SCIENCE OLYMPIAD FOUNDATION

Inspiring Young Minds
Through Knowledge Olympiads

CLASS 7

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. ● Ⓑ Ⓒ Ⓓ

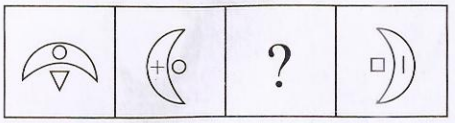
7. Rough work should be done in the blank space provided in the booklet.
8. Return the OMR Sheet to the invigilator at the end of the exam.
9. Please fill in your personal details in space on top of this page before attempting the paper.

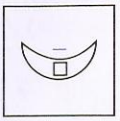
1. Pointing to a photograph, Mini said, "She is the mother of my only brother's uncle's son." How is Mini related to the person in the photograph?

   A. Aunt
   B. Niece
   C. Mother
   D. Daughter

2. Select a figure from the options which will substitute the (?) so that a series is formed by the Problem Figures.

   Problem Figures



   A. 
   B. 
   C. 
   D. 

3. How many such 4's are there in the following sequence that the sum of the immediately following two digits is greater than the sum of the immediately preceding two digits?

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

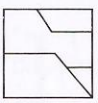
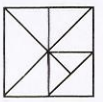
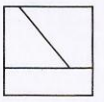
   A. 7
   B. 6
   C. 5
   D. 4

4. If it is possible to make a meaningful word with the first, fourth, fifth and eighth letters of the word HYPOTHESIS which of the following will be the third letter of that word ? If more than one such word can be formed, give 'X' as the answer. If no such word can be formed, give 'M' as the answer.

   A. M B. X
   C. S D. T

5. In which of the following options, Fig. (X) is exactly embedded as one of its part?

   Fig. (X)

   A. 
   B. 
   C. 
   D. 

6. Ahika is standing to the North of Sumit. Priyanka is standing to East of Ahika. Puneet is to the West of Sumit. What is the position of Puneet with respect to Priyanka?

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

7. Select the correct water image of the given combination of letters and numbers.

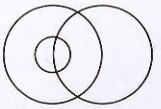
   5N6OMAT

   A. ƧИ9OWAT
   B. Ƨ9ИOWAT
   C. Ƨ9ИWOAT
   D. ƧAИOW9T

8. Three of the following four groups of letters are alike in some away while one is different. Find out which one is different.

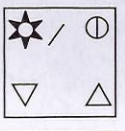
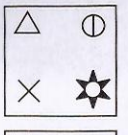
   A. AGDKB
   B. CIFMD
   C. EKHOF
   D. JPMSK

9. Which of the following Venn diagrams correctly represents the relationship amongst "Rivers, Oceans, Water sources"?

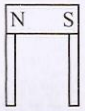
   A. 
   B. 
   C. 
   D. 

10. Select the option in which only specified components of the Fig. (X) are found.

   Fig. (X)

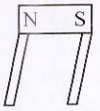
   A. 
   B. 
   C. 
   D. 

11. Which of the following diagrams best depicts the situation when two long iron rods are placed at the ends of a very short bar magnet?

A. 

B. 

C. 

D. 

12. The end of a cyclone comes quickly if the cyclone moves over
A. Sea B. Lake
C. Land D. Cloud.

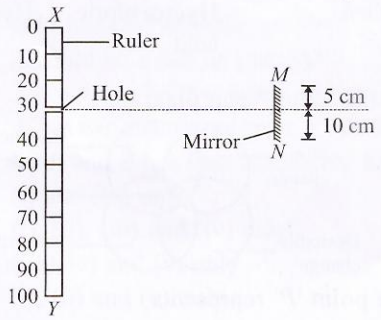
13. Four magnetic materials are used to pick up metallic paper clips after they were taken out from a coil which is connected to a strong direct current. The numbers of paper clips picked up by the four magnetic materials are listed here:

Magnetic material	Number of paper clips picked up
P	0
Q	5
R	10
S	20

Which is the best magnetic material to be used as an electromagnet?
A. *P* B. *Q*
C. *R* D. *S*

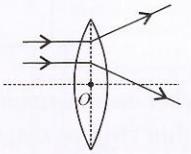
14. Which of the following statements does not illustrate uniform motion?
A. A boy runs 80 m along a straight track at a constant speed.
B. A stone is thrown upwards with a speed of 10 m s^{-1}.
C. A ball moves along a frictionless surface without any external force.
D. An aeroplane flying with a constant speed of 250 m s^{-1} at an altitude of 1000 m.

