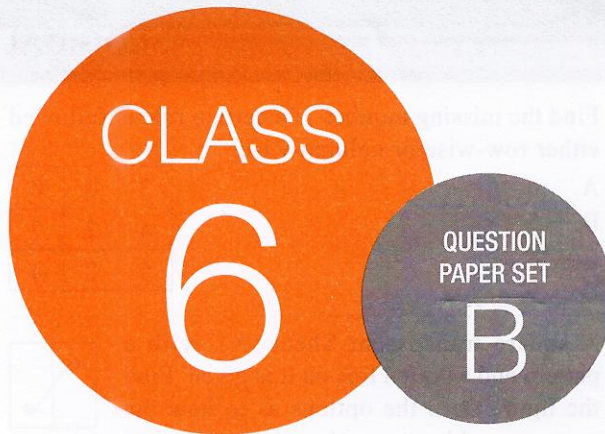


**SOF NATIONAL SCIENCE  
OLYMPIAD 2017-18**



DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

Total Questions: 50 | Time: 1 hr.

Name:.....

Section:..... Olympiad Roll No.:..... Contact No.:.....

### 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 **Mobile Number** clearly on the **OMR Sheet** and do not forget to sign it. We will share your marks / result 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 in 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.
10. For classes 8, 9 & 10, "Innovation Challenge" is being conducted by Techfest IIT Bombay in association with SOF. For details, please visit : [www.sofworld.org/sof-techfest-iit-bombay-innovation-challenge](http://www.sofworld.org/sof-techfest-iit-bombay-innovation-challenge).

16. ● (B) (C) (D)

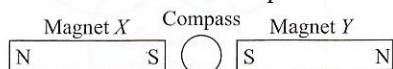


SCIENCE OLYMPIAD FOUNDATION  
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12. Which of the following statements are incorrect?
- The size of a shadow changes with the distance between the light source and the object.
  - The dark part of a shadow that receives no light from the source is called the penumbra.
  - The image formed by a pinhole camera is always of the same size as the object.
  - During solar eclipse the shadow of the Moon falls on the Earth.
- A. (i) and (ii) only      B. (iii) and (iv) only  
C. (i) and (iv) only      D. (ii) and (iii) only

13. A compass is placed between two magnets as shown in the diagram. Magnet *X* is stronger than magnet *Y*. In which direction will the compass needle point?



- A.      B.   
C.      D.

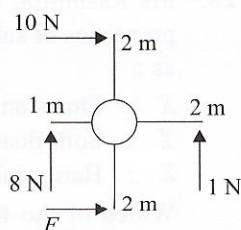
14. Read the given paragraph with few blanks and select the option that correctly fills these blanks.

An eclipse occurs when a planet or moon gets in the way of the sun's light. If the moon is completely hidden by the shadow of the earth, it is called (i). In solar eclipse the (ii) casts a shadow on the (iii). Lunar eclipse occurs at (iv) and solar eclipse occurs only at (v) day.

- |    | (i)                 | (ii)  | (iii) | (iv)      | (v)       |
|----|---------------------|-------|-------|-----------|-----------|
| A. | Total lunar eclipse | Moon  | Earth | New moon  | Full moon |
| B. | Total solar eclipse | Sun   | Moon  | Full moon | New moon  |
| C. | Total solar eclipse | Earth | Moon  | New moon  | Full moon |
| D. | Total lunar eclipse | Moon  | Earth | Full moon | New moon  |

15. Which of the following conversions is/are incorrect?
- 10 decades = 1 century
  - 100 centuries = 1 millennium
  - 100 inches = 2.54 metres
  - 100 millimetres = 10 centimetres
- A. (ii) only      B. (iv) only  
C. (i) and (ii) only      D. (iii) and (iv) only

16. A windmill is pushed by four external forces as shown. Calculate the force *F* required to make the windmill stationary.



- A. -10 N  
B. 10 N  
C. 13 N  
D. 17 N

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

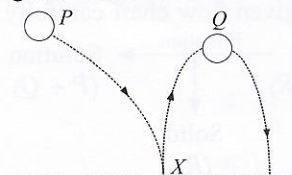
**Statement 1 :** At sunrise or at sunset, the shadows on the ground become much longer than the sizes of the objects.

**Statement 2 :** The size of the shadow becomes smaller when the object is brought near the light source or the screen is moved away from the object.

- 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.
18. A solid transparent sphere has a small opaque dot at its centre. When observed from outside, the apparent position of the dot will be
- A. Closer to the eye than its actual position  
B. The same as its actual position  
C. Farther away from the eye than its actual position  
D. None of these.

19. Which of the following statements are correct?
- An electric circuit must be opened for current to flow through it.
  - A dry cell converts electrical energy into chemical energy.
  - Electric current always flows from positive to the negative terminal of the cell through the circuit.
  - Pure water does not conduct electricity.
- A. (i) and (ii) only  
B. (iii) and (iv) only  
C. (i), (ii) and (iii) only  
D. (ii), (iii) and (iv) only

20. A ball dropped from point *P* bounces to point *Q* before dropping again. Which one of the following is true?



- A. Energy is not conserved.  
B. When the ball reaches the ground at point *X*, its kinetic energy is equal to its gravitational potential energy.  
C. When the ball hits the ground at point *X*, a small part of its energy is lost due to deformation of the ball.  
D. From point *X* to point *Q*, kinetic energy of the ball increases.



