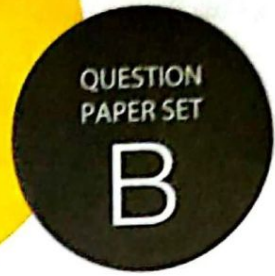




SOF NATIONAL SCIENCE  
OLYMPIAD 2022-23



DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

Total Questions: 50 | Time: 1 hr.

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.
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.

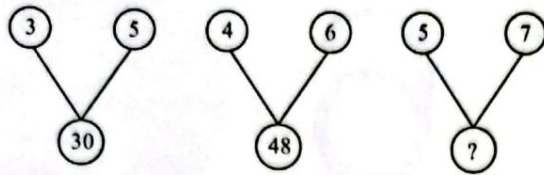
16. ● (B) (C) (D)



Name:.....

SOF Olympiad Roll No.:..... Contact No.:.....

1. Find the missing number, if same rule is followed in all the three figures.



- A. 60  
B. 70  
C. 80  
D. 35

2. Ram is the husband of Reena. Reena is the sister of Raju and Raju is the son of Hemant. How is Ram related to Hemant?

- A. Father  
B. Brother-in-law  
C. Father-in-law  
D. Son-in-law

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

LNQ : MOP  $::$  TVY : ?

- A. UVX  
B. SVX  
C. UWX  
D. UWZ

4. Rahul ranks eleventh from the top in a class of 40 students. What will be his rank from the bottom?

- A. 29<sup>th</sup>  
B. 30<sup>th</sup>  
C. 31<sup>st</sup>  
D. 32<sup>nd</sup>

5. Some letters are given which are numbered as 1, 2, 3, 4, 5 and 6. Select the combination of numbers so that the letters are arranged accordingly to form a meaningful English word.

T H Y M R H  
1 2 3 4 5 6

- A. 6, 4, 3, 2, 1, 5  
B. 5, 6, 3, 1, 2, 4  
C. 6, 3, 4, 1, 2, 5  
D. 5, 1, 3, 4, 6, 2

6. How many 7's are there in the given series each of which is immediately preceded by 3 and immediately followed by 8?

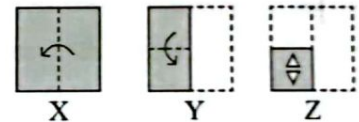
8 6 2 1 4 3 7 9 6 3 7 8 7 8 4 3 7 8 9 3 5

- A. 1  
B. 2  
C. 3  
D. 4

7. In a certain code language, if RANDOM is written as OBSLNC, then what will be the code of ABROAD in the same code language?

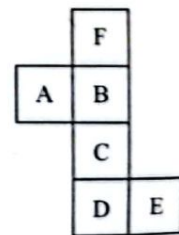
- A. BCSNZC  
B. SCBEBP  
C. BCSCZN  
D. SCBCZN

8. The given question consists of a set of three figures X, Y and Z which shows a sequence of folding of a piece of paper. Fig. Z shows the manner in which the folded paper has been cut. Select a figure from the options which would most closely resemble the unfolded form of Fig. Z.



- A. B. C. D.

9. Select a box from the options that is similar to the box formed from the given sheet.



- A. B. C. D.

10. Ali starts walking towards North. He walked a distance of 20 m and then took a right turn and walked a distance of 30 m. Then he took a right turn again and walked a distance of 20 m. How far and in which direction is Ali now from the starting point?

- A. 30 m, East  
 B. 20 m, North  
 C. 30 m, South-East  
 D. 10 m, North-West

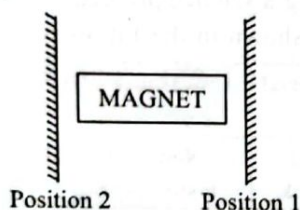
## SCIENCE

11. Which of the following conversions is/are correct?

- (i) 100 quintals = 1 metric ton  
 (ii) 10 decades = 100 years  
 (iii) 1 light year =  $9.46 \times 10^{15}$  m  
 (iv) 10 centuries = 1 millennium

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

12. Peechu has a card with the word MAGNET written on it. She places a plane mirror at position 1 and then at position 2 as shown in the given figure, and observes the images.

