Midterm Review #3 - 2018

1. The reaction below represents an energy-producing process.

Hydrogen (lighter element) + Hydrogen (lighter element) → Helium (heavier element) + Energy

The reaction represents how energy is produced

A) when water condenses in Earth's atmosphere
B) during nuclear decay
C) from the movement of crustal plates
D) in the Sun by fusion

2. Base your answer to the following question on the table below, which shows eight inferred stages describing the formation of the universe from its beginning to the present time.

Data Table

Stage	Description of the Universe	Average Temperature of the Universe (°C)	Time From the Beginning of Universe
1	the size of an atom	?	0 second
2	the size of a grapefruit	?	10^{-43} second
3	"hot soup" of electrons	10^{27}	10^{-32} second
4	Cooling allows protons and neutrons to form.	10^{13}	10^{-6} second
5	still too hot to allow the forming of atoms	10^{8}	3 minutes
6	Electrons combine with protons and neutrons, forming hydrogen and helium atoms. Light emission begins.	10,000	300,000 years
7	Hydrogen and helium form giant clouds (nebulae) that will become galaxies. First stars form.	–200	1 billion years
8	Galaxy clusters form and first stars die. Heavy elements are thrown into space, forming new stars and planets.	–270	13.7 billion years

What is the most appropriate title for this table?

A) The Big Bang Theory
B) The Law of Superposition
C) The Theory of Plate Tectonics
D) The Laws of Planetary Motion

3. Which star has a surface temperature most similar to the surface temperature of *Alpha Centauri?*

A) *Sirius*
B) *Polaris*
C) *Procyon B*
D) *Betelgeuse*

4. Compared to Jovian planets, terrestrial planets have

A) shorter periods of rotation
B) larger equatorial diameters
C) shorter periods of revolution
D) larger masses

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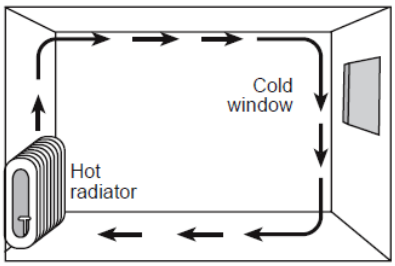
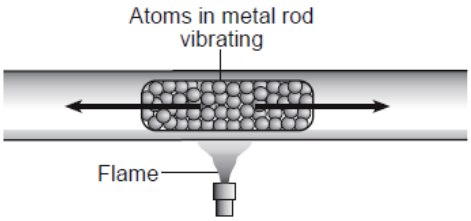
5. Which diagram best represents heat transfer mainly by the process of conduction?

A)



B)



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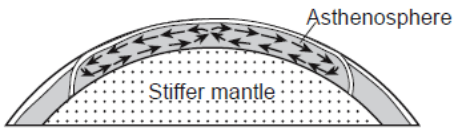

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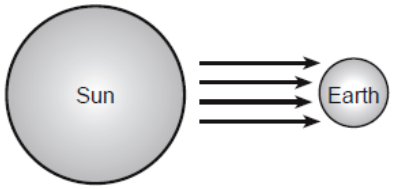


6. Which planet is located approximately ten times farther from the Sun than Earth is from the Sun?

A) Uranus B) Mars
C) Saturn D) Jupiter

7. Ozone is important to life on Earth because ozone

A) absorbs energy that is reradiated by Earth
B) cools refrigerators and air-conditioners
C) destroys excess atmospheric carbon dioxide
D) absorbs harmful ultraviolet radiation

8. Energy is produced within a star's core by the process of

A) nuclear fusion
B) radioactive decay
C) conduction
D) insolation

9. Which phase change requires water to gain 2260 Joules per gram?

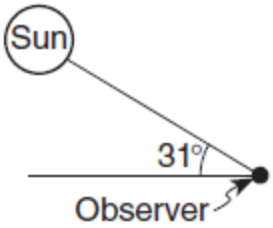
A) solid ice melting
B) water vapor condensing
C) liquid water vaporizing
D) liquid water freezing

10. Equal masses of granite, iron, copper, and lead are placed in sunlight. Based on specific heat, which material will warm up the fastest?

