

The mass of Peri, who rides a bike with a mass of 10 kg on a horizontal road, is 30 kg.



Since the bike travels 4 meters per second, how many joules is the total kinetic energy of the bike and Peri? (ignore the effects of frictional forces)

- A) 480
- B) 360
- C) 320
- D) 160

The energy values of some foods are given on the figure.



100 g Chocolate
50 kJ



100 g Soda
25 kJ

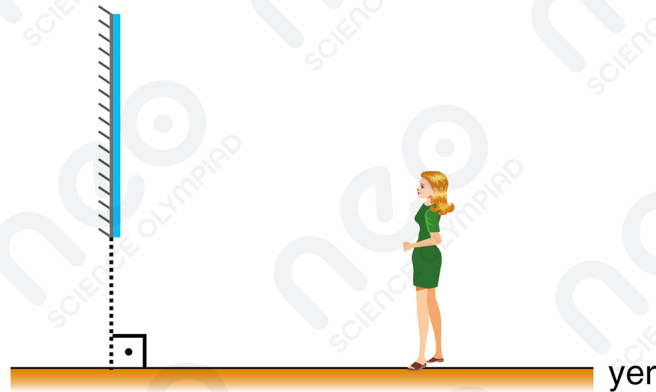


100 g Cake
100 kJ

How many hours does Yaman, who spends 50 kJ energy in a 30-minute run, need to run in order to get the energy same as when he consumes 150 grams of cake, 100 grams of chocolate, and 200 grams of soda?

- A) 2
- B) 2,5
- C) 3
- D) 3,5

Mari is looking at the plane mirror hanging on the wall as shown in the figure.



Which of the following statements is correct?

- I. If Mari approaches the mirror, the part she sees on her body increases.
- II. If the plane mirror is lifted up a little, the area Mari sees on her body does not change.
- III. If the plane mirror is lowered a little downward, the area she sees on Mari's body increases.

A) Only I

B) Only II

C) Only III

D) I and II



Which of the heat transfer method(s) is/are used in obtaining images with thermal cameras?

- I. Convection
- II. Conduction
- III. Radiation

- A) Only I
- B) Only II
- C) Only III
- D) I, II and III

Which of the following statement(s) about the transfer of heat is/are correct?

- I. Transfer of heat by convection is only seen in liquid and gaseous substances.
- II. The transfer of heat by conduction occurs in solid and liquid substances.
- III. A material medium is required for the transfer of heat by convection and radiation.

- A) Only I
- B) Only II
- C) II and III
- D) I, II and III

“While a group of students were watching a video, they realized that a waiter was quickly pulling the table cover with plates and glasses on it, however the plates and glasses were not coming with the cover, but remained still on the table without breaking.”

Accordingly, which of the following makes the items stay on the table?

- A) Inertia
- B) Action-reaction force
- C) Friction force
- D) Acceleration

A conductor with resistance R has a length of L and a cross-sectional area of S . Which of the following statements(s) about the conductor is/are correct?

- I. If the length of the conductor is doubled, its resistance becomes $2R$.
- II. If the cross-sectional area of the conductor is halved, its resistance becomes $2R$.
- III. If the length and cross-sectional area of the conductor is doubled, its resistance does not change.

- A) Only I
- B) Only II
- C) I and II
- D) I, II and III

In a house, the iron is used for one hour, the washing machine is run for five hours and the kettle is run for 10 hours in a week. The power consumption of electrical household appliances per hour is given on the figure.



1000W



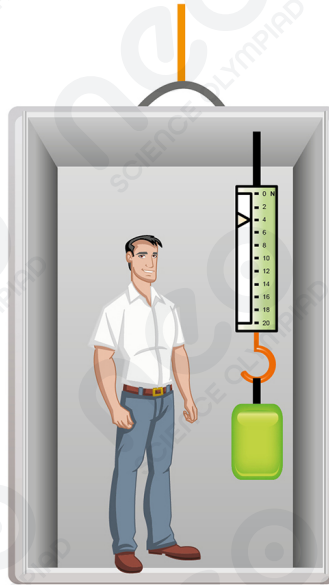
2000W



1200W

How many kW-hours of energy do the electrical devices in this house consume in a month?

- A) 80
- B) 72
- C) 48
- D) 36

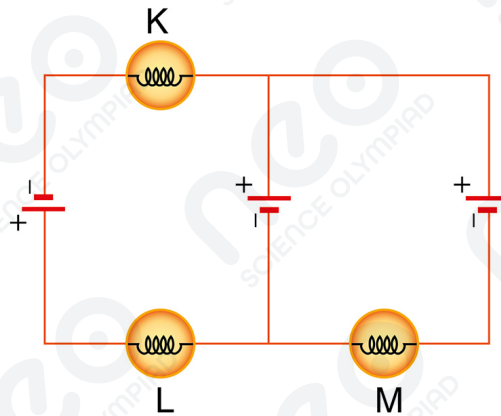


The figure above shows an object weighing 5 kg, hanging from the ceiling of the elevator with the help of a dynamometer and a rope. ($g=10 \text{ m/s}^2$) (effects of all frictional forces (e.g air resistance) are ignored)

Accordingly, which of the following statements is false?

