



Inspiring Young Minds
Through Knowledge Olympiads

CLASS

6

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)



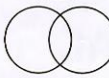

7. Rough work should be done in the blank space provided in the booklet.
8. Return the OMR Sheet to the invigilator at the end of the exam.
9. Please fill in your personal details in space on top of this page before attempting the paper.

LOGICAL REASONING





1. Trishika starts walking straight facing South. After walking 30 metres she turned to her right, walked 25 metres and turned to her left. Again after walking a distance of 10 metres she turned to her left. In which direction is she facing now?

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

2. Select the CORRECT match.

- A.  – Mountains, Forest, Earth
- B.  – Fruit, Mango, Grass
- C.  – Cars, Brakes, Steering wheels
- D.  – Cereal, Wheat, Rice

3. Select a figure from the options which completes the pattern in Fig. (X).

- A. 
- B. 
- C. 
- D. 

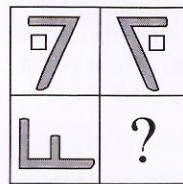
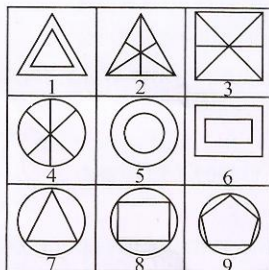


Fig. (X)

4. Mohit is 27th from the left end in a row of 49 boys and Samrath is 27th from the right end in the same row. How many boys are there between them in the row?

A. 6
B. 3
C. 5
D. Can't be determined

5. Group the given figures into three classes using each figure only once.



- A. 1, 5, 6; 2, 3, 4; 7, 8, 9
B. 1, 4, 7; 2, 5, 8; 3, 6, 9
C. 1, 2, 3; 4, 5, 8; 6, 7, 9
D. 1, 3, 5; 2, 4, 8; 6, 7, 9

6. Pointing to a photograph, a man said, "She is the daughter of my grandfather's only son." How is the woman related to the man?

A. Mother
B. Daughter
C. Sister
D. Sister-in-law

7. If 'P' denotes '×', 'R' denotes '÷', 'M' denotes '-' and 'W' denotes '+', then the value of

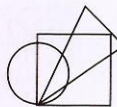
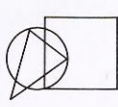
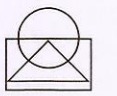
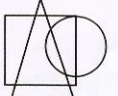
$$20 R 5 W 12 M 3 P 4 = ?$$

- A. 4
B. 16
C. 28
D. 52

8. Select the option which satisfies the same conditions of placement of the dots as in Fig. (X).



Fig. (X)





- A. 
- B. 
- C. 
- D. 

9. If in a certain code language, UTENSIL is coded as WVGPUKN, which word would be coded as WINTER?

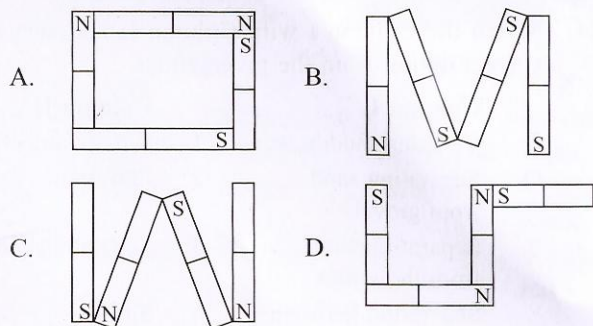
A. UGLRCP
B. UGLRPC
C. ULGRCP
D. PCRLGU

10. Select the correct mirror image of the given figure, if the mirror is placed vertically to the left.



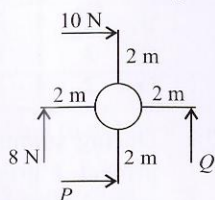
- A. 
- B. 
- C. 
- D. 

11. Which of the following arrangements of four bar magnets is not possible?



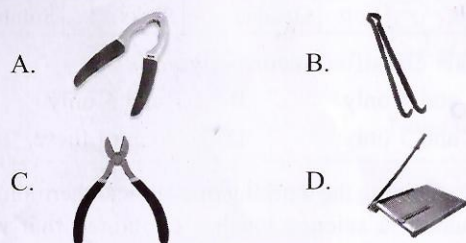
12. A windmill is pushed by four external forces as shown in the figure. Which of the following is not a possible set of forces P and Q for the windmill to be stationary?

