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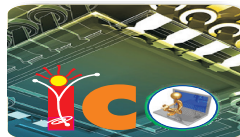
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# ROUGH WORK

# GENERAL IQ

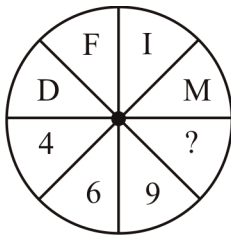
1. If 'South-east' is called 'East', 'North-west' is called 'West', 'South-west' is called 'South' and so on, what will 'North' be called?

- (1) East (2) North-east  
(3) North-west (4) South

2. Pointing to the lady on the platform, Manju said "she is the sister of the father of my mother's son" who is the lady to Manju?

- (1) mother (2) sister  
(3) aunt (4) niece

3. Find the missing term in the given figure



- (1) 10 (2) 13  
(3) 12 (4) 14

4.  $S \times T$  means 'S is the brother of T'

$S - T$  means 'S' is the mother of T'

$S + T$  means 'S is the father of T'

Which of the following represents 'M is the son of Q'?

- (1)  $M \times R + Q$  (2)  $M + R \times Q$   
(3)  $M - R + Q$  (4)  $Q + M \times R$

5. In the word PORTER can be coded as MBNZQN, how can REPORT be written?

- (1) NQMNBZ (2) NQMBNZ  
(3) NBQMNZ (4) NQBMNZ

6. There is a toy boat floating in a tank of water. Place lead ball in the boat (without sinking it) and measure the level of water in the tank. Now take the ball out of the toy boat and drop it in the pool and measure the water's level again. Will the two water level measurements be different, if so which will be higher?

- (1) The water level will be higher when the ball is in the boat

- (2) The water level will be higher when the ball is put in water

- (3) The water level will be same in both cases  
(4) None of these

7. When asked about his birthday, a man said "the day before yesterday I was only 25 and next year I will turn 28." This is true only one day in a year. When was he born?

- (1) He was born on 29th February (leap year) and spoke about it on March 1st

- (2) He was born on December 31st and spoke about it on January 1st

- (3) He was born on November 30th and spoke about it on December 1st

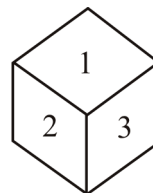
- (4) None of these

8. If '+' mean 'minus', ' $\times$ ' means 'divided by', ' $\div$ ' means 'multiplied by' and '-' means 'Plus' then, which of the following will be the value of the expression

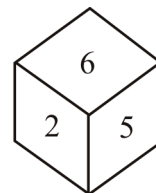
$$28 \times 4 + 17 \div 2 - 9$$

- (1) 18 (2) -22 (3) -18 (4) 22

9. Where is the invisible number in the two positions of the same cube?



I



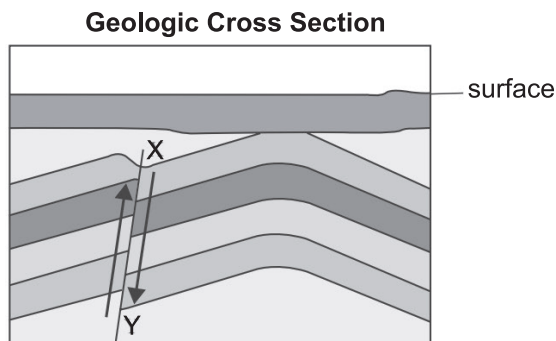
II

- (1) Opposite of 2 (2) Opposite of 3  
(3) Opposite of 4 (4) Opposite of 6

10. One morning at 7 O'clock, Naresh started walking with his back towards the Sun. Then, he turned towards left, walked straight and then turned towards right and walked straight. Then, he again turned towards left. Now, which direction is he facing?

