

Inspire Science – Grade 8 General. AY: 2023 – 2024 . . .Term – 3.
 Review Questions and Answers. Source: Inspire Science Program Platform.
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U3: Understanding Waves.	M3: Information Technologies.	L1: Communicating with Signals. L2: Modern Communication with Digital Signals.
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Q1: People use signals to communicate.

[A] True.

[B] False.

Q2: A(n) analog signal changes between two values.

[A] True.

[B] False.

Q3: Computers use ___ signals to store, send, and receive information.

[A] digital.

[B] analog.

Q4: Which of these uses digital signals to store, send, or receive information?

[A] A film camera

[B] A CD player

[C] A tape recorder

[D] A vinyl recorder

Q5: Digital signals are more reliable than analog signals.

[A] True.

[B] False.

Q6: Sign language and written language are examples of signals used to communicate.

[A] True.

[B] False.

Q7: Before a signal is sent, it must be decoded.

[A] True.

[B] False.

Q8: Electronic signals can travel very long distances in ___ fibers, due to total internal reflection.

[A] optical

[B] electrical

[C] thermal

[D] digital

Q9: What do all signals that are used to communicate have in common?

[A] They all involve light waves.

[B] They all send information.

[C] They all use printed words.

[D] They all use a series of sounds.

Q10: What is a *disadvantage* of using radio waves to transmit information?

[A] They do not permanently move matter.

[B] They can travel over long distances.

[C] They can be varied to hold information.

[D] They lose energy as they travel through mediums.

Q11: How does noise affect a signal?

[A] It causes the signal to deteriorate.

[B] It amplifies the signal.

[C] It allows the signal to travel further.

[D] It changes the signal as it moves from one medium to another.

Q12: Which correctly orders the steps of communication using signals?

[A] encode, transmit, decode.

[B] transmit, encode, decode.

[C] decode, transmit, encode.

[D] transmit, decode, encode.

Q13: Identify three devices that were developed to send or receive signals carried by electromagnetic waves.

1. Radio

2. Television (TV)

3. Mobile Phones

4. Wireless Devices.

5. Radar Systems

6. Remote Controls

7. Sonar Systems

Q14: All of the following are types of electromagnetic waves that can be used to transmit signals **except** ____.

[A] sound waves

[B] light waves

[C] radio waves

[D] microwaves

Q15: Describe three characteristics of electromagnetic waves that make them useful for transmitting signals.

[1] Electromagnetic waves travel very fast. This means that signals can be sent with very little delay between transmitting and receiving.

[2] Electromagnetic waves do not need a medium through which to travel. This means that they can be sent through space, if necessary.

[3] Electromagnetic waves can be easily modulated. This is necessary for them to be used to carry information that can be decoded.

Q16: A(n) analog signal is one that changes continuously.

[A] True.

[B] False.

Q17: Radio waves are an example of a digital signal.

[A] True.

[B] False.

Q18: Digital signals are more affected by noise than analog signals.

[A] True.

[B] False.

Q19: The more pixels a digital image consists of, the clearer the image.

[A] True.

[B] False.

Q20: Computers use a series of ___ numbers to encode information.

- [A] unary
- [B] binary
- [C] ternary
- [D] quaternary

Q21: Which is the best model of an analog signal?

- [A] A smooth wave.
- [B] A light switch going on and off.
- [C] A series of 1's and 0's.
- [D] A series of pulses.

Q22: Which best compares the reliability of analog signals and digital signals?

- [A] Only analog signals are reliable.
- [B] Analog signals are more reliable than digital signals.
- [C] Digital signals are more reliable than analog signals.
- [D] Both types of signals are equally reliable.

Q23: Which best describes binary numbers?

- [A] a continuously changing wave.
- [B] a set of two discrete values
- [C] a large array of values
- [D] a set of four or five numbers

Q24: For which type(s) of signals does noise alter the *original* information?

- [A] analog only
- [B] digital only
- [C] both analog and digital
- [D] neither analog nor digital

Q25: Describe pixels and explain how digital cameras use pixels to form images.

Pixels are locations that hold color values. One pixel can hold one color value. The more pixels there are for a given area, the sharper an image will appear. When there are enough pixels, an image will appear continuous. When light reaches the sensor of a camera, the sensor encodes that information digitally. The digital information is then translated into a single value for each pixel.

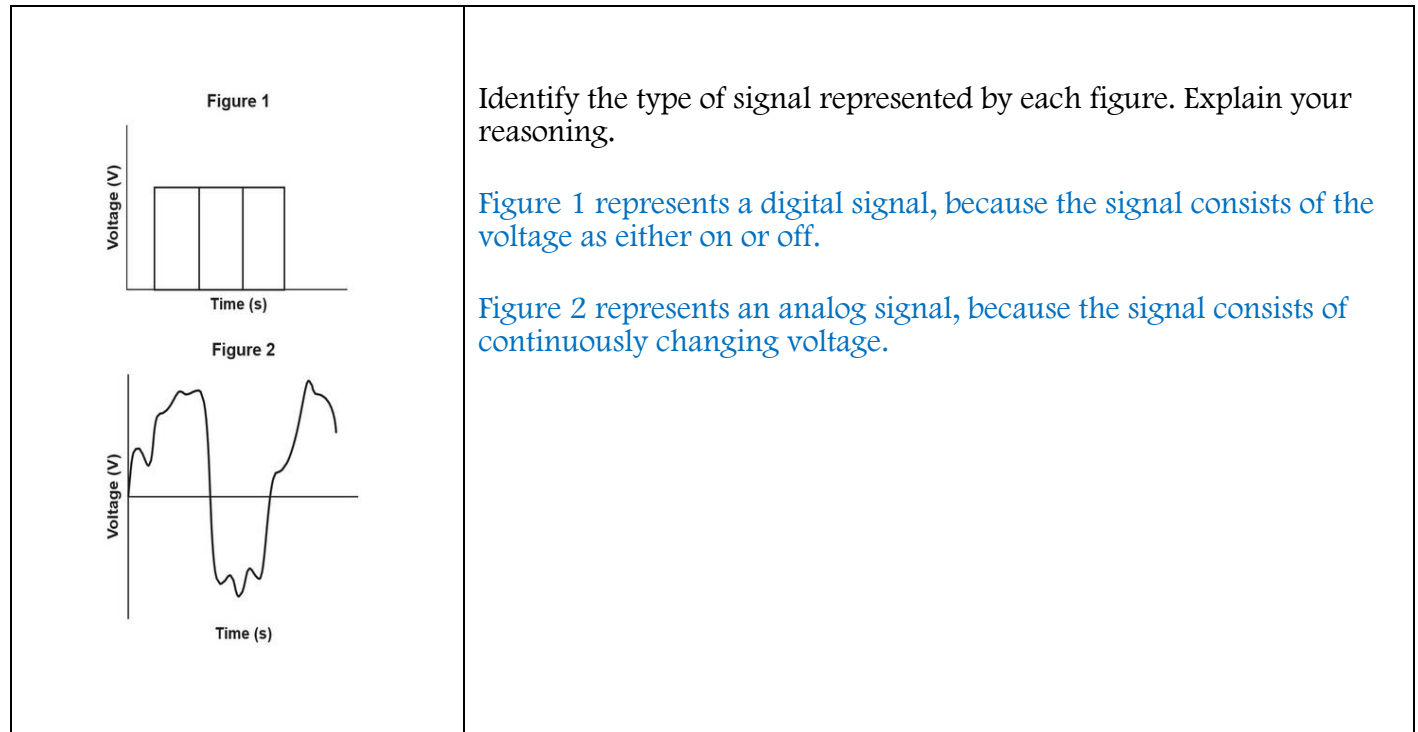
Q26: Evelyn learns that a sound wave can be recorded electronically as an analog signal or as a digital signal. She investigates these two signal types.

She records her voice using a tape recorder, which uses an analog signal to produce sound when played back. She also records her voice using a computer, which uses a digital signal to produce sound when played back. Evelyn replays each recording 100 times.

- a. Describe a difference that Evelyn would **most likely** hear between the two recordings after being replayed 100 times.
- b. Explain why the two recordings would sound different after being replayed 100 times.
 - a. The analog signal (tape recorder) may not be as clear as the digital signal (computer). After being played 100 times, the voice on the tape recorder may sound scratchy, distorted, or garbled compared to the voice on the computer.
 - b. The tape player physically stores the sound on tape that can wear down (degrade) when it is replayed many times. However, the computer stores the sound electronically, which does not wear down.

Q27: Brooke is learning about electronic devices that use electric current to encode information. She learns that when a person speaks into the microphone of a telephone, the sound wave generated by the person's voice is changed into an electronic signal. This electronic signal is then transmitted to another telephone where it is converted back to a sound wave so the other person can hear the voice.

The sound wave is encoded by varying the voltage of the electronic signal. Brooke learns that the voltage can be changed in two ways, resulting in two types of electronic signals: analog and digital. Figure 1 and Figure 2 represent these two types of signals.



Q28: Light waves, radio waves, and microwaves are examples of electromagnetic waves.

- [A] True.
- [B] False.

Q29: Analog signals are ___ affected by noise than digital signals.

- [A] less
- [B] more

Q30: Light waves stay inside an optical fiber as they are transmitted because the _____.

- [A] light waves curve to follow the path of the fiber.
- [B] fiber is insulated to prevent loss of thermal energy.
- [C] fiber reflects the light back into the core.
- [D] fiber is perfectly straight.

Q31: Which do NOT interfere with FM radio transmissions?

- [A] mountains
- [B] buildings
- [C] bad weather
- [D] AM transmissions.

Q32: Which is an example of a signal being encoded?

[A] reading braille.

[B] writing a word in Morse code.

[C] hearing sound from a radio.

[D] receiving an email.

Q33: Name one digital device that has contributed to scientific research.