	P	Q
A.	10 N	8 N
B.	9 N	9 N
C.	2 N	16 N
D.	6 N	14 N

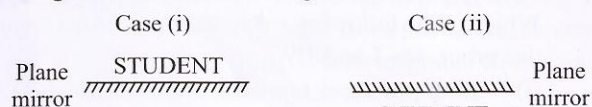


13. Which of the following statements is correct?
- Eclipse occurs due to reflection of light.
 - A person located in umbra region may not see the source of light directly.
 - Moon is a luminous body.
 - The size of the shadow depends on the size of object only.

14. In which of the following does the fulcrum lie between the load and the effort?



15. Which of the following options correctly shows the image formed in the two given cases?



Case (i)	Case (ii)
A.	A.
B.	B.
C.	C.
D.	D.

16. Submultiple micro is equal to

A. $1/1000000$	B. $1/100000$
C. $1/10000000$	D. $1/1000$

17. Fill in the blanks by choosing an appropriate option. Venus is the brightest planet in the Earth's night sky. Venus rotates from (i) to (ii) about its axis, and all the other planets rotate from (iii) to (iv) about their axes.

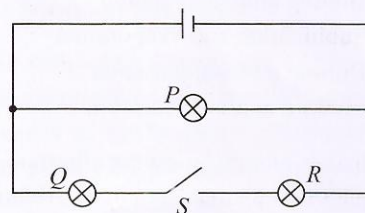
	(i)	(ii)	(iii)	(iv)
A.	East	West	East	West
B.	East	West	West	East
C.	West	East	East	West
D.	West	East	West	East

18. Match column-I with column-II and select the correct option from the given codes.

	Column-I		Column-II
(i)		(a)	Oscillatory motion
(ii)		(b)	Rotatory motion
(iii)		(c)	Curvilinear motion
(iv)		(d)	Random motion

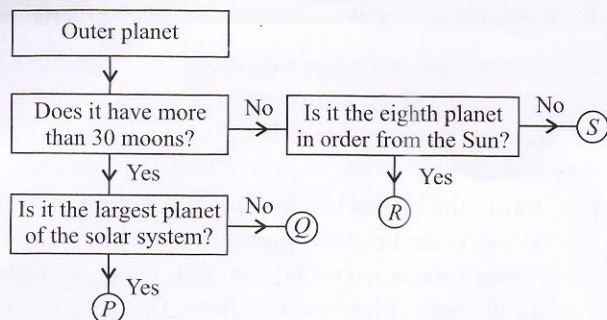
- (i) – (b), (ii) – (a), (iii) – (d), (iv) – (c)
- (i) – (c), (ii) – (d), (iii) – (a), (iv) – (b)
- (i) – (b), (ii) – (d), (iii) – (a), (iv) – (c)
- (i) – (c), (ii) – (a), (iii) – (d), (iv) – (b)

19. In the given circuit, the three lamps are identical. When switch S is closed then



- Lamp P becomes dimmer
- Lamp P is as bright as lamp Q
- Lamp Q is not as bright as lamp R
- Lamp P remains as bright as before.

20. Study the given flowchart carefully.



Which of the following correctly lists the names of planets that can be placed at P, Q, R and S in the given flowchart?

	P	Q	R	S
A.	Saturn	Jupiter	Uranus	Neptune
B.	Saturn	Uranus	Jupiter	Neptune
C.	Jupiter	Neptune	Saturn	Uranus
D.	Jupiter	Saturn	Neptune	Uranus

21. Substances X, Y and Z have the following properties:

X: Elastic, opaque, non-edible

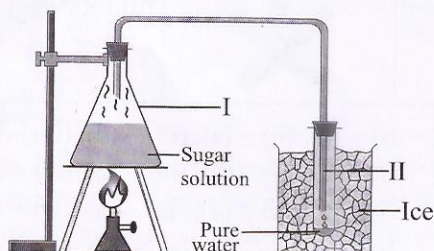
Y: Liquid, inflammable, edible

Z: Hard, floats on water, inflammable

X, Y and Z are respectively

- Plastic, milk and iron nail
- Sand, honey and soap
- Rubber band, cooking oil and matchstick
- Aluminium foil, shampoo and steel plate.

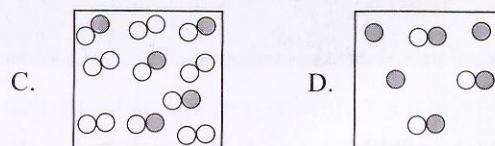
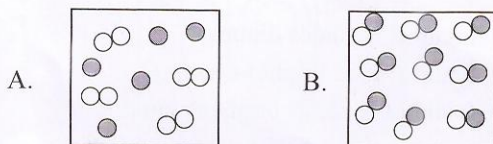
22. The given figure shows the apparatus used to obtain pure water from sugar solution :



The processes occurring in apparatus I and II are respectively

- Boiling and vaporisation
- Sublimation and evaporation
- Boiling and condensation
- Melting and condensation.

