



EDUHEAL FOUNDATION

CLASS 12

LEVEL - 1

Set A1

EHF OLYMPIADS

- 4000 schools • 6 lakh students
- 10 olympiads • Global outreach



EHF

NATIONAL INTERACTIVE SCIENCE OLYMPIAD

Name :

Roll No :

Class :

School :



NATIONAL BIOTECHNOLOGY OLYMPIAD



NATIONAL MATHS OLYMPIAD



NATIONAL SCIENCE OLYMPIAD



INTERNATIONAL CYBER OLYMPIAD



INTERNATIONAL ENGLISH OLYMPIAD



INTERNATIONAL GENERAL KNOWLEDGE OLYMPIAD



BSE international finance olympiad (BIFO)



NATIONAL IIT-PMT OLYMPIAD (NIPO)

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 and Cricket.

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

Instructions for the Candidate

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.

ROUGH WORK

GENERAL IQ

1. Enter the missing figure: 3, 4, 8, 17, 33, ...

- (1) 58 (2) 78
(3) 98 (4) None of these

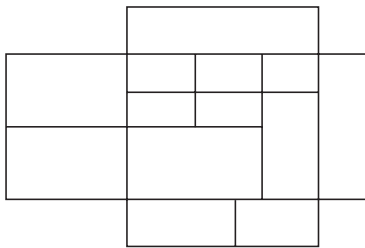
2. Enter the missing character: B, C, E, H, L, ...

- (1) P (2) S
(3) R (4) None of these

3. Insert the missing character to form two words:
SLO ... IDE

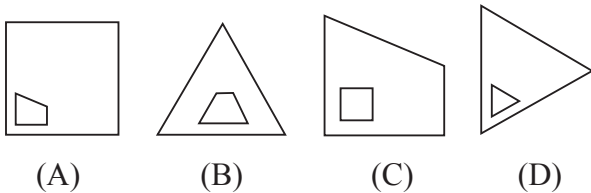
- (1) A (2) X
(3) B (4) None of these

4. How many four sided shapes does this diagram have?



- (1) 12-15 (2) 16-21
(3) 35-40 (4) None of these

5. Which of the five designs is least like the other four?



- (A) (B) (C) (D)
- (E) 

- (1) A and E (2) B and C
(3) D (4) None of these

6. When red is X, green is Y. When green is not Y, blue is Z. But blue is never Z as long as red is X. Therefore which one of these statements is correct?

- (1) While blue is Z, green is Y.
(2) While red is not X, blue is not Z.
(3) While green is not Y, red is not X.
(4) None of these

7. There are five children in the X family. A's sister B is younger than C, who is older than D. D has one older brother and a younger sister but her youngest brother E is not the "baby" of the family. In what order are the children from eldest to youngest?

- (1) E, D, C, B, A
(2) C, D, A, E, B
(3) A, B, C, D, E
(4) None of these

8. A person has certain number of cows and birds. They have 172 eyes and 344 legs. How many cows and birds does he have?

- (1) 25 birds and 86 cows
(2) 35 birds and 76 cows
(3) 29 birds and 66 cows
(4) None of these

9. I have a horse. Do you know what colour it is? Rohan said, "I guess it is not black". Raj said, "It is either brown, or grey". Chander said "I know it is brown". I said, "At least one of you is right and at least one of you is wrong." What is the colour of my horse if the colour is one of the above?

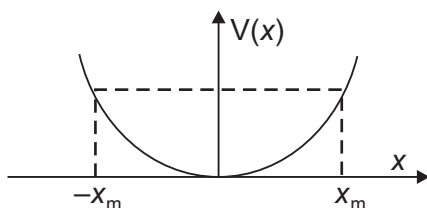
- (1) Brown
(2) Grey
(3) Black
(4) None of these

10. A group of friends went to a hotel for Dinner. After having their dinner the Bill amount was of ₹ 2400. So they decided to distribute it into equal amount for each. In the group two friends forget to bring their purses along with them. So later on it has been decided that ₹ 100 has to be paid more by the other friends on calculated amount. So total how many friends were there in the group?

