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Level - 1 : All Level-1 successful* participants will get certificate, aptitude report and online subscription, and school toppers will be eligible for school hero medals.

Level - 2 : School toppers* will be selected for level-2-National level - online computer based interactive test held at exam centres all over India. Besides selection for level-3, winner will get merit certificate, medals, educational CDs, laptop, scholarship and other prizes. There is no level 2 in Art, Cricket, Cyber, NIPO and Biotech.

Level - 3 : Toppers will qualify# for level 3-International level-where you will compete with students globally. Get selected for EHF's International Olympiad training camp. Only Indian organization giving students exposure to global competitions. Represent India & win laurels. Guidance by top scientists. Prizes ranges from cash (millions of \$), gadgets, foreign trips, publicity, fame, scholarships, Internships, conference participation and more.

* # See prospectus/website for details

1. You are allowed additional 10 minutes to fill the required details in the **RESPONSE SHEET (OMR)**.
2. The question paper is made as per syllabus guidelines & pattern given in the information Booklet. The Question Paper for Classes 1 to 6 contains 25 Questions each to be answered in 40 minutes. The Question paper for classes 7 to 12 contains 50 Questions each to be answered in 60 minutes. All questions are compulsory. Further instructions are given in the instruction letter to the teacher.
3. Use the response sheet to mark your responses by darkening the required circle. The response sheet has to be returned to the foundation, duly filled in. **THE STUDENT CAN RETAIN THE QUESTION PAPER.**

EHF
NATIONAL INTERACTIVE SCIENCE OLYMPIAD

NISO

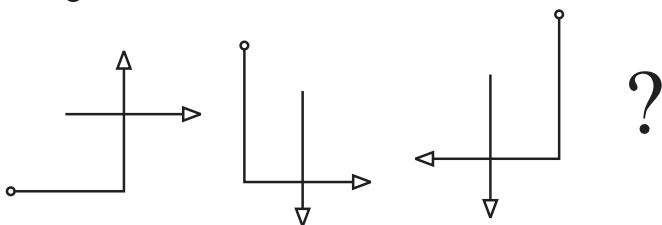
11
Class

B1
Paper Code

LEVEL - 1

SECTION-A : GENERAL IQ

1. The given question consists of three figures shown as below. Choose the correct option which fits the best for the continuation of the given pattern of figures.



- (1)
- (2)














- (3)
- (4) None of these

2. If in a certain code language BOSTON can be written as SNSNSN, then how would you write CALIFORNIA in the same code language?
 - (1) LONLONLON
 - (2) LOILOILOI
 - (3) OAOAOA
 - (4) None of these
3. At a conference, 12 members shook hands with each other before & after the meeting. How many total number of hand shakes occurred?
 - (1) 100
 - (2) 132
 - (3) 145
 - (4) None of these

4. Choose the correct option in place of question mark (?) in the following series :
91, 85, 94, 83, 97, 81, (?), 79.

- (1) 120 (2) 100
(3) 105 (4) None of these

5.

				
colour				
				
				

No. of flowers

There are 15 flowers in a garden as shown in the above table. The flowers are red, yellow, blue and orange. Most of the flowers are red, there are more blue flowers than orange. There are fewer yellow flowers than any other colour. The least number of flowers are yellow. Now find out how many flowers are there of each colour ?

Red = —, Blue = —, Orange = —, Yellow = —.

- (1) Red = 3, Blue = 6, Orange = 2, Yellow = 4
(2) Red = 4, Blue = 2, Orange = 6, Yellow = 3
(3) Red = 6, Blue = 4, Orange = 3, Yellow = 2
(4) None of these.
6. Which is greater - half of quarter or quarter of half?
(1) Half (2) Quarter
(3) Both are same (4) None of these
7. If you drop a 10 kg iron bar and a 10 kg bag of cotton from a height of 50 m, which will reach the ground first ?
(1) Iron bar (2) Both
(3) Cotton (4) None of these
8. At noon and midnight on a clock, the hour and minute hands are pointing in the exact same direction. How many other times between noon and midnight do the hour and minute hands cross?
(1) 10 times (2) 8 times
(3) 6 times (4) None of these

9. In a wrestling team there are 8 wrestlers. The coach is trying to separate the wrestlers by their 'weight class' for their competition. The wrestlers are A, B, C, D, E, F, G, H.