23. Which one of the following diagrams represents an example of an element-element mixture?



24. Match the Column I with Column II and select the correct option from the given codes.

Column I

Column II

- | | |
|---|----------------------|
| P. Cleaning muddy water | 1. Winnowing |
| Q. Separating sand from gravel | 2. Filtration |
| R. Separating chaff from the grains | 3. Separating funnel |
| S. Separating kerosene from a mixture of kerosene and water | 4. Sieving |

P Q R S

- 4 2 1 3
- 2 4 3 1
- 3 2 1 4
- 2 4 1 3

25. During summer holidays while doing their science project, a group of class 6 students classified things around them as given in the table :

	Material	Appearance	Transparency	Floats/sinks in water	Soluble/insoluble in water
1.	Silver coin	Hard	Opaque	Sinks	Insoluble
2.	Grass	Soft	Transparent	Sinks	Soluble
3.	A piece of glass	Hard	Transparent	Sinks	Insoluble
4.	Cotton ball	Soft	Opaque	Floats initially then sinks	Insoluble
5.	Hair	Soft	Opaque	Sinks	Soluble

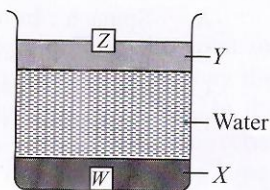
Materials classified incorrectly are

- 3 and 4 only
- 1 and 5 only
- 2 and 5 only
- None of these.

26. While explaining the working of a clinical thermometer, Ms. Kusum, a science teacher explained that when temperature rises, mercury in the thermometer expands (Process I) and when temperature goes down, the mercury contracts and falls to a lower reading (Process II). Which of the following statements are correct regarding the processes I and II?

- Both processes represent chemical changes.
 - Both processes are reversible.
 - Process I is a physical change and process II is a chemical change.
 - Both processes represent physical changes.
- (ii) and (iv) only
 - (i) and (ii) only
 - (ii) and (iii) only
 - None of these

27. When four different substances *W*, *X*, *Y* and *Z* are placed in a beaker, they get arranged in a way as shown in the figure : Identify substances *W*, *X*, *Y* and *Z*.



	<i>W</i>	<i>X</i>	<i>Y</i>	<i>Z</i>
A.	Stone	Mustard oil	Mercury	Ice cube
B.	Ice cube	Mercury	Mustard oil	Paper
C.	Iron bar	Honey	Mustard oil	Wooden block
D.	Mercury	Iron bar	Honey	Wooden block

28. The given table shows some properties of three substances *P*, *Q* and *R*:

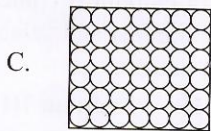
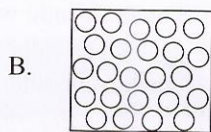
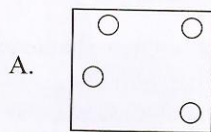
Substance	Soluble in water	Attracted by magnet
<i>P</i>	✓	×
<i>Q</i>	×	✓
<i>R</i>	×	×

The following steps were carried out to obtain *P* from a mixture of *P*, *Q* and *R* :

1. Filtration
2. Evaporation
3. Magnetic separation
4. Addition of water

The sequence in which these steps should be carried out is

- A. 4, 1, 2, 3 B. 3, 4, 2, 1
C. 3, 4, 1, 2 D. 4, 3, 2, 1
29. A solid substance '*X*' sublimes at 95°C. Which of the following figures represents the arrangement of particles of '*X*' at 100°C?



D. None of these

30. Read the given paragraph.

P is a bird that migrates from Arctic to Antarctica to escape cold weather conditions, *Q* is a fish which migrates from freshwater to sea to breed whereas *R* is also a fish which migrates from sea to freshwater to breed and *S* is an insect which migrates from Canada to Mexico to escape winters.

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

- A. *P* almost covers a distance of 71000 km on average during its migration cycle.
B. *Q* completes its migration in single generation whereas *R* completes its migration in 5 generations.

- C. *S* forms swarms which destroy and eat away crop fields that come in their way.
D. *P* is Siberian crane, *Q* is eel, *R* is salmon and *S* is Monarch butterfly.