- (1) North (2) East  
(3) West (4) South



11. Raju got stomachache. Which of the following could be a reason?
- (1) He ate food at seven in the evening
  - (2) He drank water after eating food
  - (3) He did not chew the food properly
  - (4) He did not wash his hands properly after eating food
12. Which of the following statements is not correct?
- (1) In plant cells, vacuoles are absent.
  - (2) Vacuole is bounded by a single membrane.
  - (3) In *Amoeba*, contractile vacuole is important for excretion.
  - (4) Flagellum is important for transport of bacteria
13. The polio drops given to children in pulse polio programme is
- (1) An antibiotic
  - (2) A vaccine
  - (3) A drug
  - (4) An energysuppliment
14. What is the measure of the pull of gravity on an object?
- (1) inertia
  - (2) mass
  - (3) pressure
  - (4) weight
15. Use the diagram below to answer the question.

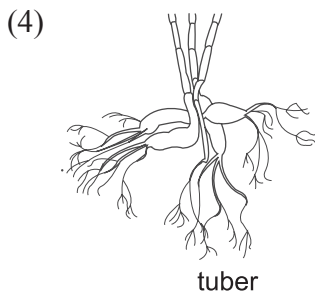
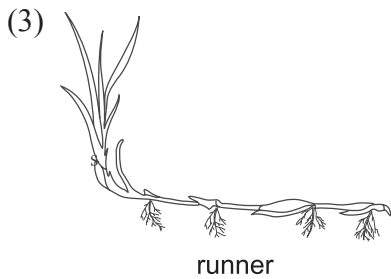


What describes the event that occurred along line XY?

- (1) erosion
  - (2) faulting
  - (3) sedimentary deposition
  - (4) volcanic eruption
16. We find it difficult to balance our body when we walk on ice or on roller skates. This is because
- (1) Friction offered in these situations is small.
  - (2) Friction makes it difficult to walk on ice or on roller skates.
  - (3) The force acting on the body is perpendicular to its surface.
  - (4) None of these
17. The major characteristics considered for classifying all organisms into 5 major kingdoms are
- (1) Whether they are made of prokaryotic or eukaryotic cells
  - (2) Whether the cells are living singly or organised into multicellular and thus complex organisms
  - (3) Both 1 and 2
  - (4) None of these
18. When we stand on loose sand our feet go deep into the sand. But when we lie down our body will not go that deep in the sand. This is because
- (1) The effect of thrust on sand is larger while standing than while lying
  - (2) The effect of thrust on sand is less while standing than while lying
  - (3) The effect of thrust on sand on standing will be the same as that while lying
  - (4) None of these
19. On heating, temperature of the system does not change
- (1) After the melting point is reached, till the entire solid melts
  - (2) Before the melting point is reached, till the entire solid melts.
  - (3) Till solid completely changes into vapour
  - (4) None of these
20. Core area of biosphere reserve is an area
- (1) in which all human activities are allowed
  - (2) which is legally protected for conservation

