. Which resource would provide you with the most reliable, up-to-date information?

A. Time Magazine article, “Constellations and Space Travel.”
B. American Astrology magazine.
C. The Center for Scientific Creation website.
D. The NASA (National Aeronautics and Space Administration) website.

40) The nebular hypothesis states that the solar system was created by a rotating cloud of matter flattened to a disk by gravity. Pierre Simon de Laplace built this hypothesis around Descartes’ vortex hypothesis and Newton’s work with gravity. Today, scientists are still gathering evidence that supports this hypothesis.
What is the importance of Laplace’s work in the modern theory of solar system formation?

A. Other scientists contradicted Laplace to provide support for their hypotheses.
B. Laplace was helpful in getting scientists the recognition that they deserved.
C. Laplace combined previous scientific knowledge into a hypothesis that is being built upon by modern day scientists.
D. Research would have stopped if Laplace had NOT given enough evidence for the hypothesis.

41) “Scientists would expect most stars to have planets because they form with disks of gas and dust around them. This process should be common for most stars.”
Which of the following best describes this statement?

A. It is a fact.
B. It is evidence.
C. It is an inference.
D. It is a scientific law.

42) A newly discovered planet, in another solar system, is about the same distance from its sun as Earth is from our sun. This planet is also about the same size as Earth. This planet has an atmosphere similar to Earth's but it lacks oxygen. Does this data suggest there is life similar to that on Earth on the newly discovered planet? Why or why not?

A. Yes, the distance from the sun is the most important thing for life
B. Yes, the size of the planet is the same as Earth so it will have life
C. No, the atmosphere lacks oxygen, a waste product of life
D. No, the tilt of its axis may be different than that of Earth

43) What is it about the Earth, as compared to other planets in our solar system, which makes it conducive to life?

A. It is at the only distance from the sun that would support life in the solar system
B. It is the only planet with an atmosphere
C. It is the only planet with a 24-hour day
D. It has liquid water

44) Based on the data table, which of the following is an inference?

	Mercury	Venus	Earth	Mars	Jupiter
Distance from Sun (millions of km)	57.9	108.2	149.6	227.9	778.3
Year	88 days	224.7 days	365.2 days	687 days	11.86 yrs
Day	59 days	243 days retrograde	23 hr 56 min 4 sec	24 hr 37 min	9 hr 55 min 30 sec
Diameter (km)	4,880	12,100	12,756	6,794	142,800
Atmosphere (main components)	Virtually none	Carbon dioxide	Nitrogen Oxygen	Carbon dioxide	Hydrogen Helium
Satellites	0	0	1	2	16
Rings	0	0	0	0	3

A. Mercury has the shortest year and smallest diameter of these five planets.
B. Venus and Mars have atmospheres containing carbon dioxide.
C. Jupiter is 778, 300, 000 million kilometers from the Sun.
D. Venus and Mars have similar atmospheres.

45) Data from many spacecraft have revealed evidence that water was once present on Mars in the form of floods, runoff channels and possible shorelines of ancient oceans. Recently, the images from the Hubble Space Telescope have indicated that there are minerals present on Mars that form only in the presence of water.
Why is the information from this new technology important?

A. It offers proof that life once existed on Mars.
B. It provides further evidence that water once existed on Mars.
C. It helps scientists conclude that Mars is suitable for human colonization.
D. It is evidence that the current temperature on Mars is warm enough to turn ice into liquid water.

46) Why is it theoretically possible to fly through the upper layers of Jupiter and Saturn?

A. they aren't solid
B. they have no gravity
C. they are fusing inside
D. internal pressures are very low
E. they receive a lot of solar energy

47) The Earth, the moon, Venus and Mars are all made of similar elements. What factors contribute to the existence of life on Earth while the other neighbor planets and moons are lifeless?

A. The tilt of the axis is different from that of the Earth on other planets and moons.
B. Liquid water and a protective atmosphere are found on Earth and not on the others.
C. Earth has active tectonic plates that continue to create and destroy mountains and basins.
D. The laws governing the behavior of atoms and molecules is different here than elsewhere.

48) On January 6th, NASA launched the $63 million Lunar Prospector. It discovered enough frozen water to fill a moderately sized lake. How might this discovery affect the future of space exploration? The water could be used to provide:

A. water for a colony on the moon
B. water for the earth's orbiting space station
C. water for the space shuttle
D. oxygen for the people on the earth
E. an atmosphere for the moon

49) Mars, Earth and Venus all receive about the same amount of solar radiation. Why does only Earth support life?

