PHYSICAL SCIENCE

QUESTION CATALOGUE

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Physical Science

Question Catalogue Index

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247. Which statement about a rock sample is an inference?
(A) The rock scratches a glass plate.
(B) The rock was formed 100 million years ago.
(C) A balance indicates the rock's mass is 254 grams.
(D) The rock has no visible crystals and is red.

267. In the classroom during a visual inspection of a rock, a student recorded four statements about the rock. Which statement about the rock is an observation?
(A) The rock formed deep in the Earth's interior.
(B) The rock cooled very rapidly.
(C) The rock was probably around at the same time as dinosaurs.
(D) The rock is black and shiny.

290. A prediction of next winter's weather is an example of
(A) a measurement
(B) a classification
(C) an observation
(D) an inference

370. A student observed a freshly dug hole in the ground and recorded statements about the sediments at the bottom of the hole. Which statement is an inference?
(A) The hole is 2 meters deep.
(B) Some of the particles are rounded.
(C) The sediments were deposited by a stream.
(D) The sediments were of different sizes.

687. Which statement about a mineral sample is most likely an inference?
(A) The sample was moved by a glacier.
(B) The sample is white in color.
(C) The sample is rectangular, with sharp, pointy corners.
(D) The sample is 8 cm long, 5 cm wide, and 3 cm high.

745. Which statement made during a weather report is most likely an inference?
(A) The record low temperature for this date was set in 1957.
(B) Hot and humid conditions will continue throughout the week.
(C) The high temperature for the day was recorded at 2 p.m.
(D) The sky is full of clouds

777. While walking on a glacier, an observer makes several statements. Which statement is an inference?
(A) "Some of the snow on this glacier is powdery."
(B) "The rocks on this glacier are of different sizes."
(C) "There are many cracks in this glacier."
(D) "Some parts of this glacier will start melting this spring."

894. A person observes a sediment consisting of clay, sand, and pebbles and then states that this material was transported and deposited by an agent of erosion. This statement is
(A) a fact
(B) a measurement
(C) an inference
(D) an observation

896. Over a 30-day period, an observer would have the most difficulty measuring the
(A) rotation of the Earth
(B) discharge of a river
(C) changing phases of the Moon
(D) weathering of a mountain

915. Which statement about an unidentified rock sample is most likely an inference?
(A) The rock is composed of large crystals.
(B) The rock has shiny, wavy mineral hands.
(C) The rock is a metamorphic rock.
(D) The rock has no visible fossils.

928. Which statement about a rock sample is most likely an inference?
(A) The rock has flat sides and sharp corners.
(B) The rock is made of small, dark-colored crystals.
(C) The rock has thin, distinct layers.
(D) The rock has changed color due to weathering.

991. The best example of an inference is a
(A) reading of atmospheric pressure
(B) measurement of air temperature
(C) weather forecast for 3 days
(D) determination of dewpoint temperature

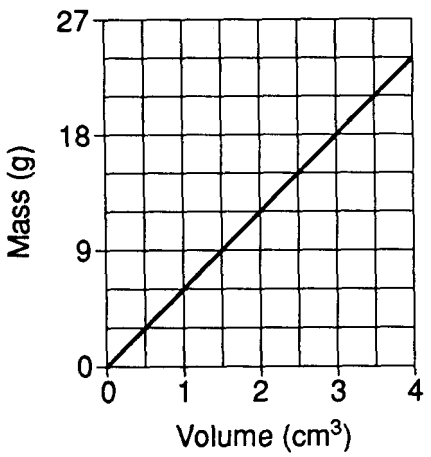
1176. Which statement about a major hurricane is an inference?
(A) The windspeed is measured at 200 km/hr.
(B) The central air pressure is recorded at 946.0 mb.
(C) A rain gauge records three inches of rain in less than one hour.
(D) Damage from the storm is expected to be extensive.

1994. A student investigated the physical and chemical properties of a sample of an unknown gas and then identified the gas. Which statement represents a conclusion rather than an experimental observation?
(A) The gas is colorless.
(B) The gas is carbon dioxide.
(C) When the gas is bubbled into limewater, the liquid becomes cloudy.
(D) When placed in the gas, a flaming splint stops burning.

516. Which material has the greatest density?
(A) ice at -20ºC
(B) a mixture of water and ice at 0ºC
(C) water vapor at 200ºC
(D) water at 4ºC

746. Water has the greatest density at
(A) 100ºC in the gaseous phase
(B) 0ºC in the solid phase
(C) 4ºC in the solid phase
(D) 4ºC in the liquid phase

830. The graph below shows the relationship between the mass and volume of a mineral.



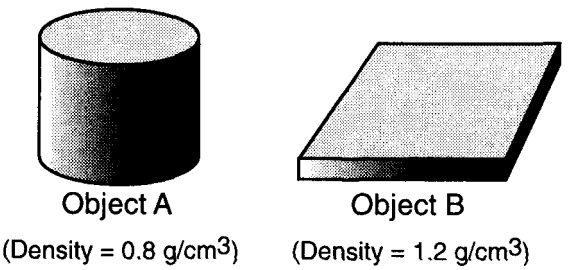
What is the density of this mineral?
(A) 6.0 g/cm^3 (C) 3.0 g/cm^3
(B) 9.0 g/cm^3 (D) 4.5 g/cm^3

895. Compared to the density of liquid water, the density of an ice cube is
(A) always less
(B) always greater
(C) always the same
(D) sometimes less and sometimes greater

927. Under the same conditions of temperature and pressure, three different samples of the same uniform substance will have the same
(A) shape (C) mass
(B) density (D) volume

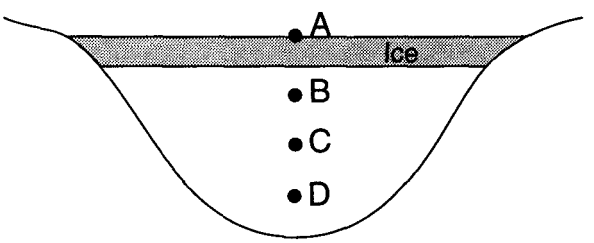
950. A quantity of water is frozen solid and then heated from 0ºC to 10ºC. Which statement best describes the properties of the water during this time?
(A) Mass and volume change.
(B) Volume and density change.
(C) Mass changes but volume remains constant.
(D) Volume changes but density remains constant.

916. The diagrams below represent two solid objects, *A* and *B*, with different densities.

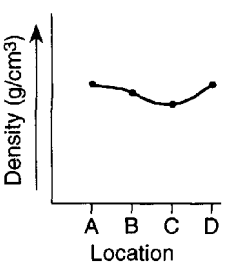


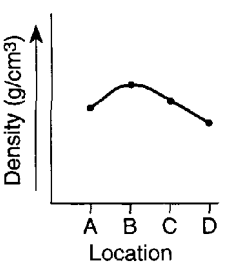
What will happen when the objects are placed in a container of water (water temperature = 4ºC)?
(A) Both objects will sink.
(B) Both objects will float.
(C) Object *A* will float, and object *B* will sink.
(D) Object *B* will float, and object *A* will sink.

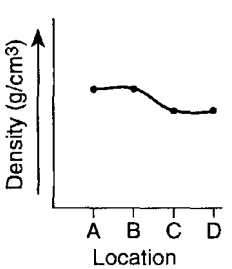
1024. The diagram below is a cross section of an ice covered lake during the month of January. Points *A*, *B*, *C*, and *D* are locations at various levels in the lake. The temperature of the water at location *D* is 4ºC.

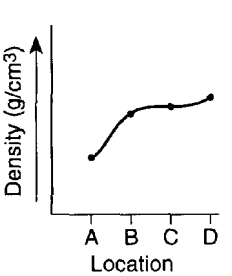


Which graph best represents the relationship between location and density of the ice or water?

(A)


(C)


(B)


(D)


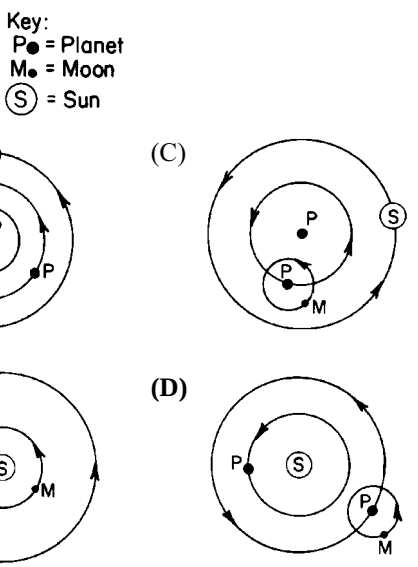
109. In the geocentric model (the Earth at the center of the universe), which motion would occur?
(A) The Earth would revolve around the Sun.
(B) The Earth would rotate on its axis.
(C) The Moon would revolve around the Sun.
(D) The Sun would revolve around the Earth.

197. Which planetary model allows a scientist to predict the exact positions of the planets in the night sky over many years?
(A) The planets' orbits are circles in a geocentric model.
(B) The planets' orbits are ellipses in a geocentric model.
(C) The planets' orbits are circles in a heliocentric model.
(D) The planets' orbits are ellipses in a heliocentric model.

252. Which observation can *not* be explained by a geocentric model?
(A) Stars follow circular paths around Polaris.
(B) The Sun's path through the sky is an arc.
(C) A planet's apparent diameter varies.
(D) A freely swinging pendulum appears to change direction.