(1) Computer.

(2) Electron microscope.

(3) Satellite.

Q34: Which does NOT help explain why digital signals are more reliable than analog signals?

[A] Noise is more easily filtered from digital signals.

[B] Digital signals are smooth and continuous.

[C] Digital signals consist of two values only.

[D] Analog signals deteriorate due to noise.

Q35: Computers use digital information that is encoded as ___ numbers.

[A] unary

[B] binary

[C] ternary

[D] quaternary

Q36: How does the data displayed by an alcohol thermometer and a digital thermometer differ?

Data from the alcohol thermometer is continuous; data from the digital thermometer has discrete values.

Q37: Digital signals _____.

[A] can only be stored on computers.

[B] consist of only two values.

[C] cannot be transmitted by light waves.

[D] are what is stored by camera film.

Q38: Sequence the three steps that must occur for a signal to be communicated effectively.

encode, transmit, decode.

Q39: Which best explains why the receiver of a signal must understand the code or language being used?

[A] This allows the signal to be decoded.

[B] This allows the signal to be transmitted.

[C] This allows the signal to be converted to binary.

[D] This allows the signal to be encoded.

Q40: Which is NOT a property of electromagnetic waves?

[A] They lose energy as they move through mediums.

[B] They can be varied to hold information.

[C] They transfer energy but not matter.

[D] They consist of a series of pulses.

Q41: A square wave with values 0 and 1 is an example of a(n) ___ signal.

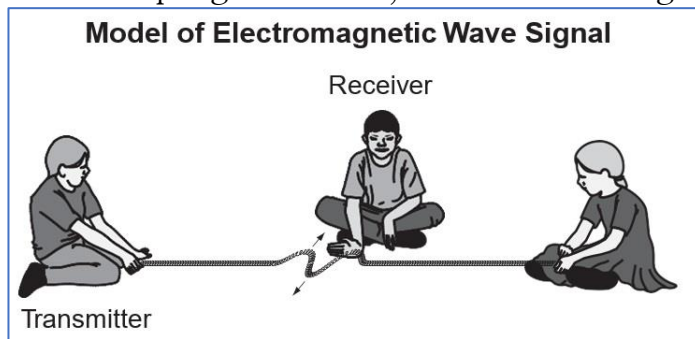
[A] analog

[B] digital

[C] continuous

[D] smooth

Q42: Three students learn that electromagnetic waves, such as radio waves, can be used to carry communication signals. The students use a long spring to model how an electromagnetic wave can carry communication signals. The “transmitter” holds one end of the spring on the floor. He represents an electromagnetic wave signal, with two rapid flicks of his hand forming two wave pulses in the spring. The “receiver” rests his hand on the floor and feels each passing wave pulse. The third student holds the other end of the spring on the floor, as shown in the diagram.



The students decide to use a code to send information, using the model. One wave pulse sent by the transmitter represents the numeral 1; two wave pulses sent close together represents the numeral 0. The transmitter sends a five-digit code, and the receiver tries to identify the code. The receiver feels the following wave pulses in order:

- two quick waves
- two quick waves
- one wave
- two quick waves
- one wave

- a. Identify the type of electronic signal that this model represents. Explain your reasoning.
 - b. Identify the five-digit code that the transmitter sent.
 - c. Explain why the amplitude of the wave from the transmitter would not affect the code identified by the receiver.
- a. The model represents a digital signal because it is made up of individual [discrete] waves representing 0s and 1s.
- b. 0, 0, 1, 0, 1
- c. The height of the wave [amplitude] transmitted does not affect whether the receiver feels one wave pulse or two wave pulses.

Q43: Three students use a long spring to model how an electromagnetic wave carries a communication signal. The “transmitter” holds one end of the spring on the floor and represents an electromagnetic wave, by continuously moving his hand side-to-side. The amplitude of the wave varies with how much the transmitter moves his hand. The “receiver” rests his hand on the floor and can feel the waves passing. The third student holds the other end of the spring on the floor, as shown in the diagram.

Model of Electromagnetic Wave Signal



The “transmitter” sends a code using the five amplitudes listed in the table.

Amplitude (in cm)

20	30	10	40	60
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a. Identify the type of electronic signal that this model represents. Explain your reasoning.

The receiver tries to identify the code by feeling the amplitudes of the waves with his hand but does not correctly identify all five amplitudes in the code.

b. Describe how the picture on a television would look if the television receiver incorrectly identified the amplitudes of this kind of electronic signal.

a. The model represents an analog signal, because the signal is continuous **OR** because the changing amplitude is the code for the

b. If the television receiver incorrectly identified the amplitudes of the signal, then the picture transmitted by the television would have static (look fuzzy).

Q44: Which is false about fiber optic cables?

[A] They rely on total internal reflection to transmit signals.

[B] The glass fiber is highly absorbent.

[C] They can send signals a long distance without the signals degrading.

[D] The cladding causes the light to reflect.

Q45: Give two reasons why music today is more often recorded and shared digitally than on tapes or vinyl records.

Digital information is less susceptible to noise; it is also more easily stored and reproduced.

Q46: What effect does recycling have on land resources?

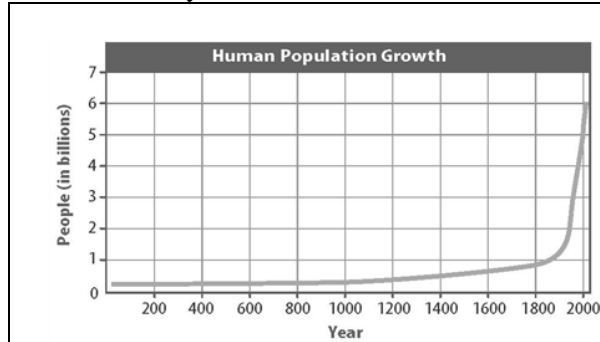
[A] Recycling conserves land resources.

[B] Recycling uses land resources more quickly.

[C] Recycling has no effect on land resources.

[D] Recycling only affects water resources.

Q47: Which of the following does not help explain the sudden rise in population that occurs from the late 1700s and beyond?



- [A] the beginning of the Industrial Revolution.
- [B] scientific advances.
- [C] the settling of the western part of the United States.
- [D] medical advances

Q48: A simple action like taking a shower _____.

- [A] has little impact on natural resources.
- [B] uses only one natural resource.
- [C] makes use of several types of natural resources.
- [D] all of the above.

Q49: What is one way people can help protect the environment?

- [A] recycling.
- [B] cutting down trees.
- [C] mining.
- [D] littering.

Q50: Concerns have been raised about whether food resources will be sufficient to feed the increasing human population on Earth. According to the Population Reference Bureau, food shortages have not yet become an issue because with “the development of fertilizers, pesticides, and more efficient farming techniques, crop yields per acre have increased and the amount of land under cultivation has expanded.”

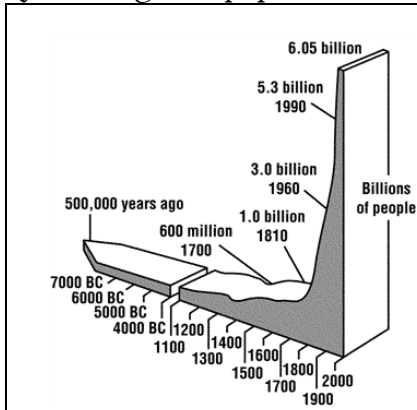
Although these developments have allowed food production to keep pace with population growth, what negative environmental impact could result from their use?

- [A] Excess use of water for farming will lead to flooding in many areas.
- [B] An overproduction of food will result in too much waste for landfills to handle.
- [C] The overuse of chemicals will lead to polluted runoff draining into lakes and rivers.
- [D] Constant use of farmland will result in it being protected from erosion.

Q51: Population explosion refers to the _____.

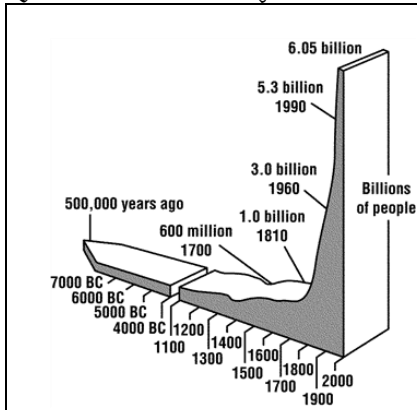
- [A] estimated world population in 2025
- [B] number of people who live in poverty.
- [C] world population in 1810
- [D] increased rate at which the population is growing.

Q52: The global population in 2000 was approximately _____.



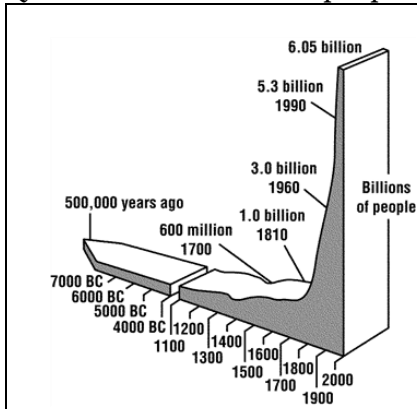
- [A] 6.05 billion
- [B] 60 billion
- [C] 3 billion
- [D] 1 billion

Q53: It took _____ years for Earth's population to grow from 1 billion to 3 billion.



- [A] 10
- [B] 15
- [C] 100
- [D] 150

Q54: There were _____ people in 1960.



- [A] 5.3 billion
- [B] 3.0 billion
- [C] 1.0 billion
- [D] 600 million

Q55: Human activities have which type of impact on the environment?

- [A] positive
- [B] negative
- [C] neither a nor b
- [D] both a and b

Q56: As the number of people increases, the amount of resources available for each person decreases.

[A] True

[B] False

Q57: A common activity like cooking a meal can use many natural ____.

[A] resources

[B] forces

[C] courses

[D] endorses.