F is in the same weight class as H.

G is in a heavier weight class than F.

A is in a heavier weight class than D and C.

E is in a heavier weight class than A.

B is in a lighter weight class than C.

Which one of the following must be false?

- (1) G is in a heavier weight class than H.
(2) C is in a heavier weight class than D.
(3) B is in the same weight class as E.
(4) None of these.
10. Standing on a platform, Anil told Shreya that Qutab Minar was more than ten kilometre but less than fifteen kilometres from there. Shreya knew that it was more than twelve kilometres but less than fourteen kilometres from there. If both of them were correct, which of the following could be the distance of Qutab Minar from the platform?
(1) 12 km (2) 13 km
(3) 11 km (4) None of these

SECTION-B : PHYSICS & CHEMISTRY

11. The dimension of force is given as
(1) MLT^{-2} (2) MLT^{-1}
(3) MLT^{-3} (4) None of these
12. Daltons law of partial pressures is not applicable to gases like
(1) O_2 and He (2) CO_2 and Cl_2
(3) NH_3 and HCl (4) None of these
13. According to VSEPR theory the shape of $SiCl_4$ will be
(1) Tetrahedral (2) Linear
(3) Pyramidal (4) None of these
14. In the reaction between HNO_3 and KOH , the nature of the solution will be
(1) Acidic (2) Neutral
(3) Basic (4) None of these

15. $\text{N}_2\text{O}_4(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$. The concentrations of N_2O_4 and NO_2 at equilibrium are 4.8×10^{-2} and 1.2×10^{-2} mol L^{-1} respectively. The K_c for the reaction is

- (1) 3×10^3 mol L^{-1} (2) 3.3×10^2 mol L^{-1}
 (3) 3×10^{-3} mol L^{-1} (4) None of these

16. The IUPAC name of the compound $\text{CH}_2 = \text{CH} - \text{CH}(\text{CH}_3)_2$ is

- (1) 2 - vinyl propene
 (2) 3 - methyl - 1 - butene
 (3) 1 isopropyl ethylene
 (4) None of these

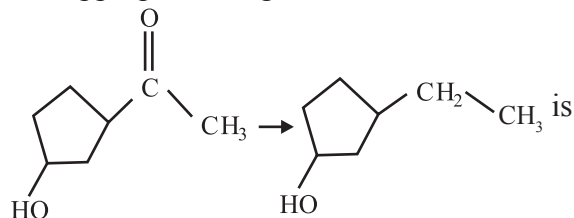
17. Ammonia has abnormally high boiling point because it has

- (1) Hydrogen bonding
 (2) SP^3 hybridisation
 (3) Alkaline nature
 (4) None of these

18. An electron is present in 4f sub-shell. The possible values for all the quantum numbers n, l, m, s can be

- (1) $n=2$ $l=3$ $m=0, -1, -2, -3, +1, +2, +3$ $s=+1/2$
 (2) $n=3$ $l=4$ $m=-1, -2, -3, 0, +3, +2, +1$ $s=+1/2$ or $-1/2$
 (3) $n=4$ $l=3$ $m=-3, -2, -1, 0, +1, +2, +3$ $s=+1/2$ or $-1/2$
 (4) None of these

19. The appropriate reagent for the conversion of



- (1) Zn-Hg/HCl (2) $\text{NH}_2\text{NH}_2, \text{OH}^-$
 (3) H_2, Ni (4) None of these

20. The oxidation number of Oxygen in OF_2 is

- (1) +2 (2) -2
 (3) +1 (4) None of these

21. A solution is obtained by dissolving 6 g of urea (molecular weight 60) in a litre of water. Another solution is obtained by dissolving 34.2 g of cane

sugar (molecular weight 342) in 1 litre of water at the same temperature. The lowering of vapour pressure in the first solution is

- (1) Nearly one-seventh of the second solution
 (2) Double that of the second solution
 (3) Same as that of the second solution
 (4) None of these

