



Inspiring Young Minds
Through Knowledge Olympiads

CLASS

8

SET-B

DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

Name:.....

Section:.....Roll No.:.....

Contact No.

Total Questions: 50

Time: 1 hr.



**19TH SOF NATIONAL
SCIENCE OLYMPIAD**

Guidelines for the Candidate

1. You will get additional ten minutes to fill up information about yourself on the OMR Sheet, before the start of the exam.
2. Write your **Name, School Code, Class, Section, Roll No.** and **% of marks/grade** in last class clearly on the **OMR Sheet** and do not forget to sign it.

3. The Question Paper comprises three sections:

Logical Reasoning (10 Questions), **Science** (35 Questions) and **Achievers Section** (5 Questions)

Each question in Achievers Section carries 3 marks, whereas all other questions carry one mark each.

4. All questions are compulsory. There is no negative marking. Use of calculator is not permitted.
5. There is only ONE correct answer. Choose only ONE option for an answer.
6. To mark your choice of answers by darkening the circles in the OMR Sheet, use **HB Pencil** or **Blue / Black ball point pen** only. E.g.

- Q. 16: In the water cycle, condensation is the process of
- A. Water vapour cooling down and turning into a liquid
 - B. Ice warming up and turning into a liquid
 - C. Liquid cooling down and turning into ice
 - D. Liquid warming up and turning into water vapour

As the correct answer is option A, you must darken the circle corresponding to option A in the OMR Sheet.

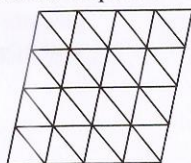
16. ● (B) (C) (D)

7. Rough work should be done in the blank space provided in the booklet.
8. Return the OMR Sheet to the invigilator at the end of the exam.
9. Please fill in your personal details in space on top of this page before attempting the paper.

LOGICAL REASONING

1. The minimum number of straight lines required to make the given figure is ____.

A. 23
B. 22
C. 17
D. 18



2. The following letters are coded as follows.
Letter : B M K A T R E U N H F I W D P
Digit/Symbol : 7 % 5 © 6 9 8 2 @ 1 # \$ 3 ★ 4
While coding the given letters following conditions are also to be observed.

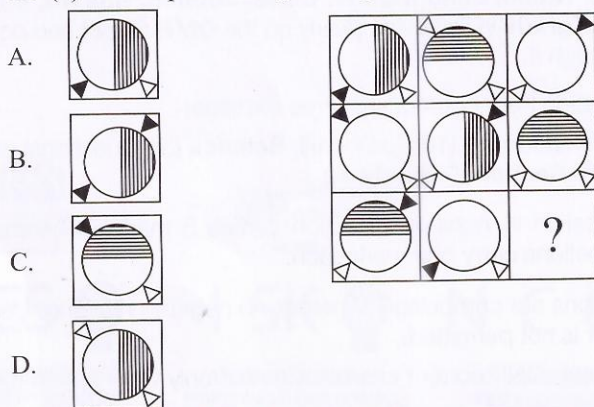
Conditions :

- (i) If the first letter is a vowel and the last letter is a consonant, both are to be coded as the code for the vowel.
- (ii) If the first letter is a consonant and the last letter is a vowel, codes for these two are to be interchanged.
- (iii) If both the first and the last letters are consonants, both are to be coded as the code for the last letter.

MATRBW

A. % © 6973 B. 3 © 6973
C. % © 697% D. 3 © 697%

3. Select the figure from the options which will replace the (?) to complete the given figure matrix.



4. Mini goes to the Departmental Store, which is to the North of her house, 6 km away by an auto. After the shopping she decides to visit her friend Trishu, hence turns to the right and reaches her friend's house which is 8 km away. From there she visits a shop which is 6 km away, taking a right turn. Finally, she turns to the right and phones up to the house to send the car. In what direction should the driver take the car to pick up Mini to bring her back?

A. West B. East
C. South D. North

5. Three of the following four are alike and hence form a group. Which one does not belong to that group?

A. NSWX
C. HMQR

B. KPSU
D. EJNO

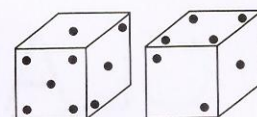
6. How many odd numbers are there in the following series which are immediately followed by an odd number?