31. Which of the following does not involve a reflex arc?

- A. Closing of the eyes when a foreign object flies into them
B. Kicking a soccer ball away when it is passed to you during a game
C. Stepping back when the toe is pricked by a thumbtack
D. Withdrawing the hand when it is burnt by a flame

32. Refer to the given dichotomous key.

- I. (a) Rock is formed from volcanic lava. – Go to II
(b) Rock is formed by deposition and cementing of small rock fragments under pressure within water bodies. – Go to III
- II. (a) Formed when magma slowly cools down beneath the earth's surface – [*P*]
(b) Formed when lava quickly cools down on earth's surface – [*Q*]
- III. (a) Formed when particles of sand get cemented together – [*R*]
(b) Formed from shells and skeletons of tiny sea creatures – [*S*]

Select the correct statement regarding *P*, *Q*, *R* and *S*.

- A. *P* consists of minerals such as mica, quartz and feldspar.
B. Powdered *Q* is used by dentists for polishing teeth whereas surgeons use knives made of *P* for eye surgery.
C. *R* is used as a body scrubber whereas Red Fort in Delhi is made of *S* rock.
D. None of these

33. Identify the incorrect statement from the following.

- A. Matter exists in three forms.
B. Matter can be changed from one form to another.
C. A new substance is formed in a chemical change.
D. Ice is heavier than water.

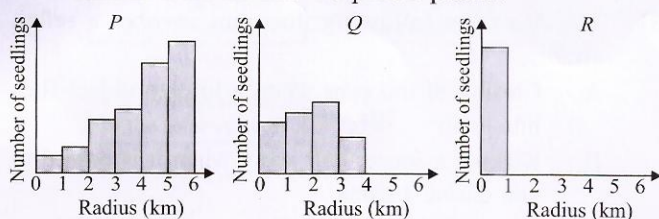
34. Read the following statements.

- (i) Air dissolved in water cannot be removed from it.
(ii) Density of air decreases with increasing altitude.
(iii) Air is an element that surrounds the earth and makes earth hospitable for living organisms.
(iv) Air helps in pollination of several flowers and in the dispersal of seeds.

Which of the above statements are correct?

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

35. Scientists selected and grew three different species of plants *P*, *Q* and *R* in a big field to investigate methods of seed dispersal in them. The given graphs show the approximate number of seedlings found at various radii around the parent plants.



Which of the following holds true regarding plants *P*, *Q* and *R*?

- Seeds of *P* are heavy and bear spines and hooks.
- Seeds of *Q* are winged and light weighted.
- Seeds of *R* are hairy or bear fibrous outer coat.
- P* can be *Dandelion*, *Q* can be *Xanthium* and *R* can be pea.

36. Given below are the four food components (*P-S*) and their corresponding sources.

P – Meat, fish, eggs

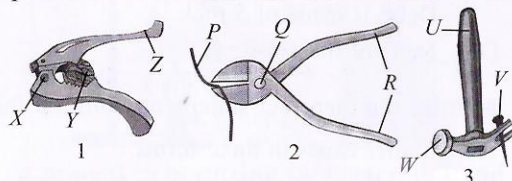
Q – Butter, ghee, margarine

R – Bread, biscuits, potatoes

S – Amla, tomato, orange

Select the incorrect statement regarding these.

- Deficiency of *P* causes marasmus in children and kwashiorkor only in adults.
 - Among *P*, *Q*, *R* and *S*, 1 gram of *Q* produces the maximum energy.
 - Excess of *R* gets stored in body cells and is used for production of energy whenever required.
 - Deficiency of *S* leads to a disease in which gums swell up and bleed.
37. Refer to the given objects (1, 2 and 3) and identify the positions of fulcrum and load in each of these.



- | 1 | 2 | 3 |
|----------------------------|-------------------------|-------------------------|
| A. Fulcrum – Z
Load – Y | Fulcrum – R
Load – P | Fulcrum – U
Load – V |
| B. Fulcrum – X
Load – Y | Fulcrum – Q
Load – P | Fulcrum – W
Load – V |
| C. Fulcrum – X
Load – Z | Fulcrum – P
Load – R | Fulcrum – V
Load – U |
| D. Fulcrum – Y
Load – Z | Fulcrum – R
Load – Q | Fulcrum – W
Load – U |

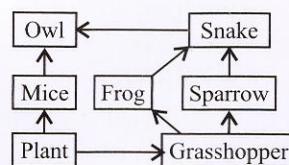
38. Study the given food relationship and select the correct option which satisfies the same relationship.