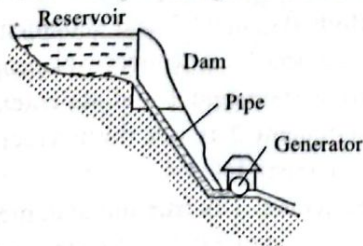


Which of the following options correctly shows the images formed by the plane mirror for the two given positions?

- |    | Position 1 | Position 2 |
|----|------------|------------|
| A. | MAGNET     | MAGNET     |
| B. | LENCAM     | TENCAM     |
| C. | TENCAM     | TENCAM     |
| D. | TENCAM     | LENCAM     |

13. Read the given passage and fill in the blanks by selecting an appropriate option.

The given picture depicts a hydropower station. It gains (i) from (ii). It is used to produce electricity. It is a (iii) and non-polluting source of energy.



- |    | (i)               | (ii)         | (iii)         |
|----|-------------------|--------------|---------------|
| A. | Mechanical energy | Wind         | Non-renewable |
| B. | Kinetic energy    | The Sun      | Renewable     |
| C. | Hydro energy      | Moving water | Renewable     |
| D. | Electrical energy | Moving water | Non-renewable |

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

Statement 1 : The displacement of a body may be zero, though the distance travelled can be finite.

Statement 2 : If a body moves such that finally it arrives at initial point, then displacement is zero while the distance is finite.

- 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. Statement 1 is false but statement 2 is true.

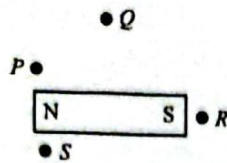
15. An apple is falling from a tree as shown in the given figure. Here, (i) energy of the apple is being converted into (ii) energy.



Select the correct option to fill the blanks in the given sentence.

- |    | (i)       | (ii)      |
|----|-----------|-----------|
| A. | Kinetic   | Potential |
| B. | Sound     | Potential |
| C. | Potential | Kinetic   |
| D. | Solar     | Potential |

16. In the given situation, the magnetic field strength is strongest at position \_\_\_\_\_.



- A. P  
B. R  
C. Q  
D. S

17. Read the following statements carefully and select the correct option.

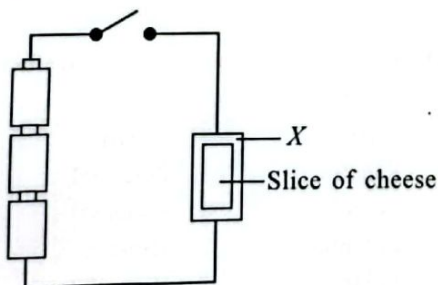
- (i) In an electric cell, chemical energy is converted into electrical energy.  
(ii) Combination of electric cells is called a battery.
- A. Only (i) is true  
B. Only (ii) is true  
C. Both (i) and (ii) are true  
D. Both (i) and (ii) are false

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

Column I	Column II
P. Corona	(i) Thickest layer of the Earth.
Q. Mantle	(ii) Thick layer of gases which forms outer part of the Sun's atmosphere.
R. Photosphere	(iii) Specific patterns formed by group of stars.
S. Constellations	(iv) Visible surface of the Sun which gives off light.

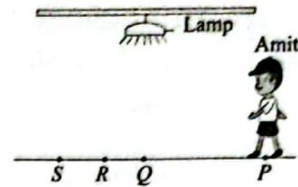
A. P - (ii), Q - (i), R - (iv), S - (iii)  
B. P - (iv), Q - (i), R - (ii), S - (iii)  
C. P - (iv), Q - (ii), R - (i), S - (iii)  
D. P - (ii), Q - (iv), R - (iii), S - (i)

19. A slice of cheese is placed on a sheet made up of material X as shown in the given figure. When the switch is turned on, then the cheese starts to melt. What can X be ?



- I. Silver  
II. Wood  
III. Plastic  
IV. Copper
- A. I and IV only  
B. I, II and III only  
C. II and III only  
D. I, II, III and IV

20. Amit is walking from point P to point S as shown in the given figure.



Which of the following options shows the correct order of the length of Amit's shadows from shortest to longest, when he walks from point P to point S?