270. The geocentric model of the solar system does *not* explain
(A) star trails (C) planetary motions
(B) day and night **(D) Foucault's pendulum**

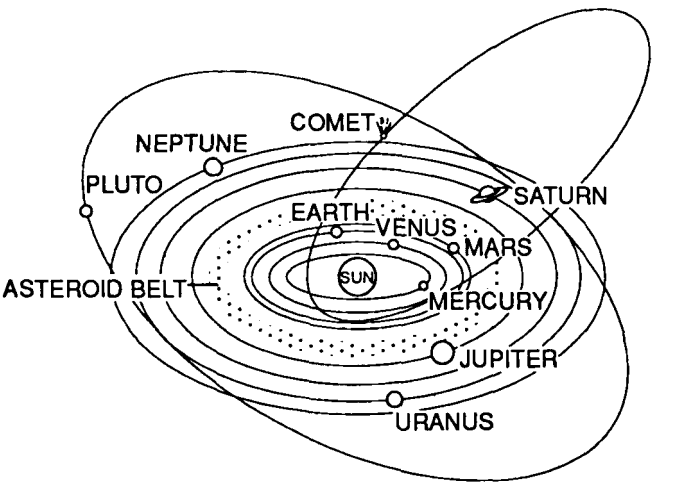
325. Which diagram best represents the motions of celestial objects in a heliocentric model?



988. In which type of model are the Sun, other stars, and the Moon in orbit around the Earth?
(A) heliocentric model (C) concentric model
(B) tetrahedral model **(D) geocentric model**

396. For what reason did the heliocentric model of the universe replace the geocentric model of the universe?
(A) The geocentric model no longer predicted the positions of the constellations.
(B) The geocentric model did not predict the phases of the Moon.
(C) The heliocentric model provided a simpler explanation of the motions of the planets.
(D) The heliocentric model proved that the Earth rotates.

783. The diagram below represents our solar system.



(NOT DRAWN TO SCALE)

This system is best classified as
(A) geocentric, with elliptical orbits
(B) geocentric, with circular orbits
(C) heliocentric, with elliptical orbits
(D) heliocentric, with circular orbits

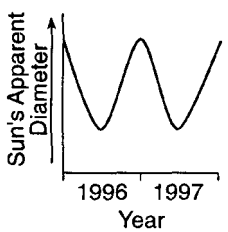
899. Which apparent motion can be explained by a geocentric model?
(A) deflection of the wind
(B) curved path of projectiles
(C) motion of a Foucault pendulum
(D) the sun's path through the sky

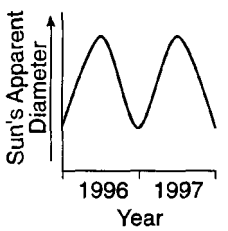
1095. Which statement best describes the geocentric model of our solar system?
(A) The Earth is located at the center of the model.
(B) All planets revolve around the Sun.
(C) The Sun is located at the center of the model.
(D) All planets *except* the Earth revolve around the Sun.

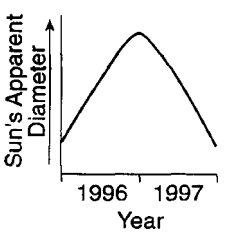
1096. In what way are the planets Mars, Mercury, and Earth similar?
(A) They have the same period of revolution.
(B) They are perfect spheres.
(C) They exert the same gravitational force on each other.
(D) They have elliptical orbits with the Sun at one focus

1121. Which planet takes longer for one spin on its axis than for one orbit around the Sun?
(A) Mercury (C) Earth
(B) Venus (D) Mars

1158. An observer on Earth measured the apparent diameter of the Sun over a period of 2 years. Which graph best represents the Sun's apparent diameter during the 2 years?

(A)


(C)


(B)


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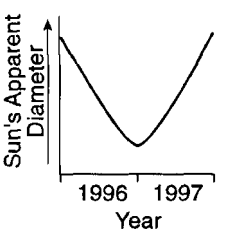
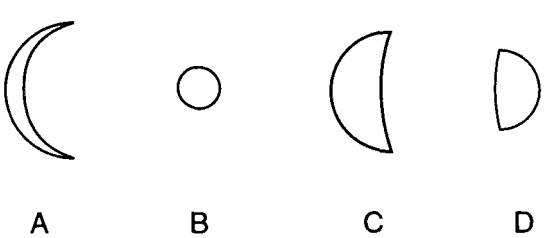


1180. The diagrams below represent photographs of Venus at four different positions in its orbit, as taken from Earth.



At which position is Venus closest to Earth?
(A) *A* (C) *C*
(B) *B* (D) *D*

3791. Compared to the average density of the terrestrial planets (Mercury, Venus, Earth, and Mars), the average density of the Jovian planets (Jupiter, Saturn, Uranus, and Neptune) is
(A) less (C) the same
(B) greater

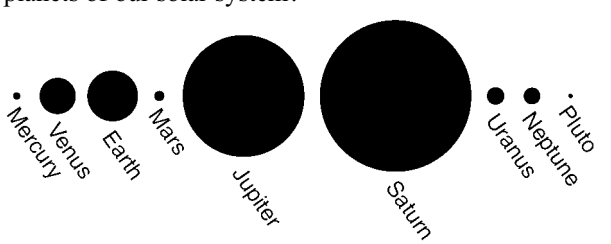
3449. Base your answer to the following question on your knowlege of our solar system.

Which list shows four planets of the solar system in order from smallest to largest?
(A) Jupiter, Saturn, Uranus, Neptune
(B) Neptune, Uranus, Saturn, Jupiter
(C) Saturn, Jupiter, Neptune, Uranus
(D) Uranus, Neptune, Saturn, Jupiter

3804. Three planets that are relatively large, gaseous, and of low density are
(A) Mercury, Jupiter, and Saturn
(B) Venus, Jupiter, and Neptune
(C) Mars, Jupiter, and Uranus
(D) Jupiter, Saturn, and Uranus

3935. Our Sun located at the center of our solar system is
(A) a planet (C) an asteroid
(B) a star (D) a galaxy

3859. Which sequence correctly shows the relative size of the nine planets of our solar system?

(A)


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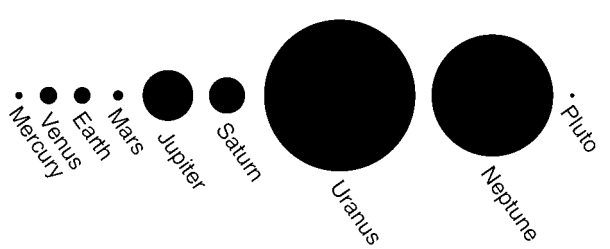

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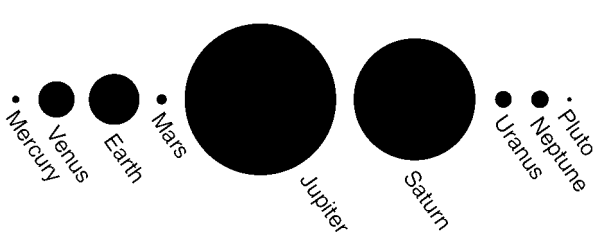
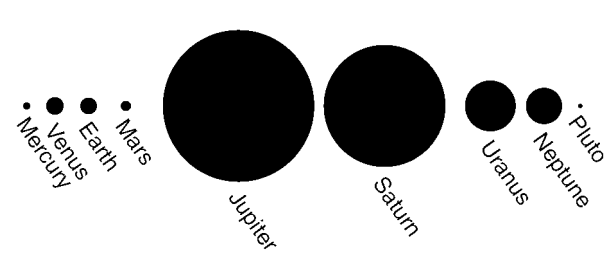


(D)


538. Chemical weathering will occur most rapidly when rocks are exposed to the
(A) hydrosphere and lithosphere
(B) mesosphere and thermosphere
(C) hydrosphere and atmosphere
(D) lithosphere and atmosphere

647. Which substance has the greatest effect on the rate of weathering of rock?
(A) nitrogen
(C) water
(B) hydrogen
(D) argon

741. Rock samples brought back from the Moon show absolutely no evidence of chemical weathering. This is most likely due to
(A) the lack of an atmosphere on the Moon
(B) extremely low surface temperatures on the Moon
(C) lack of biological activity on the Moon
(D) large quantities of water in the lunar "seas"

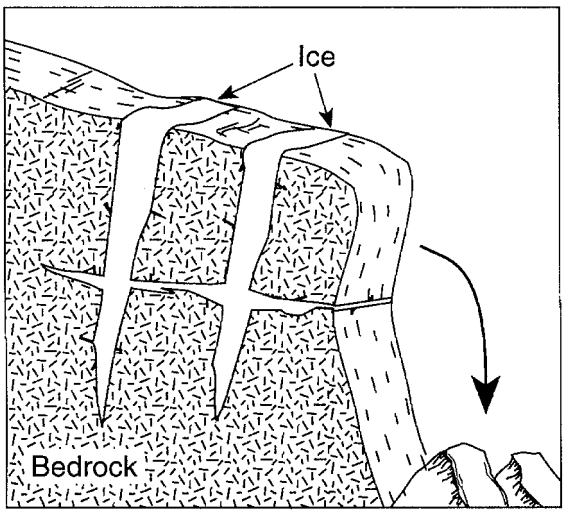
763. Which change will most likely take place in a landscape region when the climate becomes warmer and more humid?
(A) The vegetation covering the hillslopes will decrease.
(B) The gradient of the hillslopes will increase.
(C) The rate of chemical weathering will increase.
(D) The rate of chemical weathering will decrease.