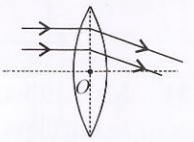
15. The diagram shows a metre ruler *XY* with a small hole drilled at the 30 cm mark. A plane mirror *MN* is placed in front of the ruler and is parallel to it.

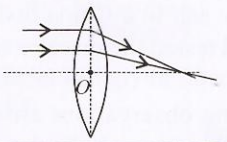


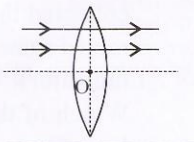
If an observer peeps through the hole at the mirror, the extent to which he can see the metre ruler is between the_____.
A. 0 cm and 90 cm mark
B. 10 cm and 70 cm mark
C. 20 cm and 50 cm mark
D. 15 cm and 60 cm mark

16. Two parallel rays of light strike a convex lens. Which of the following correctly shows the passage of the rays after passing through the lens?

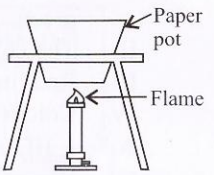
A. 

B. 

C. 

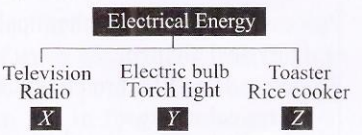
D. 

17. Some steamboat restaurants use paper pots for their customers to heat the food themselves. What is the reason for the paper not to catch fire when in contact with the flame?



(i) The paper is thin and therefore heat is conducted quickly to the water in the paper pot.
(ii) Water has a boiling point lower than the burning temperature of the paper.
(iii) The paper is thick enough to withstand the high temperature of the flame.
A. (i) and (ii) only B. (i) and (iii) only
C. (ii) and (iii) only D. (i), (ii) and (iii)

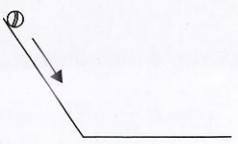
18. Study the classification carefully and select the correct option for *X*, *Y* and *Z*.



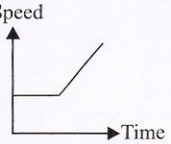
	X	*Y*	*Z*
A.	Refrigerator	Clock	Microwave
B.	Music system	Washing machine	Heater
C.	Walkman	Table lamp	Electric kettle
D.	Air-conditioner	Heater	Hair drier

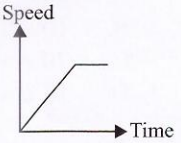
19. The length of mercury thread in a mercury thermometer is 2 mm at the ice point and 26 mm at the boiling point of water. What will be the length of mercury thread in this thermometer if it is used to measure a temperature of 75°C?
A. 18 mm B. 20 mm
C. 22 mm D. 24 mm

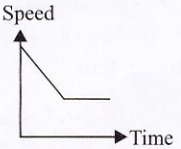
20. The given diagram shows a ball released from the top of a smooth ramp, which reaches a flat and smooth horizontal surface connected to the ramp.

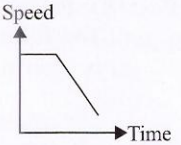


Which of the following speed-time graphs best represents the motion of this ball?

A. 

B. 

C. 

D. 

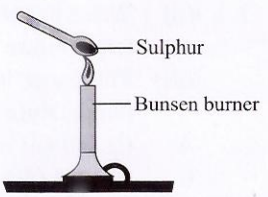
21. Ms. Kritika, a science teacher demonstrated an activity in the class. She burnt a thin strip of magnesium and collected the powdery ash in a China dish. Then she mixed some water and tested the mixture with various indicators.

Which of the following observations are correct?

