



Inspiring Young Minds
Through Knowledge Olympiads

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Name:

SOF Olympiad Roll No.:

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Total Questions: 50

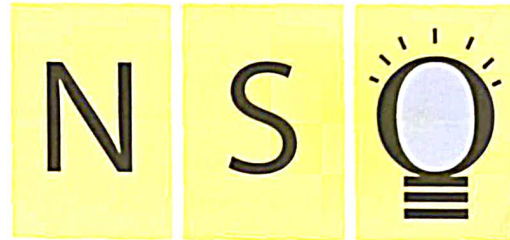
Time: 1 hr.

CLASS

7

QUESTION PAPER SET

C



SOF NATIONAL SCIENCE
OLYMPIAD 2022-23

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, Roll No.** and **Mobile Number** clearly on the **OMR Sheet** and do not forget to sign it. We will share your marks / result and other information related to SOF exams on your mobile number.
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 on 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 on the OMR Sheet.

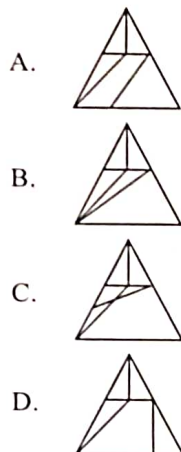
16. ● B C D

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 the space provided on this page before attempting the paper.



LOGICAL REASONING

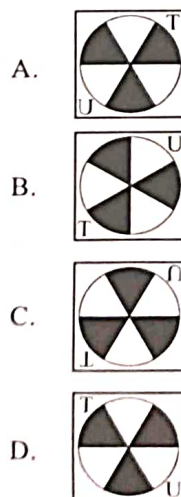
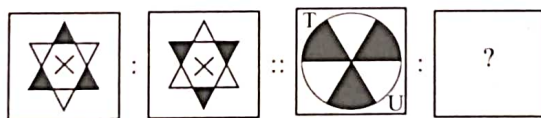
1. Select a figure from the options in which the given figure is exactly embedded as one of its parts.



2. If P stands for '+', Q stands for '-', R stands for '×' and S stands for '÷', then find the value of 17 P 24 Q 8 R 48 S 6.

- A. 23
B. -23
C. 21
D. -21

3. There is a certain relationship between the figures on either side of ::. Identify the relationship between left pair and find the missing figure.



4. How many such pairs of letters are there in the word 'STUDENT' each of which has as many letters between them in the word as in the English alphabets?

- A. One
B. Two
C. Three
D. More than three

5. Shreya walks 5 m towards North. Then she turns to East and walks 3 m. After this, she turns to North and walks 7 m. Again she turns towards East and walks 2 m. How far is Shreya now from the starting point?

- A. 15 m
B. 13 m
C. 10 m
D. None of these

6. Which of the following options will continue the given series?

ADG, BFH, CHI, DJJ, ?

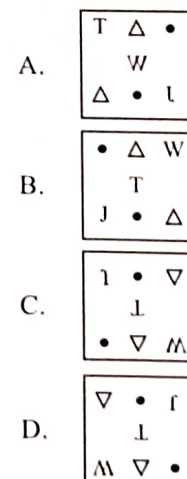
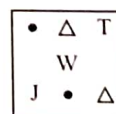
- A. EGI
B. ELK
C. DFK
D. FGK

7. How many such symbols are there in the given arrangement, each of which is immediately preceded by a consonant and immediately followed by a number?

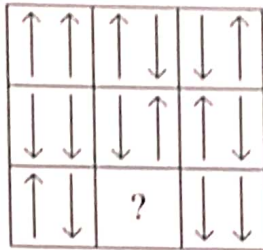
3 W M % 7 A E # 8 7 B @ 2 Z L © 4 N R 5



- A. One
B. Two
C. Three
D. More than three



8. Select the correct mirror image of the given figure.



9. Select a figure from the options which will complete the given figure matrix.



- A. 
- B. 

- C. 
- D. 

10. Some letters are coded as follows.

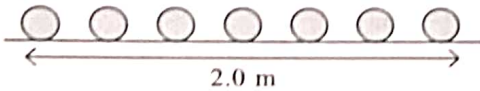
Letters	Y	P	L	I	O	S	T	E	C
Codes	α	β	$\$$	+	*	\times	#	?	•

The word which is coded as $\beta * \$ + \# ?$ is _____.