- A. P, Q, R, S  
B. S, P, R, Q  
C. Q, R, S, P  
D. R, Q, S, P

21. While doing a science project, Vikas classified a few objects as shown in the following table :

S. No.	Material	Appearance	Hardness	Floats/sinks in water
1.	Wooden block	Non-lustrous	Hard	Floats
2.	Gold coin	Lustrous	Hard	Sinks
3.	Sponge	Non-lustrous	Hard	Floats
4.	Stone	Non-lustrous	Soft	Sinks

Which of the following classifications are correct?

- A. 1 and 2 only  
B. 2 and 3 only  
C. 3 and 4 only  
D. 2 and 4 only

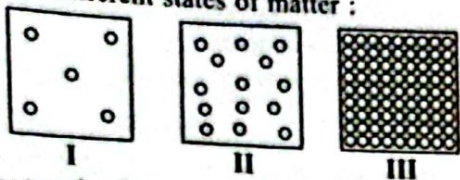
22. Read the given statements and select the correct option.

**Statement 1 :** Handles of cooking utensils are made up of metals like copper, aluminium, etc.

**Statement 2 :** Metals are poor conductors of heat.

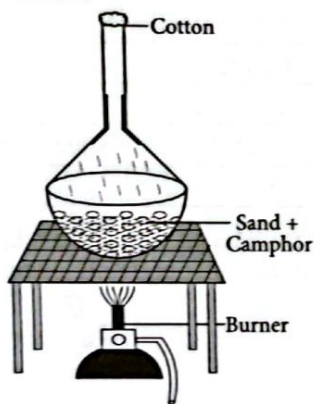
- A. Both statement 1 and statement 2 are true and statement 2 is the correct explanation of statement 1.  
B. Both statement 1 and statement 2 are true but statement 2 is not the correct explanation of statement 1.  
C. Statement 1 is true but statement 2 is false.  
D. Both statement 1 and statement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

23. The following figures show the arrangement of particles in three different states of matter :



Observe the figures carefully and select the correct option.

- A. State III depicts the arrangement of particles in oxygen gas.  
 B. State II depicts the arrangement of particles in a syrup.  
 C. State I represents the arrangement of particles in a wooden block.  
 D. State I can be converted to state II through a process called evaporation.
24. What happens when a mixture of sand and camphor powder is heated?



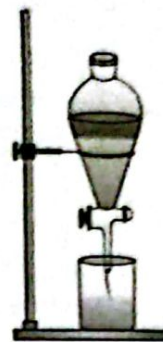
- A. Camphor powder is left in the China dish.  
 B. Sand is left in the China dish.  
 C. Camphor gets deposited on the outer part of funnel.  
 D. Sand gets deposited on the inner cold surface of the funnel.
25. When salt is added to water, it dissolves to form a solution. In this case,
- A. Salt is solvent while water is the solute  
 B. Both salt and water are solutes  
 C. Salt is solute and water is the solvent  
 D. Both salt and water are solvents.

26. Read the following statements and select the option which correctly identifies them as true (T) and false (F) ones.

- (i) Tearing of paper is a physical, irreversible change.  
 (ii) Burning of wood is a chemical, reversible change.  
 (iii) Melting of butter is a physical, reversible change.

- |    | (i) | (ii) | (iii) |
|----|-----|------|-------|
| A. | T   | F    | F     |
| B. | F   | T    | T     |
| C. | T   | F    | T     |
| D. | F   | F    | T     |

27. Observe the given figure carefully.



Now, select the correct statement.

- A. The apparatus shown in the given figure is used to separate two immiscible liquids.  
 B. Evaporation takes place in the given apparatus.  
 C. Oil and water cannot be separated by using this apparatus.  
 D. This apparatus is used to separate salt and water.

28. Which pair of substances among the following represents examples of conductors?

- A. Copper, wood  
 B. Gold, rubber  
 C. Plastic, Eraser  
 D. Aluminium, Silver

29. Read the following passage and select the correct option regarding (i) and (ii).

Molecules of a (i) are packed tightly as there are strong forces of attraction between them. The state of (ii) has no definite shape but definite volume.