5 1 4 7 3 9 8 5 7 2 6 3 1 5 8 6 3 8 5 2 2 4 3 4 9 6

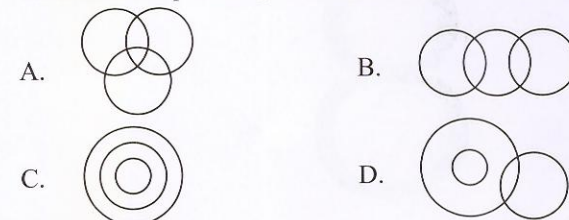
A. 1 B. 2
C. 4 D. More than 4

7. Two positions of a dice are shown below. When there are two dots at the bottom, the number of dots at the top will be ____.

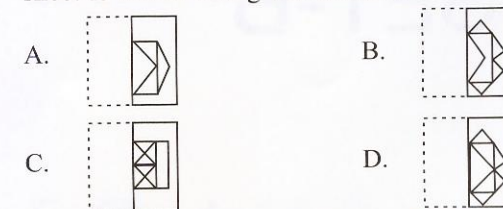
A. 3
B. 5
C. 6
D. Cannot be determined



8. Which of the following Venn diagrams best depicts the relationship amongst, 'Singers, Dancers, Actors'?



9. A square transparent sheet with a pattern is given. Find the option as to how the pattern would appear when the transparent sheet is folded along the dotted line.

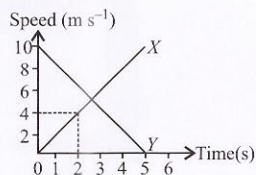


10. Six friends – Mohit, Arun, Amit, Samrath, Aman and Siddharth are studying six different specialisations which are – metallurgy, telecommunication, humanities, mechanical, electrical and electronics not necessarily in the same order. Each one likes a different sport which are hockey, cricket, swimming, football, badminton and tennis again not in the same order. Samrath is not studying electronics. Aman is studying humanities and likes hockey. Amit likes swimming and is not studying electronics. The one who likes football is studying electrical. Siddharth is studying mechanical and does not like tennis. The one who likes badminton is studying telecommunication. Mohit and Arun do not like badminton. Mohit does not like tennis. Which sport does Mohit like?

A. Football B. Cricket
C. Hockey D. None of these

11. The speed-time graphs of motion of two bicycles *X* and *Y* are shown here. If at $t = 0$ s, both *X* and *Y* are at same position, then at what time will they be at same position again?

- A. 2 s
B. 2.5 s
C. 5 s
D. After 6 s



12. A solid object moving through a fluid experiences a frictional force exerted by the fluid. At a particular instant the frictional force exerted by the fluid does not depend on

- A. Shape of the object
B. Speed of the object
C. Nature of the fluid
D. Volume of the fluid.

13. The given figure shows a statue. It exerts a pressure of 340 Pa on the floor. What is the weight of the statue if base area of its one foot is 17 cm^2 ?



- A. 5.780 N
B. 1000 N
C. 1.156 N
D. 2000 N

14. While trying to put out a fire in an electric appliance, we should pour _____ on it.

- A. Distilled water
B. Tap water
C. Rain water
D. Salt water

15. Which of the following statements is incorrect about constellation?

- A. It is a group of stars that has recognisable shape.
B. It appears to move in the sky from east to west.
C. It consists of large number of stars but we are able to see only the bright ones.
D. All the stars of a constellation are at the same distance from us.

16. Which of the following statements about conduction are true?

- (i) Conduction can transfer heat faster in denser medium.
(ii) Conduction can transfer heat faster through good electrical conductors.
(iii) Conduction cannot happen along with convection.
A. (i) and (ii) only
B. (i) and (iii) only
C. (ii) and (iii) only
D. (i), (ii) and (iii)

17. A student is given a thermometer that reads -1°C for the lower fixed point and 99°C for the upper fixed point. He uses the thermometer to measure the temperature of some

water before and after heating. Which of the following correctly describes the temperature recorded by the thermometer as compared to the actual temperatures of the water before and after heating, and the temperature difference recorded by the thermometer and the actual temperature difference?