Honey : Carbohydrate : Sugarcane

- Spinach : Iron : Liver
- Maize : Protein : Fish
- Fish oil : Vitamin A : Carrot
- Groundnut : Fat : Milk

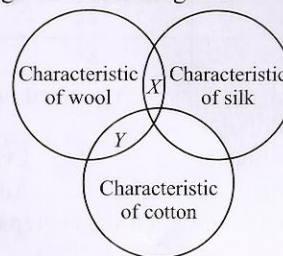
39. Refer to the given food web.

If a population of an organism *X* is introduced in this community who preys on mice and snake then what will be the likely consequence over time?



- The population of owl will decline with time.
- The populations of frog and sparrow will increase with time.
- Plant and grasshopper population will remain unaffected by introduction of organism *X*.
- Both A and B

40. Refer to the given Venn diagram.



What could be *X* and *Y* respectively?

- X* – Ability to trap and retain air, *Y* – Fluffy texture
 - X* – Obtained from animals, *Y* – Ability to absorb water
 - X* – Rough texture, *Y* – Comfortable to wear in hot and humid weather
 - X* – Shiny appearance, *Y* – Give characteristic smell of burning paper when burnt
41. Match column I (nutrient) with column II (function) and column III (deficiency symptom) and select the correct option from the given codes.

Column I	Column II	Column III
P. Vitamin K	(i) For normal functioning of thyroid glands	(a) Anaemia
Q. Iodine	(ii) Maintains normal vision	(b) Haemorrhage
R. Iron	(iii) Helps in blood clotting	(c) Goitre
S. Vitamin A	(iv) Required for haemoglobin formation	(d) Night blindness
A.	P - (iii) - (b); Q - (i) - (c); R - (iv) - (a); S - (ii) - (d)	
B.	P - (ii) - (c); Q - (i) - (d); R - (iii) - (a); S - (iv) - (b)	
C.	P - (iv) - (a); Q - (ii) - (c); R - (i) - (b); S - (iii) - (d)	
D.	P - (i) - (b); Q - (iv) - (a); R - (iii) - (c); S - (ii) - (d)	

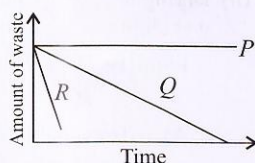
42. Read the given paragraph.

In the 16th and 17th centuries, sailors who went on long voyage suffered from a disease 'X' as they did not get fresh fruits to eat during the voyage. In the year 1747, a doctor named, James Lind discovered that if these sailors were given lemons and oranges, the disease was cured very quickly. This led to the discovery that X is a deficiency disease caused by the deficiency of Y.

Identify X and Y in the above paragraph and select the correct option.

X	Y
A. Pellagra	Vitamin B ₁
B. Scurvy	Vitamin C
C. Goitre	Iodine
D. Rickets	Fluorine

43. Ravi collected three different types of wastes P, Q and R from a human dwelling and left wastes P and Q in an open field while disposed off R by a manual method of waste disposal as it was toxic. The given graph shows the changes in amount of P, Q and R with time.

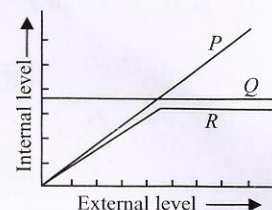


Refer to the above given graph and select the incorrect option regarding P, Q and R.

- A. P could be a man-made object whereas Q is derived from living organisms.
 B. The method used for disposing off R is often employed in disposal of hospital wastes.
 C. Management of wastes P and R by any manual method will always increase air and water pollution.

- D. Q is disposed off by decomposition process which is slow but completely disposes off the waste.

44. Refer to the given graph that shows how three different organisms P, Q and R cope with external environmental conditions and select the correct option regarding this.



- A. P and R are warm blooded whereas Q is cold blooded.
 B. R could be a mammal, Q could be an amphibian whereas P could be a reptile.
 C. Q may show a wide range of distribution but P is restricted to areas with favourable environmental conditions.
 D. P and R can tolerate extremes of temperatures and are cosmopolitan in distribution.

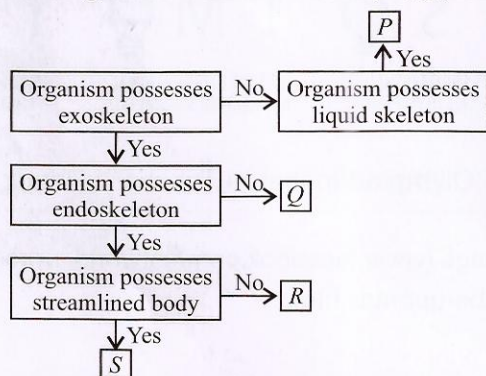
45. Refer to the given classification table and select the correct option regarding P, Q, R and S.