Q58: Gasoline is not made from natural resources.

[A] True

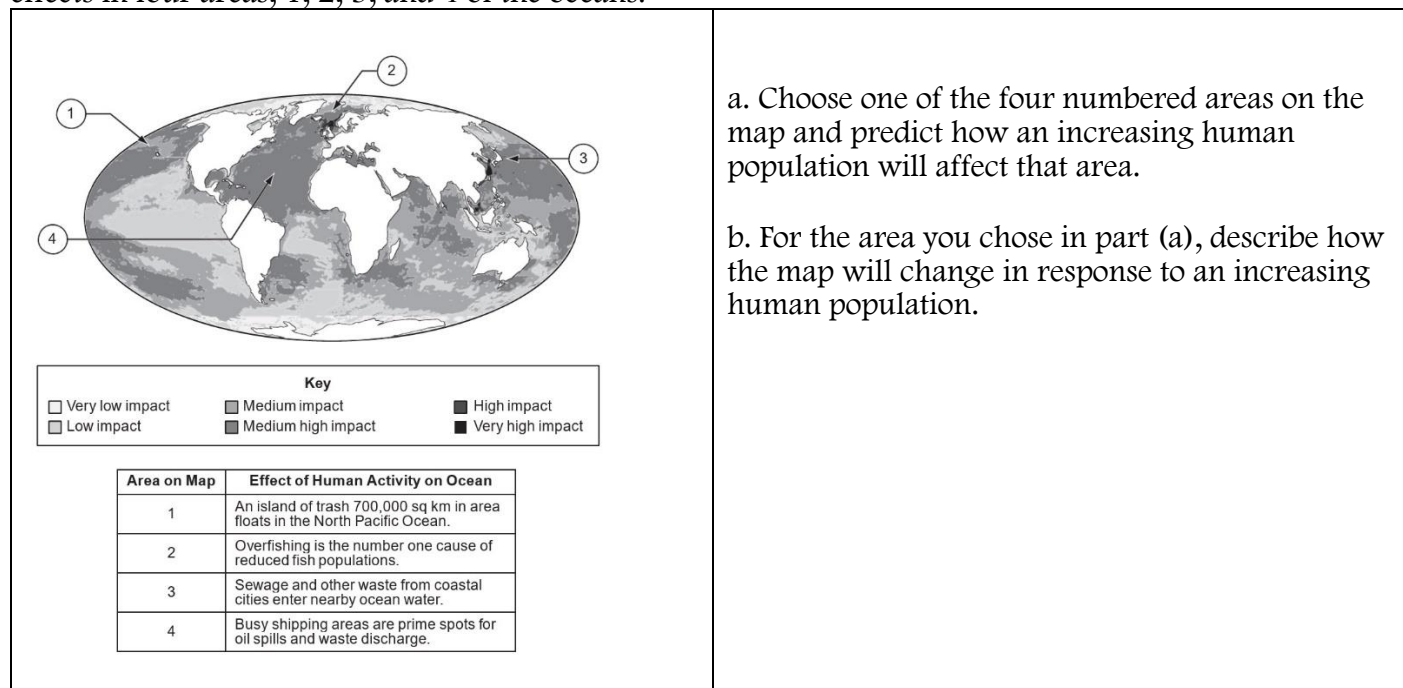
[B] False

Q59: The largest number of individuals of one species that an ecosystem can support over time is its biotic potential.

[A] True

[B] False

Q60: The map shows the levels of impact of human activity on the world's oceans. The table lists specific effects in four areas, 1, 2, 3, and 4 of the oceans.



a. Area 1. People generate trash and more people means more trash. The trash island of the North Pacific Ocean could easily grow to an enormous size.

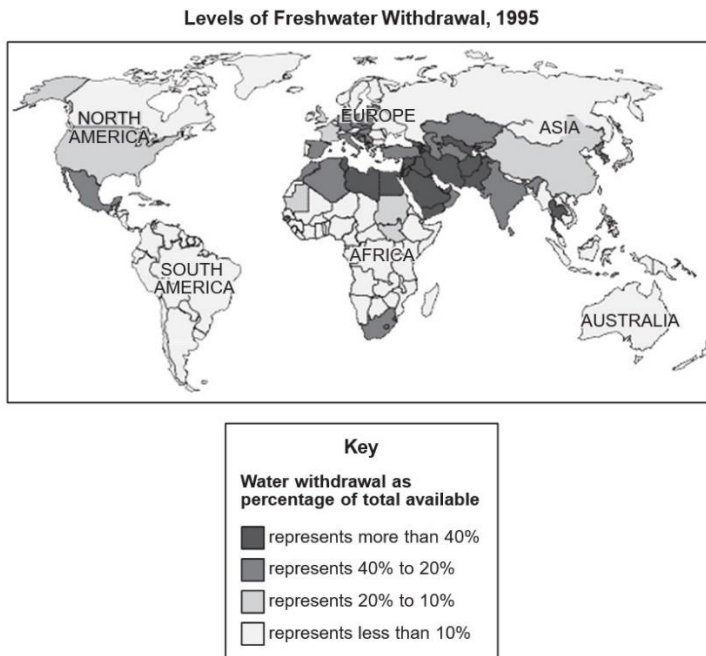
Area 2. An increased population would require more food; so, overfishing the oceans could continue, leading to the extinction of marine species.

Area 3. Population increases often occur in large cities. More people means more energy, fuel, and goods needed, which leads to an increase in waste that could eventually pollute nearby ocean waters.

Area 4. An increasing population results in an increased need for foods and goods, which are often shipped on the oceans. More ships could result in increased waste pollution and a greater chance of oil spills.

- b. Area 1. The map in this area would become a darker shade of medium or even high impact.
 Area 2. The current dark shade of high impact would spread to more of the oceans around the world.
 Area 3. The current medium impact would become a darker shade, most likely high to very high impact, especially in coastal zones.
 Area 4. The map for these areas would darken to high impact.

Q61: The map shows the percentages of available freshwater that humans withdrew from groundwater or surface water in 1995. In that year, the human population worldwide was 5.7 billion. By 2025, the human population is expected to reach 8 billion.



Suppose the map is updated after 2025. Which prediction about how the map will change is **best** supported by the data?

[A] South America and Australia will withdraw more than 40% of their available freshwater, changing their areas on the map to the darkest shade of gray.

[B] Europe, Asia, and North America will withdraw 20 to 40% of their available freshwater, changing their areas of the map to a darker shade of gray.

[C] All countries will reduce their freshwater needs, which means areas marked with dark shades of gray will change to the lightest shade of gray.

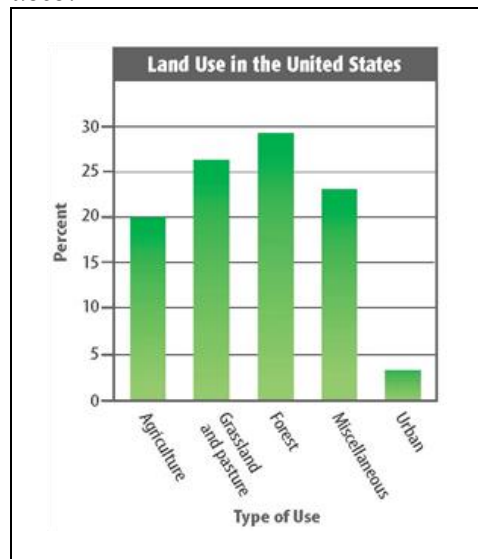
[D] Freshwater needs will be met in other ways, which means the darkest shade of gray will no longer appear in any areas of the map.

Q62: Reforestation is the cutting of large areas of forests for human activities.

[A] True

[B] False

Q63: According to the graph, in the United States how much land is used by cities compared to other land uses?



- [A] Most land is used by cities.
- [B] Cities use half as much land as agriculture.
- [C] Cities use one third as much of the land as forests.
- [D] Cities use very little land compared to any other category.

Q64: Name two ways to make your home more energy efficient in order to reduce air pollution.
Samples Answers: Clean air-conditioning and heating filters. Use energy saving light bulbs.

Q65: Reduced vegetation on Earth results in _____.

- [A] more carbon dioxide in the atmosphere.
- [B] increased habitats.
- [C] less room for humans.
- [D] more oxygen in the atmosphere.

Q66: Explain why forests are an important resource. Include at least two reasons in your explanation. Then, identify two possible negative impacts of deforestation.

Forests are an important resource because they provide things that people need, such as wood and paper. They are also home to many species.

Deforestation can cause habitat loss or even extinction for species that cannot adapt. It can increase climate change because trees remove carbon dioxide from the atmosphere during the process of photosynthesis. When large areas of forest are cut down, rates of photosynthesis decrease, and more carbon dioxide remains in the atmosphere. Deforestation also has an impact on soil erosion because tree roots help hold soil in place, and it can increase the occurrence of droughts because cleared land dries quickly and does not retain much moisture.

Q67: Which atmospheric gas contributes to climate change?

- [A] carbon dioxide
- [B] oxygen
- [C] ozone
- [D] nitrogen

Q68: Of the following, which helps conserve natural resources?

- [A] using a cloth shopping bag instead of a paper bag.
- [B] riding your bike on short trips around town.
- [C] planting trees in your front yard.
- [D] all of the above.

Q69: Why is conservation important today?

As the human population grows, more people on Earth use more and more resources. There must be a better balance between the human need to use resources and the conservation and protection of existing resources.

Q70: One cause of _____ may be deforestation.

[A] thunderstorms

[B] climate change

[C] clouds

[D] precipitation

Q71: Almost 30 percent of the food grown in the world is never used. The food is lost, spoiled, or wasted between the time it is harvested and the time it is eaten. The statistics below describe some environmental impacts of growing food that is never used.

- The water used each year could fill 70 million Olympic-sized swimming pools.
- The amount of cropland used is the same size as Mexico.
- Each year, 28 million tons of fertilizer are used.