22. 6.022×10^{20} molecules of urea are present in 100 ml of its solution. The concentration of urea solution is

- (1) 0.1 M (2) 0.01 M
 (3) 0.001 M (4) None of these

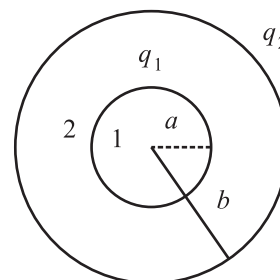
23. At 500°C , the equilibrium constant for the reaction $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ is 6.02×10^{-2} litre $^{-2}$ mol $^{-2}$. What is the value of K_p at the same temperature?

- (1) 1.5×10^{-5} (2) 15×10^{-5} atm $^{-2}$
 (3) $\approx 15 \times 10^{-6}$ (4) None of these

24. Which of the following is a primary alkyl halide?

- (1) $\text{C}_6\text{H}_5\text{CHClCH}_3$ (2) $\text{CH}_3\text{CHClCH}_2\text{CH}_3$
 (3) $(\text{CH}_3)_2\text{CHCH}_2\text{Cl}$ (4) None of these

25.



Two conducting spheres having radii a and b charged to q_1 and q_2 respectively. The potential difference between 1 and 2 will be

- (1) $\frac{q_1}{4\pi\epsilon_0 a} - \frac{q_2}{4\pi\epsilon_0 b}$ (2) $\frac{q_1}{4\pi\epsilon_0} \left(\frac{1}{a} - \frac{1}{b} \right)$
 (3) $\frac{q_2}{4\pi\epsilon_0} \left(\frac{1}{a} - \frac{1}{b} \right)$ (4) None of these

26. A bullet is fired from a rifle. If the rifle recoils freely, the kinetic energy of rifle is

- (1) Less than that of bullet
 (2) More than that of bullet
 (3) Same as the bullet
 (4) None of these

37. $\cot(x - y) = \square$ then \square
- (1) $\frac{\cos x + \cot y + 1}{\cot y - \cot x}$ (2) $\frac{\cot y - \cot x}{\cot x \cot y + 1}$
 (3) $\cot x - \cot y$ (4) None of these
38. Equation of a line is $3x - 4y + 10 = 0$. Find its slope
- (1) $\frac{4}{3}$ (2) $\frac{2}{6}$
 (3) $\frac{2}{6}$ (4) None of these
39. Pipes A and B can fill a tank in 5 & 6 hours respectively. Pipe C can empty it in 12 hours. If all the three pipes are opened together, then the tank will be filled in
- (1) $1\frac{13}{17}$ hours (2) $3\frac{9}{17}$ hours
 (3) $2\frac{8}{11}$ hours (4) None of these
40. In how many ways a committee, consisting of 5 men and 6 women can be formed from 8 men and 10 women?
- (1) 266 (2) 11760
 (3) 5040 (4) None of these