- (3) where hunting can be done  
 (4) where research, education training can be done
- 21.** Mitochondria and chloroplast have their own DNA and protein synthesizing machinery. Choose the correct option according to this statement  
 (1) This statement is true  
 (2) This statement is false  
 (3) This statement is true for mitochondria but false for chloroplast  
 (4) This statement is false for mitochondria but true for chloroplast
- 22.** When a natural predator living being is applied on the other pathogen organism to control them, this process is called  
 (1) Genetic engineering (2) Biological control  
 (3) Artificial control (4) Confusion technique
- 23.** Deoxygenated blood  
 (1) flows to lungs from the left side of the heart.  
 (2) flows to lungs from the right side of the heart.  
 (3) flows to right side of the heart from lungs.  
 (4) flows to left side of the heart from the lungs
- 24.** Rhizobium, Nostoc and Anabaena are examples of  
 (1) Biofertilizers (2) Vermicompost  
 (3) Green manure (4) Compost
- 25.** Consider the following statements.  
 (i) Cuscuta is a parasite.  
 (ii) It does not have chlorophyll.  
 (iii) It takes host's nutrients through structures called haustoria.  
 Which of the above statements are true ?  
 (1) Only (i)  
 (2) Only (ii)  
 (3) Only (iii)  
 (4) All of the above
- 26.** Which of the following is not the correct pairing of structure with function?  
 (1) Golgi complex : breakdown of complex molecules  
 (2) Mitochondrion : production of ATP  
 (3) Rough Endoplasmic Reticulum : synthesis of proteins  
 (4) Vacuole : storage of waste products
- 27.** During expiration, CO<sub>2</sub> moves through the pathway  
 (1) Golgi complex : breakdown of complex molecules  
 (1) Alveoli → Bronchioles → Bronchi → Trachea → Larynx → Pharynx → Nostrils  
 (2) Nostrils → Pharynx → Larynx → Trachea → Bronchi → Bronchioles → Alveoli  
 (3) Nose → Trachea → Lungs  
 (4) Alveoli → Trachea → Bronchi → Larynx → Nostrils
- 28.** Which determines the state of matter of a substance?  
 (1) density (2) temperature  
 (3) volume (4) weight
- 29.** Which of the following statements is/are false ?  
 (A) When we are at rest, our heart stops pumping blood for a while.  
 (B) When we are sleeping, our heart beats slower than when we are awake.  
 (C) When we are exercising, our heart beats faster than when we are at rest.  
 (D) When we are exercising, our heart beats at the same rate as when we are at rest.  
 (1) A only  
 (2) A and D  
 (3) C only  
 (4) B and D
- 30.** Which of the following should come in the missing step "X" in the given sequence?  
 Ploughing → Levelling → X → Sowing seeds → Irrigation  
 (1) Broadcasting  
 (2) Transplantation  
 (3) Manuring  
 (4) Drilling

31. Which of the following clues would tell you whether a cell is prokaryotic or eukaryotic?
- (1) The presence or absence of a rigid cell wall
  - (2) Whether or not the cell is partitioned by internal membrane system
  - (3) The presence or absence of ribosomes
  - (4) Whether or not the cell contains DNA
32. An athlete's muscle becomes tired after vigorous exercise. Which of the following chemicals increases in quantity in the muscle?
- (1) Glucose
  - (2) Oxygen
  - (3) Lactic acid
  - (4) None of these
33. Which statement about the mammalian circulatory system is correct ?
- (1) The thickness of walls of veins is greater than that of arteries.
  - (2) The order of decreasing velocity of blood flow is : veins > capillaries > arteries.
  - (3) The total surface area of the capillaries is considerably greater than that of all the arteries and veins combined.
  - (4) In order to return blood to the heart, the blood pressure in veins is higher than it is in the arteries
34. Which of the following is an example of cell devoid of nuclear membrane and mitochondria ?
- (1) Bacterial cell
  - (2) Sperm
  - (3) Protist
  - (4) Sponge cell
35. Select the incorrect statement.
- (1) Phloem tubes are only found in the leaves of plants as this is where the sugars are made.
  - (2) Volume of blood in an average human adult is 10 liters.
  - (3) Blood contains many more white blood cells than red blood cells.
  - (4) All of the above
36. A student flips a light switch, but the light does not turn on. Based on this information, which inference is NOT valid?
- (1) The light switch is broken.
  - (2) The light bulb is burned out.
  - (3) The electrical connection is broken.
  - (4) The electrical wire is made of copper.
37. Unicellular organisms rarely grow larger than 1 mm in diameter. Beyond this size,
- (1) cells become visible to predators.
  - (2) it is not possible for mitosis (cell division) to occur.
  - (3) cell membranes begin to disintegrate.
  - (4) diffusion alone is not adequate for nutrient supply
38. What is Earth's inner core made of?
- (1) hot gases
  - (2) partly-melted rock
  - (3) dense, solid metals
  - (4) dense, liquid materials
39. Which root system MOST helps a plant to survive in a dry environment with an underground water source?
- (1)   
bulb root
  - (2)   
tap root



40. Arrange the following in the ascending order of the number of nuclei present in each of them.

Brain cell, Paramecium, RBC of mammals.

