

- Which of the following statement is correct regarding biological molecules?
 - Molecular mass of those are always between $10^4 - 10^{10}$.
 - C, H, O are definitely included in all biological molecules.
 - The most abundant group of biological molecules on earth is nucleic acids.
 - H : O atomic ratio is always 2 : 1 in biological molecules.
- Following are few respiratory structures found in the animal kingdom.
 - body covering
 - external gills
 - internal gills
 - tracheal systems
 - lungs

The correct sequence of animals bearing above respiratory structure is,

- flatworm, tadpole, crab, bee, dolphin.
 - earthworm, crab, tuna, cockroach, mynah.
 - tapeworm, tadpole, scorpion, bee, man.
 - tuna, crab, earthworm, cockroach, horse.
- Chemoautotrophs,
 - use solar energy as energy source.
 - use CO_2 as carbon source.
 - absorb energy in wave length of visual spectrum by chlorophyll pigments.
 - are always green plants.
 - Which of the following is incorrect regarding body coverings of animals?
 - In earthworms, it acts as a respiratory surface.
 - In insects, it prevents desiccation.
 - In man, it synthesizes vitamin A.
 - In tapeworms, it absorbs nutrients.
 - Black eye colour in humans is dominant over grey eye colour. A son with grey eyes was born to a couple with black eyes. What is the probability of having next baby with grey eyes?
 - $\frac{1}{2}$
 - $\frac{1}{4}$
 - $\frac{3}{4}$
 - $\frac{1}{8}$
 - Which of the following would not lead to extinction of biodiversity?
 - Global climatic changes.
 - Genetic erosion due to popularity of crop plants.
 - Accumulation of environmental pollutants.
 - Increased rate of evolution due to geographical changes.
 - Select the incorrect combination of air pollutant and the effect.

Air pollutant	–	Effect
(A). Nitrogen dioxide	–	acid rain
(B). Carbon dioxide	–	photo chemical smog
(C). CFC	–	ozone layer depletion
(D). Methane	-	Global warming
 - Biochemical analysis of a DNA sample showed that 30% was Guanine. What is the percentage of Thymine in that sample?
 - 10%
 - 20%
 - 40%
 - 30%
 - Which bond type is involved in keeping the α - helix structure of a polypeptide?
 - peptide bonds
 - disulfide bonds
 - hydrogen bonds
 - ionic bonds

10. Water possesses specific properties important for life. Few properties of water and their importance for living organisms are mentioned below. Which combination is not matched?

Property	Importance
(A). polarity	- behave as a good solvent
(B). high adhesive and cohesive forces	- accent of water along the plant
(C). high specific heat capacity	- wide variation of body temperature
(D). anomalous expansion in freezing	- freezing of surface water in reservoirs in winter.

Questions 11 and 12 are based on the following experiment.

A student prepared four (04) fruit juice samples and carried out Benedict's test taking 'X' volume of each sample. Then he took another new 'X' volume from each of all juices and hydrolyzed with diluted HCl, neutralized by a diluted base and then carried out the Benedict's test. Precipitates were dried and weighed in both sets of experiments and the weights are given below.

Type of fruit juice	Weight of precipitate before hydrolyzing with HCl (mg)	Weight of precipitate after hydrolyzing with HCl (mg)
a	25	55
b	50	70
c	55	55
d	75	85

11. Out of a – e, in which one contains maximum amount of non-reducing sugars?
 (A). a (B). b (C). c (D). d
12. What is the possible non-reducing sugar type that may present in the selected fruit juice?
 (A). Lactose (B). Sucrose (C). Maltose (D). Fructose
13. Functions of few cell organelles are mentioned below;
 1. Detoxification 2. Transportation of proteins
 3. Synthesis of glycoproteins 4. Storing Ca^{++} 5. Synthesis of proteins
- Which of the following organelle combination represents their functiond 1 – 5 respectively?
 (A). smooth ER, ribosomes, Golgi complex, rough ER, peroxisomes
 (B). Golgi complex, ribosomes, rough ER, smooth ER, peroxisomes
 (C). smooth ER, Golgi complex, ribosomes, rough ER, peroxisomes
 (D). peroxisomes, rough ER, Golgi complex, smooth ER, ribosomes
14. Which statement is incorrect regarding ATP?
 (A). It is an Adenine containing nucleotide.
 (B). 30.6 kJ energy is released by the hydrolysis of all three phosphate groups in it.
 (C). It consists of ribose type pentose sugar.
 (D). ATP provides energy for the endergonic reactions take place within cells.
15. Which of the following feature is common for both prokaryotic and eukaryotic organizations?
 (A). Presence of a cytoskeleton in the cytoplasm.
 (B). Ability to fix atmospheric nitrogen
 (C). Dividing of cells by mitosis.
 (D). Storing of genetic information in DNA.