If food loss and waste were a country, it would be the third-largest emitter of greenhouse gases. Using this information as support, describe two benefits to the environment from decreasing food loss.

Examples of how decreasing the amount of food loss can benefit the environment include:

- Less water would be withdrawn from aquifers. This benefits the environment because the aquifers help supply water to all living things.
- Less fertilizer would be used. This benefits the environment because too much fertilizer can lead to an overgrowth of algae in surface water (lakes, ponds, oceans), which reduces the amount of oxygen available to other organisms that live in the water.
- Less land would be destroyed for growing crops. This benefits the environment by protecting ecosystems; reducing soil loss, which prevents erosion; and reducing tree loss, which improves air quality and mitigates climate change [trees act as a carbon sink].
- Fewer greenhouse gases would be given off. This benefits the environment because there would be fewer gases contributing to increasing global temperatures.

Q72: Deforestation can lead to _____.

[A] loss of animal habitats

[B] soil erosion

[C] increases in Earth's average surface temperature.

[D] all of the above

Q73: List two disadvantages to deforestation.

Answers may include soil erosion, loss of animal habitats, increase in Earth's average surface temperature.

Q74: As a young person, how can you influence greater use of renewable energy resources?

Sample answer: You can talk with your family about ways to use renewable energy at home. You can make purchasing decisions based on how products are manufactured.

Q75: An increased concentration of _____ in the atmosphere can lead to global warming,

[A] Oxygen

[B] Carbon dioxide

[C] Nitrogen

[D] Ozone

Q76: Name two changes that resulted in the human population explosion.

Two of the following: improved health care, cleaner water, technological advances

Q77: Samantha joins a group that cleans litter out of streams. What sort of impact is this group having on the environment?

[A] They are having a positive impact.

[B] They are having a negative impact.

[C] They do not have positive or negative impact.

[D] None of the above.

Q78: Living things do not need natural resources for survival.

[A] True

[B] False

Q79: Sustainability means meeting human needs in ways that will allow future generations to meet their needs as well.

[A] True

[B] False

Q80: When is Earth's human population expected to reach 9.8 billion?

[A] by 2020

[B] by 2050

[C] by 2100

[D] by 2150

Q81: How can you reduce the amount of solid waste you throw away?

You can reduce the amount of solid waste by **recycling** any glass, paper, metal, or plastic items you use. You can also reduce waste by **limiting** the number of items you purchase that are made from nonrenewable resources and **reusing** as many items as possible.

Q82: During which process do trees remove carbon dioxide from the air?

[A] deforestation

[B] respiration

[C] photosynthesis

[D] both a and b

Q83: Which of the following is a way a 13-year-old can help control greenhouse gasses?

[A] plant trees

[B] recycle aluminum cans.

[C] turn off electronics that are not in use.

[D] all of the above

Q84: Human populations increase as medical care improves and becomes more available.

[A] True

[B] False

Q85: When do populations increase?

[A] when birth rates are smaller than death rates.

[B] when death rates are higher than birth rates.

[C] when birth rates are higher than death rates.

[D] when birth rates and death rates are equal.

Q86: Carrying capacity refers to the largest _____ an environment can support.

- [A] ecosystem
- [B] organisms
- [C] population
- [D] habitat

Q87: What have humans been able to do that other species cannot?

- [A] return from extinction.
- [B] experience exponential growth
- [C] reach biotic potential.
- [D] increase the carrying capacity of their environment.

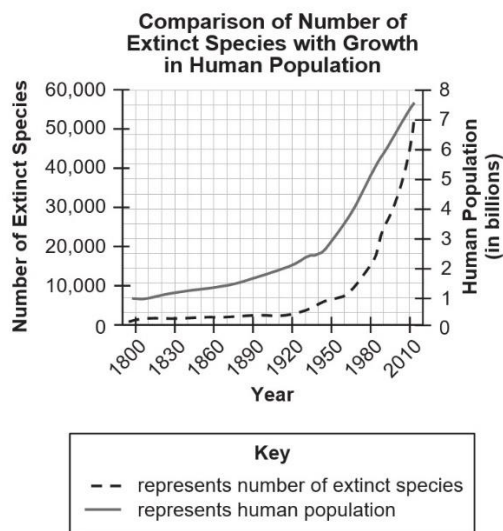
Q88: In an area with high death rates from a disease such as malaria, what would lead to population growth?

- [A] A high birth rate would make up for the death rate.
- [B] A low birth rate would make up for the death rate.
- [C] The birth rate has no effect on population growth.
- [D] The death rate has no effect on population growth.

Q89: As resources in one area grow scarce^{نادر}, people often immigrate to another area with more resources.

- [A] True
- [B] False

Q90: The graph shows changes in the human population and in the numbers of species that were declared extinct, from 1800 to 2010.



- a. Describe the relationship shown in the graph and explain **two** possible reasons for the trend seen in the species extinction data.
- b. Explain why, even if the growth of the human population were to become stable, a species could still be vulnerable^{معرض لـ} to extinction for many years. Provide an example using a specific habitat.

a. Humans modify ecosystems to obtain resources, such as food and water. These actions affect the habitats of other organisms by decreasing the amount of resources (food, water, space) available to the organisms, which can result in the extinction of the species. Human activities, such as development, burning fossil fuels, poaching, and pollution, damage or destroy the natural habitats of many species, which can also cause them to die out.

b. Habitats take a long time to recover; so, even if humans were no longer affecting a habitat, it will take time for the habitat to return to a natural state where it can support the species again. For example, many species of trees grow slowly. In a forest habitat, an animal species makes their homes in the trees and the trees are cut down, leading to the near extinction of the animal species. The trees are replanted, but it will take many years for the trees to be tall and strong enough to support the animals that remain.

Q91: Earth rotates on its axis about once every year.

[A] True

[B] False

Q92: Night and day on Earth are caused by Earth's revolution around the Sun.

[A] True

[B] False

Q93: The Sun revolves around Earth.

[A] True

[B] False

Q94: The Moon makes one revolution around Earth in the same amount of time that it makes one rotation on its axis.

[A] True

[B] False

Q95: The Moon revolves around _____.

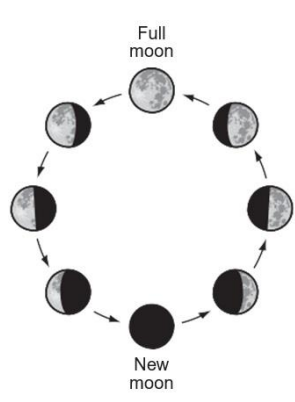
[A] the solar system.

[B] Earth

[C] Sun

[D] itself

Q96: Emma observed the Moon on eight nights during a lunar cycle. A full moon was visible on the first night. The diagram shows Emma's observations.



Which phase of the Moon did Emma **most likely** observe on the eleventh night of this lunar cycle?

[A]	[B]	[C]	[D]
			

Q97: The summer solstice occurs in June in the northern hemisphere and in December in the southern hemisphere.

[A] True

[B] False

Q98: Earth's rotational axis is always tilted in the same direction. For half of the year, the northern hemisphere is tilted toward the Sun and the other half of the year the southern hemisphere is slanted toward the Sun.

[A] True

[B] False

Q99: The yearly orbit of Earth around the Sun is called its ____.

[A] rotation

[B] ellipse

[C] revolution

[D] tilt

Q100: Summer occurs on the hemisphere of Earth that is ____.

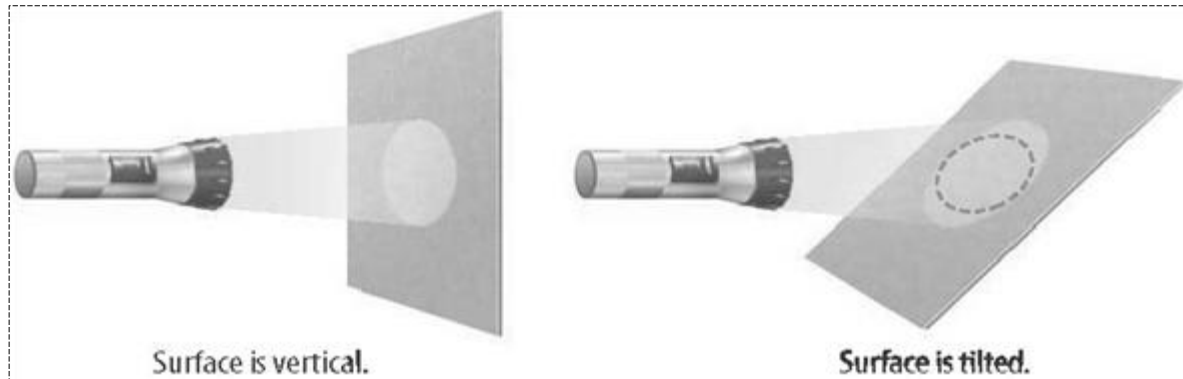
[A] turned away from the Sun.

[B] tilted toward the Sun.

[C] tilted away from the Sun.

[D] turned toward the Sun.

Q101: A light source is shining on a vertical surface, or a slanted surface as shown below. Which statement is correct?



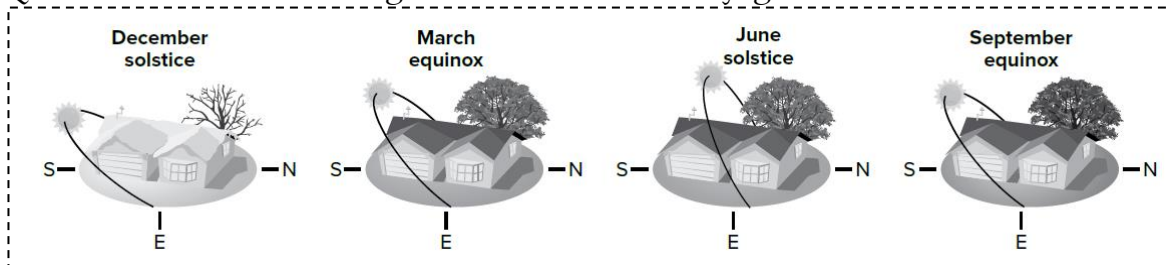
[A] The light energy that hits the vertical surface is stronger because it is concentrated on a smaller area.