- (1) 8
(2) 10
(3) 12
(4) None of these

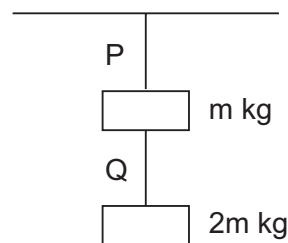
SECTION B: PHYSICS & CHEMISTRY

11. Significant figures in 0.00580 are
- (1) 3
 - (2) 2
 - (3) 1
 - (4) None of these
12. A stone is dropped from the top of a cliff and is found to travel 44.1 m during the last second before it reaches the ground. What is the height of the cliff? ($g = 9.8 \text{ m/s}^2$).
- (1) 132.5 m
 - (2) 122.5 m
 - (3) 142.5 m
 - (4) None of these
13. A shell of mass 0.020 kg is fired by a gun of mass 100 kg. If the muzzle speed of the shell is 80 m/s, what is the recoil speed of the gun?
- (1) 0.016 m/s
 - (2) 0.026 m/s
 - (3) 0.036 m/s
 - (4) None of these
14. The potential energy function for a particle executing linear SHM is given by $(1/2)kx^2$ where k is the force constant of the oscillator. For $k = 0.5 \text{ N/m}$, the graph of $V(x)$ versus x is shown in the figure. A particle of total energy E turns back when it reaches $x = \pm x_m$. If V and K indicate the P.E. and K.E., respectively of the particle at $x = +x_m$, then which of the following is correct?



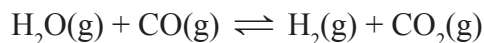
- (1) $V = 0, K = E$
- (2) $V = E, K = 0$
- (3) $V < E, K = 0$
- (4) None of these

15. A solid cylinder of mass 20 kg rotates about its axis with angular speed 100 s^{-1} . The radius of the cylinder is 0.25 m. What is the kinetic energy associated with the rotation of the cylinder?
- (1) 3125 J
 - (2) 6125 J
 - (3) 7125 J
 - (4) None of these
16. If the change in the value of g at the height h above the surface of the earth is the same as at a depth x below it, then (both x and h being much smaller than the radius of the earth)
- (1) $x = h$
 - (2) $x = 2h$
 - (3) $x = \frac{h}{2}$
 - (4) None of these
17. Two wires P and Q of same diameter are loaded as shown in the figure. The length of wire P is L m and its young's modulus is $Y \text{ N/m}^2$ while length of wire Q is twice that of P and its material has young's modulus half that of P. Compute the ratio of their elongation.



- (1) $\frac{4}{7}$
- (2) $\frac{5}{9}$
- (3) $\frac{3}{8}$
- (4) None of these

24. Peroxide ion _____.
- is diamagnetic.
 - has five completely filled antibonding molecular orbitals.
 - is isoelectronic with neon.
 - has bond order one.
- Which one of these is correct?
- (a), (b) and (d)
 - (d) and (c)
 - (a) and (d)
 - None of these
25. All the real gas change to solid before reaching
- -273.16°C
 - 0°C
 - 100°C
 - None of these
26. If one mole of ammonia and one mole of hydrogen chloride are mixed in a closed container to form ammonium chloride gas, then
- $\Delta H > \Delta u$
 - $\Delta H = \Delta u$
 - $\Delta H < \Delta u$
 - None of these
27. One mole of H_2O and one mole of CO are taken in 10 L vessel and heated to 725 K. At equilibrium 40% of water (by mass) reacts with CO according to the equation,



Calculate the equilibrium constant for the reaction.