A) copper B) iron
C) granite D) lead

11 In which diagram is the observer experiencing the greatest intensity of insolation?

A)



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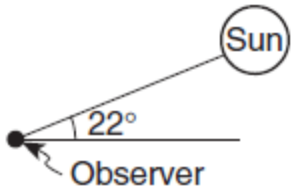

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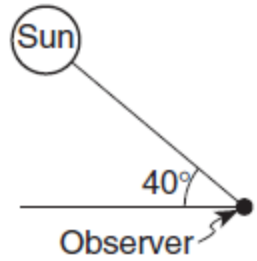

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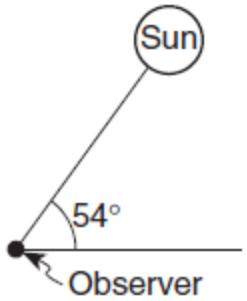
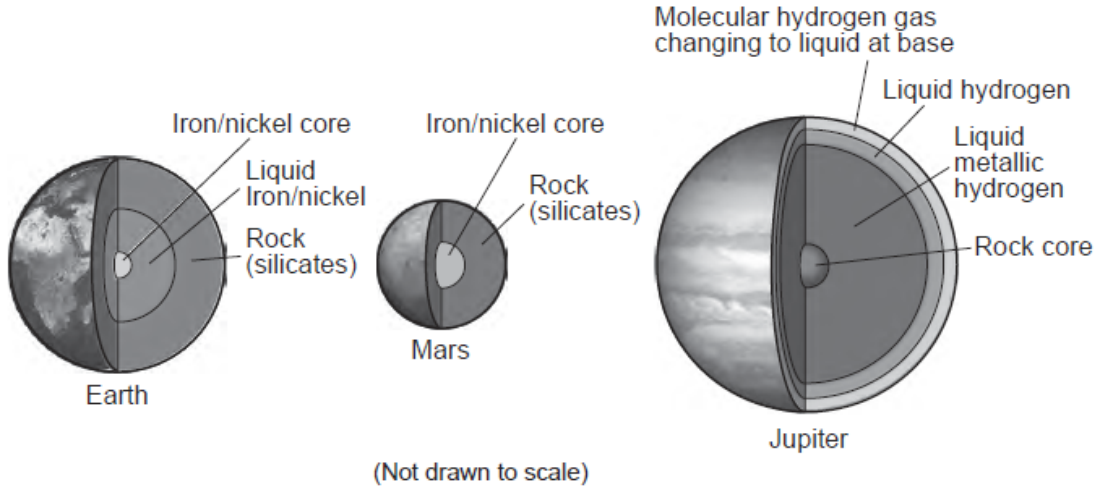


___ 12. The diagram below represents the interiors of three planets in our solar system.



Which inference best describes the interiors of the planets in our solar system?

A) Only terrestrial planets have layered interiors, with density decreasing toward the center.
B) Only Jovian planets have layered interiors, with density increasing toward the center.
C) Both terrestrial and Jovian planets have layered interiors, with density increasing toward the center.
D) Both terrestrial and Jovian planets have layered interiors, with density decreasing toward the center.

___ 13. In which list are the forms of electromagnetic energy arranged in order from longest to shortest wavelengths?

A) x-rays, infrared rays, blue light, gamma rays
B) radio waves, infrared rays, visible light, ultraviolet rays
C) gamma rays, x-rays, ultraviolet rays, visible light
D) infrared rays, radio waves, blue light, red light

___ 14. Which sequence correctly lists the relative sizes from smallest to largest?

A) our solar system, universe, Milky Way Galaxy
B) our solar system, Milky Way Galaxy, universe
C) Milky Way Galaxy, universe, our solar system
D) Milky Way Galaxy, our solar system, universe

___ 15. Which statement best explains why Earth and the other planets of our solar system became layered as they were being formed?

A) Materials that cooled quickly stayed at the surface of each planet.
B) Gravity caused less-dense material to move toward the center of each planet.
C) Materials that cooled slowly stayed at the surface of each planet.
D) Gravity caused more-dense material to move toward the center of each planet.