843. In which type of climate does the greatest amount of chemical weathering of rock occur?
(A) cold and dry
(C) cold and moist
(B) warm and dry
(D) warm and moist

1037. Which factor has the most influence on the development of soil?
(A) climate
(B) longitude
(C) amount of rounded sediment
(D) slope of the landscape

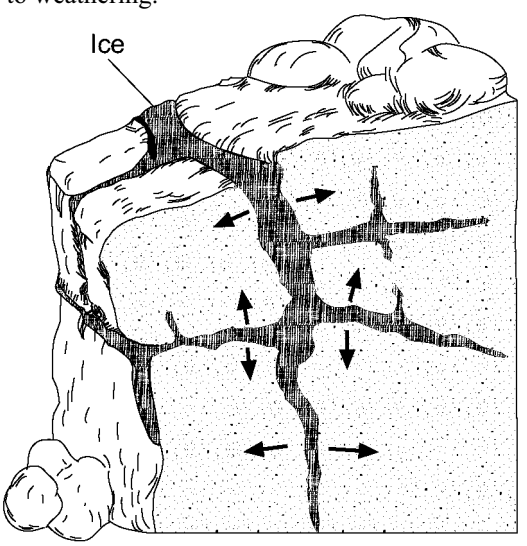
3834. Which activity demonstrates chemical weathering?
(A) freezing of water in the cracks of a sandstone sidewalk
(B) scraping of a streambed by tumbling rocks
(C) grinding of talc into a powder
(D) dissolving of limestone by acid rain

973. The diagram below shows a process called frost wedging.



Frost wedging is an example of
(A) weathering
(C) metamorphism
(B) cementing
(D) deposition

3787. The diagram below shows granite bedrock with cracks. Water has seeped into the cracks and frozen. The arrows represent the directions in which the cracks have widened due to weathering.



Which statement best describes the physical weathering shown by the diagram?
(A) Enlargement of the cracks occurs because water expands when it freezes.
(B) This type of weathering occurs only in bedrock composed of granite.
(C) The cracks become wider because of chemical reactions between water and the rock.
(D) This type of weathering is common in regions of primarily warm and humid climates.

178. A large belt of mountain ranges and volcanoes surrounds the Pacific Ocean. Which events are most closely associated with these mountains and volcanoes?
(A) hurricanes (C) tornadoes
(B) sandstorms **(D) earthquakes**

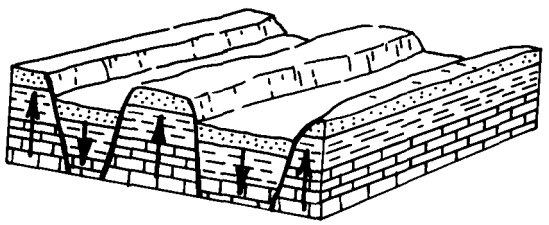
210. An observer discovers shallow-water marine fossils in rock strata at an elevation of 5,000 meters. What is the best explanation for this observation?
(A) The level of the ocean was once 5,000 meters higher.
(B) Violent earthquakes caused crustal subsidence.
(C) Marine organisms have evolved into land organisms.
(D) Crustal uplift has occurred in this area.

239. Where are earthquakes most likely to take place?
(A) along the core-mantle interface
(B) where the composition of the Earth tends to be uniform
(C) near the Earth's Equator
(D) near a fault zone

241. Which best describes a major characteristic of both volcanoes and earthquakes?
(A) They are centered at the poles.
(B) They are located in the same geographic areas.
(C) They are related to the formation of glaciers.
(D) They are restricted to the Southern Hemisphere.

262. Recent volcanic activity in different parts of the world supports the inference that volcanoes are located mainly in
(A) the centers of landscape regions
(B) the central regions of the continents
(C) zones of crustal activity
(D) zones in late stages of erosion

336. The landscape shown in the diagram below is an area of frequent earthquakes.

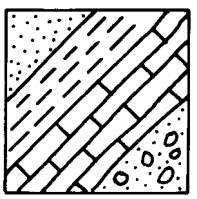


This landscape provides evidence for
(A) converging convection cells within the rocks of the mantle
(B) density differences in the rocks of the mantle
(C) movement and displacement of the rocks of the crust
(D) differential erosion of hard and soft rocks of the crust

353. Which event provides direct evidence of crustal movement?
(A) the erosion of the outside of a river curve
(B) the deposition of sediments in the ocean
(C) the displacement of rock strata during an earthquake
(D) the weathering of rock to form a residual soil

355. Which evidence suggests that sections of the Earth's crust have been uplifted in the past?
(A) Fossils of organisms that lived in shallow water are found at great ocean depths.
(B) Fossils of organisms that lived in the oceans are found in rocks above sea level.
(C) Sediments that were deposited in shallow water are found in great thicknesses.
(D) Large ocean basins containing accumulations of sediments show signs of subsidence (sinking).

388. The diagrams below show cross sections of exposed bedrock. Which cross section shows the *least* evidence of crustal movement?

(A)


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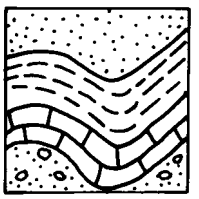

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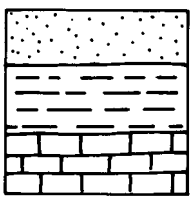

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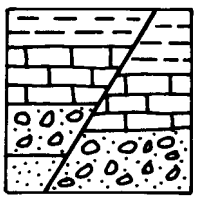


432. Crustal disturbances such as earthquakes and volcanic eruptions are best described as
(A) events that are cyclic and predictable
(B) events that are usually related and cannot be predicted with accuracy
(C) unrelated events that follow no pattern
(D) phenomena seldom found in the same regions

544. Where does most present-day faulting of rock occur?
(A) in regions of glacial activity
(B) in the interior areas of continents
(C) at locations with many lakes
(D) at interfaces between moving parts of the crust

1394. When a battery is in use, stored chemical energy is first changed to
(A) electrical energy (C) light energy
(B) heat energy (D) mechanical energy

1418. In a rechargeable battery system, the discharging reaction is
(A) exothermic and the charging reaction is exothermic
(B) exothermic and the charging reaction is endothermic
(C) endothermic and the charging reaction is exothermic
(D) endothermic and the charging reaction is endothermic

1436. As electrical energy is converted into heat energy, the total amount of energy in the system
(A) decreases **(C) remains the same**
(B) increases

1877. A battery consists of which type of cells?
(A) electrolytic (C) electroplating
(B) electrochemical (D) electromagnetic

2822. Which type of energy conversion occurs in an electric motor?
(A) rotational mechanical energy to electrical energy
(B) electrical energy to rotational mechanical energy
(C) chemical energy to induced electrical energy
(D) induced electrical energy to stored chemical energy

3208. When an incandescent bulb glows, electrical energy is converted to
(A) sound and light energy
(B) heat and light energy
(C) mechanical and heat energy
(D) mechanical and light energy

3219. What energy change occurs when a candle burns?
(A) electical to mechanical
(B) chemical to mechanical
(C) chemical to light and heat
(D) mechanical to light and heat

3239. A hydroelectric plant produces electrical energy from
(A) nuclear energy. (C) electrical energy.
(B) chemical energy. **(D) mechanical energy.**

3244. The source of warmth in a greenhouse is the conversion of
(A) light energy to heat energy.
(B) heat energy to light energy.
(C) chemical energy to heat energy.
(D) nuclear energy to light energy.

3293. What energy change occurs when a rock falls off of a cliff?
(A) potential to kinetic (C) chemical to kintetic
(B) kinetic to potential (D) potential to chemical

3295. When electrical energy is converted into any other form of energy, the total amount of energy
(A) increases. **(C) remains the same.**
(B) decreases. (D) cannot be determined.

3328. When gasoline is burned to power a car some of the chemical energy is turned into motion of the car. But, *most* of the chemical energy is turned into
(A) heat. (C) sound.
(B) electricity. (D) magnetism.

3352. As steam is produced, it can be used to move piston in a train. The mechanical energy is formed from
(A) heat energy (C) nuclear energy
(B) light energy (D) electrical energy

3356. In a cars engine, burning vaporized gas pushes the pistons. The energy transfer in this process is from chemical energy to
(A) electrical energy. **(C) mechanical energy.**
(B) heat energy. (D) magnetic energy.

3359. Idenfity the energy changes that take place in a microwave oven.
(A) nuclear to heat energy.
(B) chemical to electrical.
(C) mechanical to electrical energy.
(D) electrical to heat energy.