- 0.74
 - 0.84
 - 0.94
 - None of these
28. In a compound, atoms of element Y form ccp lattice and those of element X occupy $2/3$ rd of tetrahedral voids. The formula of the compound will be
- X_3Y_4
 - X_4Y_3
 - X_2Y_3
 - None of these
29. The highest value of oxidation number changes from 1 to 7
- across the third period in the periodic table
 - in alkaline earth metals
 - in the atoms of transition elements
 - none of these
30. Which of the following reactions of methane is incomplete combustion?
- $2\text{CH}_4 + \text{O}_2 \xrightarrow{\text{Cu}/523\text{ K}/100\text{ atm}} 2\text{CH}_3\text{OH}$
 - $\text{CH}_4 + \text{O}_2 \xrightarrow{\text{Mo}_2\text{O}_3} \text{HCHO} + \text{H}_2\text{O}$
 - $\text{CH}_4 + \text{O}_2 \longrightarrow \text{C}(\text{s}) + 2\text{H}_2\text{O}(\text{l})$
 - None of these

SECTION C: MATHEMATICS

31. Solve:

$$\frac{(\sin 7x + \sin 5x) + (\sin 9x + \sin 3x)}{(\cos 7x + \cos 5x) + (\cos 9x + \cos 3x)}$$

- $\tan 6x$
 - $\tan 7x$
 - $\sin 6x$
 - none of these
32. Solve the following by using the principle of mathematical induction for all $n \in \mathbb{N}$:

$$\frac{1}{1.2.3} + \frac{1}{2.3.4} + \frac{1}{3.4.5} + \dots + \frac{1}{n(n+1)(n+2)}$$

- $\frac{(n+3)}{4(n+1)(n+2)}$
- $\frac{n(n+3)}{4(n+1)(n+2)}$
- $\frac{n(n^2+3)}{(n+5)(n+6)}$
- None of these

33. The points z_1, z_2, z_3, z_4 in the complex plane are the vertices of a parallelogram taken in order, if and only if
- (1) $z_1 + z_4 = z_2 + z_3$
 - (2) $z_1 + z_3 = z_2 + z_4$
 - (3) $z_1 + z_2 = z_3 + z_4$
 - (4) None of these
34. If the line $x - 1 = 0$ is the directrix of the parabola $y^2 - kx + 8 = 0$, then one of the values of k is
- (1) 6
 - (2) 8
 - (3) 4
 - (4) None of these
35. If $f(x) = 1 - x + x^2 - x^3 \dots - x^{99} + x^{100}$, then $f'(1)$ is equal to
- (1) 50
 - (2) -150
 - (3) -50
 - (4) None of these
36. Three mangoes and three apples are kept in a box. If two fruits are selected at random from the box, the probability that the selection will contain one mango and one apple, is
- (1) $3/5$
 - (2) $5/6$
 - (3) $1/36$
 - (4) None of these
37. Objective of linear programming for an objective function is to
- (1) subset or proper set modeling
 - (2) maximize or minimize
 - (3) row or column modeling
 - (4) none of these
38. A committee of 5 is to be formed from 9 ladies and 8 men. If the committee commands a lady majority, then the number of ways this can be done is
- (1) 3486
 - (2) 3360
 - (3) 1008
 - (4) None of these
39. If the sum of first n natural numbers is $1/5$ times the sum of their squares, then the value of n is
- (1) 5
 - (2) 6
 - (3) 7
 - (4) None of these
40. If in the expansion of $(1+x)^m(1-x)^n$, the coefficients of x and x^2 are 3 and -6 respectively, then m is
- (1) 6
 - (2) 9
 - (3) 12
 - (4) None of these