- A. POLICY
 B. POLICE
 C. POLITE
 D. POLITY

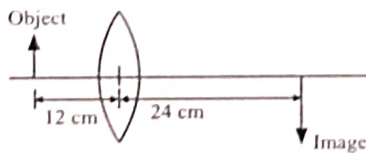
SCIENCE

11. The diagram given below shows a series of photographs (taken per second) of a ball moving with constant velocity.



The camera was capturing images at a constant rate of seven per second. What was speed of the ball?

- A. 10.0 m s^{-1}
 B. 9.5 m s^{-1}
 C. 3.5 m s^{-1}
 D. 14 m s^{-1}
12. When an object is placed 12 cm in front of a thin convex lens, the image formed is 24 cm from the lens as shown in the figure.

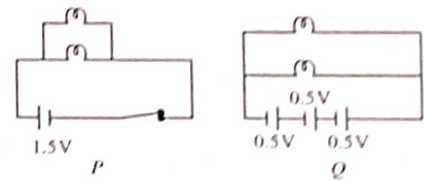


How would the size and distance of the image change when the object is moved slightly closer to the lens?

- | | Size of image | Image distance |
|----|---------------|----------------|
| A. | Increases | Decreases |
| B. | Decreases | Increases |
| C. | Increases | Increases |
| D. | Decreases | Decreases |
13. Two pendulums *A* and *B* of masses 20 g and 40 g respectively, having same length are set into oscillations. The time period of oscillations is

- A. Same for *A* and *B*
 B. Greater for *B*
 C. Greater for *A*
 D. None of these

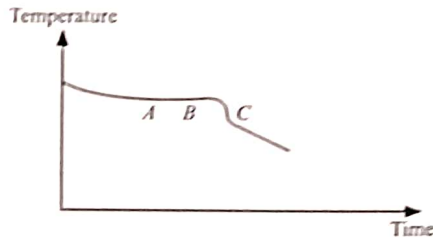
14. In which of the given circuits, the bulbs will glow brighter?
 (The bulbs are identical in both the circuits.)



- A. In circuit *P* only.
 B. In circuit *Q* only.
 C. In both circuits *P* and *Q*, the bulbs will glow with equal brightness.
 D. Data is insufficient.
15. Match column I with column II and select the correct option from the given codes.

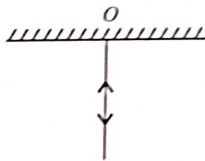
Column I	Column II
P. Monsoon	(i) Typhoon
Q. A cyclone	(ii) Humid tropical regions
R. Movements of the winds	(iii) Uneven heating of the Earth
S. Thunderstorms	(iv) Seasonal wind
A. P - (iv), Q - (i), R - (iii), S - (ii)	
B. P - (i), Q - (iii), R - (iv), S - (ii)	
C. P - (ii), Q - (iv), R - (i), S - (iii)	
D. P - (i), Q - (iii), R - (ii), S - (iv)	

16. The graph given below shows the temperature changes that took place when a substance was cooled.



Which change of state does the portion AB of the graph best represent?

- A. Gas to liquid
 B. Solid to liquid
 C. Solid to gas
 D. Liquid to gas
17. Which of the following statements are correct?
- I. Image formed by a pinhole camera is always erect.
 II. Pinhole camera produces upside down image of an object.
 III. A shadow is formed on the same side of the object as the source of light.
 IV. Rainbow is due to dispersion of white light into its constituent colours.
- A. I and III only
 B. II and III only
 C. I, III and IV only
 D. II and IV only
18. What is the angle of incidence and angle of reflection of a light ray, as shown in the given figure?



- A. 360°
 B. 180°
 C. 90°
 D. 0°
19. The given diagram shows a compass placed (on the Earth's surface) between two identical magnets in presence of the Earth's magnetic field.



If one of the magnets is flipped as shown below, in which direction will the compass needle point?



- A. ↙
 B. ←
 C. ↘
 D. ↓

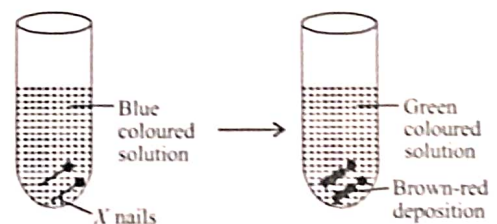
20. A coil of copper wire is wrapped around a core for making an electromagnet. Which of the following combinations can be used to produce the strongest electromagnet?