- (1) Paramecium, Brain cell, RBC of mammals
- (2) RBC of mammals, Brain cell, Paramecium.
- (3) Brain cell, RBC of mammals, Paramecium
- (4) All of these have same number of nuclei, i.e., one

41. Plant mushroom gets its food



*Mushroom*

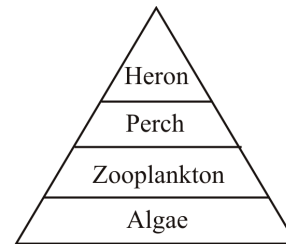
- (1) from dead and decaying plants
- (2) from photosynthesis
- (3) by eating small insects which come near it
- (4) from the water we pour near it

42. Why does an apple look red?

- (1) Red light waves are reflected by the apple.

- (2) Red light waves are absorbed by the apple.
- (3) Red light waves are reflected by a student's eyes.
- (4) Red light waves are absorbed by a student's eyes.

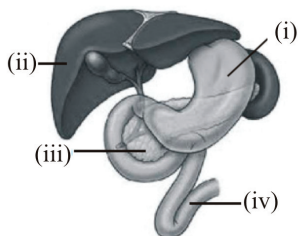
43. The diagram below shows an energy pyramid for a lake ecosystem



Which of the following best described the role of the perch in this energy pyramid?

- (1) Producer
  - (2) Decomposer
  - (3) Primary consumer
  - (4) Secondary consumer
44. If a body starts from a point and returns back to the same point, then its
- (1) average velocity is zero but not average speed
  - (2) average speed is zero but not average velocity
  - (3) both average speed and velocity are zero
  - (4) none of these
45. Choose the correct option
- (i) Bacteria - Prokaryote, Unicellular, Heterotrophs
  - (ii) Virus - Prokaryote, Unicellular, Autotrophs
  - (iii) Algae - Eukaryote, Multicellular, Autotrophs
  - (iv) Protozoa - Prokaryote, Unicellular, Heterotrophs
- (1) i and ii
  - (2) i and iii
  - (3) ii and iv
  - (4) ii and iii

46. Given below are some clues regarding the functions of various parts of digestive system shown in the diagram. Identify the correct option



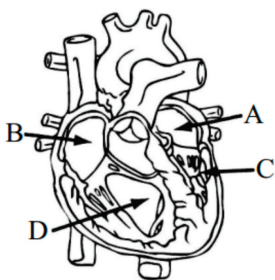
- (1) Enzymes secreted here require an acidic medium for their action  
 (2) It produces a juice which does not have any enzymes  
 (3) Juice secreted from here contain enzyme trypsin
- (1) A-ii ; B-i ; C-iv      (2) A-ii ; B-iv ; C-i  
 (3) A-i ; B-ii ; C-iii      (4) A-iii ; B-ii ; C-i
47. Which of the following chemical reaction shows the aerobic respiration?  
 (1)  $6\text{CO}_2 \rightarrow 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$   
 (2)  $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{H}_2\text{CO}_2$   
 (3)  $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{ATP}$   
 (4) None of these

48. Match the following and select the correct option.

- (P) Cholera                      (i) Virus  
 (Q) Rust of wheat              (ii) Protozoa  
 (R) Ranikhet disease          (iii) Bacteria  
 (S) Sleeping sickness        (iv) Fungi

- (1) (P-iv), (Q-i), (R-ii), (S-iii)  
 (2) (P-ii), (Q-iv), (R-i), (S-iii)  
 (3) (P-i), (Q-iii), (R-ii), (S-iv)  
 (4) (P-iii), (Q-iv), (R-i), (S-ii)

49. Which letters represent the ventricles in the diagram of human heart given below ?



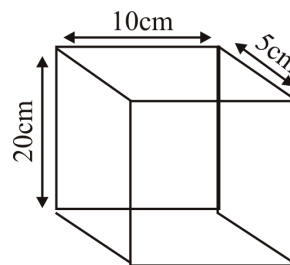
- (1) A and B  
 (2) A and C  
 (3) D and B  
 (4) C and D

50. Which of the following best describes the figure given below ?



- (1) It is made up of many genes that code for traits.  
 (2) It is made up of many cells that work together to survive.  
 (3) It is made up of many amino acids, forming a long protein.  
 (4) It stores the energy that a cell uses to carry out life processes.