SECTION-C : BIOLOGY

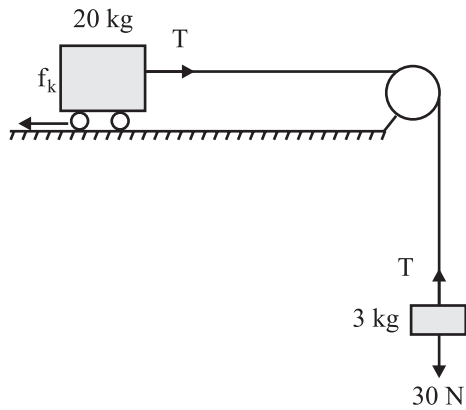
31. Multiple-fission is an asexual mode of reproduction. Which of the following organisms reproduces through binary fission?
- (1) Amoeba (2) Planaria
 (3) Leishmania (4) None of these
32. The growth of pollen tubes towards ovules is an example for
- (1) Chemotropism
 (2) Hydrotropism
 (3) Geotropism
 (4) None of these
33. If we suddenly remove all the protein molecules from the plasma membrane of a cell (without destroying the cell). Which of the following would you expect to happen?
- (1) Transport of all molecules across the plasma membrane would stop
 (2) Transport of most ions across the plasma membrane would stop
 (3) Amino acids would rapidly aggregate on the plasma membrane and replace the missing proteins.
 (4) None of these
34. In evolutionary terms, we have more in common with a
- (1) Dog (2) Bear
 (3) Chimpanzee (4) None of these
35. The involuntary actions like blood pressure, salivation and vomiting are controlled by which part of the brain?
- (1) Cerebrum (2) Medulla
 (3) Cerebellum (4) None of these
36. Which of the following statement is false?
- (1) In a hypertonic solution, a cell from a multi-cellular animal usually will swell and burst.
 (2) Chloroplasts and mitochondria are each bounded by two membranes
 (3) If a lysosome bursts its contents can seriously damage the cytoplasm of a cell.
 (4) None of these
37. Which of the following, circulating in the blood, help in clot formation at the points of injury?
- (1) Platelets (2) Polymorphs
 (3) Monocytes (4) None of these
38. One of Mendel's laws states the following : Units of inheritance which control different aspects of the phenotype may be inherited independently. Which of the following true statements best restates this conclusion in modern terms?
- (1) In the first stage of meiosis, chromosomes pair with their homologues.
 (2) During fertilization, which sperm combines with which egg is a matter of chance.
 (3) In the first stage of meiosis, the segregation of one pair of chromosome does not affect the segregation of other chromosomes.
 (4) None of these
39. Which of the following produces negative pressure within your thoracic cavity?
- (1) Contraction of the muscles in the wall of the stomach.
 (2) Contraction of the diaphragm muscles.
 (3) Relaxation of the muscles between the ribs.
 (4) None of these

40. Individuals afflicted with haemophilia suffer from excessive bleeding due to the failure of the normal clotting mechanism. The disease is associated with a sex linked recessive gene. Two brothers are haemophiliacs; their parents do not suffer from excessive bleeding. The probability that their sister inherited the gene for haemophilia is most likely.

- (1) $1/4$
- (2) $1/2$
- (3) $3/4$
- (4) None of these

INTERACTIVE SECTION

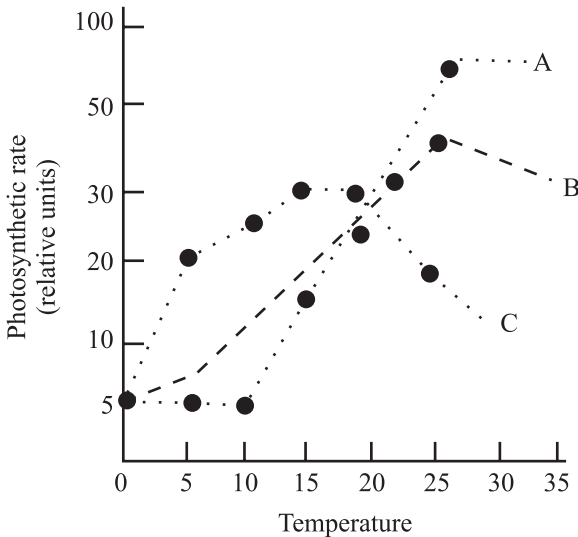
41.



What is the acceleration of the block and trolley system shown in the above figure? The coefficient of kinetic friction between the trolley and the surface is 0.04.

- (1) 0.86 ms^{-2}
- (2) 0.96 ms^{-2}
- (3) 0.78 ms^{-2}
- (4) None of these

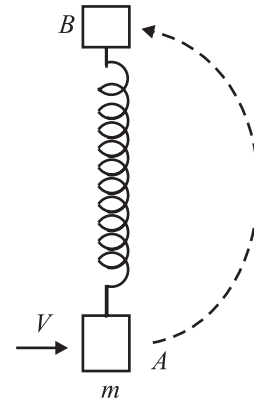
42.



The given graph shows the relationship between photosynthetic rate and temperature. Based on these results, which species is best adapted to arctic conditions where the mean temperature does not exceed 8°C during the growing season?