3360. Identify the energy change(s) that take place when a match lights.
(A) mechanical to light
(B) heat to light
(C) mechanical to eletrical
(D) chemical to heat and light

3361. Identify the energy change(s) that take place in the Sun?
(A) nuclear to light and heat
(B) chemical to light and heat
(C) nuclear to chemical
(D) chemical to nuclear

3363. An electric car is powered by batteries. This an example of conversion of
(A) chemical into electrical into mechanical energy
(B) electrical into chemical into mechanical energy
(C) nuclear into eletrical into mechanical energy
(D) eletrical into heat into mechanical energy

1326. The number of calories needed to raise the temperature of 10 grams of water from 20ºC to 30ºC is
(A) 10 **(C) 100**
(B) 20 (D) 40

1356. How many kilocalories of heat energy are absorbed when 100 grams of water is heated from 20ºC to 30ºC?
(A) 1 kcal (C) 100 kcal
(B) 10 kcal (D) 0.1 kcal

1385. When a quantity of electricity is converted to heat, the heat energy produced is measured in
(A) volts **(C) calories**
(B) amperes (D) degrees

1392. When 20 grams of water is cooled from 20ºC to 10ºC, the number of calories of heat released is
(A) 10 (C) 30
(B) 20 **(D) 200**

1423. What is the total number of calories of heat that must be absorbed to change the temperature of 100 grams of H_2O from 25ºC to 30ºC?
(A) 100 (C) 2,500
(B) 500 (D) 3,000

1471. How many calories of heat are needed to raise the temperature of a 4.0-gram sample of water 8.0 Celsius degrees?
(A) 12 calories **(C) 32 calories**
(B) 2.0 calories (D) 4.0 calories

1476. The temperature of a sample of water in the liquid phase is changed from 15º C to 25º C by the addition of 500 calories. What is the mass of the water?
(A) 10 grams (C) 100 grams
(B) 50 grams (D) 5,000 grams

1509. How many calories of heat are required to raise the temperature of 20 grams of water from 30ºC to 40ºC?
(A) 10 cal (C) 100 cal
(B) 20 cal **(D) 200 cal**

1514. How many calories are equivalent to 35 kilocalories?
(A) 0.035 calorie (C) 3,500 calories
(B) 0.35 calorie **(D) 35,000 calories**

1562. How many grams of water will absorb a total of 600. calories of energy when the temperature of the water changes from 10.0°C to 30.0°C?
(A) 10.0 g **(C) 30.0 g**
(B) 20.0 g (D) 60.0 g

1565. If 100. calories are added to 20. grams of water at 30.°C, what will be the final temperature of the water?
(A) 25°C (C) 40.°C
(B) 35°C (D) 50.°C

1624. What is the total number of calories of heat absorbed by 65.0 grams of water when the temperature of the water is raised from 25.0ºC to 40.0ºC?
(A) 15.0 cal **(C) 975 cal**
(B) 25.0 cal (D) 1630 cal

1633. The greatest amount of heat energy would be required to raise the temperature of a 1 gram sample of water from
(A) 10ºC to 30ºC **(C) 30ºC to 60ºC**
(B) 20ºC to 30ºC (D) 40ºC to 60ºC

1644. A sample of water is cooled from 45ºC to 35ºC by the removal of 20. calories of heat. What is the mass of the water?
(A) 10. g (C) 20. g
(B) 2.0 g (D) 200 g

1651. How many kilocalories of heat are needed to raise the temprature of 500 grams of water for 15ºC to 20ºC
(A) 1.0 (C) 10.
(B) 2.5 (D) 25

1708. The temperature of 15 grams of water increased 3.0 Celsius degrees. How much heat was absorbed by the water?
(A) 5.0 calories (C) 18 calories
(B) 12 calories **(D) 45 calories**

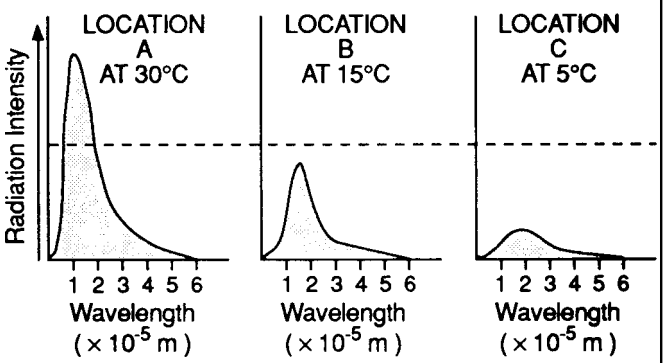
1718. A 10.-gram sample of water would lose the greatest amount of heat when its temperature is changed from 50.ºC to
(A) 10.º C (C) 30.º C
(B) 20.º C (D) 40.º C

1737. When a 500.-gram sample of water at 19ºC absorbs 2000. calories of heat, the temperature of the water will change to
(A) 23ºC (C) 15ºC
(B) 19ºC (D) 4.0ºC

1758. What is the maximum number of grams of water at 10.°C that can be heated to 30.°C by the addition of 40.0 calories of heat?
(A) 1.0 g (C) 20. g
(B) 2.0 g (D) 30. g

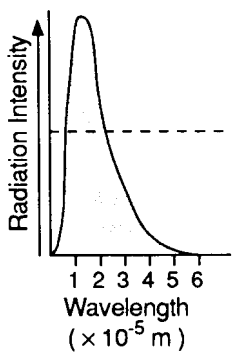
1772. How many kilocalories are equivalent to 10 calories?
(A) 0.001 kcal (C) 1000 kcal
(B) 0.01 kcal (D) 10,000 kcal

776. The graphs below show the intensity and wavelength of radiation given off by the Earth's surface at locations *A*, *B*, and *C*. The temperature of the ground surface is shown for each location.

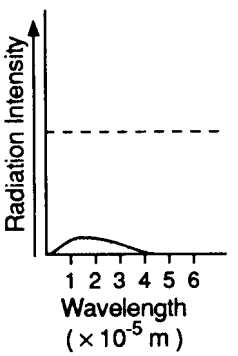


Which graph best represents the radiation intensity and wavelengths for another Earth location that has a temperature of 10ºC?

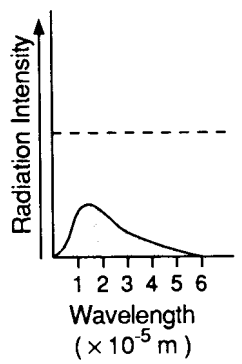
(A)



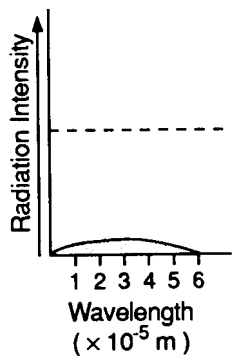
(C)



(B)



(D)



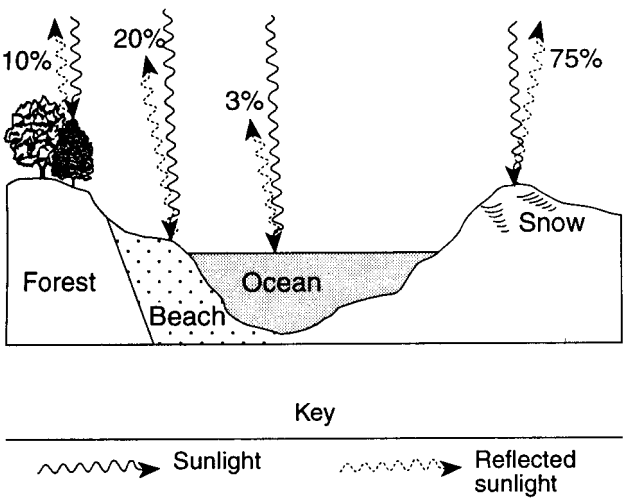
3428. Most of the energy radiated by Earth's surface at night is in the form of

(A) infrared rays (C) visible light rays
(B) ultraviolet rays (D) x rays

3476. Which of the following Earth surfaces usually reflects the most incoming solar radiation?

(A) snow cover (C) dark soil
(B) green grass (D) lake water

3429. The diagram below shows the percentage of sunlight reflected by different Earth surfaces when the Sun is directly overhead.



Which material reflects the *least* sunlight?

(A) forest **(C) ocean**
(B) beach (D) snow

3766. Energy is transferred from the Sun to Earth mainly by

(A) molecular collisions **(C) electromagnetic waves**
(B) density currents (D) red shifts

3767. Compared to dull and rough rock surfaces, shiny and smooth rock surfaces are most likely to cause sunlight to be

(A) reflected (C) scattered
(B) refracted (D) absorbed

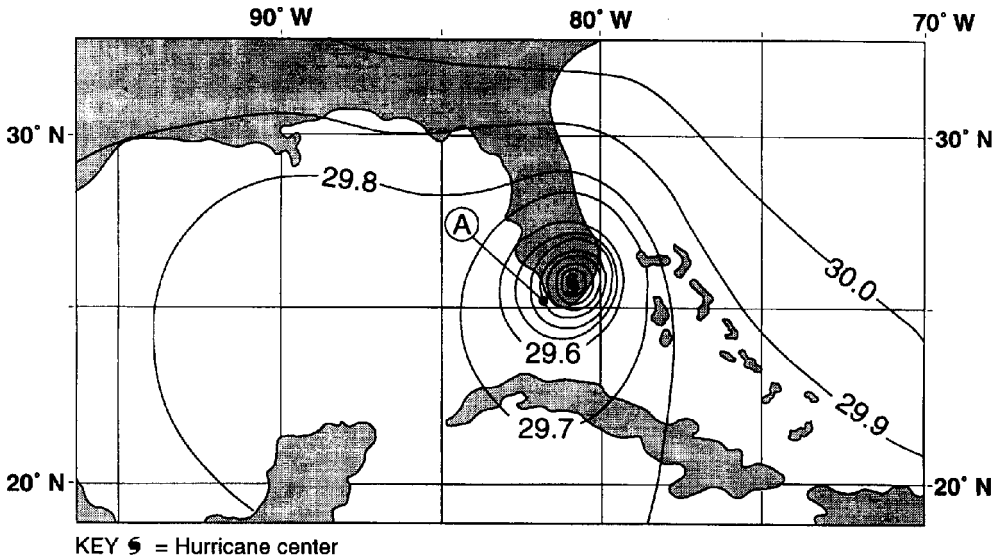
3785. Which characteristics of a building material would provide the most energy-absorbing exterior covering for a house?