I. The colour of China rose indicator changed to green.
II. The colour of turmeric paper changed to blue.
III. Red litmus changed to blue.
IV. Colour of methyl orange changed to yellow.

A. I, III and IV only
B. II and III only
C. III and IV only
D. I and II only

22. The given diagram shows burning of sulphur :

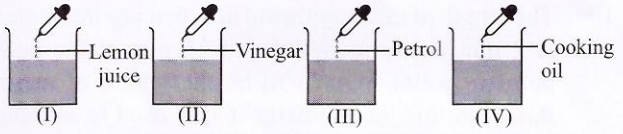


After heating sulphur for few minutes, it melts (process I) and then vaporises (process II). After this, vapour ignite and burn with oxygen to form sulphur dioxide (process III).

Identify the types of changes taking place in these processes.

A. Processes I and III are chemical changes while II is a physical change.
B. Processes II and III are chemical changes while I is a physical change.
C. Process III is a chemical change while processes I and II are physical changes.
D. All are chemical changes.

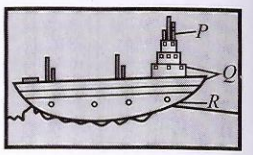
23. The following activity was performed to check the solubility of various liquids in water :



Which of the following observations is correct?

A. Two separate layers will be formed in beakers I and II and liquids are completely miscible.
B. Components will mix well in beakers III and IV as they are completely miscible.
C. Vinegar will disappear completely in beaker II as it is a miscible liquid.
D. Cooking oil will form a separate layer below water in beaker IV.

24. Which portion of the ship will rust the fastest?



A. P
B. Q
C. R
D. P, Q and R will rust equally.

25. The given table shows the properties of four substances K, L, M and N :

Substance	Colour	Nature	Magnetic	Dissolves in water
K	White	Salty	No	Yes
L	Blue	Sweet	No	No
M	White	Sweet	No	Yes
N	Black	Metallic	Yes	No

Which two substances would be most difficult to separate when mixed in water?

A. K and L
B. K and M
C. L and M
D. M and N

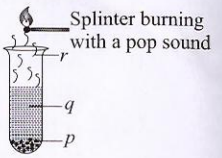
26. Consider the following statements :

I. Baking soda is an acidic salt whereas common salt is a basic salt.
II. The water extract of spinach does not change the colour of red litmus solution.
III. Organic matter neutralises the acidic nature of the soil.
IV. Lime water is acidic in nature.

The incorrect statement(s) is/are

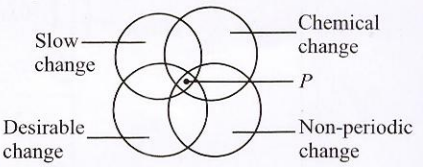
A. I, II and IV only
B. II, III and IV only
C. I, III and IV only
D. II only.

27. Observe the given figure carefully and identify the substances marked as p, q and r.



	p	q	r
A.	Baking soda	Vinegar	Carbon dioxide
B.	Magnesium	Hydrochloric acid	Chlorine
C.	Calcium carbonate	Hydrochloric acid	Carbon dioxide
D.	Zinc	Hydrochloric acid	Hydrogen

28. Study the given Venn diagram :



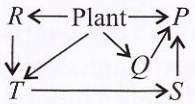
Centre point 'P' represents

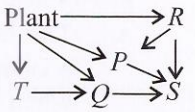
A. Rusting of iron
B. Eruption of volcanoes
C. Ripening of a fruit
D. Burning of cooking gas.

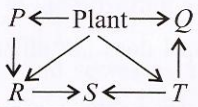
29. The given table classifies five animals *P*, *Q*, *R*, *S* and *T* according to their feeding habits. These animals live in the same habitat.

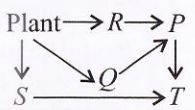
Carnivore	Herbivore	Omnivore
S	*R*	*P*
	T	*Q*

Which of the following shows their correct interlinking with respect to their feeding habits?

A. 

B. 

C. 

D. 