51. A brick of weight 80 N stands upright on the ground as shown in figure. The pressure exerted on the ground by brick is



- (1)  $\frac{5 \times 10}{80} \times 10^{-4} \text{ Nm}^{-2}$       (2)  $80 \times 5 \times 10^{-4} \text{ Nm}^{-2}$   
 (3)  $\frac{10}{80 \times 5 \times 10^{-4}} \text{ Nm}^{-2}$       (4)  $\frac{80}{10 \times 5 \times 10^{-4}} \text{ Nm}^{-2}$

52. Tropical rain forests have the greatest biodiversity of any type of land ecosystem. How does biodiversity contribute to the sustainability of an ecosystem?

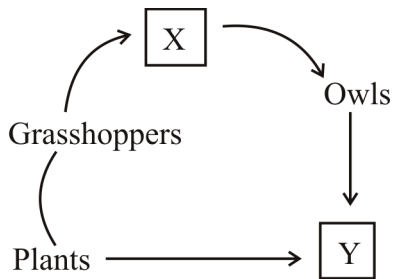
- (1) The presence of more species with different adaptations makes it more likely that some organisms will survive an ecological diaster.

- (2) Greater genetic variation within species makes it more likely that some individuals will survive a disease outbreak
- (3) The presence of a variety of herbivore species that can feed on a large number of different producer species helps ensure abundant prey for predators in the ecosystem
- (4) All of the above

53. Human activities have many effects on food chains and food webs. Indigenous people try to reduce the negative effects of agricultural practices on ecosystems by using a technique called intercropping (planting many different kinds of crops in the same field at the same time). The most useful reason for planting beans and peas in the field is that they....

- (1) are harvested before other crops and used as a food source
- (2) enrich the soil with nitrogen
- (3) are tall and protect other plants from strong winds
- (4) provide support for climbing crops

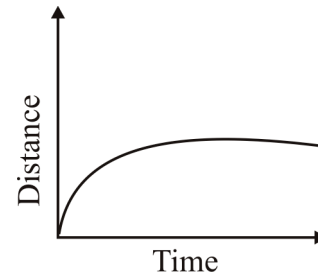
54. Study the food chain carefully



Which of these can we say about organisms X and Y based on the above figure ?

- (1) X is a carnivore, Y is a herbivore
- (2) X is an omnivore, Y is a carnivore
- (3) X is a herbivore, Y is a herbivore
- (4) X is a carnivore, Y is an omnivore

55. Study the graph given below. How is the speed of the moving body?

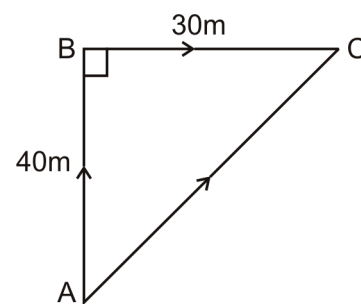


- (1) It goes on increasing
- (2) It first decreases then becomes zero
- (3) It increases then becomes constant but not zero
- (4) It decreases then becomes constant but not zero

56. Which is NOT an example of a symbiotic relationship?

- (1) a tick biting a white-tailed deer
- (2) a caterpillar changing into a butterfly
- (3) a remora fish sticking to the shell of a sea turtle
- (4) a clownfish living within the parts of a sea anemone

57. During a race from point A to C as shown in figure, Ram followed the path A to B then B to C but Shyam followed the direct path A to C. If time taken by Ram is 14 seconds and by Shyam is 10 seconds, then



- (1) average velocity of Ram and Shyam are equal
- (2) average velocity of Ram is more than that of Shyam
- (3) average velocity of Ram is less than that of Shyam
- (4) None of the above