- A) While the elevator is moving downward at a constant speed, the value indicated by the dynamometer is equal to the weight of the object.
- B) If the elevator moves downward with an acceleration of 10 m/s^2 , the dynamometer shows zero
- C) If the elevator moves upwards with a constant speed, the value indicated by the dynamometer will be greater than the weight of the object.
- D) When the elevator is stationary, the value indicated by the dynamometer is equal to the weight of the object.

The luminous intensity of K, L, M lamps are I_K , I_L , I_M in the circuit that is established with identical lamps and batteries with insignificant internal resistances.



Accordingly, what is the relationship between I_K , I_L , I_M ?

- A) $I_K > I_L > I_M$
- B) $I_K = I_L > I_M$
- C) $I_M > I_K = I_L$
- D) $I_L > I_K > I_M$

In an amusement park, two brothers Denis ($m = 50 \text{ kg}$) and Sam ($m = 30 \text{ kg}$) are driving 30 kg colliding cars separately. Denis's car moves at a speed of 3 m/s and collides head-on with Sam's car moving in the opposite direction at 2 m/s .



After the collision, since Denis's car is going backward with a speed of 1.5 m/s , what is the speed of Sam's car going backward after the collision?

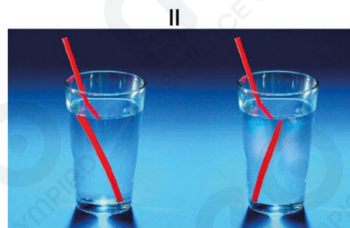
A) 2 m/s

B) 4 m/s

C) 6 m/s

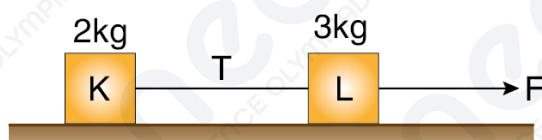
D) 8 m/s

Which of the following phenomena seen in nature is related to diffraction?



- A) I B) II C) III D) IV

The objects K and L have masses 2 and 3 kg, respectively. They are being pulled in one direction with F force on a frictionless horizontal surface.

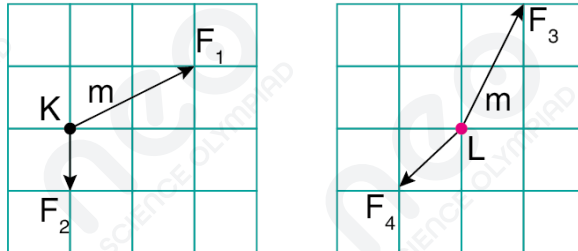


- I. K and L have equal acceleration.
- II. Magnitude of F is greater than that of T.
- III. When Kinetic energies compared $E_L > E_K$

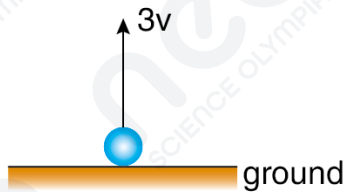
Which one(s) of statements above is/are true about the motion of the objects?

- A) Only I B) Only II
C) I and II D) I, II and III

Objects, K and L, which are on horizontal plane have equal masses. According to this diagram given, what is the ratio of a_K to a_L $\frac{a_K}{a_L}$?



- A) 1 B) 2 C) $\frac{3}{2}$ D) $\frac{5}{2}$



In a frictionless environment, the object thrown vertically upwards with a speed of $3v$ falls to the ground after the time of $6t$. If the object has kinetic energy E after the time of $4t$;

Which of the statements below are correct?

- I. The potential energy of the object at maximum height is $9E$.
- II. Its mechanical energy is $9E$.
- III. Potential energy of object after the time of $2t$ is $8E$.

- A) I and III B) I and II
C) II and III D) I, II and III

On a day when the air temperature is -5°C , a lake with a vertical section as in the figure freezes from the top.



Accordingly, which of the following statements are correct?

- I. The density of water at point M is the greatest.
- II. The temperature of the water at point L is between 0°C and $+4^{\circ}\text{C}$.
- III. The water temperature at point K is 0°C .
- IV. The water temperature at point M is $+4^{\circ}\text{C}$.

A) I, II and III

B) II, III and IV

C) III and IV

D) I, II and IV

The graph shows the electric current passing through the K, L, M conductors and the potential difference between the ends of the conductor as in figure I.