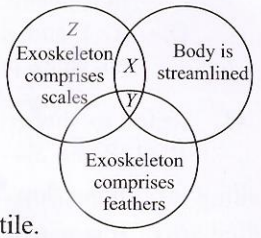
30. The given table shows some observations of food test experiments.

	Test \ Food sample	*W*	*X*	*Y*	*Z*
(i)	Iodine test	Brown	Brown	Bluish-black	Brown
(ii)	Benedict's test	Orange	Blue	Blue	Blue
(iii)	Copper sulphate + Caustic soda test	Blue	Purple	Blue	Purple
(iv)	Ethanol test	Colourless	Emulsion	Colourless	Colourless

Which of the following correctly identifies *W*, *X*, *Y* and *Z*?

A. *W* – Sugar, *X* – Egg, *Y* – Potato, *Z* – Soyabean
B. *W* – Pulses, *X* – Cabbage, *Y* – Butter, *Z* – Jam
C. *W* – Milk, *X* – Orange, *Y* – Peanuts, *Z* – Paneer
D. *W* – Cheese, *X* – Potato, *Y* – Honey, *Z* – Meat

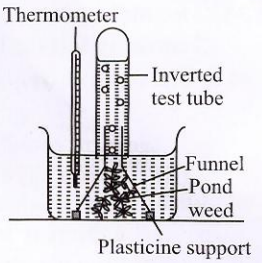
31. Refer to the given Venn diagram and select the correct statements regarding *X*, *Y* and *Z*.



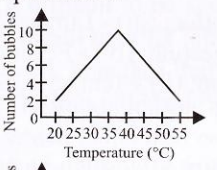
(i) *X* could be *Scoliodon*, *Y* could be pigeon and *Z* could be tortoise.
(ii) *Y* is warm blooded whereas *X* and *Z* are cold blooded animals.
(iii) *X* could be a fish or a reptile.
(iv) *Y* possesses hollow bones and air sacs.
(v) *X* has two chambered heart, *Y* has three chambered heart and *Z* has four chambered heart.

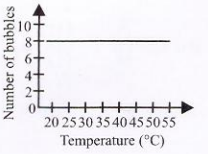
A. (i) and (iv) only
B. (i), (ii), (iii) and (iv) only
C. (ii), (iv) and (v) only
D. (i), (ii) and (v) only

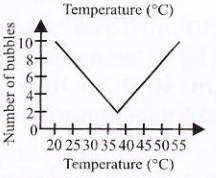
32. Divya set up an experiment in an open field as shown here to study how temperature affects the rate of photosynthesis. She left the apparatus in field from 7 am in the morning till 1 pm in afternoon and tabulated her observations which were later plotted on a graph.

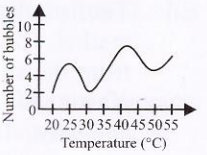


Which of the following graphs shows the result of her experiment?

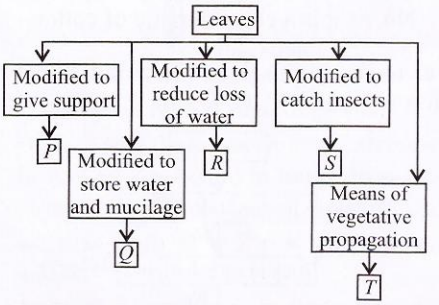
A. 

B. 

C. 

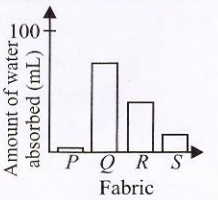
D. 

33. Refer to the given flow chart and identify *P*, *Q*, *R*, *S* and *T*.



A. *P* - Pea, *Q* - *Opuntia*, *R* - *Aloe*, *S* - *Utricularia*, *T* - Lettuce
B. *P* - Grapevine, *Q* - *Acacia*, *R* - *Coleus*, *S* - *Dionaea*, *T* - Passion flower
C. *P* - *Gloriosa*, *Q* - *Aloe*, *R* - *Opuntia*, *S* - *Nepenthes*, *T* - *Bryophyllum*
D. *P* - Bottle gourd, *Q* - Cactus, *R* - *Asparagus*, *S* - *Drosera*, *T* - *Coleus*

34. The given graph shows the amount of water absorbed by four fabrics *P*, *Q*, *R* and *S* of same size when put in four separate beakers each containing 100 mL of water.