A. Earth's atmosphere shields the surface from harmful UV radiation and liquid water is present
B. Earth has a hot interior of both liquid and solid parts and plates that move on the surface
C. Earth is tilted 23.5 degrees on its axis and has four seasons away from the equator
D. Earth has frozen water at its poles and a hole in its ozone layer

50) The Earth's early atmosphere was much different than it is today. Which important gas was not present?

A. nitrogen
B. oxygen
C. carbon dioxide
D. ozone

51) From the table what data explain the most likely reason Mercury has virtually no atmosphere?

A. A year on Mercury is very short at only 88 days in length.
B. Mercury's rotation is slower than planets with thick atmospheres.
C. Mercury is the smallest and closest to the sun.
D. Mercury has no moons and no rings to hold an atmosphere.

52) From the following data table what evidence suggests that there is life on planet C?

	Planet A	Planet B	Planet C	Planet D	Planet E	Planet F
Atmosphere	H, He, N	H, N	N, O	H, N	none	none
Diameter (km)	8752	9685	9521	15,024	1232	3214
Distance from Sun (millions of km)	300	258	326	1389	28,556	34
Day Length	1	89	42	15	.5	1
Moons	0	1	0	2	0	0

A. There is oxygen in the atmosphere
B. The diameter is in the 9000 km range
C. It is about 325 million km from the sun
D. Its day length is 42 days

53) Which of the following best describes why Mercury, Venus and Mars do not support abundant life?

A. They are all smaller in diameter than Earth, so there is not enough room for life.
B. Their orbits bring them too close to the Sun which makes them too hot.
C. They are lacking atmospheric nitrogen which is essential to plant life.
D. The length of their year is not long enough to sustain life.

54)

	Mercury	Venus	Earth	Mars	Jupiter
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Atmosphere (main components)	Virtually none	Carbon dioxide	Nitrogen Oxygen	Carbon dioxide	Hydrogen Helium
Satellites	0	0	1	2	16
Rings	0	0	0	0	3

From the above data table, which planet has an atmosphere containing the most oxygen?

A. Mercury
B. Venus
C. Earth
D. Mars

55) Even though Mercury is closer to the sun than Venus, why isn't it hotter?

A. Mercury's clouds reflect heat
B. Mercury is too small to catch heat
C. Mercury is in Venus' shadow
D. Mercury has no atmosphere

E. Mercury has thick icecaps

EarthT1

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

(Do not photo copy)
55 Question(s)
Test ID: 298290

1) Which of the following statements is the best reason the big bang is an accepted scientific theory?

A. A group of people met together and decided to make it a theory
B. There is no other way to explain the formation of the universe
✔ Distant galaxies were observed to be moving away from Earth
D. Edwin Hubble was an honest man

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

2) Why was the discovery of moons orbiting Jupiter a significant event?

A. we discovered life on another world
B. it proved that not everything revolved around the earth
✔ we discovered geological activity on another world
D. it proved that astronomy was a useful science

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

3) In the early 1900's, V.M. Slipher studied faint, cloud like objects in the sky. He noted that most of the objects had red shifts and that the fainter the object, the larger the red shift. Before 20 years had passed, astronomers determined that these objects were galaxies similar to the Milky Way. Edwin Hubble and Milton Humason published what is now known as the Hubble law. This law describes the relationship between red shift and the distance of the object being measured.
Which of the following statements best describes the relationship between Slipher, Hubble and Humason?

A. Scientists usually work in direct competition with each other.
✔ Scientists often build upon the evidence gathered by other scientists.
C. Scientists work individually and do not usually interact with each other.
D. Scientists each have jobs where they study completely different areas of science.

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

4) A prediction made in the Big Bang Theory is that the entire universe should be filled with left-over radiation. This radiation, referred to as Cosmic Microwave Background Radiation, was measured by the 1989 Cosmic Background Explorer (COBE) satellite. The success of this satellite prompted the development of a more sophisticated mission. The Wilkinson Microwave Anisotropy Probe (WMAP) satellite, launched in 2001, allowed scientists to take a closer look at the variations in data from COBE – providing a more detailed map of the most ancient light in the universe and supplying additional evidence that is consistent with the Big Bang Theory.
Why are technological developments like the COBE and WMAP satellites important?