	Number of turns	Core
A.	Few	Steel
B.	Many	Soft iron
C.	Few	Soft iron
D.	Many	Steel

21. Which of the following cannot represent that a physical change is taking place?
- I. Formation of a precipitate
 II. Change in state of the substance
 III. A new smell is produced
 IV. Change in the shape or size of a substance
 V. Evolution of a gas
- A. I, III and IV only
 B. II, III and IV only
 C. II and IV only
 D. I, III and V only

22. (i) has no effect on red litmus paper while (ii) turns red litmus paper blue. (i) and (ii) are respectively
- A. Soap and baking soda
 B. Vinegar and soap solution
 C. Lime water and sugar solution
 D. Salt solution and sugar solution.

23. Study the given figure carefully.



Which of the following reactions explains the above change most appropriately?

- A. $\text{ZnSO}_4 + \text{Cu} \rightarrow \text{CuSO}_4 + \text{Zn}$
- B. $\text{CuSO}_4 + \text{Fe} \rightarrow \text{FeSO}_4 + \text{Cu}$
- C. $\text{FeSO}_4 + \text{Cu} \rightarrow \text{CuSO}_4 + \text{Fe}$
- D. $\text{CuSO}_4 + \text{Zn} \rightarrow \text{ZnSO}_4 + \text{Cu}$

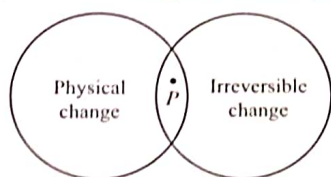
24. Read the given statements and select the correct option.

Statement 1 : A mixture containing ethanol and water can be separated by using a separating funnel.

Statement 2 : A separating funnel is used to separate two miscible liquids.

- A. Both statement 1 and statement 2 are true and statement 2 is the correct explanation of statement 1.
- B. Both statement 1 and statement 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 statement 1 and statement 2 are false.

25. Study the given Venn diagram carefully.



Here *P* cannot represent

- A. Shredding of paper
- B. Cutting a picture of aeroplane from paper
- C. Melting of butter
- D. Breaking of glass

26. Among the following, metallic substances are

Steel jar, Allpins, Rubber ball, Wooden shelf, Windowpane, Iron nails

- A. Wooden shelf, rubber ball, windowpane only
- B. Allpins and wooden shelf only
- C. Steel jar, allpins and iron nails only
- D. Steel jar and iron nails only

27. Renuka took some strips of turmeric paper and dipped them in the following solutions.

- (i) Caustic soda
- (ii) Limewater
- (iii) *Amla* juice
- (iv) Curd

What changes will be observed by her in the colour of turmeric paper?

	(i)	(ii)	(iii)	(iv)
A.	No change	Red	No change	Red
B.	No change	No change	Red	Red
C.	Red	Red	No change	No change
D.	Red	No change	No change	Red

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

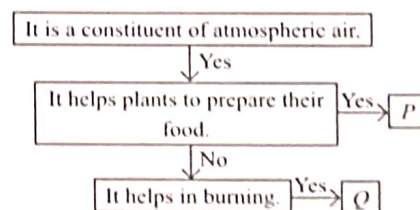
Column I	Column II
P. Burning of magnesium ribbon	(i) Neutralisation reaction
Q. Heating calcium carbonate	(ii) Displacement reaction
R. Mixing of potassium hydroxide and sulphuric acid	(iii) Decomposition reaction
S. Reaction of zinc and iron sulphate solution	(iv) Combination reaction

A. P-(iv), Q-(iii), R-(i), S-(ii)
 B. P-(iii), Q-(iv), R-(i), S-(ii)
 C. P-(iv), Q-(iii), R-(ii), S-(i)
 D. P-(ii), Q-(i), R-(iv), S-(iii)

29. Select the option that on unscrambling gives the name of an adaptation mechanism.

- A. G R W I C L A N
- B. L T E I N S H I R G
- C. T I R A I G O M N
- D. All of these

30. Refer to the given flow chart and select the correct statement regarding it.

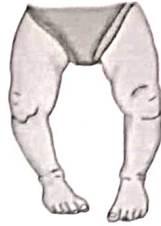


- A. *P* could be a gas that is used in fire extinguishers.
- B. *Q* could be a gas that is necessary for us to get energy from food.
- C. During breathing, *Q* is taken in whereas *P* is given out.
- D. All of these

31. Select the correct match of animal and its adaptive feature.

- A. Polar bear - Thick fur on body
- B. Dolphin - Presence of gills
- C. Snow leopard - Large ears
- D. Camel - Hump that stores water

32. Refer to the given picture and identify the disorder.



The disorder, the child is suffering from, is caused due to the deficiency of

- A. Vitamin A
- B. Vitamin D
- C. Vitamin C
- D. Vitamin B₁.