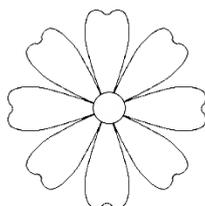
16. The water content in a lake is $2.0 \times 10^2 \text{ km}^3$. What is the volume of water in this lake in liters?
(1000 m = 1 km; 10 dm = 1m; $1 \text{ dm}^3 = 1 \text{ liter}$)
(A). $2 \times 10^{14} \text{ L}$ (B). $2 \times 10^8 \text{ L}$ (C). $2 \times 10^9 \text{ L}$ (D). $1 \times 10^{14} \text{ L}$

17. Contents of iron and oxygen in a sample containing only iron and oxygen are given below.

	Mass of sample	Mass of iron	Mass of Oxygen
Sample A	1.518 g	1.094 g	0.404 g
Sample B	1.873 g	1.335 g	0.538 g

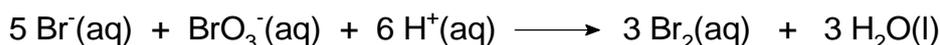
What is the correct statement about the two samples?

- (A). Both samples contain only one compound
(B). Two samples contain two different compounds
(C). Two samples contain mixtures of two compounds in different proportions
(D). Two samples do not contain the same compound
18. Assume that the number of petals in the flower given in the following diagram is equal to number molecules in one mole of a compound. Then how many atoms of oxygen are present in 50 g of CaCO_3 according to this assumption? (Atomic masses: Ca = 40; C = 12; O = 16)



- (A). 8 (B). 4 (C). 12 (D). 16
19. A sample containing only $\text{CuSO}_4 \cdot 5 \text{ H}_2\text{O}$ was heated at 110°C until it gives a constant weight. During heating, water in the $\text{CuSO}_4 \cdot 5 \text{ H}_2\text{O}$ evaporates. What is the mass of CuSO_4 remaining when 1.50 g of $\text{CuSO}_4 \cdot 5 \text{ H}_2\text{O}$ was heated to a constant weight?
(Atomic masses: Cu = 63; S = 32; O = 16; H = 1)
(A). 0.85 g (B). 0.17 g (C). 0.36 g (D). 0.96 g
20. What is the volume in mL of 0.10 M H_2SO_4 solution required to make a 200 mL of 0.05 M H_2SO_4 solution?
(A). 100 mL (B). 50 mL
(C). 200 mL (D). Correct answer is not given
21. In an experiment, O_2 gas was collected over water at 25°C to a container with a volume 0.10 L. During the collection of O_2 over water, water vapor mixes with O_2 to give a mixture of O_2 (g) and H_2O (g). The pressure of this gas mixture is 745.8 mmHg. Pressure of water vapor at 25°C is 23.8 mmHg. Calculate the number of moles of pure O_2 gas in the container.
(1 atm = 760 mmHg; Gas Constant R = 0.0821 L.atm/K.mol).
(A). 4.2×10^{-3} (B). 2.5×10^{-4} (C). 3.9×10^{-3} (D). 3.9×10^{-4}

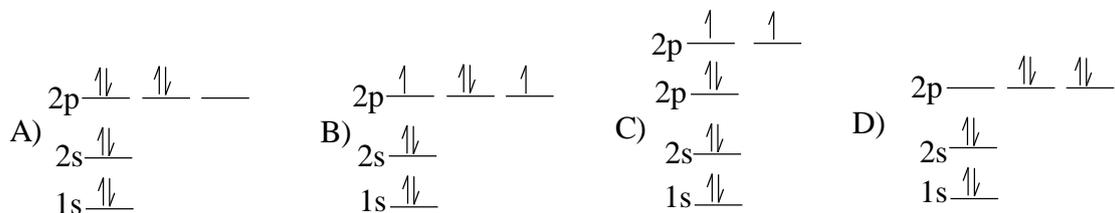
22. Consider the following reaction;



In an experiment, rate of removal of Br^- was found to be 0.50 mol s^{-1} . What is the rate of formation of Br_2 in the reaction?