X and Y circuits are set up using K, L, M conductors as in figure-II

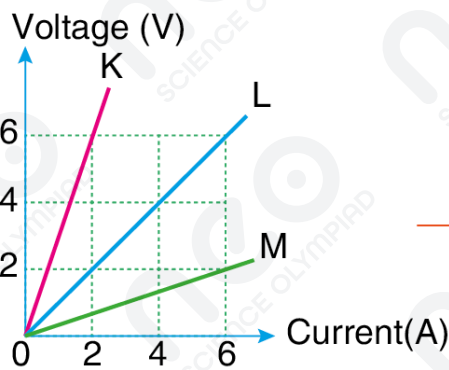


Figure-I

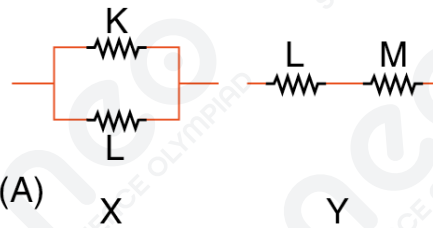
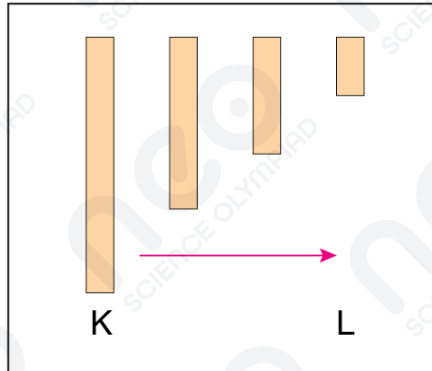


Figure-II

Since the equivalent resistances of the X and Y circuits are R_X and R_Y , What is the ratio of R_X / R_Y ?

- A) 16/9 B) 9/16 C) 1 D) 1/2

Mary begins to play the musical instrument that her father brought as a gift



She hits the metal rods from K to L with the same force with the mallet in her hand.

If the thickness of the metal rods are the same, which of the following statement(s) is/are correct?

- I. The speed of sound decreases from K to L.
- II. The frequency of the sound increases from K to L.
- III. The sound from K to L becomes high pitched

- A) Only I
- C) Only III

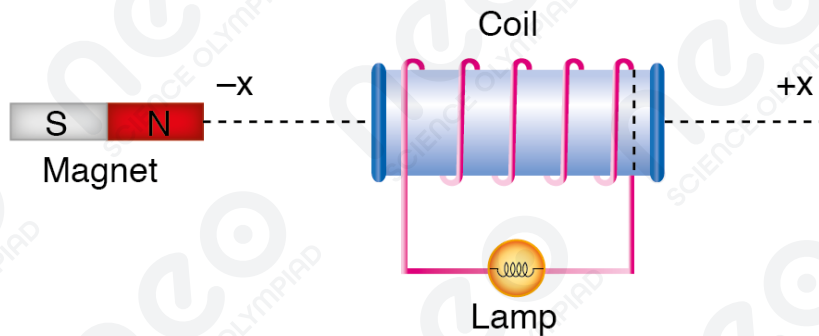
- B) Only II
- D) II and III

As shown in the figure, the ambulance moves at a constant speed with its siren on that has a wavelength, λ .



What can be said for the wavelength of the sound heard by Paul and Alexander?

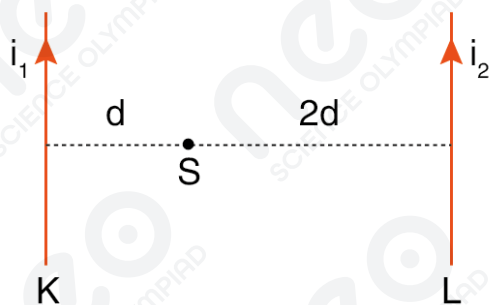
	What Paul heard	What Alexander heard
A)	greater than λ	smaller than λ
B)	greater than λ	greater than λ
C)	smaller than λ	greater than λ
D)	smaller than λ	smaller than λ



Which of the following should be done alone for the lamp to give light?

- I. Only magnet must be pulled in the + x direction.
- II. Only the coil should be pulled in the + x direction.
- III. Magnet must be pulled in the -x direction and coil must be pulled in the + x direction.

- A) I or II or III
- B) I or II
- C) I or III
- D) II or III



Currents i_1 and i_2 pass through parallel linear wires K, L shown in the figure.

(The wires are in the same plane)

If the resultant magnetic field created by the wires at the S point is zero; which of the following statements are correct?

- I. i_2 current intensity is greater than i_1 .
- II. If the wire L is brought closer to the point S, the direction of the resultant magnetic field is out of page
- III. If the i_1 current intensity is increased, The direction of the resultant magnetic field intensity at point S becomes out of page.

A) I and II

B) II and III

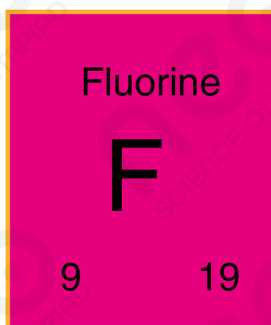
C) I and III

D) I, II and III

Valence electrons are electrons that can participate in the formation of a chemical bond.

What is the meaning of number of valence electron?

- A) Number of electrons
- B) Number of electrons in the nucleus
- C) Number of electrons in inner shell
- D) Number of electrons in outer most shell



Compounds of fluorine, including sodium fluoride, are used in toothpaste and in drinking water to prevent dental cavities. Hydrofluoric acid can dissolve glass and is used to etch the glass in light bulbs and in other products.