___ 16. A major piece of evidence supporting the Big Bang theory is the observation that wavelengths of light from stars in distant galaxies show a

A) redshift, appearing to be shorter
B) blueshift, appearing to be longer
C) blueshift, appearing to be shorter
D) redshift, appearing to be longer

17. The table below shows the duration of insolation at different latitudes for three different days during the year.

Latitude	Day 1 Duration of Insolation (hours)	Day 2 Duration of Insolation (hours)	Day 3 Duration of Insolation (hours)
90° N	24	12	0
80° N	24	12	0
70° N	24	12	0
60° N	$18\frac{1}{2}$	12	$5\frac{1}{2}$
50° N	$16\frac{1}{4}$	12	$7\frac{3}{4}$
40° N	15	12	9
30° N	14	12	10
20° N	$13\frac{1}{4}$	12	$10\frac{3}{4}$
10° N	$12\frac{1}{2}$	12	$11\frac{1}{2}$
0°	12	12	12

Which dates are represented most correctly by Day 1, Day 2, and Day 3, respectively?

A) September 22, December 21, March 21
B) June 21, September 22, December 21
C) March 21, September 22, December 21
D) December 21, March 21, June 21

18. Scientists are concerned about the decrease in ozone in the upper atmosphere primarily because ozone protects life on Earth by absorbing certain wavelengths of

A) x-ray radiation
B) infrared radiation
C) microwave radiation
D) ultraviolet radiation

19. What is the heat energy required to change 2 grams of liquid water at 100ºC to water vapor at 100ºC?

A) 4520 J
B) 2260 J
C) 334 J
D) 668 J

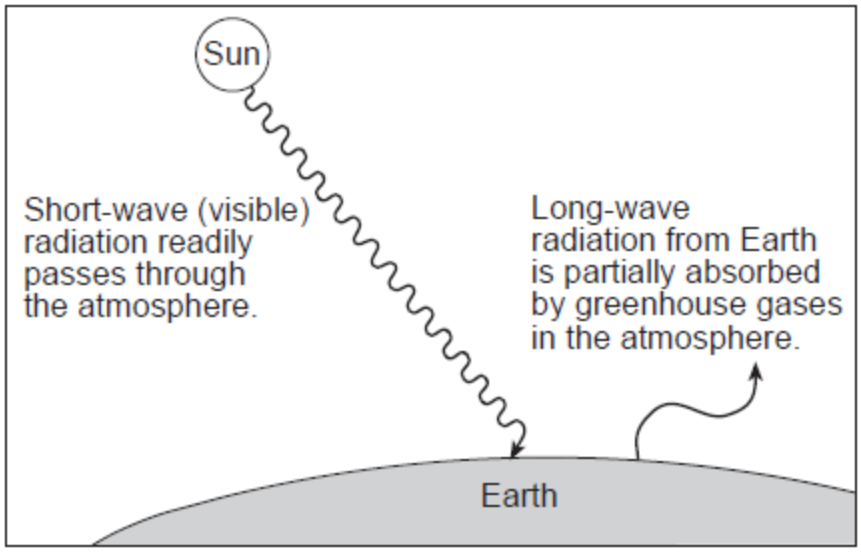
20. Which list shows stars in order of increasing temperature?

A) *Aldebaran*, the *Sun*, *Rigel*, *Procyon B*
B) *Rigel*, *Polaris*, *Aldebaran*, *Barnard's Star*
C) *Procyon B*, *Alpha Centauri*, *Polaris*, *Betelgeuse*
D) *Barnard's Star*, *Polaris*, *Sirius*, *Rigel*

21. The terrestrial planets differ from the Jovian planets because the terrestrial planets are

A) less dense and larger
B) more dense and larger
C) less dense and smaller
D) more dense and smaller

Base your answers to questions **22** and **23** on the diagram below, which represents the greenhouse effect in which heat energy is trapped in Earth's atmosphere



(Not drawn to scale)