- (A). 0.50 mol s^{-1} (B). 0.83 mol s^{-1} (C). 0.30 mol s^{-1} (D). 0.75 mol s^{-1}

23. What is the correct electron arrangement of oxygen atom?



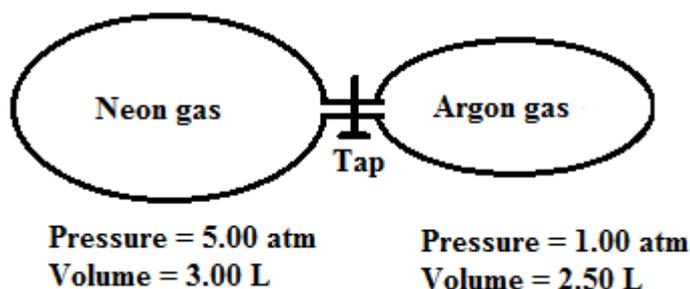
24. What is the wrong statement about water?

- (A). Water molecules have H bonds among themselves.
 (B). Water molecules do not have London forces.
 (C). Chemical bonds between hydrogen and oxygen in water are stronger than H bonds.
 (D). Some ionic compounds do not dissolve in water.

25. What is the correct order of increasing the energy required for the removal of an electron from K^+ , Ar, Cl^- in the gas state?

- (A). $\text{K}^+ < \text{Ar} < \text{Cl}^-$ (B). $\text{Ar} < \text{K}^+ < \text{Cl}^-$ (C). $\text{Cl}^- < \text{Ar} < \text{K}^+$ (D). $\text{Ar} < \text{Cl}^- < \text{K}^+$

26. What is the final pressure of the following system when the tap is opened?



- (A). 3.18 atm (B). 2.72 atm (C). 0.45 atm (D). 6.08 atm

27. Hydrochloric acid (HCl) is a strong acid and acetic acid (CH_3COOH) is a weak acid. What is the wrong statement about these acids?

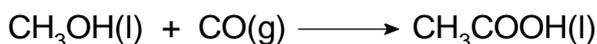
- (A). If fully ionized, 1 L of 1 M HCl and 1 L of 1 M CH_3COOH can provide equal amounts of H^+ .
 (B). In an aqueous solution, H^+ concentration of 1M HCl solution is higher than the H^+ concentration of 1M CH_3COOH solution.
 (C). pH of 1M HCl is higher than the pH of 1 M CH_3COOH at a given temperature
 (D). 1 mole of HCl reacts with 1 mole of NaOH and 1 mole of CH_3COOH also reacts with 1 mole of NaOH

28. Consider the following energy diagram for the following reaction.

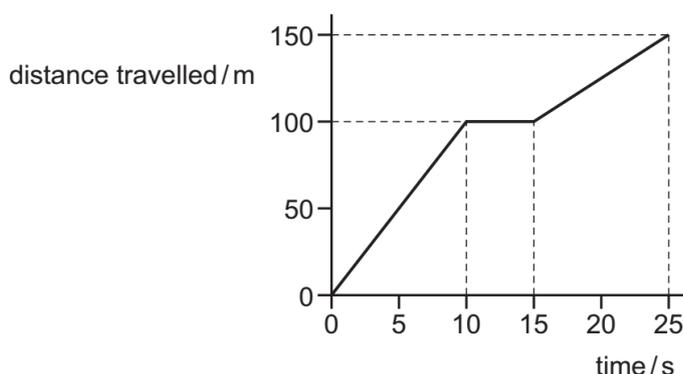


What is the wrong statement about this reaction?

- (A). This reaction generates heat
 (B). Overall reaction absorbs heat
 (C). Catalysts will make this reaction faster
 (D). Reverse reaction is favored by temperature
29. A new method of making acetic acid (CH_3COOH) in industries use the reaction given in the following equation. When 1 mole of CH_3OH is reacted with 1 mole of CO , 55.0 g of CH_3COOH was formed. What is the percentage yield of the reaction?

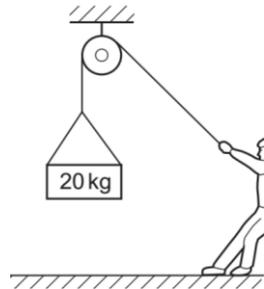


- (A). 100 % (B). 92 % (C). 53 % (D). 46%
30. How many structures can be written with the same molecular formula as n-pentane ($\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-CH}_3$) in addition to n-pentane?
 (A). 3 (B). 4 (C). 2 (D). 5
31. Diagram shows a distance –time graph of a cyclist’s ride. What is the average speed for the whole ride?