[B] The light energy that hits the vertical surface is weaker because it is concentrated on a smaller area.

[C] The light energy that hits the slanted surface is stronger because it is concentrated on a larger area.

[D] The light energy that hits the slanted surface is stronger because it is concentrated on a smaller area.

Q102: Which of the following would have the most daylight hours?



[A] December solstice

[B] March equinox

[C] June solstice

[D] September equinox

Q103: The line on which an object rotates is defined as _____.

[A] revolution axis

[B] rotation axis

[C] tilt axis

[D] spin axis

Q104: Not only is the summer solstice the longest day of the year, it is also the day on which _____.

[A] the Sun is lowest in the sky.

[B] sunset comes earliest.

[C] the Sun appears to be highest in the sky.

[D] sunrise comes latest.

Q105: As shown below, sunlight is more spread out as you move away from the _____.



[A] equator.

[B] rotation axis.

[C] south pole

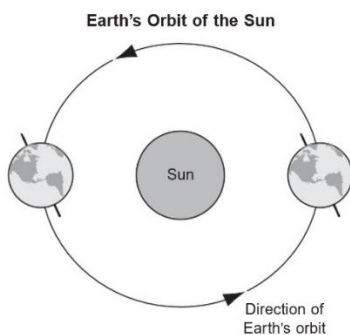
[D] north pole

Q106: What season is shown for the northern hemisphere? Explain your answer.



It is summer. The northern hemisphere is slanted toward the Sun and therefore receives more solar energy from the sunlight.

Q107: The diagram is a model of Earth orbiting the Sun.



[a] Identify a cycle on Earth that can be represented by this model.

[b] Describe how the model represents this cycle.

[a] the model can be used to show the cycle of seasons on Earth.

[b] the model shows summer in the northern hemisphere on the right side of the model and then winter in the Northern Hemisphere on the left side of the model, because Earth's axis (or the North Pole) is tilted toward the Sun on the right side and away from the Sun on the left side of the model.

Q108: The Moon emits its own light.

[A] True

[B] False

Q109: During waning phases, more of the Moon's near side is seen each night.

[A] True

[B] False

Q110: The phase of the Moon that comes right before the new moon is the ____.

[A] full moon

[B] first quarter

[C] second quarter

[D] waning crescent

Q111: Which phase of the moon is shown in this picture of the sky at midnight?

	[A] new moon [B] first quarter [C] full moon [D] third quarter
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Q112: Which phase of the moon is shown in this picture of the sky at midnight?

	[A] new moon [B] first quarter [C] full moon [D] third quarter
---	---

Q113: Which phase of the moon is shown in this picture of the sky at midnight?

	[A] new moon [B] first quarter [C] full moon [D] third quarter
---	---

Q114: During _____ phases, more of the Moon is visible each night.

[A] waxing

[B] waning

[C] new

[D] full

Q115: During which phase is just the western half of the Moon lit?

- [A] first quarter
- [B] full moon
- [C] third quarter
- [D] new moon

Q116:

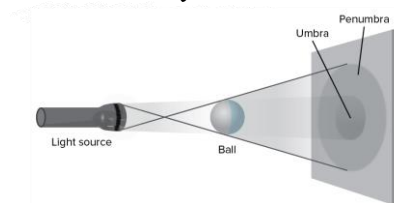
a. Sequence the Moon's phases in order, beginning with the new moon phase.
b. What is the relationship between Moon phases and the relative positions of the Sun, the Moon, and Earth?

a. The Moon's phases in order are new moon, waxing crescent, first quarter, waxing gibbous, full moon, waning gibbous, third quarter, and waning crescent.

b. The Sun is always shining on half of the Moon, just as the Sun is always shining on half of Earth. As the Moon revolves around Earth and Earth revolves around the Sun, different parts of the Moon's near side is visible on Earth. These changing portions of the Moon's lit side are phases of the Moon.

Q117: Sally wants to design a model that will show how the Earth-Sun-Moon system causes the Moon's phases. She has a lamp, a tennis ball, and a cotton ball. Sally decides to set the lit lamp on a table to represent the Sun.

How can Sally use the tennis ball and cotton ball to represent the new moon phase?



[A] She can place the tennis ball, representing Earth, and the cotton ball, representing the Moon, on opposite sides of the lamp.

[B] She can hold the tennis ball, representing the Moon, and the cotton ball, representing Earth, in the same hand and move them in a circle around the lamp.

[C] She can hold the tennis ball, representing Earth, in one hand within the lamp's light and hold the cotton ball, representing the Moon, in her other hand between the lamp and the tennis ball.

[D] She can hold the tennis ball, representing the Moon, in her right hand and the cotton ball, representing Earth, in her left hand within the lamp's light. Then she can have someone else turn the lamp on and off repeatedly.

Q118: A lunar eclipse occurs when Earth's shadow falls on the Moon.

- [A] True
- [B] False

Q119: A lunar eclipse only occurs during a new moon phase.

- [A] True
- [B] False

Q120: A ____ occurs when the Moon moves directly between the Sun and Earth and throws a shadow on Earth.

- [A] solar eclipse
- [B] lunar eclipse
- [C] waning gibbous.
- [D] waxing gibbous.

Q121: When the shadow of the Moon appears on Earth's surface a _____ is occurring.

- [A] solar eclipse
- [B] new moon
- [C] lunar eclipse
- [D] astral eclipse

Q122: The longest a total solar eclipse lasts is about how long?

- [A] 1 minute
- [B] 7 minutes
- [C] 30 minutes
- [D] an hour

Q123: Why don't solar eclipses occur every new moon?

[A] The Moon's orbit around Earth and Earth's orbit around the Sun are not the same speed, so the three bodies only line up during the full moon.

[B] The Moon's orbit around Earth and Earth's orbit around the Sun are not in the same plane, so the three bodies only line up occasionally.

[C] The Moon's orbit around the Sun and Earth's orbit around the Sun are not in the same plane, so the three bodies only line up occasionally.

[D] The Moon's orbit around Earth and the Sun's orbit around Earth are not in the same plane, so the three bodies only line up occasionally.

Q124: Eclipses occur when the Sun, the Moon, and ____ line up perfectly.

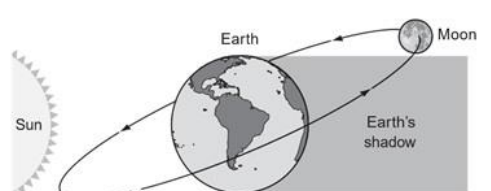
- [A] Earth
- [B] Jupiter
- [C] Mars
- [D] Neptune

Q125: What is the first stage of a lunar eclipse? The Moon moves into Earth's penumbra.

Q126: Describe a lunar eclipse.

A lunar eclipse occurs when Earth is between the Moon and the Sun, and the Moon moves into the shadow of Earth.

Q127: Lunar eclipses occur about every 2.5 years. Full moons occur once or twice each month.

 The diagram illustrates the Sun-Earth-Moon system. On the left, the Sun is shown as a semi-circle with rays. In the center is Earth, a sphere with continents and oceans. To the right of Earth is the Moon, a smaller sphere. The Moon's orbit around Earth is shown as an elliptical path that is tilted relative to the plane of Earth's shadow. Earth's shadow is depicted as a large, dark, rectangular area extending to the right from Earth. The Moon's orbit crosses through this shadow, demonstrating how it can pass through Earth's shadow during a lunar eclipse.	Use the diagram of the Sun-Earth-Moon system to explain why lunar eclipses occur less often than full moons. This diagram shows that the Moon does not directly pass in front of Earth and block sunlight every full moon but only when the tilt of the Moon's orbit is low enough to pass through Earth's shadow.
--	--

Q128: Daylight hours are shorter for the hemisphere that is tilted toward the Sun during the solstice.

[A] True

[B] False

Q129: When it is summer in the United States, Earth is closest to the Sun.

[A] True

[B] False

Q130: The Sun's rays strike Earth at their northernmost and southernmost positions during ____.

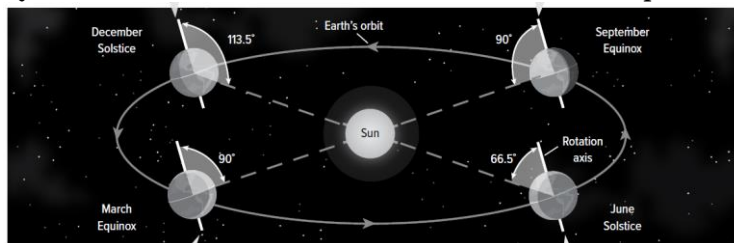
[A] winter and summer solstices

[B] spring and fall equinoxes.

[C] lunar eclipses

[D] solar eclipses

Q131: Which statement is true about both the September equinox and the March equinox shown below?



[A] There are about 12 hours of daylight and 12 hours of darkness everywhere on Earth.

[B] Spring is starting for the southern hemisphere.

[C] Spring is starting for the northern hemisphere.

[D] They are the longest days of the year.

Q132: When the north end of Earth's rotation axis is pointing toward the Sun, which statement is true?

[A] The southern hemisphere receives more energy from the Sun.

[B] Temperatures decrease in the northern hemisphere.

[C] The northern hemisphere receives more energy from the Sun.

[D] Temperatures increase in the southern hemisphere.

Q133: A *solstice* is a day when _____.

[A] Earth's rotation axis is most toward the Sun.