	Reading before heating	Reading after heating	Temperature difference
A.	Lower	Lower	Low
B.	Lower	Higher	High
C.	Lower	Lower	Same
D.	Higher	Higher	Same

18. Read the given statements and select the correct option.

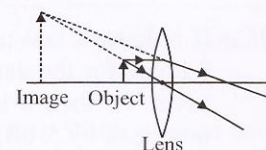
Statement 1 : It is difficult to drive a vehicle at high speed on a rainy day.

Statement 2 : Friction depends on the nature of surfaces in contact.

- A. Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.
B. Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.
C. Statement 1 is true but statement 2 is false.
D. Both statements 1 and 2 are false.

19. The diagram shows a converging lens producing an upright and virtual image.

Which of the following optical instruments uses this arrangement?



- A. A camera
B. A magnifying glass
C. A photographic enlarger
D. A projector

20. Meera's father was born on February 2, 1977. How many complete turns has he gone round the sun till October 20, 2016?

- A. 28
B. 39
C. 40
D. 77

21. Match the column I with column II and select the correct option.

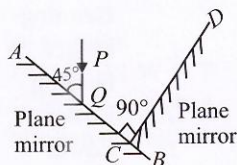
Column I	Column II
P. Convex mirror	1. Peep-hole in the door
Q. Convex lens	2. Shop security mirror
R. Concave lens	3. Reflector of torch
S. Concave mirror	4. Magnifying glass
A. P-2, Q-3, R-4, S-1	
B. P-2, Q-4, R-1, S-3	
C. P-1, Q-4, R-3, S-2	
D. P-3, Q-1, R-4, S-2	

22. Rearranging charges in uncharged metal object without contact with charged object is called

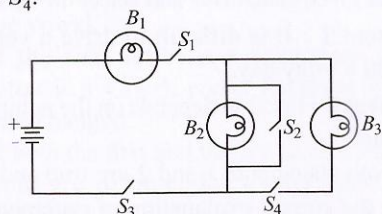
A. Conduction B. Discharge
C. Insulation D. Induction.

23. Two plane mirrors AB and CD are placed at right angle to one another. A ray of light PQ hits AB at Q making an angle of 45° as shown in the diagram. This ray will be reflected from mirror CD at an angle of

A. 20°
B. 35°
C. 45°
D. 60° .



24. The given figure shows a circuit which contains three identical bulbs B_1 , B_2 , B_3 and four switches S_1 , S_2 , S_3 and S_4 .



Which of the following combinations of switch positions will make all the three bulbs to glow?

	S_1	S_2	S_3	S_4
A.	Closed	Open	Closed	Open
B.	Closed	Closed	Open	Closed
C.	Open	Closed	Closed	Closed
D.	Closed	Open	Closed	Closed

25. It is known that normally at 90 dB, it takes about 8 hours for the damage to receptor nerves of ear to occur. Further, it is found that if the sound level is increased by 5 dB, the safe exposure limit is cut to half. Based on the information, what is the non-stop exposure time for a 105 dB sound to damage the ear?
- A. 1 h B. 2 h
C. 4 h D. 5 h

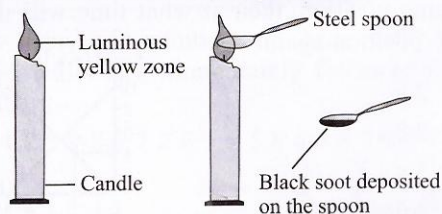
26. Three colourless liquids I, II and III are tested with red and blue litmus papers with the following results:

Paper	I	II	III
Red litmus	Stays red	Stays red	Turns blue
Blue litmus	Turns red	Stays blue	Stays blue

Which of the following is the correct identification of I, II and III?