Which one of the following is the correct Lewis symbol of Fluorine atom?

- A) $\cdot\ddot{\text{F}}\cdot$ B) $\cdot\ddot{\text{F}}\cdot$ C) $\cdot\ddot{\text{F}}\cdot$ D) $\cdot\ddot{\text{F}}\cdot$

Hydrogen H 1 1	Carbon C 6 12	Oxygen O 8 16
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Ethanol, $\text{CH}_3\text{CH}_2\text{OH}$, is an important industrial chemical. It is used as a solvent in the synthesis of other organic chemicals. Ethanol is also the ingredient of many alcoholic beverages such as wine, and distilled spirits.

What is the relative molecular mass of ethanol?

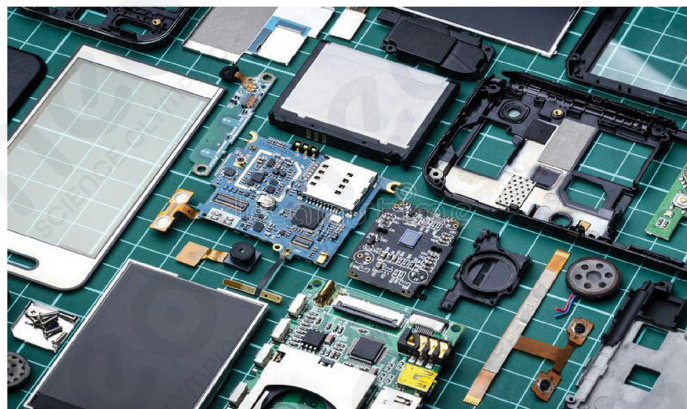
- A) 46 B) 92 C) 23 D) 8

A chef buys some groceries to make pickles and fried chicken for his restaurant menu. He bought cooking oil, mineral water, cooking gas (butane) and vinegar.

Which of these items has the lowest boiling point?

- A) Cooking oil
B) Mineral water
C) Cooking gas
D) Vinegar

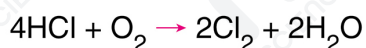
Gallium is one of the main components for producing semiconductor. This semiconductor could be found in many electronic devices such as mobile phones. Gallium occurs naturally in two isotopes, gallium-69 and gallium-71 in the ratio of 3:2 respectively.



What is the relative atomic mass of gallium?

- A) 69.8 B) 70.2 C) 140.0 D) 28.0

Based on the following balanced equation:



How many litres of chlorine gas is produced when 0.35 L of hydrochloric acid reacts with excess oxygen at standard temperature and pressure?

- A) 0,175 L
B) 0,35 L
C) 2,0 L
D) 175 L

Nitrogen	
N	
7	14

Nitrogen is a very important element for living organisms. It's a part of the structure of proteins and nucleic acids.

In which compound does nitrogen have a reducing property?

- A) HNO_3 B) NH_3 C) NO D) N_2O_3

The electron arrangement of an atom is related to its position in the Periodic Table. The electronic configurations of four elements are shown on the table below.

Element	Number of electrons		
	Shell 1	Shell 2	Shell 3
X	2	8	1
Y	2	8	3
Z	2	8	5
T	2	8	8

Which element is an alkali metal?

- A) T B) Z C) Y D) X



Titration between strong base of HCl and strong acid of NaOH involved neutralisation process which produce water and aqueous NaCl. This process required internal indicator of phenolphthalein as an endpoint which give the mark that the reaction is completed.

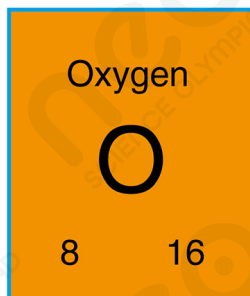
What is the colour change when the titration reaches the endpoint?

- A) Colourless to strong pink
- B) Colourless to light pink
- C) Light pink to colourless
- D) No changes

A polar molecule is a chemical species in which the distribution of electrons between the covalently bonded atoms is not even.

Which one of the following molecules is polar?

- A) H_2
- B) O_2
- C) CH_4
- D) H_2O



The relationship between mole number(n) and mass is given below.

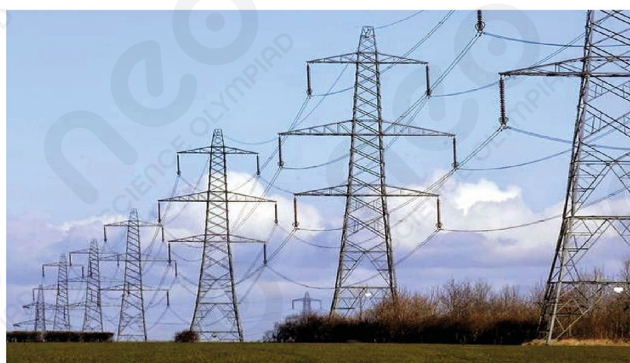
$$n = m/M_m$$

m : mass (g) M_m : Molar mass (g/mole).