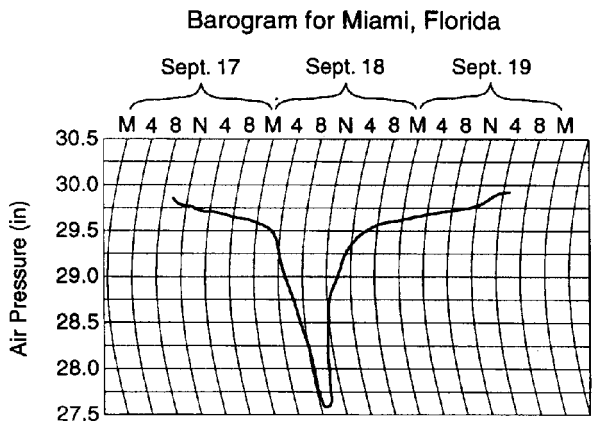
(A) dark colored and smooth textured
(B) dark colored and rough textured
(C) light colored and smooth textured
(D) light colored and rough textured

3826. A person worked outdoors in sunlight for several hours on a day in July. Which type of clothing should the person have worn to absorb the *least* electromagnetic radiation?

(A) dark colored with a rough surface
(B) dark colored with a smooth surface
(C) light colored with a rough surface
(D) light colored with a smooth surface

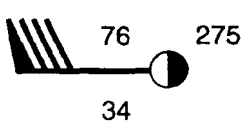
Base your answers to questions **1238** through **1241** on the weather map and barogram below. The weather map shows a hurricane that was located over southern Florida. The isobars show air pressure in inches of mercury. Letter A represents a point near the west coast of Florida. The barogram shows the recorded air pressure in inches of mercury as the hurricane passed near Miami, Florida.

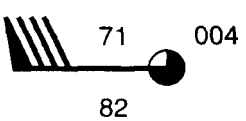


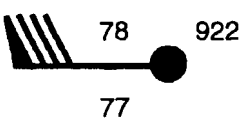


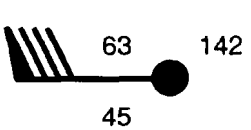
1238. What is the latitude and longitude at the center of the hurricane?
(1) 26° N 81° W **(2) 26° N 89° W** (3) 34° N 81° W (4) 34° N 89° W

1239. What was the lowest air pressure recorded on the barogram as the hurricane passed near Miami?
(1) 27.30 in (2) 27.60 in **(3) 27.75 in** (4) 28.60 in

1240. Which station model best represents the weather conditions at point A?
(1) 

(2) 

(3) 

(4) 

1241. Which type of air mass would most likely be the source of the moisture that causes the strong winds and heavy rain associated with this hurricane ?
(1) cP (2) cT (3) mP **(4) mT**

1327. The atomic number of an atom is always equal to the total number of
(A) neutrons in the nucleus
(B) protons in the nucleus
(C) neutrons plus protons in the atom
(D) protons plus electrons in the atom

1365. Which particle is electrically neutral?
(A) proton **(C) neutron**
(B) positron (D) electron

1371. What is the mass number of an atom which contains 21 electrons, 21 protons, and 24 neutrons?
(A) 21 **(C) 45**
(B) 42 (D) 66

1384. As the number of neutrons in the nucleus of an atom increases, the nuclear charge of the atom
(A) decreases **(C) remains the same**
(B) increases

1412. What is the charge in the nucleus of an atom with a mass of 23 and an atomic number of 11?
(A) + 11 (C) + 23
(B) + 12 (D) + 34

1425. What is the mass number of an atom that contains 19 protons, 19 electrons, and 20 neutrons?
(A) 19 **(C) 39**
(B) 20 (D) 58

1427. Which particle has approximately the same mass as a proton?
(A) alpha (C) electron
(B) beta **(D) neutron**

1479. An atom that contains 35 protons, 45 neutrons, and 35 electrons has an atomic number of
(A) 35 (C) 80
(B) 45 (D) 115

1495. Which atom has a nucleus that contains 13 protons and 14 neutrons?
(A) Mg **(C) Al**
(B) Be (D) N

1496. An atom that contains 8 protons, 8 electrons, and 9 neutrons has
(A) an atomic number of 9 **(C) a mass number of 17**
(B) an atomic number of 16 (D) a mass number of 25

1516. The atomic number of any atom is equal to the number of
(A) neutrons in the atom, only
(B) protons in the atom, only
(C) neutrons plus protons in the atom
(D) protons plus electrons in the atom

1543. Which particles account for most of the mass of the atom?
(A) protons and neutrons (C) neutrons and electrons
(B) protons and electrons (D) neutrons and positrons

1559. What is a possible mass number of a sodium atom?
(A) 1 (C) 12
(B) 11 **(D) 23**

1645. What is the mass number of an ion that consists of 20 protons, 20 neutrons, and 18 electrons?
(A) 18 (C) 38
(B) 20 **(D) 40**

1659. Which of the following particles has the *least* mass?
(A) proton (C) neutron
(B) hydrogen nucleus **(D) electron**

1720. Which of the following particles has the smallest mass?
(A) neutron (C) proton
(B) electron (D) hydrogen atom

1721. What is the atomic number of an element whose atoms each contain 47 protons, 60 neutrons, and 47 electrons?
(A) 13 (C) 60
(B) 47 (D) 107

1735. An element occurs as a mixture of isotopes. The atomic mass of the element is based upon
(A) the masses of the individual isotopes, only
(B) the relative amounts of the isotopes, only
(C) both the masses and the relative amounts of the individual isotopes
(D) neither the masses nor the relative amounts of the individual isotopes

1742. In a sample of pure copper, all atoms have atomic numbers which are
(A) the same and the atoms have the same number of electrons
(B) the same but the atoms have a different number of electrons
(C) different but the atoms have the same number of electrons
(D) different and the atoms have a different number of electrons

1329. The bonding in NH_3 is most similar to the bonding in
(A) H_2O (C) MgO
(B) NaCl (D) KF

1430. Which electron dot diagram represents H_2?
(A) H • H (C) H : H
(B) H : H (D) H : H

1467. Which formula represents a substance that contains covalent bonds?
(A) LiCI (C) K_2O
(B) $CaCl_2$ **(D) CO_2**

1482. Which is the correct electron dot formula for a molecule of chlorine?
(A) ·Cl : Cl· (C) :Cl : :Cl:
(B) :Cl : :Cl: **(D)** :Cl : Cl:

1629. Which molecule contains a nonpolar covalent bond?
(A) I_2 (C) NaI
(B) NaCl (D) KCl

1630. Which type of bond is formed between the carbon and oxygen atoms in a CO_2 molecule?
(A) hydrogen (C) ionic
(B) covalent (D) metallic

1638. Which kind of bond is formed when two atoms share electrons to form a molecule?
(A) ionic (C) hydrogen
(B) metallic **(D) covalent**

1664. Which type of bond is present in a water molecule?
(A) covalent (C) ionic
(B) hydrogen (D) metallic

1694. When two atoms form a chemical bond by sharing electrons, the resulting molecule will be
(A) ionic **(C) covalent**
(B) hydrogen (D) metallic

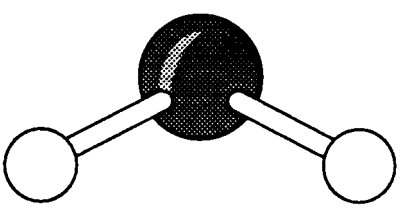
1776. Which formula represents a molecular solid?
(A) NaCl(s) (C) Cu(s)
(B) $C_6H_{12}O_6$(s) (D) KF(s)

1790. Which atoms are most likely to form covalent bonds?
(A) metal atoms that share electrons
(B) metal atoms that share protons
(C) nonmetal atoms that share electrons
(D) nonmetal atoms that share protons

1828. What type of bond exists in a molecule of iodine? (I_2)
(A) ionic **(C) covalent**
(B) hydrogen (D) metallic

1850. The chemical bond in a hydrogen molecule is
(A) covalent (C) ionic
(B) hydrogen (D) metallic

1895. The diagram below represents a water molecule.



This molecule is best described as
(A) polar with polar covalent bonds
(B) polar with nonpolar covalent bonds
(C) nonpolar with polar covalent bonds
(D) nonpolar with nonpolar covalent bonds

1936. Which is the correct electron-dot formula for a hydrogen molecule at STP?
(A) H· (C) H · H
(B) H: **(D)** H : H

2078. Which molecule contains a pair of electrons equally shared between two atoms?
(A) Cl_2 (C) H_2O
(B) HCl (D) HF

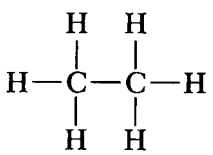
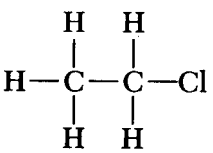
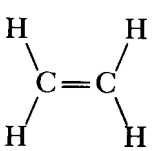
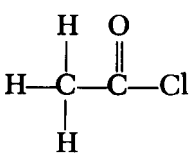
2085. Which pair of atoms is held together by a nonpolar covalent bond?
(A) Ca–S (C) K–I
(B) H–Cl **(D) H–H**