- A. I is lime water, II is common salt solution and III is hydrochloric acid.
B. I is *amla* juice, II is lemon juice and III is caustic soda solution.
C. I is vinegar, II is sugar solution and III is baking soda solution.
D. I is window cleaner, II is milk of magnesia and III is soap solution.

27. Sohail conducted an experiment by taking a candle and a steel spoon. He put the spoon in the middle of the yellow part of the candle flame for a few seconds. He observed black deposition on the spoon. What can be concluded from this experiment?



- A. Wax is an inflammable substance hence, it burns with a smoky flame.
B. Unburnt carbon particles produce smoke (soot) which gets deposited on the spoon.
C. Yellow region of the flame is the hottest hence, it produces smoke.
D. Out of three colours (blue, black and yellow) of the flame, black being the darkest gets deposited on the spoon.

28. Study the given table carefully and choose the incorrect match.

S. No.	Object/material	Malleability	Conductor of electricity
I.	Iron nail	✓	×
II.	Coal piece	✓	×
III.	Aluminium block	✓	✓
IV.	Pencil lead	×	✓

- A. I and II only B. II and III only
C. I, III and IV only D. All of these

29. Some materials are listed as :

- (a) Cotton (b) Dacron
(c) Bakelite (d) Jute
(e) Terylene (f) Melamine

They are classified as

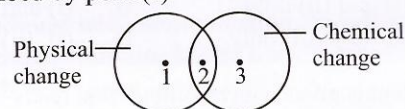
- (i) Biodegradable
(ii) Manufactured from petroleum products
(iii) Thermosetting plastics

Choose the correct match.

- A. (i) – c, d; (ii) – a, e; (iii) – b, f
B. (i) – d, f; (ii) – a, c; (iii) – b, e
C. (i) – a, d; (ii) – b, c; (iii) – e, f
D. (i) – a, d; (ii) – b, e; (iii) – c, f

30. In a biogas plant, anaerobic bacteria digest animal waste and produce biogas (Process I) which is burnt as household fuel (Process II).

In the given Venn diagram, processes I and II are best described by point(s)



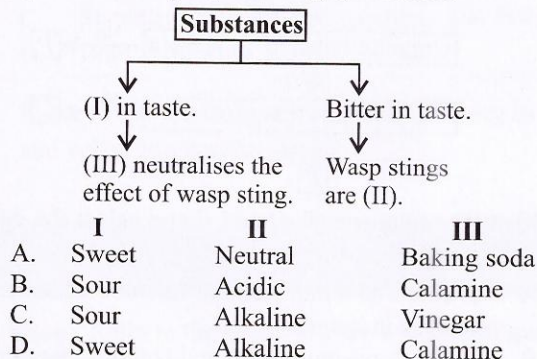
- A. 1 B. 2
C. 3 D. 1 and 3 respectively.

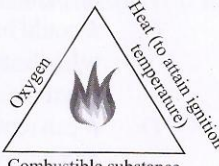
31. A brief description of four substances is given as:
 W : Obtained from natural gas and is used in the production of urea.
 X : Contains mainly carbon and is obtained by carbonisation of dead vegetation.
 Y : A petroleum product used for road surfacing.
 Z : Used as a fuel for jet aircrafts.

W, X, Y and Z are respectively

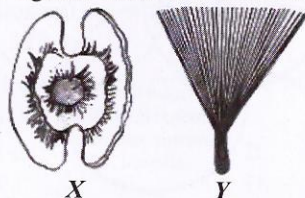
- CNG, coke, coal tar and diesel
- Hydrogen, coal, bitumen and kerosene
- Coal gas, coke, coal tar and kerosene
- Hydrogen, coke, bitumen and diesel.

32. Observe the given flowchart and mark the appropriate option correctly representing I, II and III.



33. Fire triangle is represented as shown in the figure:
 Eliminating one or more of the three factors helps in fighting fire.
 Water, which is the most common fire extinguishing agent works by
- 
- Raising the ignition temperature of the substance
 - Removing the combustible substance
 - Removing heat and oxygen
 - Supplying CO₂ which covers the fire like a blanket.