SECTION C: BIOLOGY

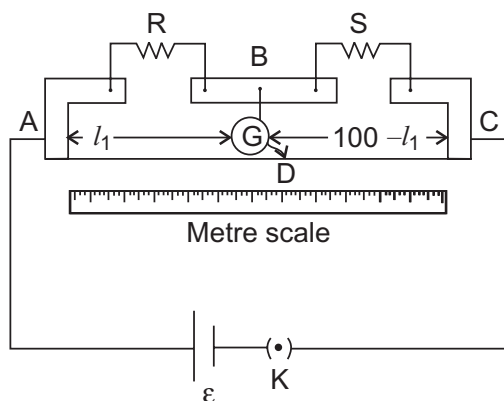
31. Which of the following is a merit in the Bentham and Hooker's system of classification?
- (1) The placement of order - Ranals in the beginning
 - (2) The placement of family - Asteraceae in the beginning of Gamopetalae
 - (3) Closely related families are placed apart
 - (4) None of these
32. For a critical study of secondary growth in plants, which one of the following pairs is suitable?
- (1) Sugarcane and sunflower
 - (2) Teak and pine
 - (3) Deodar and fern
 - (4) None of these
33. Which one of the following is wrongly matched?
- (1) Root pressure – Guttation
 - (2) Puccinia – Smut
 - (3) Cassia – Imbricate aestivation
 - (4) None of these

34. Interfascicular cambium is a
- (1) Primordial meristem
 - (2) Primary meristematic tissue
 - (3) Secondary meristematic tissue
 - (4) None of these
35. As secondary growth proceeds, in a dicot stem, the thickness of
- (1) both sapwood and heartwood increases
 - (2) both sapwood and heartwood remains the same
 - (3) heartwood increases
 - (4) none of these
36. **Assertion:** Eukaryotic cells have the ability to adopt a variety of shapes and carry out directed movements.
- Reason:** There are three principal types of protein filaments-actin filament, microtubules and intermediate filaments, which constitute the cytoskeleton.
- (1) Both assertion and reason are true and the reason is the correct explanation of the assertion.
 - (2) Both assertion and reason are true but the reason is not the correct explanation of the assertion.

- (3) Assertion is true statement but reason is false.
 - (4) None of these
37. The polypeptide or protein part of the enzyme is called
- (1) Holoenzyme
 - (2) Apoenzyme
 - (3) Prosthetic group
 - (4) None of these
38. In some microorganisms the source of protons and electrons is
- (1) H_2S
 - (2) H_2O
 - (3) CO_2
 - (4) None of these
39. Our throat divides into two separate tubes: the windpipe and the gullet. What prevents food from entering the windpipe?
- (1) The tongue
 - (2) The trachea
 - (3) The epiglottis
 - (4) None of these
40. De Vries gave his mutation theory on organic evolution while working on-
- (1) *Althea rosea*
 - (2) *Pisum sativum*
 - (3) *Oenothera lamarckiana*
 - (4) None of these

INTERACTIVE SECTION

41. In a given meter bridge the point D is a neutral point.



Which of the following points is correct according to the given figure?

- (1) The meter bridge can have no other neutral point for this set of resistances.
- (2) When the jockey contacts a point on meter wire left of D, current flows to B from the wire.
- (3) When R is increased, the neutral point shifts to left.
- (4) None of these

42. While analysing the DNA of an organism a total number of 5386 nucleotides were found. Out of which the proportion of different bases were: Adenine = 29%, Guanine = 17%, Cytosine = 32%, Thymine = 17%. Considering the Chargaff's rule it can be concluded that:

- (1) it is a double stranded circular DNA
- (2) it is single stranded DNA
- (3) it is a double stranded linear DNA
- (4) none of these

43. Mercury has some properties for being used in thermometers. Those properties are given below.

- (I) The expansion of Mercury is fairly regular and uniform.
- (II) It is opaque and shining, hence can be easily seen through the glass tube.
- (III) Mercury is a good conductor of heat and has low thermal capacity.
- (IV) Mercury wet the sides of the glass tube in which it is filled.

Which of the above properties is not correct?