2144. An example of a polar molecule is
(A) H_2O (C) Cl_2
(B) CH_4 (D) He

1575. Which formula represents a saturated hydrocarbon?
(A) CH_4 (C) C_3H_6
(B) C_2H_4 (D) C_4H_8

1730. A carbon atom in an alkane has a total of
(A) 2 covalent bonds **(C) 4 covalent bonds**
(B) 2 ionic bonds (D) 4 ionic bonds

1750. Which is the general formula for the alkane series of hydrocarbons?
(A) C_nH_{2n+2} (C) C_nH_{2n-2}
(B) C_nH_{2n} (D) C_nH_{2n-6}

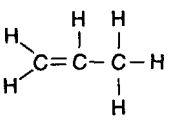
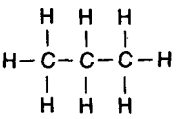
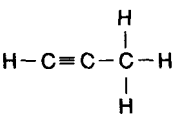
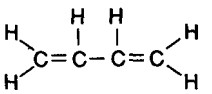
1799. Which structural formula represents a saturated hydrocarbon?
(A) 
(C) 
(B) 
(D) 

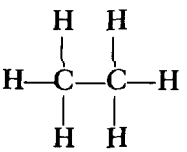
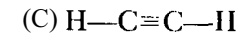
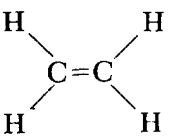
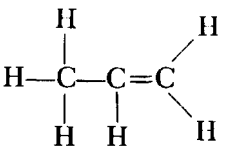
1818. Each member in the alkane series of hydrocarbons, when considered in successive order, has 1 more carbon atom and how many more hydrogen atoms?
(A) 1 (C) 3
(B) 2 (D) 4

1876. The compound C_4H_{10} belongs to the series of hydrocarbons with the general formula
(A) C_nH_{2n} (C) C_nH_{2n-2}
(B) C_nH_{2n+2} (D) C_nH_{2n-6}

1929. Which compound is a member of the alkane series?
(A) C_2H_6 (C) C_4H_6
(B) C_3H_6 (D) C_6H_6

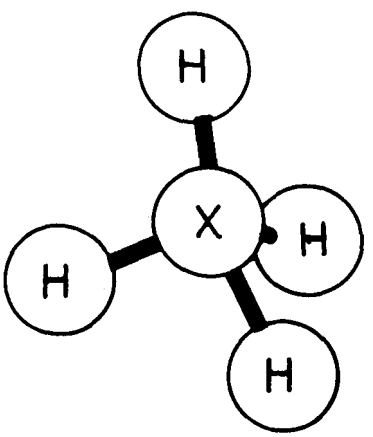
2008. A hydrocarbon molecule is considered to be saturated if the molecule contains
(A) single covalent bonds, only
(B) a double covalent bond, only
(C) a triple covalent bond
(D) single and double covalent bonds

1971. Which structural formula represents a saturated compound?
(A) 
(C) 
(B) 
(D) 

2242. Which structural formula represents a saturated hydrocarbon?
(A) 
(C) 
(B) 
(D) 

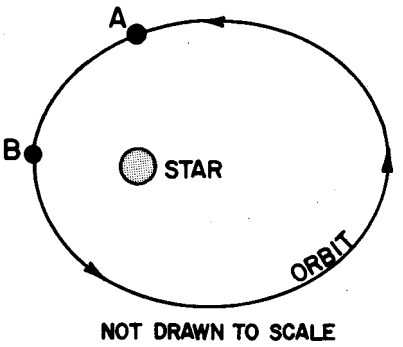
2243. How many covalent bonds are found between the carbon atoms in one molecule of ethane?
(A) 1 **(C) 7**
(B) 6 (D) 4

2260. The diagram shown below is a "ball and stick" model of a molecule.



If the molecule is organic, then X must be
(A) carbon (C) sulfur
(B) chlorine (D) silicon

161. The diagram below represents a planet in orbit around a star. Which statement best describes how the planet's energy is changing as it moves from point *A* to point *B*?



(A) Kinetic energy is increasing and potential energy is decreasing.
(B) Kinetic energy is decreasing and potential energy is increasing.
(C) Both kinetic and potential energy are decreasing.
(D) Both kinetic and potential energy are increasing.

2327. At a height of 10 meters above the earth's surface, the potential energy of a 2-kilogram mass is 196 joules. After the mass which starts at rest falls 5 meters, its kinetic energy will be

(A) 196 J **(C) 98 J**
(B) 147 J (D) 49 J

2343. A ball is thrown vertically upward. As the ball rises. its total energy (neglecting friction)

(A) decreases **(C) remains the same**
(B) increases

2368. A 40-newton object is released from rest at a height of 10 meters above the earth's surface. Just before it hits the ground, its kinetic energy will be closest to

(A) 0 joules (C) 800 joules
(B) 400 joules (D) 1,200 joules

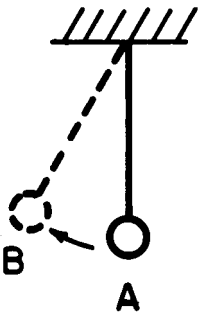
2557. A 2.0-newton book falls from a table 1.0 meter high. After falling 0.5 meter, the book's kinetic energy is

(A) 1.0 J (C) 10 J
(B) 2.0 J (D) 20 J

2611. At what point in its fall does the kinetic energy of a freely falling object equal its potential energy?

(A) at the start of the fall
(B) halfway between the start and the end
(C) at the end of the fall
(D) at all points during the fall

2410. As a pendulum swings from position *A* to position *B* as shown in the diagram, its total mechanical energy (neglecting friction)

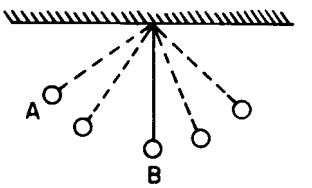


(A) decreases **(C) remains the same**
(B) increases

2703. As an object falls freely in a vacuum, its total energy

(A) decreases **(C) remains the same**
(B) increases

2744.



As the pendulum swings from position *A* to position *B* as shown in the diagram above, what is the relationship of kinetic energy to potential energy? [Neglect friction.]

(A) The kinetic energy decrease is more than the potential energy increase.
(B) The kinetic energy increase is more than the potential energy decrease.
(C) The kinetic energy decrease is equal to the potential energy increase.
(D) The kinetic energy increase is equal to the potential energy decrease.

2803. As an object falls freely near the Earth's surface, the loss in gravitational potential energy of the object is equal to its

(A) loss of height (C) gain in velocity
(B) loss of mass **(D) gain in kinetic energy**

3114. As a pendulum moves from the bottom of its swing to the top of its swing, the

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

2324. The force required to accelerate a 2.0-kilogram mass at 4.0 meters per second^2 is

(A) 6.0 N **(C) 8.0 N**
(B) 2.0 N (D) 16 N

2351. What force is necessary to give a 2.0-kilogram mass initially at rest an acceleration of 5.0 meters per second^2?

(A) 0.4 N **(C) 10 N**
(B) 2.5 N (D) 20 N

2355. Compare to the force of the floor acting on a person in an elevator that is stopped, the force of the floor acting on the person in an elevator that is accelerating upwards is

(A) less. (C) the same.
(B) greater.

2369. When an unbalanced force of 10. newtons is applied to an object whose mass is 4.0 kilograms, the acceleration of the object will be

(A) 40. m/s^2 (C) 9.8 m/s^2
(B) 2.5 m/s^2 (D) 0.40 m/s^2

2428. If the net force acting on an object is doubled, the acceleration of the object is

(A) halved (C) unchanged
(B) doubled (D) quadrupled

2516. An unbalanced force of 10.0 newtons causes an object to accelerate at 2.0 m/s^2. What is the mass of the object?

(A) 0.2 kg (C) 8.0 kg
(B) 5.0 kg (D) 20 kg

2517. An unbalanced force of 10 newtons acts on a 20-kilogram mass for 5 seconds. the acceleration of the mass is

(A) 0.5 m/s^2 (C) 40 m/s^2
(B) 2 m/s^2 (D) 200 m/s^2

2550. An object with a mass of 2 kilograms is accelerated at 5 m/s^2. The net force acting on the mass is

(A) 5 N **(C) 10 N**
(B) 2 N (D) 20 N

2607. Two frictionless blocks, having masses of 8.0 kilograms and 2.0 kilograms, rest on a horizontal surface. If a force applied to the 8.0-kilogram block gives it an acceleration of 5.0 m/s^2, then the same force will give the 2.0-kilogram block an acceleration of

(A) 1.2 m/s^2 (C) 10. m/s^2
(B) 2.5 m/s^2 **(D) 20. m/s^2**

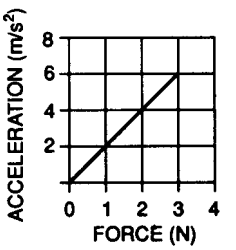
2643. An object accelerates at 2.5 meters per second^2 when an unbalanced force of 10. newtons acts on it. What is the mass of the object?