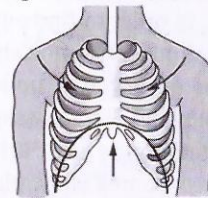
34. The given figures show two kinds of fruits.



How are X and Y adapted for their dispersal in the surroundings?

- | | |
|---|--|
| X | Y |
| A. Fleshy and sweet to attract animals | A. Hair-like structure to stick onto bodies of animals |
| B. Wing-like structure to enable to float on water | B. Hook-like structure to stick onto fur of animals |
| C. Air trapped within its structure to enable to float on water | C. Hair-like structure to enable to float on water |
| D. Wing-like structure to get blown off with the wind | D. Hair-like structure to get blown off with the wind |

35. Given figure represents a breathing process.



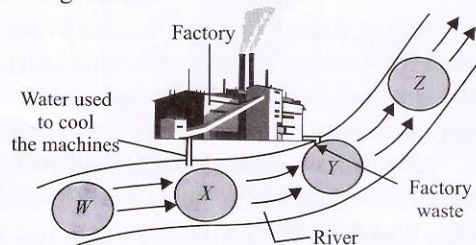
During this process _____.

- Air from atmosphere rushes into the lungs
- Volume of thoracic cavity and lungs decreases
- The air pressure inside the lungs decreases
- Both A and B

36. Refer to the given dichotomous key and select the correct option regarding P, Q, R, S and T.

- It is a method of asexual reproduction in plants. - Go to II
 - It is a method of asexual reproduction in animals. - Go to IV
 - Vegetative propagation by leaves - P
 - Vegetative propagation by stems - Go to III
 - Vegetative propagation by rhizomes - Q
 - Vegetative propagation by bulbs - R
 - Reproduction through binary fission - S
 - Reproduction through budding - T
- P - Potato, Q - Turmeric, R - *Spirogyra*, S - *Plasmodium*, T - *Hydra*
 - P - *Bryophyllum*, Q - Ginger, R - Onion, S - *Amoeba*, T - *Hydra*
 - P - *Colocasia*, Q - Mint, R - Potato, S - *Paramecium*, T - Sponge
 - P - Strawberry, Q - *Chlamydomonas*, R - Onion, S - *Paramecium*, T - Yeast

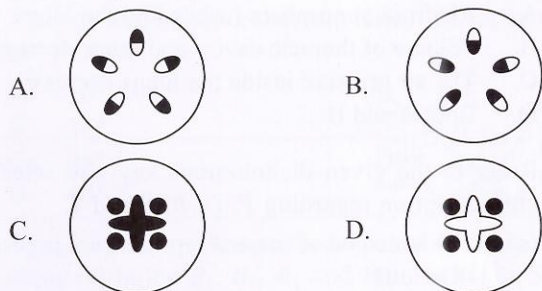
37. A factory is built beside a river. Water used to cool the machines as well as some factory waste containing mercury are discharged into the river as shown in the given diagram.



Which of the following statements are correct regarding this?

- The quantity of fish in area W is the highest as compared to those in areas X, Y and Z.
- The fish present in area Z are not consumable as they are likely to contain poisonous mercury.
- Areas X and Y are directly affected by pollution so the chances of getting fish in this area are negligible.
- All of these

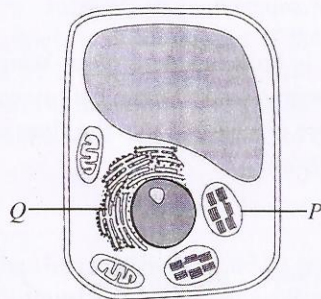
38. Anita bought a bunch of blue flowers with intact stems from the market. In order to find out whether the colour was artificially introduced or not, she prepared a section of the stem and observed it under the microscope. Which of the following correctly shows the condition of the section, if the colour was artificially introduced in flowers. (The dark area is the place where the colour is present).



39. Read the given paragraph.
Organism *X* has leathery lips and a big hump, organism *Y* has thick layer of fur on skin and thick layer of subcutaneous fat whereas organism *Z* is brilliantly coloured and has sticky pads on its feet. Which of the following holds true for organisms *X*, *Y* and *Z*?