✔ Technology has influenced the advancement of science by providing new data on the Big Bang Theory.
B. The Big Bang Theory is less controversial in light of the new data that has been collected.
C. The technology used for these studies was so expensive that the data collected on these missions had to be reported to the general public.
D. The two satellites conducted the same research but led to completely different conclusions.

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

5) Red shift and blue shift measurements were recorded for a group of stars and a group of galaxies. Using the collected data shown below, explain how they support the idea that the universe is expanding.

Galaxy	% Red Shift	% Blue Shift
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A. The stars showing a blue shift suggest the universe is expanding
✔ The red shift in all the galaxies suggests the universe is expanding
C. The blue shifted stars suggest the universe is not expanding
D. The 0 shift in stars B and I suggest the universe is not expanding

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

6) Scientists use spectrographs to determine the composition of distant stars and galaxies. The spacing of dark lines on the spectrum is unique to each element. Relative motion of these stars and galaxies can be studied by observing the location of the dark lines.

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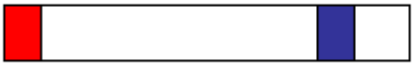
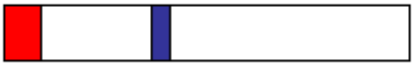
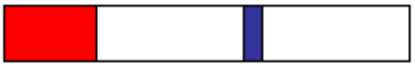


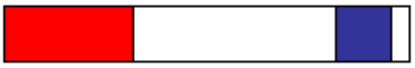
Galaxy W



Galaxy X



Galaxy Y



Galaxy Z

A. from furthest to nearest, Z W Y X
B. from furthest to nearest, W Z Y X
C. from furthest to nearest, Y X Z W
✔ from furthest to nearest, X Y W Z

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

7) Why is the Big Bang Theory the most accepted theory of how the universe was formed?

✔ It is the simplest explanation of the current scientific data
B. It is based on a combination of scientific and religious facts
C. It has not been revised or changed by scientists for many years
D. It has been proven correct by using mathematical models

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

8) What is the following: "The universe began in a gigantic explosion called the 'Big Bang.'"

✔ Theory
B. Law
C. Observation
D. Fact
E. Superstition

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

9) Scientists examine the light spectra from distant stars to determine if the size of the universe is changing. Why do astronomers believe the size of the universe is changing?

✔ The red shift indicates that distant galaxies are moving away from each other
B. The red shift indicates that distant galaxies are moving towards each other
C. The blue shift indicates that distant galaxies are moving away from each other
D. The blue shift indicates that distant galaxies are moving towards each other

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

10) A Belgian priest, Georges Lamaître, was the first to develop a “big bang” theory. In 1927, after studying red shifts of galaxies, he proposed that the universe began with an immense infusion of pure energy into space.
Later, Edwin Hubble discovered that the speed of a galaxy moving away from Earth was proportional to its distance. This relation was predicted by Lamaître’s theory.
Then, in 1964, Arno Penzias and Robert Wilson discovered the cosmic background radiation, which was also predicted by Lamaître's theory.
Which of the following best describes the work of these scientists and the development of the Big Bang Theory?

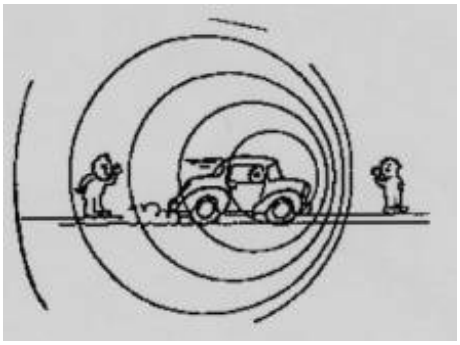
✔ Scientific theories are the cumulative result of evidence from many scientists.
B. Scientific theories are rarely confirmed so scientists try to provide more evidence.
C. Georges Lemaître should be given credit as the one who developed the Big Bang theory.
D. Because of the work of these scientists, the Big Bang should now be a fact instead of a theory.

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

11) Measurements of light from 7 nearby stars were made. Doppler analysis was performed and red shift was observed in all the measurements. What does this evidence suggest about the stars?

✔ All the stars measured are moving away from the Earth
B. All the stars measured are moving toward the Earth
C. Four of the stars measured are moving away from the Earth
D. All of the stars are not moving relative to the Earth

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

12) 

In the drawing above two observers are hearing the sound of the car. However, the sound is higher pitched to one observer and lower pitched to the other observer. Which observer hears the sound as a higher pitch and why?