- (1) Species A
- (2) Species B
- (3) Species C
- (4) None of these

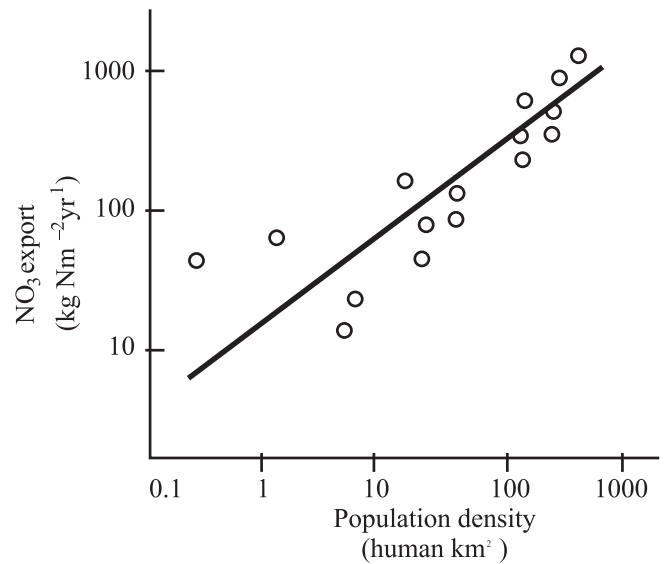
43.



Mass m suspended by a spring of unextended length R and spring constant k . The horizontal velocity that has to be imparted at point A so that the mass reaches the point B is

- (1) $\sqrt{(mg R)}$
- (2) $\sqrt{(mg R^3)}$
- (3) $\sqrt{(Kx^2 + 2mg R)}$ where x is the extension of the spring.
- (4) None of these

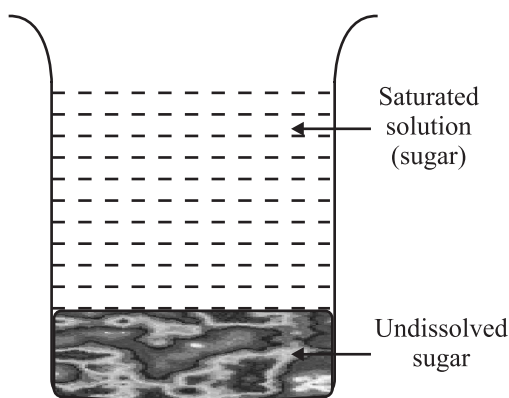
44.



The graph shows how much nitrate (NO_3^-) is exported from the continent towards the ocean by 16 major rivers in the world compared to the density of human populations living in those drainage basins. Nitrate exported through rivers causes eutrophication and has been implicated in the development of toxic algal blooms in marine coastal regions. What conclusion drawn from the graph is correct?

- (1) Large drainage basins exported more NO_3^-
- (2) Drainage basins with higher population densities export more NO_3^-
- (3) Small drainage basins export more NO_3^-
- (4) None of these

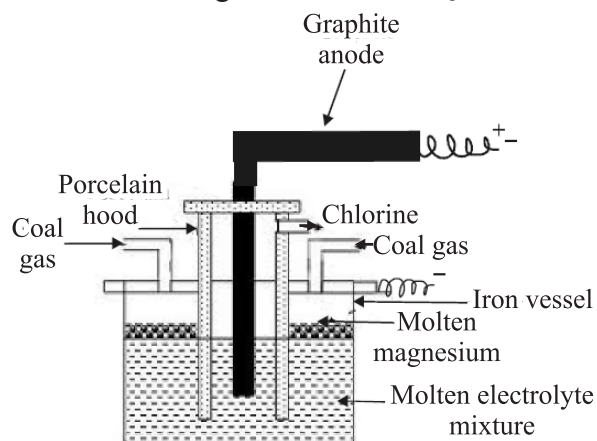
45.



The equilibrium between a solid and its solution is indicated by the saturated solution. Then solubility is defined as

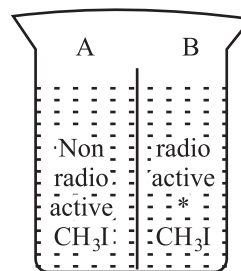
- (1) The minimum amount of the solute in grams which dissolves in 100g of the solvent at a given temperature to form the saturated solution.
- (2) The minimum amount of the solute in grams which dissolves in 100 g of the solution at a given temperature to form the saturated solution.
- (3) The maximum amount of the solute in grams which dissolves in 100 g of the solvent at a given temperature to form the saturated solution.
- (4) None of these.