How many moles are there in 16g oxygen gas?

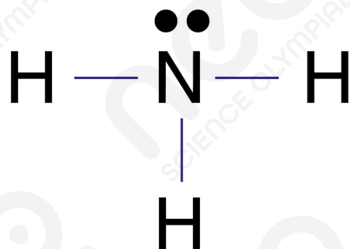
- A) 0,5 mol B) 1 mol C) 2 mol D) 4 mol

Metals have shiny colour and they are good conductor of heat and electricity.



Which one does not conduct electricity?

- A) Cu B) S C) Na D) Au



Ammonia (NH₃) is one of the very dangerous toxic gases. If high concentrations of ammonia are inhaled, the victim may burn the mucosa of the nose, throat, respiratory failure and may die in just a few minutes if not given immediate emergency. At room temperature, the colourless, pungent ammonia gas easily dissolves in water and is lighter than air.

Suggest the molecular geometry of NH₃ based on the Lewis structure shown above:

- A) Trigonal planar
- B) Trigonal bipyramidal
- C) Trigonal pyramidal
- D) Tetrahedral

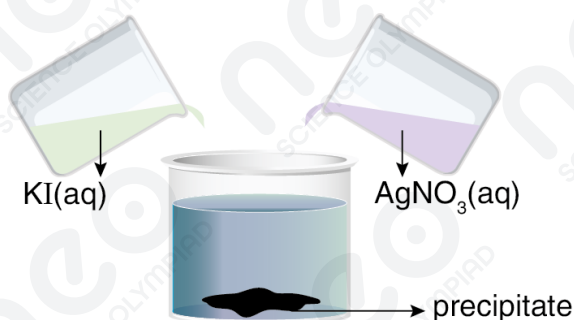


Corrosion can be defined as the breakup of materials due to environmental effects and becoming unusable. This term is mostly used for metals as they lose their metallic properties. Bridges and buildings can collapse and pipelines can be damaged by corrosion.

Which of the following metals has the highest corrosion resistance?

- A) Fe
- B) Au
- C) Cu
- D) Ag

When solutions are mixed, different ions are introduced into the same solution. If any two of these ions form an insoluble salt, they will combine and form a solid at the bottom of the solution. The formation of a solid from a solution is called precipitation. And the solid itself is called precipitate.

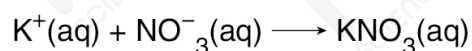


When the aqueous solutions of the KI and the AgNO₃ are mixed in a different container, a solid is observed at the bottom.

For this experiment;

I. KI and AgNO₃ do not react with each other.

II. One net ionic equation for this reaction is



III. AgI is the only insoluble product for this reaction

Which ones of the above are correct?

A) Only III

B) I and II

C) I and III

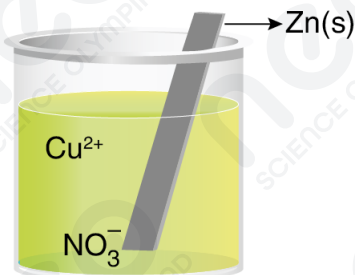
D) II and III

- The reaction of substances with oxygen gas is a combustion reaction. All of them are exothermic, except the reaction with nitrogen gas.
- In a synthesis reaction, multiple reactants combine to form a single product and the reverse process is the analysis reaction
- Reactions of acidic and basic substances usually form salt and water.
- A precipitation reaction is a reaction in which substances in solution are mixed and produce an insoluble product.

According to the information above, which one of the following reactions is classified incorrectly?

	Type of reaction
A) $2\text{CO}_{(g)} + \text{O}_{2(g)} \rightarrow 2\text{CO}_{2(g)}$	Combustion
B) $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$	Acid-Base
C) $\text{NH}_{3(g)} + \text{HCl}_{(g)} \rightarrow \text{NH}_4\text{Cl}_{(s)}$	Synthesis
D) $\text{N}_2 + \text{O}_2 \rightarrow 2\text{NO}$	Precipitation

In the system shown above, Zn(s) rod wears out when it is dipped into the aqueous solution of $\text{Cu}(\text{NO}_3)_2$.



According to the given information,

- I. Zn metal is more active than Cu.
- II. The reaction of $\text{Zn}^{2+}(\text{aq}) + \text{Cu}^0(\text{s}) \longrightarrow \text{Zn}^0(\text{s}) + \text{Cu}^{2+}(\text{aq})$ occurs spontaneously.
- III. The ion concentration of NO_3^- in the solution does not change.

which one(s) of the above is/are correct?

- | | |
|--------------|---------------|
| A) Only I | B) I and II |
| C) I and III | D) II and III |



Silicon dioxide, SiO_2 , is the stable compound of silicon. It has a similar structure and hardness to diamond. It is the main component of quartz glass and is used to manufacture laboratory glassware and various lenses.