[B] Earth's rotation axis is most away from the Sun.

[C] Earth's rotation axis is neither leaning toward or away from the Sun.

[D] Both a and b are correct.

Q134: The seasons are caused by _____.

[A] the tilt of Earth's axis as Earth orbits the Sun.

[B] Earth's distance from the Sun

[C] the shape of Earth's orbit

[D] the tides of the ocean

Q135: Why do solar eclipses happen only during a new moon?

[A] A new moon occurs when the Sun, the Moon, and Earth are all aligned. This allows the Moon to appear to cover the Sun.

[B] A new moon occurs when the Sun, the Moon, and Earth are all in a 90-degree angle. This allows the Moon to appear to cover the Sun.

[C] A new moon occurs when the Sun, the Moon, and Earth are all aligned. This allows the Sun to appear to cover the Moon.

[D] A new moon occurs when the Sun, the Moon, and Earth are all in a 90-degree angle. This allows the Sun to appear to cover the Moon.

Q136: A lunar eclipse can only occur during which type of moon phase?

[A] first quarter moon

[B] full moon

[C] new moon

[D] third quarter moon

Q137: Why don't lunar eclipses occur every full moon?

[A] The temperature is not always right for an eclipse.

[B] The Moon's orbit around Earth and Earth's orbit around the Sun are not in the same plane, so the three bodies only line up occasionally.

[C] The Moon's orbit around the Sun and Earth's orbit around the Sun are not in the same plane, so the three bodies only line up occasionally.

[D] The Moon's orbit around Earth and the Sun's orbit around Earth are not in the same plane, so the three bodies only line up occasionally.

Q138: Hours of daylight and nighttime are equal during a(n) ____.

[A] equinox.

[B] solstice.

[C] full moon.

[D] new moon.

Q139: Earth is closest to the Sun during the month of ____.

[A] January

[B] February

[C] March

[D] April

Q140: Earth ____ on its axis and ____ around the Sun.

[A] rotates, revolves.

[B] revolves, rotates.

[C] rotates, rotates.

[D] revolves, revolves.

Q141: The Sun, the Moon, and the stars appear to move from east to west across the sky because Earth rotates from ___ to ___.

[A] east, west.

[B] west, east.

[C] north, south.

[D] south, north.

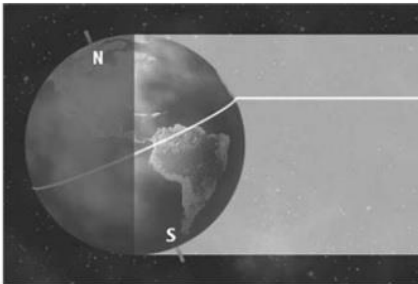
Q142: What may happen when the Moon enters Earth's umbra during a total lunar eclipse?

The Moon may become dark red because some light is bent through Earth's atmosphere.

Q143: Why have only a few people ever seen a total solar eclipse?

Only those people who are in the small region where the Moon's umbra strikes Earth can witness a total solar eclipse.

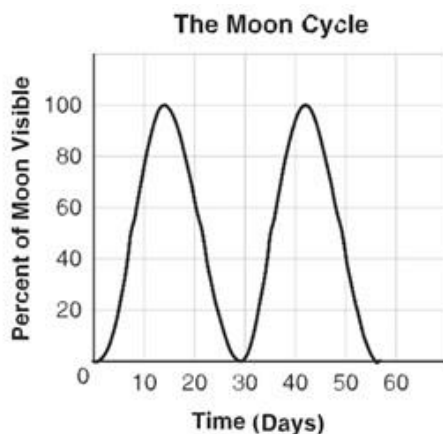
Q144: What season is shown for the northern hemisphere? Explain your answer.



It is winter. The northern hemisphere is slanted away from the Sun and therefore receives less solar energy from the sunlight.

Q145: For a 60-day period, Amy observes how much of the lit side of the moon is visible each night. She starts her observations on a night when 0 percent of the lit side of the Moon is visible.

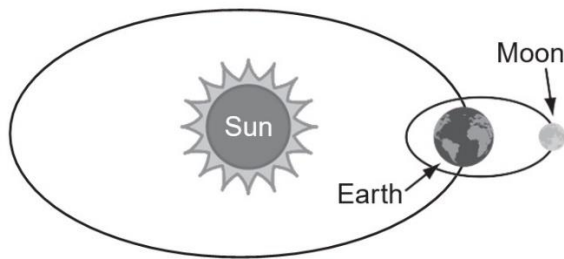
This is a line graph that represents how much of the Moon is visible to Amy each night of the 60-day period.



Predict the night when the next full moon will occur after Amy's 60 days of observations. Explain your answer.

The next full moon will occur at about 70 days [days 65–75], because it is about 14 days after the last new moon (day 56).

Q146: Molly researched the lunar eclipses that had been observed in her city. She found that all of them occurred during the full moon phase. She then drew a model to show the positions of the Sun, Earth, and the Moon during lunar eclipses. The diagram shows the model that Molly created.



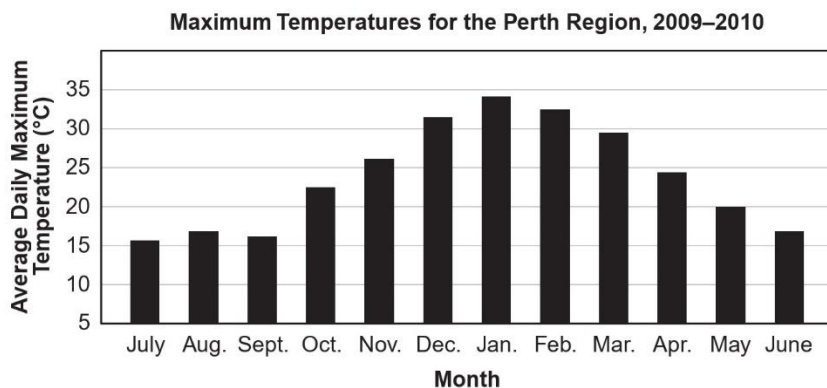
a. Explain why the model shows that all lunar eclipses occur during the full moon phase.____
Molly knows that lunar eclipses do not occur every full moon. In reality, lunar eclipses occur less often.

b. Describe how the model could be changed to show why lunar eclipses do not occur every full moon.

a. Lunar eclipses happen when the Sun, Earth, and the Moon line up so that the shadow of Earth falls on the Moon, which is also the case during a full moon.

b. The model should indicate that the orbit of the Moon is not in the same plane as the orbit of Earth. Eclipses do not happen on every full moon because the orbit of the Moon is tilted relative to the orbit of Earth around the Sun.

Q147: The graph shows the average daily maximum temperature each month for one year in the Perth region of Australia. Australia is located in the southern hemisphere, between Antarctica and Indonesia.



a. Explain the temperature pattern shown in the graph by describing Earth's movement around the Sun.

b. The Perth region has four seasons; each season is three months long. Identify the months of each season in the Perth region. Explain your answer using data from the table.

a. Earth is tilted on its axis and moves around the Sun over a one-year period. Because of Earth's tilt, Perth receives direct rays from the Sun when temperatures are the highest, December through February. Perth receives indirect rays from the Sun when temperatures are the lowest, June through September.

b. The temperatures are highest in the Perth region in December, January, and February, so these three months are the summer season. The coldest months, or the winter season, are June, July, and August. The fall season would be the time going from summer to winter; these months are March, April, and May. In a similar way, the spring months, going from winter to summer, are September, October, and November.

Q148: What is the basic shape of every planet's orbit?

- [A] circle
- [B] ellipse
- [C] square
- [D] triangle

Q149: Which explains why scientists no longer consider Pluto to be a planet?

- [A] Scientists discovered it did not orbit the Sun.
- [B] Scientists found that Pluto did not have any gravity.
- [C] Scientists changed the definition of a planet based on new information.
- [D] Scientists decided that there should only be eight planets in the solar system.

Q150: Which statement explains why the objects of the solar system revolve around the sun?

- [A] The Sun holds 99% of the mass in the solar system, so it has enormous gravitational pull.
- [B] The Sun generates its own energy, so the planets stay close to absorb its heat and light.
- [C] Light waves from the Sun cause the planets to revolve around it.
- [D] Heat energy from the Sun attracts the planets and keeps them in orbit.

Q151: A student draws a scientifically accurate model of the solar system. Which is NOT a piece of information that the student needs to make their model?

- [A] the size of Mars
- [B] the shape of the Milky Way galaxy
- [C] the distance between the Sun and each planet
- [D] the shape of Earth's orbit

Q152: Zach uses data collected from Earth-based telescopes and space-based instruments to study characteristics that Mars and Earth have in common.

Which characteristic of Mars required a space-based instrument to observe **and** is similar to a characteristic of Earth?

- [A] The diameter of the planet is 4220 miles.
- [B] The thin atmosphere contains mostly carbon dioxide.
- [C] The complex surface features provide evidence of water erosion.
- [D] The reddish appearance is due to iron compounds in the rocks that cover the planet's surface.

Q153: The solar system formed 4.6 billion years ago when a disk of dust and gas was pulled together by __.

- [A] gravity
- [B] electricity
- [C] magnetism
- [D] heat

Q154: Spiral, elliptical, and irregular are three types of __ in the universe.

- [A] galaxies
- [B] stars
- [C] planets
- [D] dust

Q155: Which describes a characteristic that is shared by different galaxies in the universe?

- [A] They all are about the same distance from the Milky Way.
- [B] They all have similar planets and stars.
- [C] They all formed because of gravity.
- [D] They all have the same shape.

Q156: Which correctly describes the gravity between objects in the solar system?

- [A] Objects far from the Sun are not large enough to pull on any other objects in the solar system.
- [B] Objects in orbit are in motion and are not affected by gravity.
- [C] Objects far apart pull on each other more strongly than objects close together.
- [D] Objects with a large mass pull with more force than objects with a small mass.