A. The observer on the left - becasue each wave hits his ear less quickly than the observer on the right.
✔ The observer on the right - because each wave hits his ear more quickly than the observer on the left
C. The observer on the right - because each wave hits his ear less quickly than the observer on the left
D. The observer on the left - because each wave hits his ear more quickly than the observer on the right

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

13) Scientists are able to look at distant galaxies and planets due to technological advances. Which instrument has helped them look the farthest into the universe?

A. Space Probes
B. Space Shuttle
✔ Hubble Telescope
D. Ground-based Observatories

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

14) Which of the following is an example of technology?

A. the Moon's gravitational constant
B. chemical composition of Moon rocks
C. the moon's orbit
✔ Hubble photographs of the Moon
E. phases of the Moon

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

15) In the 1600's Copernicus and Galileo believed that the earth and other planets orbited the sun. Why were their ideas not accepted at first?

A. They had no good research to support their claims
B. People did not study the night sky in the 1600's
C. Their books were not published until after their deaths
D. Their claims could not be verified by the instruments of the time
✔ Their claims contradicted those of the prevailing churches

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

16) Data from a Doppler analysis of the sun show a red shift on the west side of the sun and a blue shift on the east side. What does that data suggest about the sun?

A. The sun is the center of the solar system
B. The sun is near the end of its life cycle
C. The sun is a smaller, less massive star
✔ The sun is spinning on its axis

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

17) Why has NASA, in the last 20 years, sent probes, instead of manned missions, to places like the moon and Mars?

A. They have not found people willing to risk their lives to go to the moon or Mars
✔ The public doesn't want to spend money for more expensive manned missions
C. People could not survive the long trip to Mars
D. People are too unreliable for space travel
E. Probes can more easily handle the unexpected situations that may arise during such missions

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

18) Which of the following events that can occur in a star will also happen to our sun?

✔ It will become a red giant
B. It will become a neutron star
C. It will go supernova
D. It will become a black hole

[SC:ES:1:2 - ILOs ESS, B, C, & P:3]

19) Why is the back side of the Moon more heavily cratered than the front?

A. the back side has a thicker atmosphere
B. the front side has less gravity
✔ craters on the front side have been obliterated by lava flows
D. the back side is closer to the sun
E. erosion has covered up ore of the front side's craters

[ILOs ESS, B, C, & P:3 - SC:ES:1:2]

20) Why does the earth experience day and night?

✔ the earth rotates on its axis
B. the earth revolves around the sun
C. the moon revolves around the earth
D. the earth is tilted on its axis
E. the earth is an inner planet

[ILOs ESS, B, C, & P:3 - SC:ES:1:2]

21) If science accepts the conclusion that heavy elements found on earth were formed in stars, what are they assuming is true?

A. Stars and planets have similar sizes and life cycles.
B. Planets are constantly collecting heavy elements from nearby stars.
C. Heavy metals are the first elements created in stars so they stay massive.
✔ Nuclear fusion in stars occurs in the same way it happens on earth.

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

22) Studying star clusters is essential to understand stars because individual stars change at such a slow rate. Studying these clusters allows scientists to observe stars that are similar in age, composition and distance but different in size. It also provides information that scientists would not be able to observe about one star because of the length of its life cycle. What does this information explain about the nature of science?

✔ Science findings are based upon observation and evidence.
B. Scientific information needs to be studied in a group.
C. Scientific knowledge takes a long period of time to change.

D. Science has contributions from numerous scientists.

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

23) Which answer below best describes the future of models of the life cycles of stars?

A. Models will probably stay the same because scientists do not enjoy creating new models.
B. Models will probably stay the same because scientists have learned all there is to know about the life cycle of stars.
C. Models will probably change because scientists like to make changes.
✔ Models will probably change because new technology will provide better information about the life cycle of stars.

[SC:ES:1:2 - ILOs ESS, B, C, & P:5]

24) Evaluate the statement: “The key to the past is the present.” How is this evident in scientific knowledge?

A. Past scientists had to predict the future to understand their data.
B. Present day knowledge is gathered and evaluated without any connection to past evidence.
✔ Present evidence is used to form hypotheses about what has happened in the past.
D. Evidence shows that the natural laws of science were different in the past than in the present.

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

25) Which of the following is the most appropriate title for this chart?