(A) 1.0 kg (C) 3.0 kg
(B) 2.0 kg **(D) 4.0 kg**

2769. A 50.0-kilogram object in outer space is attracted to a nearby planet with a net force of 400. newtons. What is the object's acceleration towards the planet?

(A) 8.00 m/s^2 (C) 78.4 m/s^2
(B) 9.81 m/s^2 (D) 2,000 m/s^2

2796. In the graph below, the acceleration of an object is plotted against the unbalanced force on the object.



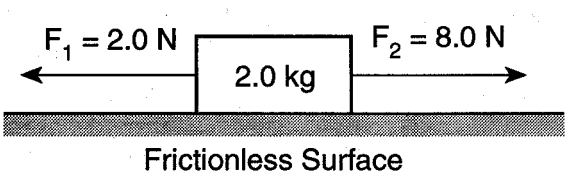
What is the object's mass?

(A) 1 kg **(C) 0.5 kg**
(B) 2 kg (D) 0.2 kg

2843. A 50.-kilogram woman wearing a seat belt is traveling in a car that is moving with a velocity of 10 meters per second. In an emergency, the car is brought to a stop in 1.0 second. What force does the seat belt exert on the woman so that she remains in her seat?

(A) -1000 N **(C) -500 N**
(B) -5000 N (D) -5 N

2965. Two forces are applied to a 2.0-kilogram block on a frictionless horizontal surface, as shown in the diagram below.



The acceleration of the block is

(A) 5.0 m/s^2 to the right **(C) 3.0 m/s^2 to the right**
(B) 5.0 m/s^2 to the left (D) 3.0 m/s^2 to the left

2323. How much work is needed to lift a box weighing 15 newtons 3.0 meters upward?

(A) 5.0 J
(C) 45 J
(B) 12 J
(D) 150 J

2342. As the time required to lift a 60-kg. object 6 meters increases, the work required to lift the body

(A) decreases
(C) remains the same
(B) increases

2356. What is the work required to raise a l0.-kilogram box from the surface of the earth to a height of 5.0 meters ?

(A) 50 J
(C) 200 J
(B) 100 J
(D) 490 J

2371. Joanne pushes a baby stroller along a level sidewalk with a force of 20 newtons. If she pushes for a distance of 10 meters, how much work has she done?

(A) 0 J
(C) .2 J
(B) 2 J
(D) 200 J

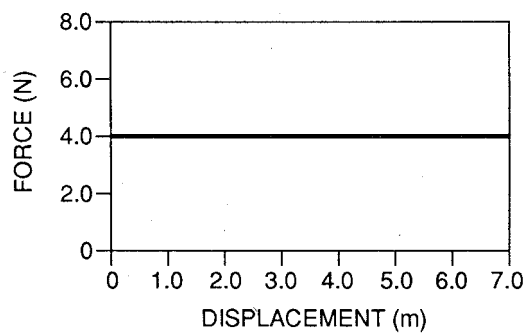
2519. An object has a mass of 8.0 kilograms. A 2.0-newton force moves the object a distance of 3.0 meters to the east, and then 4.0 meters to the north. What is the total work done on the object?

(A) 10. J
(C) 28 J
(B) 14 J
(D) 56 J

2554. A force of 80. newtons pushes a 50.-kilogram object across a level floor for 8.0 meters. The work done is

(A) 10 J
(C) 640 J
(B) 400 J
(D) 3,920 J

2772. The graph below shows the force exerted on a block as the block moved in the direction of the force.



How much work did the force do in moving the block 5.0 meters?

(A) 0 J
(C) 0.80 J
(B) 20. J
(D) 4.0 J

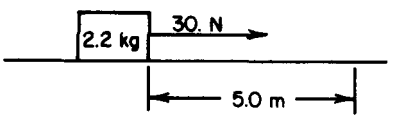
2848. A net force of 5.0 newtons moves a 2.0-kilogram object a distance of 3.0 meters in 3.0 seconds. How much work is done on the object?

(A) 1.0 J
(C) 15 J
(B) 10. J
(D) 30. J

2895. A constant force of 2.0 newtons is used to push a 3.0-kilogram mass 4.0 meters across the floor. How much work is done on the mass?

(A) 6.0 J
(C) 12 J
(B) 8.0 J
(D) 24 J

3007. A 2.2-kilogram mass is pulled by a 30.-newton force through a distance of 5.0 meters as shown in the diagram below. What amount of work is done?



(A) 11 J
(C) 150 J
(B) 66 J
(D) 330 J

3032. Which action would require no work to be done on an object?

(A) lifting the object from the floor to the ceiling
(B) pushing the object along a horizontal floor against a frictional force
(C) decreasing the speed of the object until it comes to rest
(D) holding the object stationary above the ground

3053. A force of 10. newtons is used to pull a chest weighing 50. newtons at uniform speed a distance of 5.0 meters. The work done is

(A) 10. joules
(C) 250 joules
(B) 50. joules
(D) 2,500 joules

3112. What force is required to do 60 joules of work in sliding an object a distance of 10 meters across a level floor?

(A) 6 N
(C) 60 N
(B) 10 N
(D) 600 N

3113. How much work is done when a rock weighing 10. newtons is lifted a vertical distance of 8 meters?

(A) 18 J
(C) 80 J
(B) 2 J
(D) 800 J

3167. A cart weighing 20 newtons is pushed 10 meters on a level surface by a force of 5 newtons. How much work was done on the cart?

(A) 15 J
(C) 100 J
(B) 50 J
(D) 200 J

2357. A wave which has a frequency of 20.0 cycles per second travels with a speed of 100 meters per second. What is the wavelength of this wave?

(A) 0.200 m (C) 20.0 m
(B) 5.00 m (D) 2.000 m

2395. Waves are traveling with a speed of three meters per second toward *P* as shown in the diagram.

If four crests pass *P* in one second, the wavelength is

(A) 1 m (C) 3 m
(B) 6 m (D) 9 m

2512. The frequency of a wave is 2.0 cycles per second, and its speed is 0.04 meter per second.

The wavelength of the wave is

(A) 1.0 m (C) 0.08 m
(B) 0.02 m (D) 4.0 m

2536. If the frequency of a wave is increased while its velocity remains constant then its wavelength will

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

2644. A wave traveling at 50,000 meters per second has a wavelength of 25 meters. What is the frequency of the wave?

(A) 1,250,000 Hz (C) 50,000 Hz
(B) 2,000 Hz (D) 5,000 Hz

2753. The speed of a transverse wave in a string is 12 meters per second. If the frequency of the source producing this wave is 3.0 hertz, what is its wavelength?

(A) 0.25 m (C) 36 m
(B) 2.0 m **(D) 4.0 m**

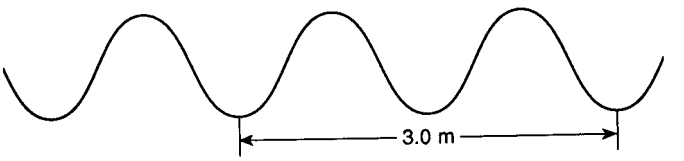
2836. What is the wavelength of a 30.-hertz periodic wave moving at 60. meters per second?

(A) 0.50 m (C) 20. m
(B) 2.0 m (D) 1,800 m

2949. Sound waves with a constant frequency of 250 hertz are traveling through air at STP. What is the wavelength of the sound waves?

(A) 0.76 m (C) 250 m
(B) 1.3 m (D) 83,000 m

2857.



The periodic wave in the diagram below has a frequency of 40. hertz.

What is the speed of the wave?

(A) 13 m/s **(C) 60. m/s**
(B) 27 m/s (D) 120 m/s

2992. A wave has a frequency of 2.0 cycles per second and a velocity of 5.0 meters per second. The distance covered by the wave in 5.0 seconds is

(A) 30. m (C) 7.5 m
(B) 9 m (D) 6.0 m

3011. It takes 1 second for a sound wave to travel from a source to observer *A*. How long does it take the same sound wave to travel in the same medium to observer *B*, who is located twice as far from the source as observer *A*?

(A) ¼ s (C) ½ s
(B) 2 s (D) 4 s

3090. A wave has a frequency of 200 vibrations per second and a speed of 100 meters per second. The wavelength is

(A) 1 m (C) 3 m
(B) 2 m **(D) 0.5 m**

3145. The frequency of a wave with a velocity of 30. meters per second and a wavelength of 5.0 meters is

(A) 150 Hz **(C) 6.0 Hz**
(B) 25 Hz (D) 5.0 Hz

3146. What is the velocity of a water wave that travels a distance of 10. meters in 5.0 seconds?

(A) 5.0 m/s (C) 15 m/s
(B) 2.0 m/s (D) 50. m/s

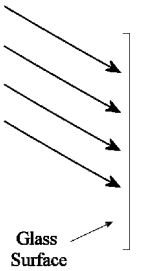
3150. The rate at which a wave travels from one point to another determines the wave's

(A) frequency (C) amplitude
(B) period **(D) velocity**

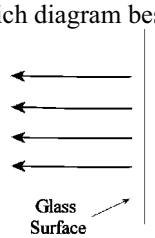
3159. If the velocity of a constant-frequency wave increases, the wavelength

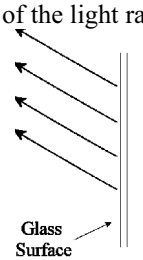
(A) decreases (C) remains the same
(B) increases

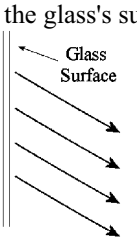
3235. The diagram below shows light rays striking a flat pane of glass.