33. Study the given table and select the correct option.

Method of reproduction	Example
Budding	<i>P</i>
Spore formation	<i>Q</i>
Fragmentation	<i>R</i>
Vegetative propagation	<i>S</i>

- | <i>P</i> | <i>Q</i> | <i>R</i> | <i>S</i> |
|---------------------|------------------|------------------|-----------------|
| A. <i>Dahlia</i> | <i>Spirogyra</i> | <i>Rhizopus</i> | <i>Begonia</i> |
| B. <i>Hydra</i> | <i>Rhizopus</i> | <i>Spirogyra</i> | <i>Oxalis</i> |
| C. <i>Spirogyra</i> | <i>Rhizopus</i> | <i>Begonia</i> | <i>Dahlia</i> |
| D. <i>Asparagus</i> | Yeast | <i>Spirogyra</i> | <i>Rhizopus</i> |

34. Which of the following is an incorrect food chain?

- A. Plant → Rat → Cat → Lion
- B. Grass → Goat → Tiger
- C. Plant → Mouse → Grasshopper → Snake
- D. Plant → Deer → Lion

35. Blending of animals with their surroundings is called

- A. Acclimatisation
- B. Camouflage
- C. Hibernation
- D. Aestivation.

36. Refer to the given table.

Group X	Group Y
Nylon	Jute
Acrylic	Cotton

Select the correct statement regarding groups X and Y.

- A. Group X is obtained from man-made sources whereas Group Y is obtained from natural sources.
- B. Group X is obtained from plant sources whereas group Y is obtained from animal sources.
- C. Group X is obtained from animal sources whereas group Y is obtained from plant sources.
- D. Group X gives smell of burning paper on burning while group Y gives smell of burning hair on burning.

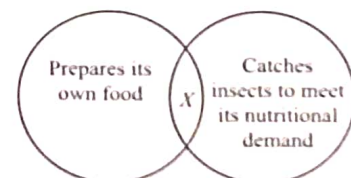
37. Match column I with column II and select the correct option from the given codes.

Column I (Fibres)	Column II (Source animal)
(i) Mohair	a. Tibetan antelope
(ii) Angora wool	b. Angora goat
(iii) Shahtoosh	c. Angora rabbit
A. (i)-a, (ii)-b, (iii)-c	
B. (i)-c, (ii)-a, (iii)-b	
C. (i)-b, (ii)-a, (iii)-c	
D. (i)-b, (ii)-c, (iii)-a	

38. Which of the following events do not happen during exhalation?

- (i) The volume of the thoracic cavity decreases.
 - (ii) Air is released.
 - (iii) Air pressure decreases inside the lungs.
 - (iv) Ribs are pushed upward and outward.
 - (v) Diaphragm returns to its dome-shape.
- A. (iii), (iv) and (v) only
 - B. (iii) and (iv) only
 - C. (i), (ii) and (v) only
 - D. (i) and (iii) only

39. Refer to the given Venn diagram and select the option that correctly identifies X.



- A. *Pinus*
- B. *Nepenthes*
- C. *Dionaea*
- D. Both B and C

40. Read the following statements and select the correct option.

Statement 1 : Root hair help in the absorption of water and mineral salts.

Statement 2 : Root hair decrease the surface area of the roots for the absorption of water and mineral salts.

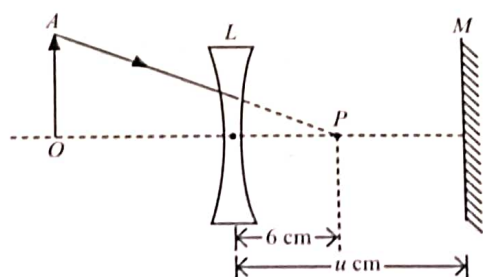
- A. Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.
 B. Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.
 C. Statement 1 is true but statement 2 is false.
 D. Both statements 1 and 2 are false.
-
41. Select the incorrect match.
- A. Plants in rainforest - Drip tips
 B. Aquatic plants - Waxy coating on leaves
 C. Plants in grassland - Needle shaped leaves
 D. Plants in desert - Long roots, fleshy stem
-
42. Which of the following is not a cause of deforestation?
- A. Increase in industrial development
 B. Overgrazing by animals
 C. Planned harvesting
 D. Forest fires caused due to lightning
-
43. Shoot forming part of embryonal axis is called X and root forming part of embryonal axis is called Y .