Identify *P*, *Q*, *R* and *S* and select the incorrect option regarding them.

A. *R* can be worn close to skin because static electricity does not build up readily.
B. Fibres of *Q* consist of keratin protein, fibres of *S* consist of fibroin protein, fibres of *R* are cellulosic in nature whereas fibres of *P* are obtained from petrochemicals.
C. Fibre of *S* is the strongest natural fibre.
D. Fibres of *P* and *Q* are animal fibres whereas fibres of *R* and *S* are plant fibres.

35. Read the given statements and select the option which correctly fills the blanks in any two of these statements.

(i) *Paramecium* has stiff hair-like structures called _____ all over its body, which are used for _____.

(ii) *Hydra* has a number of _____ around its mouth, that entangle small aquatic animals and kill them with their _____ cells.

(iii) Frog uses its long, sticky_____ to catch insects.

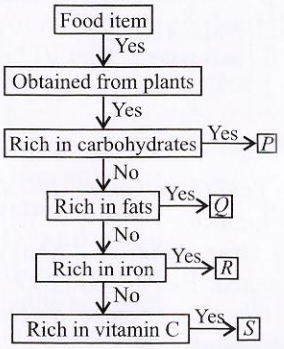
(iv) Mosquito sucks up the blood of animals with its _____.

A. (ii) - Cilia, Absorptive; (iii) - Limb
B. (i) - Tentacles, Ingestion; (iv) - Feeding tube
C. (i) - Cilia, Ingestion; (ii) - Tentacles, Stinging
D. (iii) - Tongue; (iv) - Pseudopodia

36. Your mother goes to buy a woollen shawl from the market. The shopkeeper takes out a small strand of yarn from the shawl and burns it. It smells like a burning plastic. Will it be a good decision to buy this shawl and why?

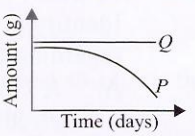
A. Yes, as it is a characteristic of pure wool.
B. No, as it is a characteristic of synthetic yarn.
C. Yes, as it is a characteristic of pure silk.
D. No, as it is a characteristic of cotton.

37. Refer to the given flow chart and select the correct option regarding *P*, *Q*, *R* and *S*.



A. *P* could be honey or sugarcane whereas *Q* could be soyabean or maize.
B. *R* should be taken in large quantities by patients suffering from goitre.
C. Deficiency of *S* leads to bleeding gums and swelling of joints.
D. *Q* should be taken in large quantities by patients suffering from kwashiorkor.

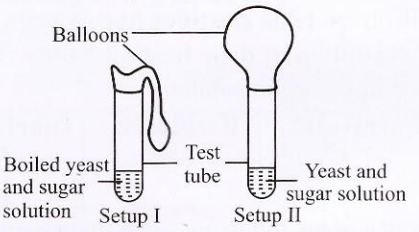
38. The given graph shows the changes in amount of solid wastes *P* and *Q* dumped on an open ground over time.



Select the correct statement regarding *P* and *Q*.

A. *Q* could be vermicomposted or burnt.
B. Hospital waste belonging to category *P* is recycled whereas that belonging to category *Q* is incinerated.
C. Reduction in amount of *P* with time is synchronised with nutrient enrichment of ground soil.
D. *P* could be plastic bag or styrofoam cup whereas *Q* could be vegetable peel or tea leaves.

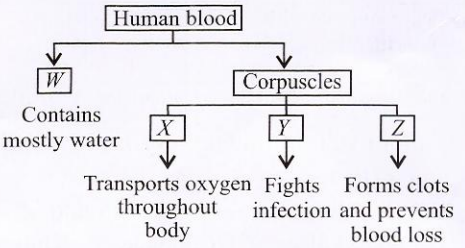
39. Siddhi set up an experiment as shown here to investigate fermentative activity in yeast.



Which of the following holds incorrect regarding the given experiment?