- |    | (i)            | (ii)     |
|----|----------------|----------|
| A. | Copper tumbler | Milk     |
| B. | Orange juice   | Oxygen   |
| C. | Carbon dioxide | Honey    |
| D. | Metal rod      | Nitrogen |

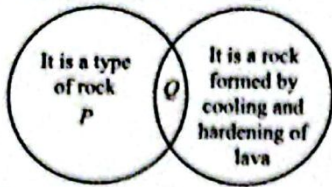
30. Which of the given letter groups upon unscrambling will give the term used to designate a group of animals that eat both flesh and plant?

- A. R E R V H O I B S E  
 B. M N O V I R O E S  
 C. C R O P R U D E S  
 D. V A E R C O I N S R

31. Select the option where one rabi and one kharif crop are correctly placed.

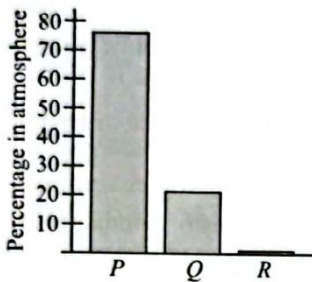
- A. Gram, Mustard  
 B. Rice, Maize  
 C. Cotton, Groundnut  
 D. Wheat, Soybean

32. Refer to the given Venn diagram and select the option that correctly identifies *P* and *Q*.



- |                 |           |
|-----------------|-----------|
| <i>P</i>        | <i>Q</i>  |
| A. Marble       | Slate     |
| B. Quartzite    | Sandstone |
| C. Conglomerate | Pumice    |
| D. Gneiss       | Limestone |

33. Refer to the given graph showing composition of different gases *P*, *Q* and *R* in air.



Identify gases *P*, *Q* and *R* and select the correct statement regarding them.

- A. *P* is an important component of fertilisers.  
 B. *Q* is necessary for most living organisms to survive.  
 C. *R* supports the process of burning.  
 D. Both A and B
34. Select the odd one out on the basis of causative agent.
- A. Chikungunya  
 B. Typhoid  
 C. Pneumonia  
 D. Tuberculosis
35. \_\_\_\_\_ was the first person in the world to go into space.
- A. Yuri Gagarin  
 B. Neil Armstrong  
 C. Rakesh Sharma  
 D. Valentina Tereshkova

36. The animal shown in the given figure breathes through



- A. Skin  
 B. Lungs  
 C. Spiracles  
 D. Gills.

37. Solubility of solids in water generally increases with
- A. Increase in temperature  
 B. Decrease in temperature  
 C. Decrease in solvent amount  
 D. Both B and C.

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

**Statement 1 :** Excess intake of carbohydrates could lead to various health problems.

**Statement 2 :** Extra carbohydrates get converted into fats and are stored in the body.

- 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.

39. Study the items listed in the given table.

Group I	Group II
Ceramic plate	Cotton shirt
<i>P</i>	Animal excreta
Glass bottle	<i>Q</i>
Plastic toy	Banana peel

Select the option that correctly identifies *P* and *Q*.

- |               |                |
|---------------|----------------|
| <i>P</i>      | <i>Q</i>       |
| A. Metal key  | Bird droppings |
| B. Rubber toy | Aluminium can  |
| C. Almonds    | Coal           |
| D. Jute bag   | Plastic straw  |
40. Read the given statement.  
 \_\_\_\_\_ is the process of seeping of water into the ground.  
 Unscramble the given letter groups and select the option that correctly fills in the blank.
- A. PRNEOAIVTA  
 B. NLRITIFTIAON  
 C. NONSTODEICAN  
 D. RIPOENITPTICA

41. Abhilasha was asked by her teacher to make groups of fibres on basis of natural and synthetic fibres. She made the following three groups. But there are a few mistakes in them. Identify the group(s) with the mistake and select the correct option.

Group I : Silk, Linen, Wool

Group II : Acrylic, Nylon, Rayon

Group III : Polyester, Cotton, Fur

- A. Group I only  
 B. Group II only  
 C. Group III only  
 D. Group I and III only

42. Select the incorrect statement.

- A. Low level of sodium in blood causes hyponatremia.
- B. Deficiency of vitamin E causes nerve disorder and muscle weakness.
- C. Deficiency of vitamin B<sub>1</sub> causes beri-beri.
- D. None of these

43. Which of the following statements are true about acid rain?

- (i) Acid rain has harmful effects on the living beings.
  - (ii) Acid rain mainly comprises of H<sub>2</sub>SO<sub>4</sub> and HNO<sub>3</sub>.
  - (iii) Acid rain causes damage to the ozone layer.
  - (iv) Acid rain causes damage to buildings and monuments.
- A. (i) and (ii) only
  - B. (i) and (iii) only
  - C. (i), (iii) and (iv) only
  - D. (i), (ii) and (iv) only

44. Read the following statements.

- (i) The ozone layer is present in the stratosphere.
- (ii) Troposphere is the coldest layer of Earth's atmosphere.
- (iii) Exosphere is the uppermost layer of the atmosphere.