Direction: See the figure and answer Q. No. 46 & 47



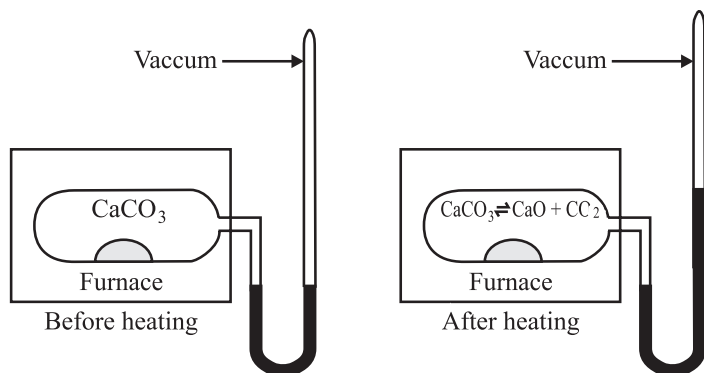
Anhydrous MgCl_2 is melted and mixed with molten NaCl and CaCl_2 in order to reduce its melting point. This molten mixture is electrolysed in an iron vessel which acts as the cathode. A graphite rod dipped in the molten electrolyte mixture acts as the anode.

46. Which are the products obtained during electrolysis?
 - (1) HCl
 - (2) KCl and MgCl_2
 - (3) Mg and Cl_2
 - (4) None of these
47. In the above apparatus, a stream of inert gas like coal gas is kept circulated in the cell to
 - (1) Check the Oxidation of Magnesium
 - (2) Check the Oxidation of Chlorine
 - (3) Check the Oxidation of Sodium
 - (4) None of these
48. A vessel has 2 compartments connected at the top. In compartment A normal methyl iodide is placed while in compartment B radio active methyl iodide is placed. We will find that



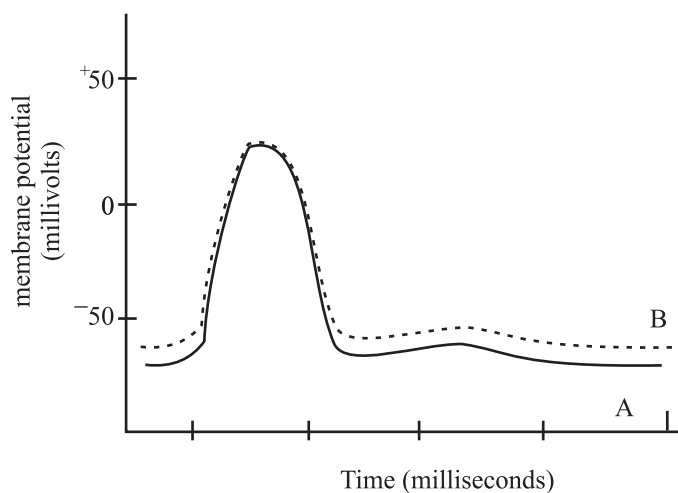
- (1) The vapours over both the compartments will become radio active.
- (2) The vapours over B will remain radio active and there is no change is the vapours of A.
- (3) The vapours over both the compartments will condense.
- (4) None of these.

49. The decomposition of CaCO_3 has reached equilibrium. In the above heterogeneous system we can see that



- (1) The reactants and products are in the same phase.
- (2) The reactants and products are in different phase.
- (3) The rate at which CaCO_3 decomposes to form CaO and CO_2 is different at which the products combine to give the reactants.
- (4) None of these

50. The above graph shows two nerve action potential recorded intracellularly in response to stimulating an axon. What experimental manipulation would most likely have caused the change from curve A (Solid line) to curve B (dashed line)?



- (1) a decrease in stimulus intensity
- (2) a decrease in sodium concentration in the extracellular fluid
- (3) a decrease in the potassium concentration inside the neuron
- (4) None of these



END OF THE EXAM