- (1) (III)
- (2) (IV)
- (3) (II)
- (4) None of these

44. A monkey of mass 40 kg is sitting on a tree. Rahim seeing the Monkey brought some fruits and gave them to the Monkey, and ran into the house immediately. On hearing the sound produced when Rahim was running the monkey was scared and climbed the nearby rope which can stand a maximum tension of 600 N. In which of the following cases will the rope will break. The monkey



- (a) climbs up with an acceleration of 6 m/s^2
- (b) climbs down with an acceleration of 4 m/s^2
- (c) climbs up with a uniform speed of 5 m/s
- (d) none of these

45. An athlete runs some steps before taking a jump _____ which help him to jump more.

- (1) to loose some initial momentum
- (2) to gain some initial momentum
- (3) to reduce resonance
- (4) none of these

46. A hospital uses an ultrasonic scanner to locate tumors in a tissue. What is the wavelength of sound in the tissue in which the speed of sound is 1.7 km/s ? (The operating frequency of the scanner is 4.2 MHz)

- (1) $7.05 \times 10^{-3} \text{ m}$
- (2) $4.05 \times 10^{-4} \text{ m}$
- (3) $8.05 \times 10^{-6} \text{ m}$
- (4) None of these

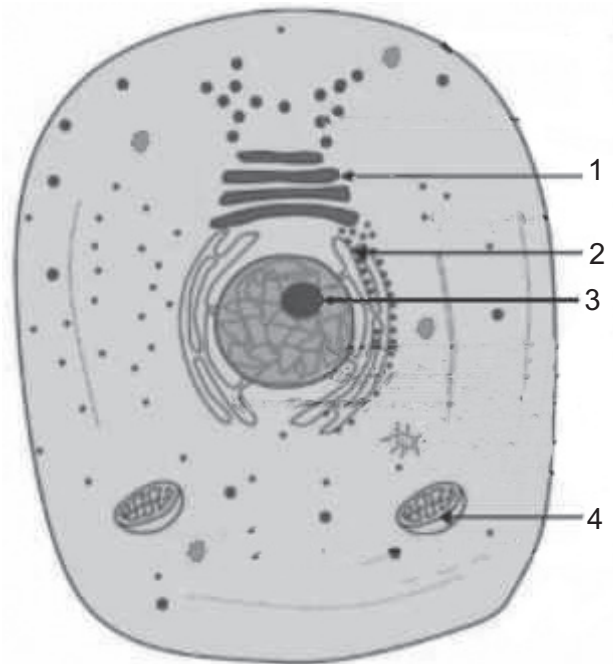
47. An elevator can carry a maximum load of 1800 kg is moving up with a constant speed of 2 m/s. The frictional force opposing the motion is 4000 N. Determine the minimum power delivered by the motor to the elevator in horse power.

- (1) 79 hp
- (2) 89 hp
- (3) 59 hp
- (4) None of these

48. Vineet saw his uncle planting seeds in the land. His uncle does not know methods of growing plants. Then he decided to make his uncle aware of this. He explained the importance of ploughing the land before planting the seeds. Uncle is convinced with his ideas. He planted accordingly. The plants grown successfully. What is the utility of ploughing a field?

- (1) When the field is ploughed, the capillaries are not broken. So water cannot rise to the surface and the soil is able to retain its moisture.
- (2) When the field is ploughed, the capillaries are broken. So water cannot rise to the surface and the soil is able to retain its moisture.
- (3) When the field is ploughed, the capillaries are broken and water rises to the surface and soil is able to retain its moisture.
- (4) None of these

49. Identify the Cell Parts of the given cell:



- (1) Golgi Apparatus, Rough Endoplasmic Reticulum, Nucleolus, Mitochondrion
- (2) Secretory Granule, Nuclear membrane, Ribosome, Cell membrane
- (3) Golgi Apparatus, Cell membrane, Lysosome Mitochondrion
- (4) None of these

50. When we breathe in, we inhale many gases, including oxygen. What happens to the gases that the body can't use?

- (1) They are exhaled.
- (2) They are changed into oxygen by the lungs.
- (3) They circulate through the body and are disposed off later.
- (4) None of these



END OF THE EXAM