Q157: The planets and other objects in the solar system stay moving in their ___ because of the pull of gravity on them.

- [A] orbit
- [B] level
- [C] phase
- [D] shape

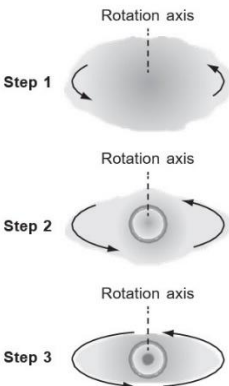
Q158: Which statement about the Milky Way is correct?

- [A] The Milky Way is unique in that it contains planets and other celestial bodies.
- [B] The Milky Way does not belong to a cluster of galaxies.
- [C] The Milky Way is one of hundreds of billions of galaxies.
- [D] The Milky Way is so big that it is not affected by gravity.

Q159: Explain why the moon orbits Earth, and not the Sun.

The gravitational pull between Earth and the Sun is stronger than the Sun and the moon.

Q160: The diagram shows a model of star formation.

	Use the model to describe the force involved in the process of star formation. In step 1, larger particles within the cloud are attracted (clump) to one another. As they become closer (step 2), the attraction and effect of gravity increase. The particles attract more and more particles to the central area, increasing the pull of other particles because of the larger mass, which eventually creates a stronger rotation and a core (step 3).
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Q161: Dan is creating a model of a galaxy. The first part of the model is the drawing shown.

	Which additions to Dan's model will correctly show both gravitational force and its effect within the galaxy?
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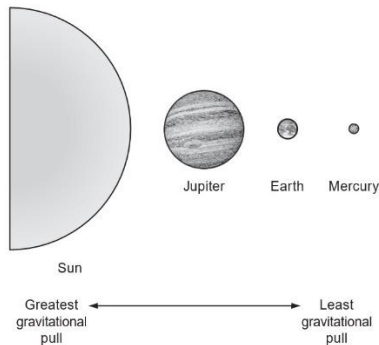
[A] a straight arrow pointing outward from the center of the galaxy, and a curved arrow showing rotation of the whole galaxy.

[B] a straight arrow pointing inward from one galaxy arm toward the center of the galaxy, and a straight arrow showing the galaxy's path through space.

[C] straight arrows pointing outward and inward from the center of the galaxy, and curved arrows showing the rotation of objects around the center of the galaxy.

[D] straight arrows pointing inward from outside each of the galaxy's arms, and straight arrows showing the paths of objects moving from within to outside the galaxy.

Q162: James has created the diagram shown to model three planets in the order of their gravitational force with the Sun.

 The diagram shows a large semi-circle representing the Sun on the left. To its right are three planets: Jupiter (the largest), Earth (medium), and Mercury (the smallest). Below the planets is a horizontal double-headed arrow. Under the left end of the arrow is the text 'Greatest gravitational pull', and under the right end is 'Least gravitational pull'.	Which change to the model will make it more accurate and why?
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[A] reorder the planets to Mercury, Earth, Jupiter, because the Sun pulls more strongly on smaller planets than on larger planets.

[B] reorder the planets to Mercury, Earth, Jupiter, because both distance from the Sun and the planets' masses influence gravitational pull.

[C] keep the same order but move Earth and Mercury much farther away, because gravitational pull increases as distance from the Sun increases.

[D] put all three planets the same distance from the Sun, because the Sun's constant mass causes the same gravitational pull on all three planets.

Q163: Which is NOT part of our solar system?

[A] the moons around Jupiter

[B] asteroids and meteoroids

[C] comets

[D] stars that are not the Sun.

Q164: The Moon orbits around the Sun.

[A] True

[B] False

Q165: Naa is reading an article about objects in the solar system. She finds out that Ganymede, one of Jupiter's moons, is bigger than the planet Mercury. Which statement explains why Ganymede is not classified as a planet?

[A] It orbits Jupiter and not the Sun.

[B] It is not as close to the Sun as Mercury.

[C] It is not shaped like the rest of the planets.

[D] It is held in its orbit by gravity.

Q166: Thom reads an article on the internet that that claims some lakes on Saturn are contain frozen methane. He reads that there is methane on Neptune, too. Which sentence best describes data that would suggest methane is frozen on Neptune?

[A] Neptune's atmosphere has more methane than Saturn's.

[B] Neptune's mass is less than Saturn's.

[C] Neptune's surface temperature is colder than Saturn's.

[D] Neptune's distance from the Sun is greater than Saturn's.

Q167: Inner planets are mostly made of __, while outer ones are made of __.

Planet	Distance from the Sun (AU)	Type	Mass (kg)	Diameter (km)	Number of Known Moons
Mercury	0.39	Rocky	0.33×10^{24}	4,878	0
Venus	0.72	Rocky	0.49×10^{24}	12,104	0
Earth	1.00	Rocky	5.97×10^{24}	12,756	1
Mars	1.52	Rocky	0.642×10^{24}	6,794	2
Jupiter	5.20	Gaseous	1898×10^{24}	142,984	67
Saturn	9.54	Gaseous	568×10^{24}	120,536	62

[A] gas, rock.

[B] rock, gas.

[C] rock, rock.

[D] gas, gas.

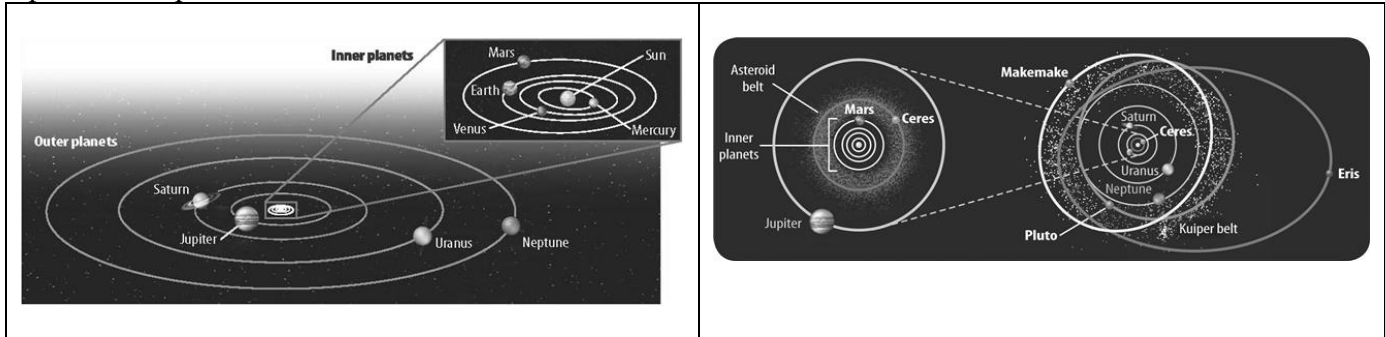
Q168: The table shows data about six planets in our solar system.

Planet	Distance from the Sun (AU)	Type	Mass (kg)	Diameter (km)	Number of Known Moons
Mercury	0.39	Rocky	0.33×10^{24}	4,878	0
Venus	0.72	Rocky	0.49×10^{24}	12,104	0
Earth	1.00	Rocky	5.97×10^{24}	12,756	1
Mars	1.52	Rocky	0.642×10^{24}	6,794	2
Jupiter	5.20	Gaseous	1898×10^{24}	142,984	67
Saturn	9.54	Gaseous	568×10^{24}	120,536	62

Identify the **most likely** distance from the Sun where a rocky planet with a diameter of 9,500 km and three moons would be found. Support your answer with evidence from the table.

The rocky planet would most likely be located between 1.0 and 2.0 AU. Based on the table, as the diameter of a planet increases, the distance from the Sun increases. Also, the farther away from the Sun a planet is, the more moons it has. Therefore, since the rocky planet's diameter is between Mars's (6,794) and Earth's (12,756) but has more moons than either one, it is probably located a little farther out than Mars (1.52 AU).

Q169: Why did the artists for both of these illustrations feel it necessary to represent the inner planets with a pulled-out piece?



[A] Both drawings are needed to show that there are other objects in our solar system.

[B] Both drawings are needed to correctly represent the distances between the planets.

[C] Both drawings are needed to show the placement of the solar system in the Milky Way.

[D] Both drawings are needed to show a more dramatic representation of the shape of the planets' orbits.

Q170: Use your knowledge of the characteristics, locations, and motions of the planets to compare and contrast inner and outer planets. Your response should include two ways that they are similar and two ways that they are different.

Inner planets and outer planets are similar in several ways. For example, both the inner and the outer planets orbit the Sun. Inner planets and outer planets are also similar in that some of each have moons. Inner planets and outer planets differ in composition. Inner planets are rocky with iron cores. Outer planets are made up of gases. They also differ in size; the outer planets are much larger than the inner planets.

Q171: Describe a comet. What is it made of? What path is its orbit? What is it like when it is close to the Sun? What is it like when it is far away from the Sun?

A comet is a mixture of rock, ice, and dust held loosely together by their gravitational pull of the particles. Comets travel in very long stretched out elliptical orbits. When they are far from the Sun the particles are closer together. When a comet nears the Sun, the energy from the Sun heats the ice into a gas and pushes this gas and the dust particles out into two separate glowing tails. The material that stays closer together is called the nucleus of the comet and it glows as well.

Q172: Which does NOT have an effect on how strongly the Sun pulls on an object in space?

[A] the mass of the object

[B] how far the object is away from the Sun.

[C] the fact that the Sun is made of a mixture of gases.

[D] the mass of the Sun

Q173: Explain why some objects in our solar system are classified as moons, even though they are larger than objects classified as planets.

Planets must orbit the Sun. Moons orbit planets.

Q174: Two of the inner planets are _____.