(iv) Most meteorites burn up in the thermosphere.  
Which of the given statements are correct?

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

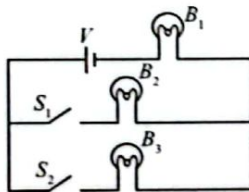
45. Which of the following statements hold true for the root system shown in the given figure?



- (i) It is a fibrous root system.
  - (ii) The branches that arise from the main root are called fibrous roots.
  - (iii) It is a tap root system.
  - (iv) Examples of this type of root system are pea, radish, carrot and turnip.
- A. (i) and (iii) only
  - B. (ii) and (iv) only
  - C. (iii) and (iv) only
  - D. (ii) and (iii) only

### ACHIEVERS SECTION

46. Prakhar made an electric circuit with three bulbs B<sub>1</sub>, B<sub>2</sub> and B<sub>3</sub>, a cell and two switches S<sub>1</sub> and S<sub>2</sub> as shown in the given figure. If switch S<sub>2</sub> is closed and S<sub>1</sub> is opened, then



- A. Only B<sub>1</sub> will glow
- B. Only B<sub>1</sub> and B<sub>3</sub> will glow
- C. Only B<sub>3</sub> will glow
- D. Brightness of B<sub>1</sub>, B<sub>2</sub> and B<sub>3</sub> will be same.

47. The table shown below represents various mixtures and their respective separation methods:

S. No.	Mixture	Separation method
1.	Stalk + Grains	Threshing
2.	Sawdust + Water	Magnetic separation
3.	Butter + Milk	Evaporation
4.	Tea leaves + Tea	Filtration

The incorrect methods are

- A. 1 and 4 only
- B. 2, 3 and 4 only
- C. 1 and 2 only
- D. 2 and 3 only

48. Read the given statements and select the option that correctly identifies them as true (T) and false (F) ones.

- (i) Air is a matter as it has mass and occupies space.
- (ii) Dust particles are rarely present in atmosphere.
- (iii) Air that we breathe in has more oxygen than the air we breathe out.
- (iv) Carbon dioxide gas is filled in packets of chips to prevent their spoilage.

- |    | (i) | (ii) | (iii) | (iv) |
|----|-----|------|-------|------|
| A. | T   | F    | T     | F    |
| B. | T   | T    | F     | F    |
| C. | F   | F    | F     | T    |
| D. | F   | T    | T     | F    |

49. Refer to the given table and select the incorrect statement regarding it.

	Has webbed feet	Has feathers	Has flippers	Breathes through lungs
W	✓	✓	✗	✓
X	✓	✓	✓	✓
Y	✗	✓	✗	✓
Z	✗	✗	✗	✓

- A. W could be a duck whereas X could be a penguin.  
 B. Y could be a parrot whereas Z could be a zebra.  
 C. X could be an ostrich whereas Z could be an earthworm.  
 D. W could be a puffin whereas Z could be a yak.

50. Ashvi, a class 6 student, was asked by her teacher to make a chart of nutrients and their major sources. She made the following table but with few mistakes. Identify the mistakes and select the correct option.

Group	Nutrient	Source
I	Carbohydrates	Rice, Maize, Wheat, Coconut oil
II	Proteins	Milk, Potato, Fish, Egg
III	Fats	Butter, Sunflower oil, Ghee, Bread
IV	Vitamin C	Tomato, Amla, Lemon, Groundnut

- A. Coconut oil in Group I should be interchanged with bread of Group III.  
 B. Potato of Group II should be interchanged with Amla of Group IV.  
 C. Maize of Group I should be interchanged with sunflower oil of Group III.  
 D. Fish of Group II should be interchanged with tomato of Group IV.

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