# INTERACTIVE SECTION

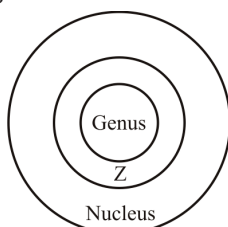
Students have to solve either left hand side (LHS) questions OR right hand side (RHS) questions. RHS section is for Google Science Fair (GSF) enthusiasts. EHF will be conducting science camp (LEVEL-3) to help students prepare for online GSF participation. The online camp will be conducted by retired IIT-Delhi Professors. Equal preference will be given to students solving either of these sections. More details of online GSF is available on EHF Website [www.eduhealfoundation.org](http://www.eduhealfoundation.org)



## LHS SECTION

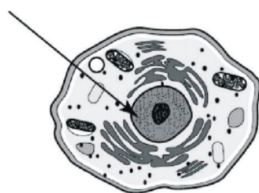
58. The diagram below represents the organization of genetic information within a cell nucleus. The circle labelled Z most likely represents

- (1) amino acids
- (2) nucleolus
- (3) vacuoles
- (4) chromosomes

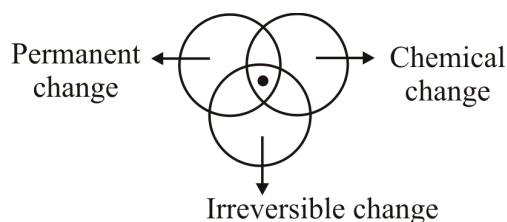


59. What is the BEST description of the cell structure indicated by the arrow in the figure below ?

- (1) Water reserve
- (2) Fuelling station
- (3) Command center
- (4) Internal skeleton



60. Study the venn diagram



Centre point represents

- |                    |                      |
|--------------------|----------------------|
| (1) Melting of ice | (2) Boiling of water |
| (3) Rusting        | (4) Condensation     |



**END OF THE EXAM**

## RHS SECTION

58. Use the tables below to answer the question.

### Investigation 1

Swing	Chain Length	Number of Swings in 60 Seconds	Release Point
1	250 centimeters	18	Full
2	220 centimeters	20	Full
3	190 centimeters	22	Full

### Investigation 2

Swing	Chain Length	Number of Swings in 60 Seconds	Release Point
1	250 centimeters	18	3/4
2	220 centimeters	20	1/2
3	190 centimeters	22	1/4

Students perform an investigation using the swings on a playground. One of the students sits on swing 1. The swing is pulled as far as it could go and is released. The students count the number of swings in 60 seconds. The same student sits on swings 2 and 3 and repeats the procedure. The students perform a second investigation, but this time with three different release points. The students want to find out if the release point affects the number of swings in 60 seconds. They conclude that the release point does not affect the number of swings in 60 seconds.

What is the experimental design flaw in their second investigation?

- (1) Chain length and time are both changed.
- (2) Release point and chain length are both changed.
- (3) All variables are controlled except chain length.
- (4) All variables are controlled except release point.

59. Use the pictures and table below to answer the question.



cardinal



pelican



hummingbird



eagle

**Bird Beaks and Diets**

Characteristics of Beak	Diet
short and pointed for cracking	seeds and nuts
wide and deep for skimming	small fish and crustaceans
long and pointed for probing	insects and nectar
curved and sharp for ripping	small mammals and fish



warbler

What does a warbler MOST likely eat?

- (1) seeds and nuts
- (2) insects and nectar
- (3) fish and insects
- (4) small mammals and nuts

60. A scientist tests the effectiveness of a medicine. The medicine is administered to 2,500 volunteers who discontinue all other treatments.

What is wrong with this experimental design?

- (1) The experiment should include fewer volunteers.
- (2) The experiment should include a group that does not take the medicine.
- (3) The experiment should be administered in random dosages.
- (4) The experiment should allow the volunteers to continue other treatments.



**END OF THE EXAM**