- Organism *X* lives in a place inhabited by xerophytic plants.
- Organism *Y* hibernates in extreme winters.
- Organism *Z* creates ghost images and uses startling colouration to elude its predators.
- All of these

40. Refer to the given figure of a plant cell and select the correct statement regarding organelles *P* and *Q*.



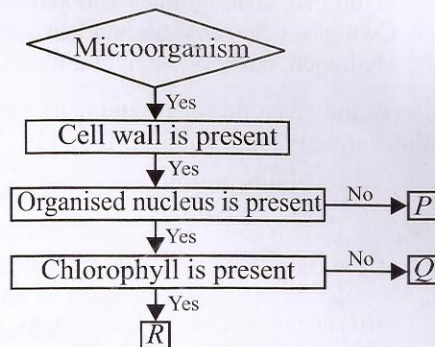
- P* synthesises energy but *Q* synthesises lipids.
- Presence of both *P* and *Q* in a plant cell maximise the rate of photosynthesis.
- P* takes part in photosynthesis whereas *Q* takes part in protein synthesis.
- Amount of *P* and *Q* remains fixed in all cell types.

41. Read the following statements with few blanks and select the option that correctly fills any three of these blanks.

- P is the transformation of a larval form into an adult animal.
- Egg laying animals are called Q whereas animals which give birth to babies are known as R.

- Testes are S sex organs of males which lie within T.
- The clone sheep U was developed by using cells from V and Scottish Blackface sheep.
A. *Q* - Oviparous, *S* - Secondary, *U* - Rosie
B. *P* - Metamorphosis, *R* - Viviparous, *V* - Finn Dorset
C. *Q* - Viviparous, *T* - Seminal vesicle, *U* - Dolly
D. *R* - Oviparous, *S* - Accessory, *T* - Scrotum

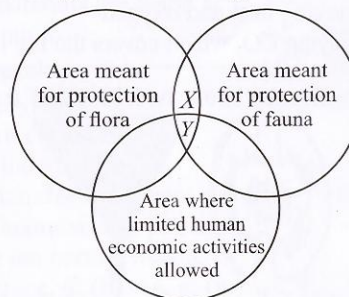
42. Refer to the given flow chart.



Identify organisms *P*, *Q* and *R* and select the correct option regarding them.

- P* could be a multicellular microbe which causes tetanus in humans.
- Q* is always unicellular and could be saprophytic or parasitic.
- R* could be a unicellular biflagellate microorganism which forms an important component of phytoplanktons.
- P* can reproduce only inside cells of host organisms and behaves as non-living entity outside the living systems.

43. Refer to the given Venn diagram.



Identify *X* and *Y* and select the correct option regarding them.

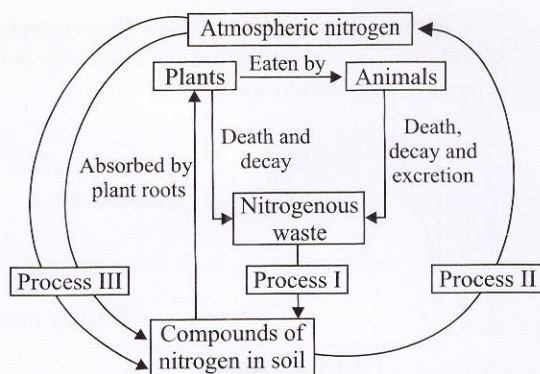
- X* is an *in situ* method of biodiversity conservation whereas *Y* is an *ex situ* method of biodiversity conservation.
- Human activities are allowed only in the core zone of *Y* however the buffer zone remains undisturbed.
- X* is an area that is owned and protected by a national government for the purpose of recreation and development.
- Hunting of animals is allowed in core zone of *Y* however, it is prohibited in all parts of *X*.

44. Read the given statements and select the correct option.

Statement 1 : A plant or animal species which is exclusively found in a particular area and is not found naturally anywhere else, is known as endemic species.

Statement 2 : The existence of endemic species is often threatened due to the introduction of exotic species from some other geographical area.