A. The balloon of setup II got inflated due to accumulation of a gas which gives white precipitate when bubbled through calcium hydroxide solution.
B. The balloon in setup I does not inflate as boiled yeast cannot respire.
C. Most of the sugar solution is converted to ethyl alcohol in setup II due to anaerobic respiration of yeast.
D. In setup I, yeast respires only aerobically whereas in setup II yeast undergoes both aerobic and anaerobic respiration.

40. Refer to the given flow chart and select the correct option regarding *W*, *X*, *Y* and *Z*.



A. *X* is enucleated, biconvex and contains red pigment haemoglobin.
B. *X* count goes up in case of anaemia whereas *Y* count goes down in case of common cold.
C. *Z* can change its shape and shows amoeboid movements.
D. *X*, *Y* and *Z* remain suspended in *W* along with enzymes, proteins, hormones, etc.

41. Refer to the given dichotomous key and identify *P*, *Q*, *R* and *S*.

I. (a) It is a flowering plant. - Go to II
(b) It is a non - flowering plant. - Go to III

II. (a) Propagates vegetatively by leaves. – [*P*]
(b) Propagates vegetatively by stem. – [*Q*]

III. (a) Reproduces asexually by fragmentation. – [*R*]
(b) Reproduces asexually by spores. – [*S*]

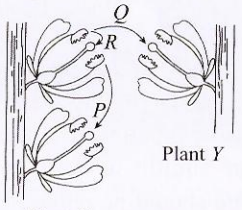
A. *P* - *Bougainvillea*, *Q* - Poppy, *R* - *Sphagnum*, *S* - *Spirulina*

B. *P* - *Begonia*, *Q* - Strawberry, *R* - *Spirogyra*, *S* - *Marchantia*

C. *P* - *Bryophyllum*, *Q* - Passion flower, *R* - *Chrysanthemum*, *S* - *Funaria*

D. *P* - Bottle brush, *Q* - *Dahlia*, *R* - Candytuft, *S* - Jasmine

42. Refer to the given diagram and select the correct option regarding processes *P*, *Q* and *R*.



A. Processes *P*, *Q* and *R* introduce genetic variability in the offspring of sexually reproducing plants *X* and *Y*.

B. Wind serves as agent for processes *P* and *Q* in case plants *X* and *Y* belong to genus *Salvia*.

C. Flowers of plant *X* and *Y* need to produce odour and nectar for completion of processes *P* and *Q* if they are rose species.

D. If plants *X* and *Y* are of maize species, then their flowers need to produce sticky and heavy pollens in very small amount for accomplishment of process *Q*.

43. Read the given paragraph.
X is a natural phenomenon which causes soil erosion mostly in hilly areas whereas *Y* is an anthropogenic cause contributing to erosion. However, *Z* is a natural phenomenon contributing to soil formation.
Select the incorrect option regarding *X*, *Y* and *Z*.

A. Lichens are biological agents responsible for phenomenon *Z*.

B. In areas experiencing extremes of temperature, contraction and relaxation of rocks aids in *Z*.

C. Phenomenon *X* can be checked to some extent by terrace and contour farming.

D. *Y* could be afforestation, floods or forest fire.

44. Which of the following is not true regarding the adaptations shown by different animals?

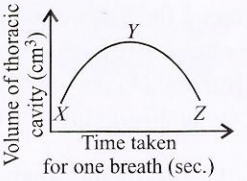
A. Jaguar has spotted skin, which merges well with the speckled shadows of the rainforest floor, making it difficult to be spotted.

B. Toucan uses its long, large bill to reach fruits on weak branches that cannot bear its weight.

C. The lion-tailed macaque has long and sticky tongue which helps it to catch insects.

D. Seals have a thick deposition of fat called blubber that protects them from cold.

45. The given graph shows changes in the volume of thoracic cavity in a normal human being while breathing.



Select the correct option regarding this.