- I. It is often called silica
- II. It has a giant covalent structure
- III. Each silicon atom forms 2 covalent bonds with oxygen atoms
- IV. Each silicon atom forms 4 covalent bonds with oxygen atoms

Which ones of the above are correct for SiO_2 ?

- | | |
|------------------|-----------------|
| A) I and III | B) I and IV |
| C) I, II and III | D) I, II and IV |

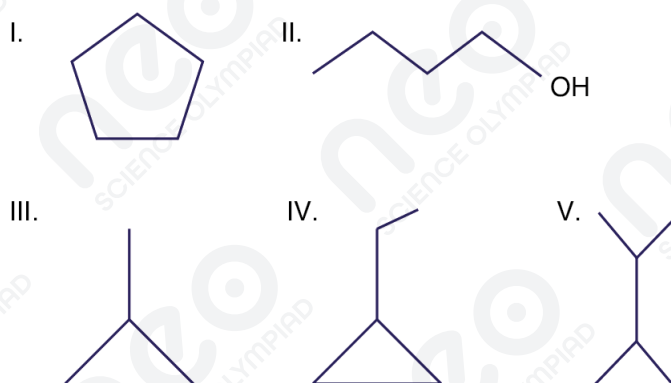
The conductivity in aqueous solutions is a measure of the ability of water to conduct electricity. The more ions there are in the solution, the higher its conductivity
According to the information above and at the same temperature;

- I. 0.4mol NaCl is dissolved in 200 mL water.
- II. 0.2mol of AlCl_3 dissolved in 100 mL of water.
- III. 0.4mol $\text{C}_6\text{H}_{12}\text{O}_6$ is dissolved in 100 mL of water.
- IV. 0.2mol $\text{Fe}_3(\text{PO}_4)_2$ dissolved in 200 mL water.

Which option is correct for the electrical conductivity of the solutions given above?

- A) I>II>III>IV
- B) II>IV>I=III
- C) II>IV>I>III
- D) III>IV>I=II

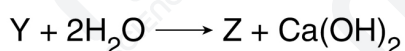
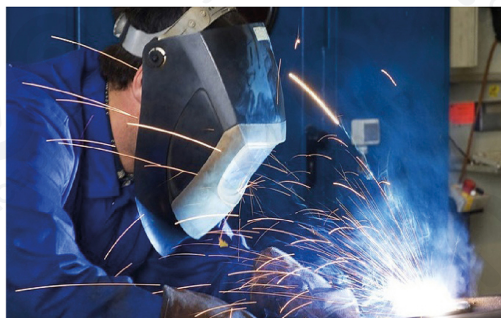
In a skeletal formula, all hydrogen atoms are removed from the carbon chains, leaving only a carbon skeleton with functional groups attached to it. It is a simplified form of the displayed formula.



Which of the compounds with the same skeletal formulas is exposed when those with an equal number of carbons (C) are paired?

- A) V
- B) IV
- C) III
- D) II

Compound Z is produced for various industrial and commercial purposes. It is mainly manufactured for chemical synthesis. The second most common application of Z is welding and cutting.



In the consecutive equation given above which one is the compound Z?

- A) C_2H_4
- B) C_2H_2
- C) CH_4
- D) C_2H_6

The structure of an atom is defined by the proton number and the nucleon (mass) number.

What is the electron number of an atom with proton (atomic) number 11 and nucleon (mass) number 23?

- A) 11
- B) 12
- C) 22
- D) 23

Which of the following statements regarding the human influence on ecosystems is incorrect?

- A) Agricultural activities prevent the cycling of nutrient elements in biogeochemical cycles.
 - B) Due to removal of nutrients from agricultural ecosystems, large supplements of nutrients are needed.
 - C) Nitrogen fixation by industrial processes is necessary.
 - D) Nutrients in fertilizer pollute groundwater.
-

How do most fossils form?

- A) Living things die and their remains are buried by sediments.
 - B) The hard parts of an organism dry out in the air.
 - C) The soft parts of an organism change to stone.
 - D) Freezing preserves the remains of an organism
-

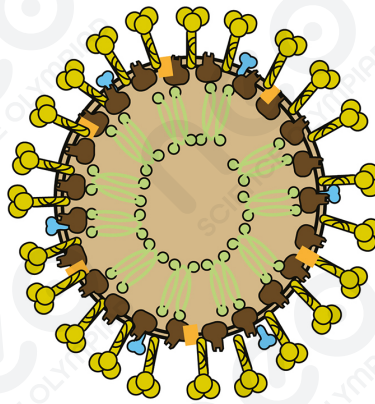
The geologic time scale is a record of

- A) the thickness of sedimentary rock layers.
 - B) the rate of fossil formation.
 - C) the life forms and geologic events in Earth's history.
 - D) the time since the evolution of dinosaurs.
-

Most biological macromolecules are made by the polymerization of small principal components. The major structural polysaccharide of the insect exoskeleton is a polymer. Which of the following statements regarding this kind of polysaccharide is NOT correct?