Select the correct option regarding X and Y .

- | | X | Y |
|----|---------|---------|
| A. | Plumule | Ovule |
| B. | Radicle | Plumule |
| C. | Carpel | Pistil |
| D. | Plumule | Radicle |
-
44. Enzymes released by the salivary gland convert
- A. Proteins into amino acid
 B. Complex sugar into simple sugar
 C. Simple sugar into starch
 D. Fats into amino acid and glycerol.
-
45. Read the given statements and select the option that correctly identifies them as true (T) and false (F) ones.
- (i) The entrance of the larynx is guarded by a flap-like structure, the epiglottis.
 (ii) Percentage of carbon dioxide in exhaled air is 0.03% whereas in inhaled air is 4.4%.
 (iii) Alveoli are thick walled and richly supplied by blood vessels.
- | | (i) | (ii) | (iii) |
|----|-----|------|-------|
| A. | T | F | F |
| B. | T | F | T |
| C. | F | T | T |
| D. | F | F | T |

ACHIEVERS SECTION

46. A plane mirror M is placed at a distance $u (> 12)$ cm, away from a thin lens L of focal length 6 cm as shown in the given figure. When a ray of light coming from a small object OA is incident on L , it appears to converge at the point P , image of the object OA is



- A. Real, inverted and of smaller size
 B. Virtual, upright and of smaller size
 C. Real, upright and of same size
 D. Virtual, upright and of larger size.

47. Read the following statements and fill in the blanks by selecting an appropriate option.

- I. The effect of the formic acid produced due to ant bite can be neutralised by using calamine solution which contains ' P '.
- II. Quick lime ' Q ' is added to the soil when it is too acidic.
- III. Sodium hydroxide which is a ' R ' reacts with hydrochloric acid to produce sodium chloride and water.
- IV. An antacid such as ' S ' is used to relieve indigestion.

- | | P | Q | R | S |
|----|----------|------------|-------------|------------------|
| A. | $ZnCO_3$ | CaO | Strong acid | Slaked lime |
| B. | $ZnSO_4$ | $Ca(OH)_2$ | Weak base | Sodium hydroxide |
| C. | $ZnCO_3$ | CaO | Strong base | Milk of magnesia |
| D. | $ZnSO_4$ | $Ca(OH)_2$ | Weak acid | Milk of magnesia |

48. Read the given statements and select the option that correctly fills any two of the given blanks.

- (i) _____ are the tiny outgrowths on the inner surface of small intestine.
- (ii) Bile is secreted by the _____.
- (iii) Length of small intestine in an adult human being is about _____.
- (iv) _____ is the sac-like structure which stores the undigested food material (faeces) temporarily.

- A. (i) Villi, (ii) Stomach
- B. (iii) 2 m, (iv) Large intestine
- C. (i) Buds, (iii) 7 m
- D. (ii) Liver, (iv) Rectum

49. Select the correct statement(s) regarding aerobic and anaerobic respiration.

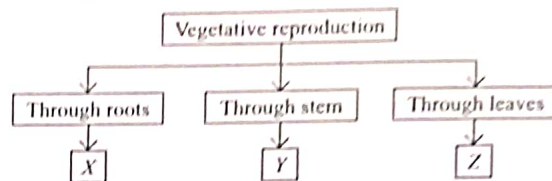
- (i) In aerobic respiration glucose is incompletely oxidised while in anaerobic respiration it is completely oxidised.
- (ii) In aerobic respiration very little energy is produced while in anaerobic respiration more energy is produced.

(iii) Aerobic respiration occurs in the presence of oxygen while anaerobic respiration occurs in the absence of oxygen.

(iv) End product of aerobic respiration is lactic acid and water while end product of anaerobic respiration is ethyl alcohol and CO_2 .

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

50. Study the given classification chart and select the correct option regarding X, Y and Z.



- A. X can be *Oxalis* and Y can be *Asparagus*.
- B. Y can be ginger and Z can be *Dahlia*.
- C. Z can be *Bryophyllum* and X can be turmeric.
- D. Y can be potato and Z can be *Begonia*.

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