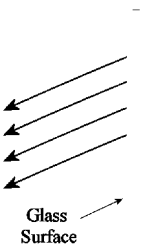


Which diagram best shows the path of the light rays take after striking the glass's sufface?

(A)


(B)


(C)


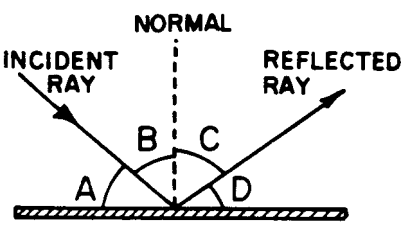
(D)


2478. A light ray is incident upon a plane mirror. If the angle of incidence is increased, the angle of reflection will

(A) decrease (C) remain the same

(B) increase

2673.



A ray is reflected from a surface as shown in the diagram below. Which letter represents the angle of incidence?

(A) *A* (C) *C*

(B) *B* (D) *D*

2726. When a light ray is reflected from a surface, compared to the angle of incidence, the angle of reflection is

(A) less **(C) the same**

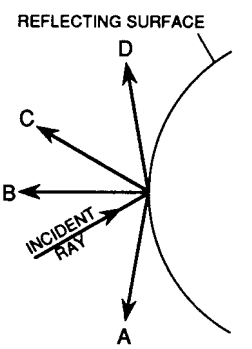
(B) greater

2780. A ray of light strikes a mirror at an angle of incidence of 60º. What is the angle of reflection?

(A) 0º **(C) 60º**

(B) 30º (D) 90º

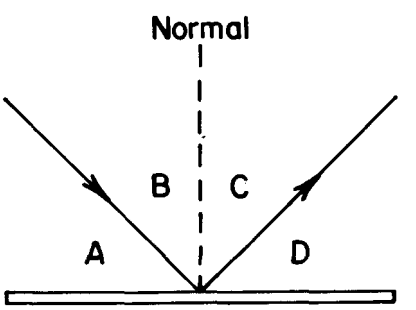
2824. A light ray is incident upon a cylindrical reflecting surface as shown in the diagram at the right. The ray will most likely be reflected toward letter



(A) *A* **(C) *C***

(B) *B* (D) *D*

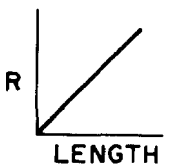
3063. The diagram below shows a ray of light being reflected from a plane mirror. Which letter indicates the angle of reflection?

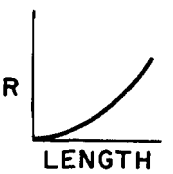


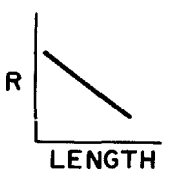
(A) *A* **(C) *C***

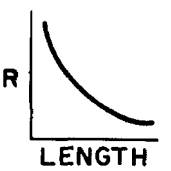
(B) *B* (D) *D*

2360. To reduce the resistance of a metal conductor one should
(A) cool the conductor to a low temperature
(B) heat the conductor to a high temperature
(C) coat the conductor with an insulator
(D) wire the conductor in series with another resistor

2377. Which diagram best represents the relationship between the length of a metal conductor and its resistance ?
(A)


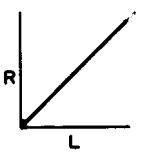
(C)


(B)


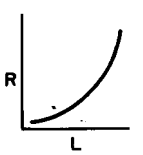
(D)


2385. As the temperature of a coil of copper wire increases, its electrical resistance
(A) decreases
(C) remains the same
(B) increases

2403. Which graph best represents the relationship between the resistance (R) of a solid conductor of constant cross section and its length (L) ?
(A)


(C)


(B)


(D)


2448. As the temperature of the metal filament of an electric light bulb increases, the resistance of the filament
(A) decreases
(C) remains the same
(B) increases

2473. A uniform copper wire has a resistance of 100 ohms. If the wire is cut into 10 equal lengths, the resistance of each piece will be
(A) 1 Ω
(C) 100 Ω
(B) 10 Ω
(D) 1,000 Ω

2504. A piece of wire has a resistance of 8 ohms. A second piece of wire of the same composition, diameter, and temperature, but one-half as long as the first wire, has a resistance of
(A) 8 Ω
(C) 16 Ω
(B) 2 Ω
(D) 4 Ω

2539. As the temperature of a metal conductor is reduced, the resistance of the conductor will
(A) decrease
(C) remain the same
(B) increase

2571. If the cross-sectional area of a fixed length of wire were decreased, the resistance of the wire would
(A) decrease
(C) remain the same
(B) increase

2572. If the temperature of a metal conductor is reduced, its resistance will
(A) decrease
(C) remain the same
(B) increase

2655. If the length of a copper wire is reduced by half, then the resistance of the wire will be
(A) halved
(C) quartered
(B) doubled
(D) quadrupled

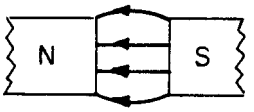
2817. If the diameter of a wire were to increase, its electrical resistance would
(A) decrease
(C) remain the same
(B) increase

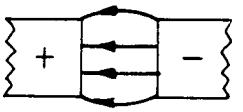
2873. A copper wire is connected across a constant voltage source. The current flowing in the wire can be increased by increasing the wire's
(A) cross-sectional area
(C) resistance
(B) length
(D) temperature

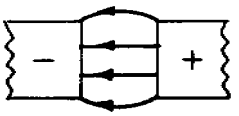
2899. The electrical resistance in a circuit can be decreased by
(A) replacing the existing wire with a thicker wire of the same length
(B) replacing the existing wire with a longer wire of the same thickness
(C) increasing the temperature of the existing wire
(D) increasing the voltage supplied by the battery

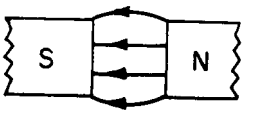
2971. A metal conductor is used in an electric circuit. The electrical resistance provided by the conductor could be increased by
(A) decreasing the length of the conductor
(B) decreasing the applied voltage in the circuit
(C) increasing the temperature of the conductor
(D) increasing the cross-sectional area of the conductor

2651. The magnetism is caused by the motions of
(A) nucleons (C) neutrons
(B) protons **(D) electrons**

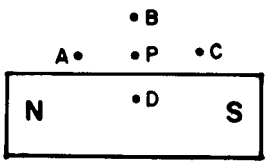
2677. Which diagram below best represents a magnetic field?
(A) 

(C) 

(B) 

(D) 

2722. The diagram below represents a bar magnet.



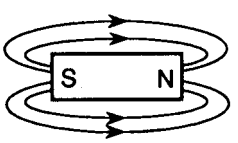
The direction of the magnetic field at point *P* is toward point
(A) *A* **(C) *C***
(B) *B* (D) *D*

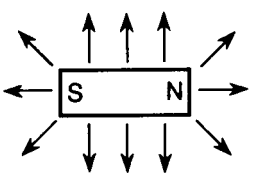
2806. Which diagram best represents the magnetic field between two magnetic north poles?
(A) 

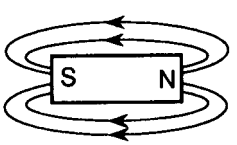
(C) 

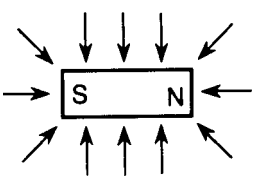
(B) 

(D) 

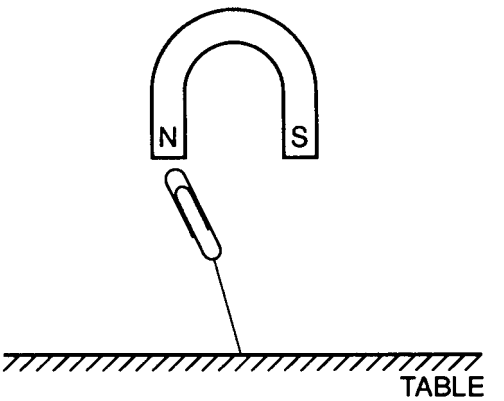
2902. Which diagram below best represents the magnetic field near a bar magnet?
(A) 

(C) 

(B) 

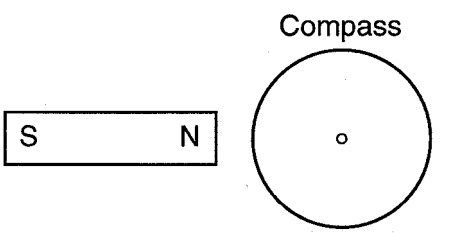
(D) 

2854. In the diagram below, a steel paper clip is attached to a string, which is attached to a table. The clip remains suspended beneath a magnet.



As the magnet is lifted, the paper clip begins to fall as a result of
(A) an increase in the potential energy of the clip
(B) an increase in the gravitational field strength near the magnet
(C) a decrease in the magnetic properties of the clip
(D) a decrease in the magnetic field strength near the clip

2929. The diagram below shows a compass placed near the north pole, *N*. of a bar magnet.



Which diagram best represents the position of the needle of the compass as it responds to the magnetic field of the bar magnet?
(A) 

(C) 

(B) 

(D)