- A) This polymer can also be found in the cell wall of fungi.
- B) It contains C, H, O and N atoms.
- C) Its structure is similar to that of cellulose.
- D) It is made by polymerization of fructose.

Why is it difficult to develop vaccines for Coronavirus?

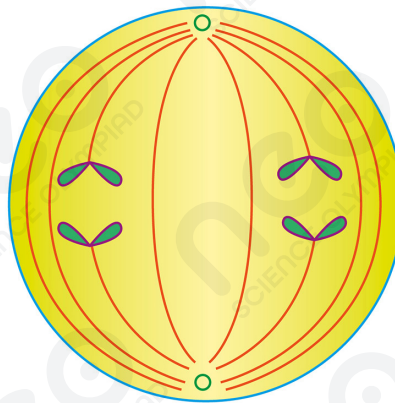


- A) Their small size evades the immune system
- B) RNA mutates more frequently than DNA
- C) The capsid of Coronaviruses is resistant
- D) Vaccines can only target blood-borne pathogens



What is the “greenhouse effect?”

- A) Greenhouse gases trap Carbon Dioxide and warm the earth.,
- B) Greenhouse gases trap carbon dioxide so plants can grow.
- C) Greenhouse gases trap infrared radiation and warm the earth.
- D) Greenhouse gases trap in UV radiation and warm the earth.



What phase is shown in the picture?

- A) anaphase 1
- B) anaphase 2
- C) metaphase 1
- D) telophase 1



What part of the skeletal system consists of the shoulder girdle, pelvic girdle, upper and lower limbs?

- A) Systematic
- B) Vertebral
- C) Axial
- D) Appendicular

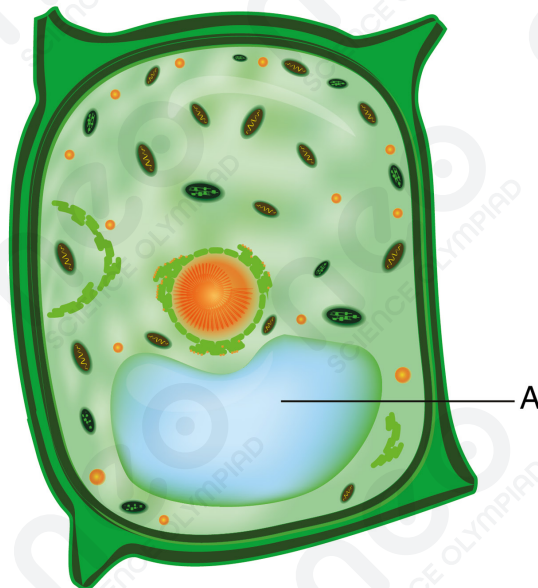
How is the rate of transpiration changed by increasing temperature and by decreasing humidity?

	Increasing temperature	decreasing humidity
A)	faster	faster
B)	slower	faster
C)	faster	slower
D)	slower	slower

The organelles that clean plant and animal cells by using chemicals to break down food and worn out cell parts are _____.

- A) lysosomes
- B) mitochondria
- C) nucleolus
- D) cell wall

What is the function of organelle that is labeled by letter A



- A) control cell activities
- B) digest big molecules
- C) produce energy
- D) store nutrition or waste products

..... is also known as fruit sugar.

- A) Fructose
- B) Maltose
- C) Glucose
- D) Lactose

Which of the following groups would contain the largest number of organisms?

- A) Class
- B) Order
- C) Phylum
- D) Family

Which of the following are a method bacteria use for genetic recombination?

- I. Conjugation
 - II. Transformation
 - III. Transduction
- A) Only I
 - B) Only II
 - C) I and III
 - D) I, II and III

Which of the following do plants need for photosynthesis?

- A) CO_2 , O_2
 - B) Sugar, CO_2
 - C) O_2 , Sunlight, and H_2O
 - D) CO_2 , H_2O and Sunlight
-

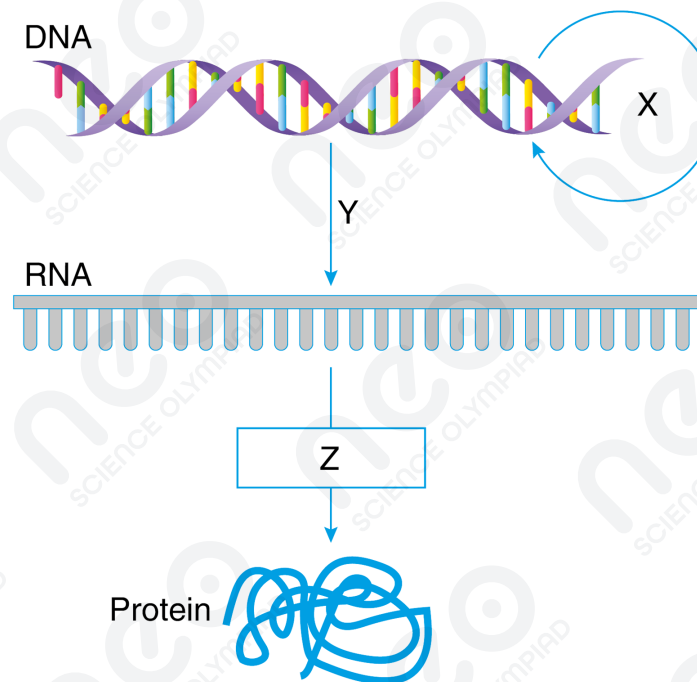
Which stage of cellular respiration produces the least ATP?