Plant part	Functions	Examples of plants
(i) Stem	(a) Photosynthesis	P
	(b) Support for climbing	Q
(ii) Leaf	(a) Reduction in water loss	R
	(b) Support for climbing	S

- A. P could be *Aloe* whereas Q could be *Gloriosa*.
 B. P and R could be xerophytic plants.
 C. R could be *Rhoeo* whereas S could be grapevine.
 D. Q could be pea whereas S could be pumpkin.

ACHIEVERS SECTION

46. Refer to the given flow chart and identify P, Q, R and S.

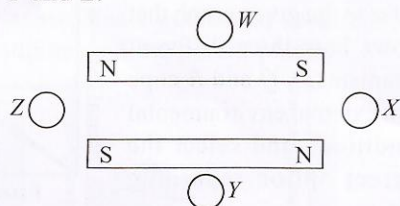


- A. P - Salamander, Q - Snail, R - Cockroach, S - Tuna
 B. P - Scorpion, Q - Octopus, R - Ladybird beetle, S - Ostrich
 C. P - Earthworm, Q - Prawn, R - Tortoise, S - *Scoliodon*
 D. P - Snake, Q - Toad, R - Crocodile, S - Centipede

47. Saurabh classified living organisms in four groups (I, II, III and IV) each containing four members on the basis of the habitats in which they are found. In doing so he unknowingly placed one wrong member in each group. Identify the odd one out and select the correct option regarding this.

- I. *Acacia*, Camel, Toucan, *Aloe*
 II. Penguin, Fur seal, Polar bear, Lion-tailed macaque
 III. Sea horse, Octopus, Corals, Silverfish
 IV. *Vallisneria*, Chimpanzee, Red-eyed frog, Fern
 A. In group I, toucan is placed incorrectly and should be replaced with Kangaroo rat.
 B. Lion-tailed macaque is incorrectly mentioned in group II and should be included in group I.
 C. In group III, sea horse is placed incorrectly and should be replaced with *Ceratophyllum*.
 D. *Vallisneria* is wrongly placed in group IV and should be replaced with sea horse.

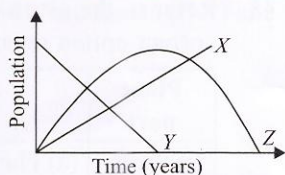
48. The given diagram shows two identical bar magnets placed side by side. Four compasses are positioned at W, X, Y and Z.



Which of the following options correctly shows the deflections of the compass needles in the given compasses?

- | | W | X | Y | Z |
|----|---|---|---|---|
| A. | | | | |
| B. | | | | |
| C. | | | | |
| D. | | | | |

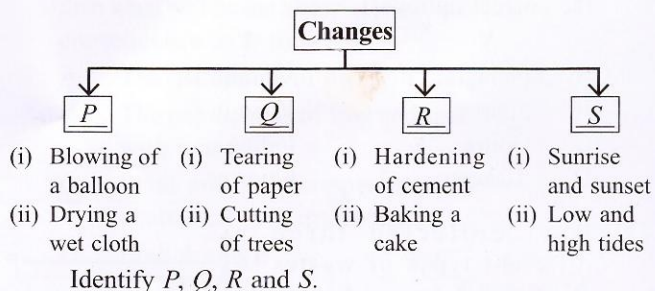
49. The given graph shows changes in populations of 3 interrelated organisms X, Y and Z in a community over some years.



What could be inferred from the given graph?

- A. Organism X exclusively preyed upon organism Y until the whole population is wiped out.
 B. Organism Z is the predator in the community whose population grew as long as its food lasted and then started decreasing.
 C. Z is the predator of Y and Y is the predator of X.
 D. Both B and C

50. Read the given flowchart carefully and fill in the blanks by choosing an appropriate option.



- | | P | Q | R | S |
|----|-----------------------|-----------------------|--------------|--------------|
| A. | Irreversible physical | Chemical | Periodic | Non-periodic |
| B. | Reversible physical | Irreversible physical | Chemical | Periodic |
| C. | Reversible physical | Chemical | Non-Periodic | Periodic |
| D. | Reversible | Chemical | Irreversible | Non-periodic |

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