Shape of the Solar System	Planet Types
▪ Disk shaped. ▪ Orbits in similar planes. ▪ Rotation and revolution of planets in the same direction. ▪ Gravity and angular momentum describe the force and the motion in the system.	▪ Inner: Terrestrial, high density. ▪ Outer: Mostly gaseous, low density, ring systems for most.

A. Theories of Solar System Formation
✔ Characteristics of the Solar System
C. Differences in Planet Types
D. Astronomical Theory of the Planets

[ILOs ESS, B, C, & P:4 - SC:ES:1:2]

26) Scientists have recently discovered planets orbiting other stars. Evidence shows that the current hypothesis of how our solar system formed may not accurately describe how these newly discovered systems formed.
Which of the following best describes what should be done with the current hypothesis?

A. Ignore all of the old evidence and create a completely new hypothesis.
✔ Make careful revisions to the current hypothesis based upon the new evidence.
C. Make no changes to the current hypothesis because it is already accepted by scientists.
D. Conduct further research to disprove the new evidence that does not complement the current hypothesis.

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

27) Consider the following two statements:
1.The orbits of the planets lie in nearly the same plane and they all revolve around the sun in the same direction.
2.A characteristic of the bodies in the solar system is that they are similar in age. Dating techniques show that the Earth is no more than 4.6 billion years old. Thus it seems that our solar system took shape about 4.6 billion years ago.
Which of the following is true about the two statements?

✔ Statement #1 is fact, #2 is an inference.
B. Statement #1 is an inference, #2 is fact.
C. Both statements are fact.
D. Both statements are inferences.

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

28) What produces energy in a nuclear reaction?

A. Radioactive atoms move more rapidly than others
✔ The splitting or fusing of atomic nuclei
C. Electricity running through the radioactive atoms
D. Burning of uranium or other radioactive substances
E. Light from atoms as they change

[SC:ES:1:2 - ILOs ESS, B, C, & P:3]

29) Why does a comet's ion tail always point away from the sun?

A. galactic gravity pulls it out toward space
✔ solar wind pushes it outward
C. the comet moves faster than the tail
D. it is still in the Oort Cloud
E. comets move slowly when they are close to the sun

[SC:ES:1:2 - ILOs ESS, B, C, & P:3]

30) What is the relationship between the mass of a star and the relative mass of elements produced?

✔ As more massive stars are examined, temperature and pressure are seen to be greater, and heavier elements are produced
B. As more massive stars are examined, temperature and pressure are seen to be less, and lighter elements are produced
C. As less massive stars are examined, temperature and pressure are seen to be greater, and lighter elements are produced
D. As less massive stars are examined, temperature and pressure are seen to be less, and heavier elements are produced

[SC:ES:1:2 - ILOs ESS, B, C, & P:3]

31) Why does the Moon only have 1/6 of the earth's gravity?

A. it is so far away from the earth
B. it has no atmosphere
✔ it is not as massive as Earth
D. it is made of basalt
E. it has cooled over time to be completely solid

[ILOs ESS, B, C, & P:3 - SC:ES:1:2]

32) Which of the following planets has a very hot atmosphere and is about the same size as our earth?

A. Jupiter
B. Mars
C. Pluto
✔ Venus

[SC:ES:1:2 - ILOs ESS, B, C, & P:3]

33) Why would a red giant star be brighter than a white dwarf?

A. the giant is hotter
✔ the giant has more surface area
C. the giant is closer to the earth
D. the dwarf is cooler
E. the dwarf is surrounded by gas

[ILOs ESS, B, C, & P:3 - SC:ES:1:2]

34) Which of the following most accurately explains the origin of heavy elements on Earth?

✔ Formed by nuclear reactions in massive, ancient stars
B. Formed by radioactive decay deep within Earth's core
C. Formed by black holes scattered throughout the galaxy
D. Formed by comets and asteroids falling to the Earth

[ILOs ESS, B, C, & P:3 - SC:ES:1:2]

35) Which two factors combine together to cause an object to remain in a stable orbit?

✔ gravity and inertia
B. mass and magnetism
C. fusion and fission
D. heat and electricity
E. temperature and luminosity

[ILOs ESS, B, C, & P:3 - SC:ES:1:2]

36) “Elements heavier than iron were created by rapid nuclear reactions that can only occur when a massive star explodes.” Which of the following would be the best question to use when choosing a reference source for this statement?

A. How do nuclear reactions occur?
B. How does a massive star explode?
✔ How are heavy elements created in stars?
D. How many elements are heavier than iron?