- A) Pyruvate oxidation
 - B) Krebs cycle
 - C) Glycolysis
 - D) Oxidative phosphorylation
-

Which are characteristics of a species?

- I. The potential to interbreed to produce fertile offspring
 - II. The formation of a population with members of the same species within a community
 - III. The overproduction of offspring
- A) I and II only
 - B) I and III only
 - C) II and III only
 - D) I, II and III
-

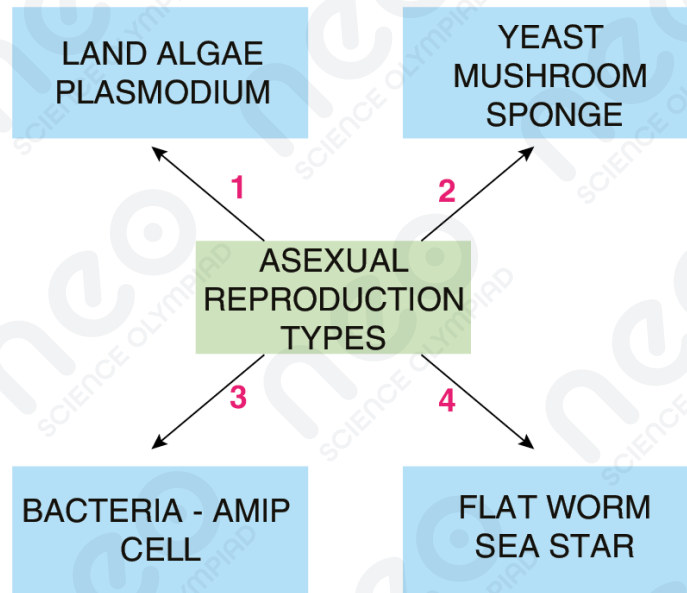
A diagram of a cellular process is shown below. Which of the following identifies the process shown at point Y?



- A) Transcription
- B) Translocation
- C) Replication
- D) Translation

Why are antibiotics ineffective against viruses?

- A) Viruses do not contain RNA.
- B) Viruses have no metabolism.
- C) Viruses are protected by a protein shell.
- D) Viruses mutate at a high rate.



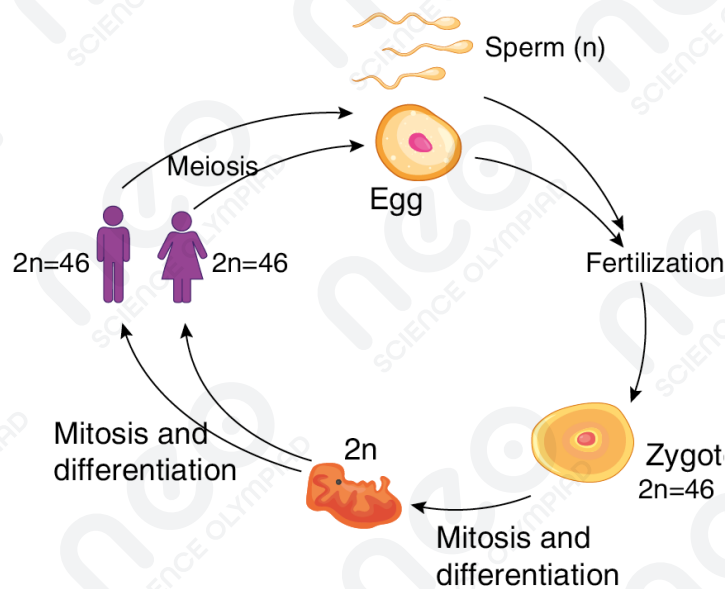
Some of the asexual reproduction types and some living things with these asexual reproduction types are given above in the concept map.

- I. The first event is reproduction with spores and formation of resistant individuals.
- II. The second event can also be seen in prokaryotic creatures.
- III. The third event involves cleavage and it can also be seen in eukaryotic organisms.
- IV. The fourth event is reproduction with regeneration and is inversely proportional to the development level of the creature.

Which of the ideas is/are correct?

- | | |
|-------------|---------------|
| A) I and II | B) II and III |
| C) Only III | D) III and IV |

The human life cycle is shown in the figure below.



Which of the following ideas about the given life cycle is correct?

- I. During sexual reproduction, a large number of different gametes are formed genetically by meiosis.
- II. In development with mitosis, hereditary diversity increases while chromosome number remains constant.
- III. Each gamete formed as a result of meiosis carries one of the chromosome pairs carried by the ancestral individual.

- A) Only I B) Only II
C) Only III D) I and III