___ 22. Which type of radiation from Earth is the long-wave radiation absorbed by greenhouse gases?

A) visible light B) radio waves C) infrared D) ultraviolet

___ 23. The Earth surface that best absorbs short-wave solar radiation has which characteristics?

A) white and smooth
B) black and rough
C) white and rough
D) black and smooth

___ 24. What is the total number of energy required to melt 1 gram of ice at 0°C to liquid water at 0°C?

A) 334 J B) 1 J
C) 3340 J D) 2260 J

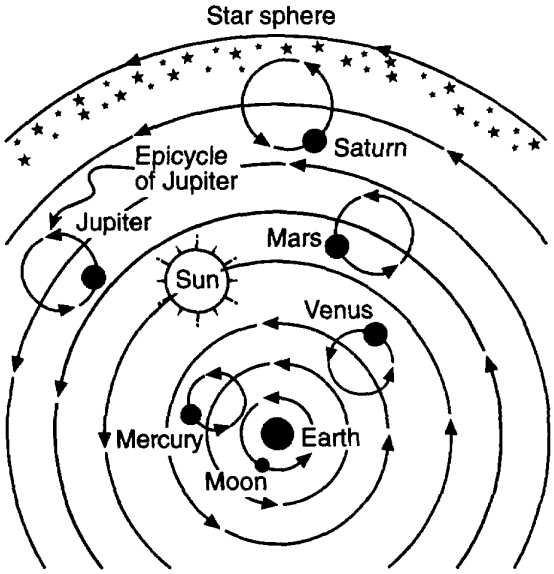
___ 25. Which evidence best supports the theory that the universe was created by an explosion called the Big Bang?

A) cosmic background radiation
B) the different compositions of terrestrial and Jovian planets
C) the blue shift of light from distant galaxies
D) impact craters found on Earth

___ 26. During which phase change will the greatest amount of energy be absorbed by 1 gram of water?

A) evaporation B) melting
C) condensation D) freezing

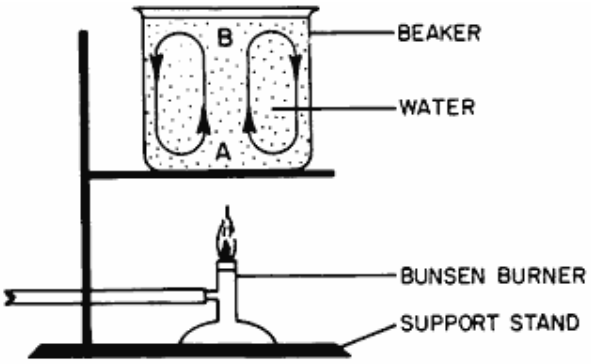
27. The diagram below shows one model of a portion of the universe.



What type of model does the diagram best demonstrate?

A) a geocentric 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 the Sun
D) a heliocentric model, in which celestial objects orbit Earth

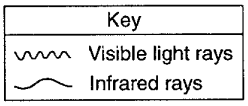
28. The diagram below represents a large beaker of water being heated to demonstrate convection.



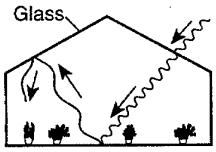
The movement of water upward from *A* toward *B* results primarily from

A) air movement across the surface of the water
B) the shape of the beaker
C) differences in density in the water
D) capillary action within the water

29. Which diagram best shows how air inside a greenhouse warms as a result of energy from the Sun?



A)



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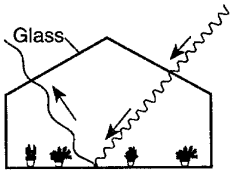
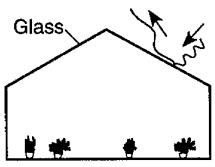
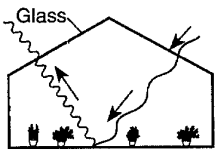


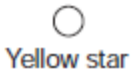
C)



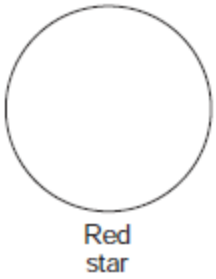
D)



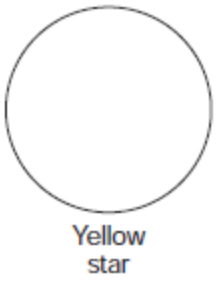
___ 30. The diagram below represents a model of the size of the Sun and indicates the color of the Sun.



Which diagram best represents the relative size and indicates the color of *Polaris* compared to the Sun?

A) 

B) 

C) 

D)