[SC:ES:1:2 - ILOs ESS, B, C, & P:4]

37) Consider the claim “The process that formed the heavy elements on Earth continues today.” What would be at least one thing that would have to happen for this claim to be called a theory?

A. At least fifty scientists would have to prove the claim to be true.
B. Some theories would have to be rejected by science investigations.
C. New planets would need to be discovered and studied in other solar systems.
✔ The claim would need to have support from the data of repeated experiments.

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

38) What causes the earth's seasons?

A. the distance to the sun
✔ the tilt of the earth's axis
C. the elliptical orbit of the earth
D. the sun is brighter in the summer
E. the closeness of the moon to the earth

[SC:ES:1:2 - ILOs ESS, B, C, & P:3]

39) You are assigned to prepare a presentation on the life cycle of stars. Which resource would provide you with the most reliable, up-to-date information?

A. Time Magazine article, “Constellations and Space Travel.”
B. American Astrology magazine.
C. The Center for Scientific Creation website.
✔ The NASA (National Aeronautics and Space Administration) website.

[ILOs ESS, B, C, & P:4 - SC:ES:1:2]

40) The nebular hypothesis states that the solar system was created by a rotating cloud of matter flattened to a disk by gravity. Pierre Simon de Laplace built this hypothesis around Descartes’ vortex hypothesis and Newton’s work with gravity. Today, scientists are still gathering evidence that supports this hypothesis.
What is the importance of Laplace’s work in the modern theory of solar system formation?

A. Other scientists contradicted Laplace to provide support for their hypotheses.
B. Laplace was helpful in getting scientists the recognition that they deserved.
✔ Laplace combined previous scientific knowledge into a hypothesis that is being built upon by modern day scientists.
D. Research would have stopped if Laplace had NOT given enough evidence for the hypothesis.

[ILOs ESS, B, C, & P:5 - SC:ES:1:2]

41) “Scientists would expect most stars to have planets because they form with disks of gas and dust around them. This process should be common for most stars.”
Which of the following best describes this statement?

A. It is a fact.
B. It is evidence.
✔ It is an inference.
D. It is a scientific law.

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

42) A newly discovered planet, in another solar system, is about the same distance from its sun as Earth is from our sun. This planet is also about the same size as Earth. This planet has an atmosphere similar to Earth's but it lacks oxygen. Does this data suggest there is life similar to that on Earth on the newly discovered planet? Why or why not?

A. Yes, the distance from the sun is the most important thing for life
B. Yes, the size of the planet is the same as Earth so it will have life
✔ No, the atmosphere lacks oxygen, a waste product of life
D. No, the tilt of its axis may be different than that of Earth

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

43) What is it about the Earth, as compared to other planets in our solar system, which makes it conducive to life?

A. It is at the only distance from the sun that would support life in the solar system
B. It is the only planet with an atmosphere
C. It is the only planet with a 24-hour day
✔ It has liquid water

[ILOs ESS, B, C, & P:3 - SC:ES:2:1]

44) Based on the data table, which of the following is an inference?

	Mercury	Venus	Earth	Mars	Jupiter
Distance from Sun (millions of km)	57.9	108.2	149.6	227.9	778.3
Year	88 days	224.7 days	365.2 days	687 days	11.86 yrs
Day	59 days	243 days retrograde	23 hr 56 min 4 sec	24 hr 37 min	9 hr 55 min 30 sec
Diameter (km)	4,880	12,100	12,756	6,794	142,800
Atmosphere (main components)	Virtually none	Carbon dioxide	Nitrogen Oxygen	Carbon dioxide	Hydrogen Helium
Satellites	0	0	1	2	16
Rings	0	0	0	0	3

A. Mercury has the shortest year and smallest diameter of these five planets.
B. Venus and Mars have atmospheres containing carbon dioxide.
C. Jupiter is 778, 300, 000 million kilometers from the Sun.
✔ Venus and Mars have similar atmospheres.

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

45) Data from many spacecraft have revealed evidence that water was once present on Mars in the form of floods, runoff channels and possible shorelines of ancient oceans. Recently, the images from the Hubble Space Telescope have indicated that there are minerals present on Mars that form only in the presence of water.
Why is the information from this new technology important?

A. It offers proof that life once existed on Mars.
✔ It provides further evidence that water once existed on Mars.
C. It helps scientists conclude that Mars is suitable for human colonization.
D. It is evidence that the current temperature on Mars is warm enough to turn ice into liquid water.