[A] Venus and Saturn

[B] Mars and Venus

[C] Earth and Pluto

[D] Mercury and Jupiter

Q175: The order of the inner planets outward from the Sun is _____.

[A] Mercury, Earth, Venus, and Mars

[B] Mercury, Venus, Earth, and Mars

[C] Mars, Venus, Earth, and Mercury

[D] Earth, Venus, Mars, and Mercury

Q176: Which does NOT describe our Sun?

[A] it is part of the Milky Way galaxy.

[B] it is the center of the universe.

[C] it holds 99% of the mass in the solar system.

[D] it is one of billions of stars.

Q177: A galaxy that has a shape similar to a football is a(n) _____ galaxy.

[A] normal spiral

[B] barred spiral.

[C] elliptical

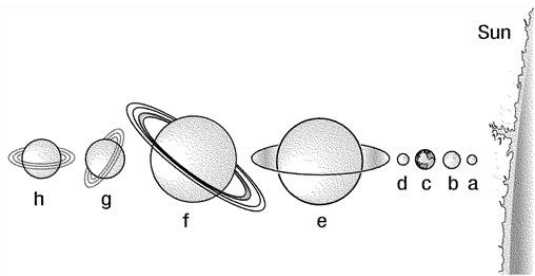
[D] irregular

Q178: As the solar system cooled and developed, larger bodies were pushed away from its center by gravity.

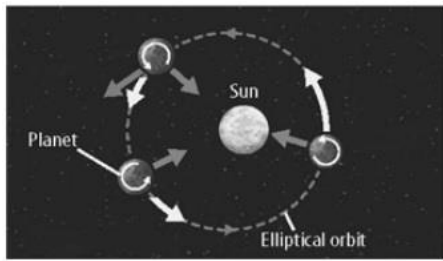
[A] True

[B] False

Q179: Match the planets below with the letters labeling the planets.

	<table border="1"><tr><td>Earth</td><td>.....</td></tr><tr><td>Mercury</td><td>.....</td></tr><tr><td>Neptune</td><td>.....</td></tr><tr><td>Venus</td><td>.....</td></tr><tr><td>Uranus</td><td>.....</td></tr><tr><td>Mars</td><td>.....</td></tr><tr><td>Saturn</td><td>.....</td></tr><tr><td>Jupiter</td><td>.....</td></tr></table>	Earth		Mercury		Neptune		Venus		Uranus		Mars		Saturn		Jupiter		<table border="1"><tr><td>Earth</td><td>c</td></tr><tr><td>Mercury</td><td>a</td></tr><tr><td>Neptune</td><td>h</td></tr><tr><td>Venus</td><td>b</td></tr><tr><td>Uranus</td><td>g</td></tr><tr><td>Mars</td><td>d</td></tr><tr><td>Saturn</td><td>f</td></tr><tr><td>Jupiter</td><td>e</td></tr></table>	Earth	c	Mercury	a	Neptune	h	Venus	b	Uranus	g	Mars	d	Saturn	f	Jupiter	e
Earth																																		
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Uranus	g																																	
Mars	d																																	
Saturn	f																																	
Jupiter	e																																	

Q180: What causes planets and other space objects to revolve around the Sun rather than traveling in a straight line as indicated by the solid arrows in the picture below?



Gravity—the gravitational pull of the Sun keeps planets traveling in an elliptical path.

Q181: Which of the following is defined as a huge collection of gas, dust, and stars held together by gravity?

- [A] nebula
- [B] solar system
- [C] galaxy
- [D] universe

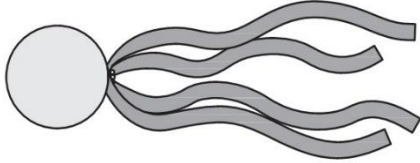
Q182: Which of the following data can help someone to infer the size of a planet?

- [A] how many moons it can capture due to its pull of gravity.
- [B] how far it is from the Sun in km.
- [C] its surface temperature in degrees
- [D] its surface geography

Q183: _____ causes cast off gases to clump together to begin forming new stars and planets.

- [A] Heat
- [B] Electricity
- [C] Gravity
- [D] Shape

Q184: Steve uses a foam ball, long strips of ribbon, and some pushpins to make a model of a comet, as shown in the diagram.

	He attaches a long string to the ball of the comet model and swings the comet model above his head in a circular motion. a. Explain how gravitational force is represented in this model and where the Sun would be located. b. Describe how this model could be used to represent motion of other objects in the solar system.
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a. The string represents the gravitational force of the Sun. Steve's head represents the Sun.

b. This model could be used to represent another object, such as a planet or asteroid. These objects are attracted by the Sun's gravitational force in the same way the comet is. Similar to Steve's model, the string would represent gravity and the foam ball would represent the object.

Q185: Kaya's class is working together to make a model of the solar system to hang in their classroom. What will the class have to do to correctly represent the distance between objects in the model?

They will have to choose a scale for their model that will fit in the classroom.

Q186: The table shows the data of four characteristics of four planets in the solar system.

Four Characteristics of Four Planets

Planet	Mass (kg)	Rotation (in Earth Days)	Revolution (in Earth Years)	Volume (km ³)
Earth	60×10^{23}	1.0	1.0	110×10^{10}
Mars	6.4×10^{23}	1.0	1.9	16×10^{10}
Mercury	3.3×10^{23}	58.6	0.2	6.1×10^{10}
Venus	40×10^{23}	243.0	0.6	93×10^{10}

a. Order the four planets from closest to the Sun to farthest. Is the distance between each orbit the same? Explain.

b. Explain why the data in the table support the order of the planets in your diagram.

a. Mercury, Venus, Earth, Mars; The distance between each orbit is not the same. The distance between Earth and Mars is greater than the distance between any other orbits of neighboring planets.

b. The data in the Revolution column of the table support the diagram, because revolution is how much time it takes a planet to go around the Sun. The planet with the longest revolution is Mars, followed by Earth, Venus, and then Mercury.

Q187: Here is some data that compares Mars and Earth.

Mars's atmosphere contains 90 percent carbon dioxide (CO₂); Earth's atmosphere has 0.03 percent CO₂. Both Mars and Earth have clouds, but the clouds on Mars are made of different compounds than clouds on Earth.

Atmospheric pressure on Mars has a narrow range: only from 0.6 to 1.0 kPa; atmospheric pressure on Earth has a broad range: from 87 to 108 kPa.

Mars's orbit averages 2.3×10^8 km from the Sun; Earth's average orbit is 1.5×10^8 km.

Mars has solid CO₂ and water on its surface; Earth's surface has abundant liquid and solid water.

a. Based on the data, describe **two** similarities of Mars and Earth.

b. Describe how the characteristics of these planets affect their surface temperature.

a. Similarities include two of the following:

- Mars and Earth both are made of rock.
- Mars and Earth both probably had volcanic activity.
- Mars and Earth both have clouds (although the composition of the clouds is not the same).
- Mars and Earth both have solid water on the surface.
- Mars and Earth both have CO₂ in the atmosphere.
- Mars and Earth both have an atmosphere.

b. The smaller orbital distance means that Earth gets more intense sunlight and is warmer than Mars. Earth has more air pressure; so, it likely has a greater greenhouse effect than Mars.

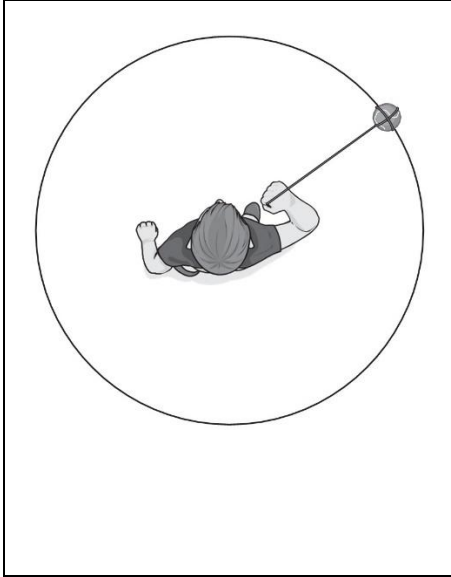
Q188: The table shows data about six planets in our solar system.

Planet	Distance from the Sun (AU)	Type	Mass (kg)	Diameter (km)	Number of Known Moons
Mercury	0.39	Rocky	0.33×10^{24}	4,878	0
Venus	0.72	Rocky	0.49×10^{24}	12,104	0
Earth	1.00	Rocky	5.97×10^{24}	12,756	1
Mars	1.52	Rocky	0.642×10^{24}	6,794	2
Jupiter	5.20	Gaseous	1898×10^{24}	142,984	67
Saturn	9.54	Gaseous	568×10^{24}	120,536	62

Identify the **most likely** distance from the Sun where a rocky planet with a diameter of 9,500 km and three moons would be found. Support your answer with evidence from the table.

The rocky planet would most likely be located between 1.0 and 2.0 AU. Based on the table, as the diameter of a planet increases, the distance from the Sun increases. Also, the farther away from the Sun a planet is, the more moons it has. Therefore, since the rocky planet's diameter is between Mars's (6,794) and Earth's (12,756) but has more moons than either one, it is probably located a little farther out than Mars (1.52 AU).

Q189: Ben made a model of Earth orbiting the Sun by tying a string to a tennis ball and spinning it around his head. The picture shows the model as viewed from above.



a. Identify what each object—the string, the tennis ball, and Ben—represents in the model.

b. Use the model to describe the role of gravity in the motion of Earth around the Sun. Be sure to include why each object is appropriate for its role within the model.

a. In the model, the string represents the force of gravity, the tennis ball represents Earth, and Ben represents the Sun.

b. Earth (tennis ball) is held in a circular orbit around the Sun (Ben) by the pull of gravity (string) toward the Sun. The tennis ball is much smaller and represents a smaller mass than Ben. The smaller mass moves around the larger mass, like the Sun-Earth system, because of gravity.

the end.