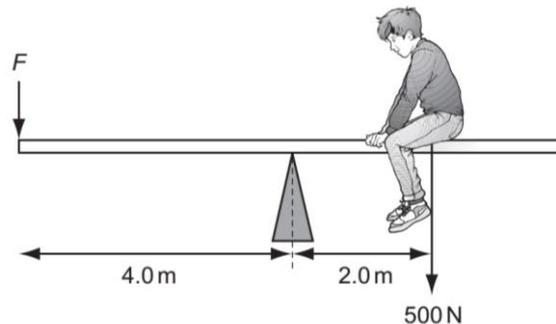
- (A). 6 m.s^{-1} (B). 7.5 m.s^{-1} (C). 10.0 m.s^{-1} (D). 11.0 m.s^{-1}
32. An object accelerates from 5 m.s^{-1} , moves 10 s with a uniform acceleration until its velocity becomes 15 m.s^{-1} . What is the distance travelled by the object?
 (A). 25 m (B). 40 m (C). 50 m (D). 100 m

33. A force of 20 N pushes an object of mass 5.0 kg along a rough horizontal surface where the frictional force is 5.0 N. What is the acceleration of the object?
 (A). 1.0 m.s⁻² (B). 2.0 m.s⁻² (C). 3.0 m.s⁻² (D). 4.0 m.s⁻²
34. A stone has a mass of 390 g and a density of 2.7 g.cm⁻³. Vegetable oil has a density of 0.9 g.cm⁻³. Which mass of oil has the same volume as the stone?
 (A). 130 g (B). 160 g (C). 900 g (D). 1200 g
35. Water of height 10 m exerts a pressure equal to atmospheric pressure. An air bubble rises to the surface of a lake from a 2 m depth. When the bubble reaches surface, its volume is 6.0 cm³. What is the volume of the air bubble at the starting depth? Assume there is no temperature difference between bottom and the surface.
 (A). 2 cm³ (B). 3 cm³ (C). 5 cm³ (D). 8 cm³
36. Two cylinders P and Q are made of copper. The height of P is twice the height of the Q. Diameter of P is half the diameter of Q. Find out the correct statement regarding P and Q.
 (A). The mass of cylinder P is four times that of cylinder Q
 (B). The mass of cylinder P is twice that of cylinder Q
 (C). The mass of cylinder P is equal that of cylinder Q
 (D). The mass of cylinder P is half that of cylinder Q
37. A man just supports a mass of 20 kg suspended from a rope.



What is the resultant force acting on the mass?

- (A). 0 N (B). 10 N (C). 20 N (D). 30 N
38. A man weighs 600 N. He runs up a staircase of total height 4.0 m in 3.0 s. What is power of this action?
 (A). 450 W (B). 800 W (C). 2400 W (D). 7200 W
39. The diagram shows a boy of weight 500 N on a see-saw. He sits 2.0 m from pivot.

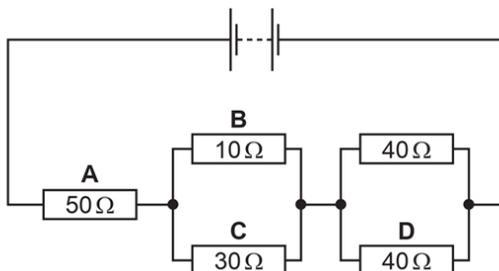


What is the force (F) needed to balance the see-saw?

- (A). 250 N (B). 7500 N (C). 1000 N (D). 3000 N

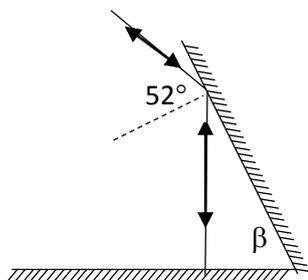
40. Thermal energy of 12000 J is supplied to a 2.0 kg mass of copper block. The specific heat capacity of copper is $400 \text{ J kg}^{-1} \text{ }^\circ\text{C}^{-1}$. What is the increase of temperature in the copper block?
 (A). $15 \text{ }^\circ\text{C}$ (B). $30 \text{ }^\circ\text{C}$ (C). $60 \text{ }^\circ\text{C}$ (D). $100 \text{ }^\circ\text{C}$

41. The following diagram shows a circuit containing five resistors connected to a battery.



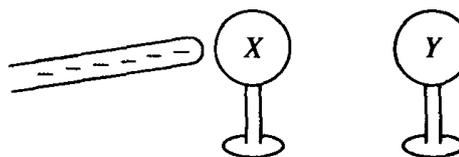
Through which resistor passes the smallest current?