[ILOs ESS, B, C, & P:5 - SC:ES:2:1]

46) Why is it theoretically possible to fly through the upper layers of Jupiter and Saturn?

✔ they aren't solid
B. they have no gravity
C. they are fusing inside
D. internal pressures are very low
E. they receive a lot of solar energy

[ILOs ESS, B, C, & P:3 - SC:ES:2:1]

47) The Earth, the moon, Venus and Mars are all made of similar elements. What factors contribute to the existence of life on Earth while the other neighbor planets and moons are lifeless?

A. The tilt of the axis is different from that of the Earth on other planets and moons.
✔ Liquid water and a protective atmosphere are found on Earth and not on the others.
C. Earth has active tectonic plates that continue to create and destroy mountains and basins.
D. The laws governing the behavior of atoms and molecules is different here than elsewhere.

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

48) On January 6th, NASA launched the $63 million Lunar Prospector. It discovered enough frozen water to fill a moderately sized lake. How might this discovery affect the future of space exploration? The water could be used to provide:

✔ water for a colony on the moon
B. water for the earth's orbiting space station
C. water for the space shuttle
D. oxygen for the people on the earth
E. an atmosphere for the moon

[ILOs ESS, B, C, & P:5 - SC:ES:2:1]

49) Mars, Earth and Venus all receive about the same amount of solar radiation. Why does only Earth support life?

✔ Earth's atmosphere shields the surface from harmful UV radiation and liquid water is present
B. Earth has a hot interior of both liquid and solid parts and plates that move on the surface
C. Earth is tilted 23.5 degrees on its axis and has four seasons away from the equator
D. Earth has frozen water at its poles and a hole in its ozone layer

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

50) The Earth's early atmosphere was much different than it is today. Which important gas was not present?

A. nitrogen
✔ oxygen
C. carbon dioxide
D. ozone

[ILOs ESS, B, C, & P:3 - SC:ES:2:1]

51) From the table what data explain the most likely reason Mercury has virtually no atmosphere?

A. A year on Mercury is very short at only 88 days in length.
B. Mercury's rotation is slower than planets with thick atmospheres.
✔ Mercury is the smallest and closest to the sun.
D. Mercury has no moons and no rings to hold an atmosphere.

[SC:ES:2:1 - ILOs ESS, B, C, & P:4]

52) From the following data table what evidence suggests that there is life on planet C?

	Planet A	Planet B	Planet C	Planet D	Planet E	Planet F
Atmosphere	H, He, N	H, N	N, O	H, N	none	none
Diameter (km)	8752	9685	9521	15,024	1232	3214
Distance from Sun (millions of km)	300	258	326	1389	28,556	34
Day Length	1	89	42	15	.5	1
Moons	0	1	0	2	0	0

✔ There is oxygen in the atmosphere
B. The diameter is in the 9000 km range
C. It is about 325 million km from the sun
D. Its day length is 42 days

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

53) Which of the following best describes why Mercury, Venus and Mars do not support abundant life?

A. They are all smaller in diameter than Earth, so there is not enough room for life.
B. Their orbits bring them too close to the Sun which makes them too hot.
✔ They are lacking atmospheric nitrogen which is essential to plant life.
D. The length of their year is not long enough to sustain life.

[ILOs ESS, B, C, & P:3 - SC:ES:2:1]

54)

	Mercury	Venus	Earth	Mars	Jupiter
Distance from Sun (millions of km)	57.9	108.2	149.6	227.9	778.3
Year	88 days	224.7 days	365.2 days	687 days	11.86 yrs
Day	59 days	243 days retrograde	23 hr 56 min 4 sec	24 hr 37 min	9 hr 55 min 30 sec
Diameter (km)	4,880	12,100	12,756	6,794	142,800
Atmosphere (main components)	Virtually none	Carbon dioxide	Nitrogen Oxygen	Carbon dioxide	Hydrogen Helium
Satellites	0	0	1	2	16
Rings	0	0	0	0	3

From the above data table, which planet has an atmosphere containing the most oxygen?

A. Mercury
B. Venus
✔ Earth
D. Mars

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

55) Even though Mercury is closer to the sun than Venus, why isn't it hotter?

A. Mercury's clouds reflect heat
B. Mercury is too small to catch heat
C. Mercury is in Venus' shadow
✔ Mercury has no atmosphere
E. Mercury has thick icecaps