A. From *X* to *Y*, pressure in lungs increases whereas from *Y* to *Z* pressure in lungs decreases.

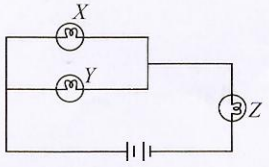
B. From *X* to *Y*, ribs move upward and outward whereas from *Y* to *Z* ribs move downward and inward.

C. At point *Y* diaphragm is dome shaped whereas at points *X* and *Z* it is flat.

D. *X* to *Y* represents exhalation and *Y* to *Z* represents inhalation.

ACHIEVERS SECTION

46. The diagram shows three identical light bulbs *X*, *Y* and *Z*, connected in a circuit.



What will happen to the brightness of the bulbs if a similar bulb is connected in series with the bulb *X*?

	X	*Y*	*Z*
A.	Dimmer	Dimmer	Brighter
B.	Dimmer	Brighter	Dimmer
C.	Brighter	Dimmer	Brighter
D.	Brighter	Brighter	Dimmer

47. Some examples of common household items are given :

(a) Soda water (b) Sour milk
(c) Sugar solution (d) Window cleaner
(e) Toothpaste
(f) Common salt solution

Fill in the blanks by choosing an appropriate option.

With solutions I methyl orange changes to red colour, with solutions II China rose indicator changes to green colour while with solutions III red or blue litmus paper do not show any colour change.

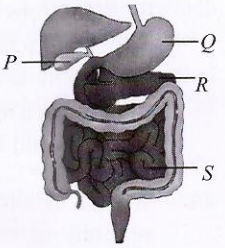
A. I – (c), (d); II – (f), (e); III – (a), (b)

B. I – (a), (b); II – (d), (e); III – (c), (f)

C. I – (d), (f); II – (c), (b); III – (a), (e)

D. I – (a), (e); II – (b), (d); III – (c), (f)

48. Refer to the given figure of human digestive system and select the correct statements regarding parts labelled *P*, *Q*, *R* and *S*.



(i) *P* and *R* secrete and pour their digestive enzymes in *Q* for digestion whereas *Q* secretes HCl which kills germs in food.

(ii) Digestion of both carbohydrates and proteins takes place in *Q* whereas digestion of only fats takes place in *S*.

(iii) *Q*, *R* and *S* secrete digestive enzymes but *P* only stores a digestive juice that emulsifies fats.

(iv) *S* does not secrete any digestive enzyme but receives digestive enzymes of *P*, *Q* and *R* for complete digestion of food.

(v) If *P* is removed in a person then he cannot digest fats present in his food.

(vi) *Q* secretes digestive enzymes and mucus whereas *R* secretes digestive enzymes and hormones.

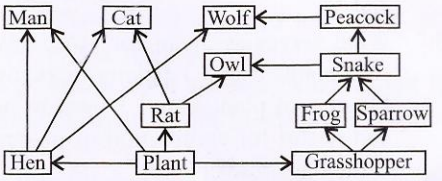
A. (ii), (iv) and (v) only B. (iii) and (vi) only
C. (iv), (v) and (vi) only D. (i), (iii) and (v) only

49. Read the given paragraph where few words have been italicised.

Waste water treatment plant involves physical, chemical and biological processes. First the waste water is made to pass through *bar screen* where *liquid* materials are removed. Then water is allowed to go into *grit* tank where speed of waste water is *increased* so that *light* objects settle at bottom. Then water enters sedimentation tank where sludge sinks slowly at the bottom which is continuously removed by *skimmer*. Water then enters *aeration* tank which contains *anaerobic* bacteria.
Select the correct statement regarding this.

A. *Bar screen* should be replaced by *digester* and *liquid* should be replaced by *solid*.
B. The positions of *grit* and *aeration* should be interchanged.
C. *Increased* and *light* should not be replaced as they are correctly mentioned.
D. *Skimmer* should be replaced by *scraper* and *anaerobic* should be replaced by *aerobic*.

50. Refer to the given food web and select the correct option regarding it.



A. There are 8 food chains in the given food web.
B. There are 4 primary consumers and 3 secondary consumers in this food web.
C. Owl and wolf serve as secondary as well as top consumers in the given food web.
D. There are only two top consumers in the given food web.

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