- A. Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.
 B. Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.
 C. Statement 1 is true but statement 2 is false.
 D. Both statements 1 and 2 are false.
45. Refer to the given nitrogen cycle occurring in nature and select the correct option.

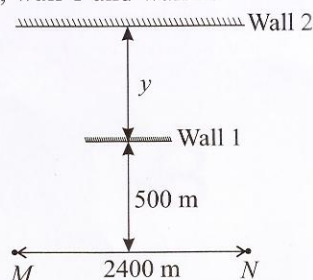


- A. Parasitic bacteria and fungi play an important role in process II.
 B. If process I does not take place then there will be no recycling of nutrients.
 C. Nitrogen fixation by free living and symbiotic bacteria and lightning process both could be process III.
 D. Both B and C

ACHIEVERS SECTION

Direction : Refer to the given passage and answer questions 46 and 47.

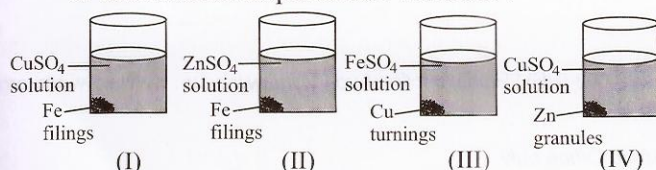
The given figure shows two men *M* and *N*, facing two flat and hard walls, wall 1 and wall 2.



Man *N* fires a gun, man *M* hears two echoes, one from wall 1 and second from wall 2. The speed of sound in air is given to be 325 m s^{-1} .

46. After the firing of a gun by the man *N*, the man *M* will hear the first echo in
 A. 4.0 s B. 8.9 s
 C. 8.0 s D. 10.5 s.
47. If the time difference between the two echoes as heard by man *M* is 1.23 s, then distance between the walls, *y* is
 A. 400 m B. 900 m
 C. 500 m D. 1300 m.

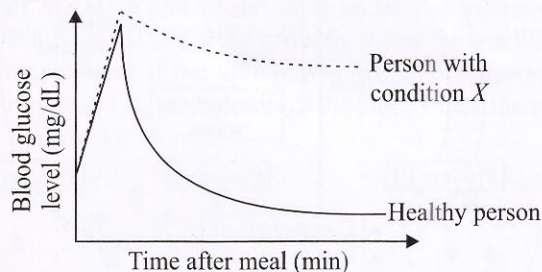
48. Ms Nisha, a science teacher set up the given apparatus to demonstrate displacement reactions :



Which of the following statements is correct?

- A. Copper will be precipitated in beaker I and there will be no change in beakers, II, III and IV.
 B. Copper will be precipitated in beaker IV and solutions in beakers I, II and III will become colourless.
 C. There will be no change in beakers II and III and solutions in beakers I and IV will turn green and colourless respectively.
 D. There will be no change in beakers II and III and solutions in beakers I and IV will become colourless and green respectively.
49. Read the given paragraph where few words have been italicised.
- Monoculture* is growing of a single crop in one habitat. It makes mechanical harvesting *easy* and *reduces* pest infestation. But, it removes some nutrients specifically from the area. Hence, crop rotation is more prevalent wherein leguminous and non-leguminous crops are grown *simultaneously* on the same field. It replenishes the soil with *magnesium* and improves soil fertility. It also *increases* pest infestation.
- Select the correct statement regarding this.
- A. *Monoculture* should be replaced with *tissue culture*.
 B. *Easy* should not be replaced as it is correctly mentioned while *magnesium* should be replaced with *boron*.
 C. *Simultaneously* should be replaced with *alternately*.
 D. *Reduces* and *increases* should not be replaced or interchanged as they are correctly mentioned.










50. The graph given below shows the changes in the blood glucose concentrations of a healthy person and a person with condition X .



Refer to the given graph and select the incorrect statement regarding it.

- A. Person with condition X needs to take insulin injections before meals.
- B. Urine of person with condition X contains some amount of glucose.
- C. Condition X arises due to malfunctioning of few cells of pancreas.
- D. Condition X is the consequence of deficiency of iodine in body.

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