- (A). A (B). B (C). C (D). D
42. A ray of light is reflected from two plane mirrors as shown in the figure. What is the value of Angle β .



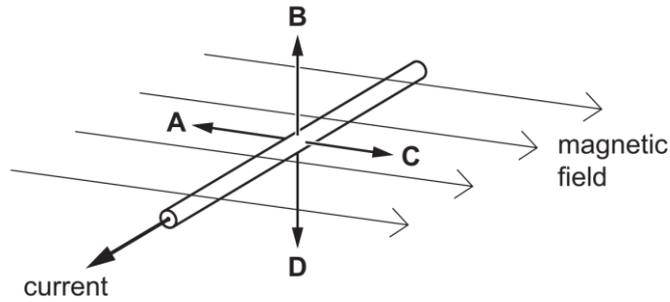
- (A). 26° (B). 52° (C). 38° (D). 64°
43. If the frequency of sound is doubled, the wavelength of it;
 (A). halves and the speed remains unchanged
 (B). doubles and the speed remains unchanged.
 (C) is unchanged and the speed doubles.
 (D) is unchanged and the speed halves.

44. Two neutral spheres are mounted on insulating stands, as shown below. A negatively charged rubber rod is brought close to, but does not make contact with, sphere X. Sphere Y is then brought close to X on the side opposite to the rubber rod. Y is allowed to touch X and then is removed some distance away. The rubber rod is then moved far away from X and Y. What are the final charges on the spheres?



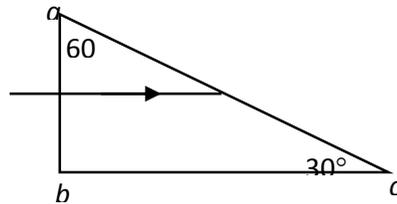
- | | | |
|------|-----------------|-----------------|
| | <u>X</u> | <u>Y</u> |
| (A). | Zero | Zero |
| (B). | Negative | Negative |
| (C). | Negative | Positive |
| (D). | Positive | Negative |

45. The diagram shows a current-carrying wire in a horizontal magnetic field. Which arrow shows the direction of the force experienced by the wire?



- (A). A (B). B (C). C (D). D

46. A ray of light in air is incident on a prism, perpendicular to the face ab , as shown in the diagram. The ray enters the prism and strikes face ac making incident angle equals to critical angle. What is the refractive index of the prism? ($\sin 60^\circ = \sqrt{\frac{3}{2}}$)



- (A) $\frac{1}{2}$ (B). $\sqrt{\frac{2}{3}}$ (C). $\sqrt{\frac{3}{2}}$ (D). 2

47. If $3^{2x+2} = 3^{x-1} \times 9$, then x is

- (A). -2 (B). -1 (C). 1 (D). 2

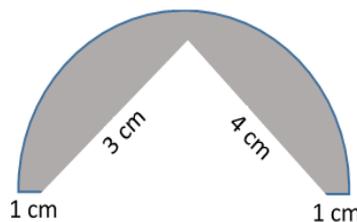
48. If $\frac{Q}{t} = \frac{P\pi a^4}{8\eta l}$, then a is

- (A). $\left(\frac{8\eta l Q}{P t \pi}\right)^{-\frac{1}{2}}$ (B). $\left(\frac{8\eta l Q}{P t \pi}\right)^{\frac{1}{4}}$ (C). $a = \left(\frac{8\eta l Q}{P t \pi}\right)^2$ (D). $\left(\frac{8\eta l Q}{P t \pi}\right)$

49. Which couple of lines do not intersect each other?

- (A). $y = 3x + 4, y = 4x$ (B). $y = 2x + 4, y = 4x + 1$
 (C). $y = 4x + 1, y = 4x + 8$ (D). $y = x + 4, y = 2x + 3$

50. A rectangular triangle was cut from a semicircular plate. What is the area of the remaining plate? ($\pi = \frac{22}{7}$)



- (A). 9.5 cm^2 (B). 13.25 cm^2 (C). 27.25 cm^2 (D). 32.5 cm^2