	X	Y	Z
A.	Cardboard	Rubber ball	Plastic mug
B.	Steel spoon	Cork	Paper weight
C.	Pen	Plastic bottle	Eraser
D.	Plastic mug	Thermocol	Glass bowl

29. Fill in the blanks in the given table by choosing an appropriate option.

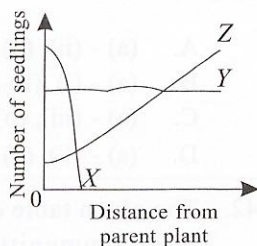
Type of mixture	Method of separation	Example
A heterogeneous solid-liquid mixture in which solid is lighter than liquid	Filtration	<u>P</u>
<u>Q</u>	Sieving	Bran and flour
A heterogeneous solid-solid mixture containing one soluble component	<u>R</u>	Sand and salt
A heterogeneous liquid-liquid mixture	<u>S</u>	Water and mustard oil

	P	Q	R	S
A.	Husk and water	Heterogeneous solid-solid mixture	Filtration and evaporation	Separating funnel
B.	Sand and water	Heterogeneous solid-liquid mixture	Hand picking	Decantation
C.	Water and oil	Homogeneous solid-solid mixture	Winnowing	Sieving
D.	Sawdust and water	Heterogeneous solid-solid mixture	Distillation	Separating funnel

30. Refer to the given graph depicting seed dispersal in three different types of plants X, Y and Z.

Select the incorrect option regarding this.

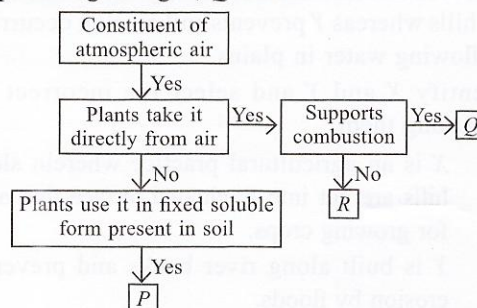
- A. X could be geranium, Y could be *Xanthium* and Z could be dandelion.  
 B. Y may produce edible fruits or seeds with hooks and spines.  
 C. Seeds of X may have hair or wing like structures that enable them to float in air currents.  
 D. Seeds of Z are small and light weighted.



31. Which of the following statements is correct?

- A. Pectoral girdle is the region where legs are attached to the hips.  
 B. Osteoporosis in the childhood is called rickets which is marked by insufficient amount of calcium in the bones.  
 C. Vertebral column of man has more number of vertebrae than that of woman.  
 D. Snail moves with the help of its muscular foot.

32. Refer to the given flow chart and select the incorrect option regarding P, Q and R.



- A. There are some bacteria present in the soil that convert P into simple soluble form which can be taken by plants for manufacturing their proteins.  
 B. Q is the gas that is added to atmosphere only by photosynthetic activity of green plants.  
 C. Increased R in atmosphere could lead to increased greenhouse effect thereby leading to global warming.  
 D. Animals get P directly from atmospheric air to manufacture their proteins.

33. Refer to the given groups (i) - (iv). Each group contains one wrong member. Identify the odd members and select the correct option.

- (i) Flax, Coir, Wool, Sisal  
 (ii) Cotton, Jute, Flax, Hemp  
 (iii) Polyester, Nylon, Acrylic, Silk  
 (iv) Shahtoosh, Wool, Silk, Coir

	(i)	(ii)	(iii)	(iv)
A.	Sisal	Hemp	Acrylic	Shahtoosh
B.	Flax	Jute	Nylon	Silk
C.	Wool	Cotton	Silk	Coir
D.	Coir	Flax	Nylon	Wool

34. Following are the properties of four minerals P, Q, R and S. Identify them and select the correct option regarding them.

P : It is required for proper functioning of thyroid gland.

Q : It helps in maintaining body's water balance.

R : It is important for haemoglobin formation.

S : It strengthens bones and teeth and helps in blood clotting.

- A. Deficiency of P causes dryness of eyes and inflammation of tongue.  
 B. Q is also required for the proper functioning of the nervous system.  
 C. Deficiency of R causes goitre.  
 D. S also helps to fight infections and keeps skin and mouth healthy.

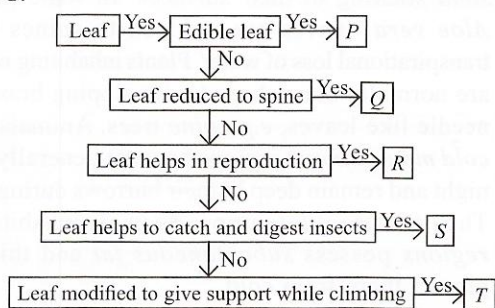
35. Study the given relationship and select the option that satisfies the same relationship.

Pumpkin :: Rose :: Pea

- A. Money plant :: *Hibiscus* :: Bottle gourd  
 B. Mint :: Bottlebrush :: Grapevine  
 C. Watermelon :: *Hibiscus* :: Betel  
 D. *Calliandra* :: Spinach :: Bitter gourd

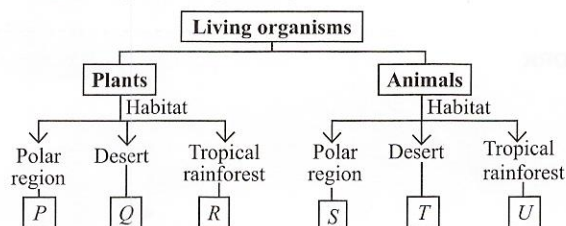


43. Refer to the given flow chart and identify *P*, *Q*, *R*, *S* and *T*.



- |    | <i>P</i>  | <i>Q</i>         | <i>R</i>           | <i>S</i>         | <i>T</i>  |
|----|-----------|------------------|--------------------|------------------|-----------|
| A. | Lettuce   | <i>Aloe vera</i> | <i>Petunia</i>     | Mistletoe        | Grapevine |
| B. | Fenugreek | <i>Acacia</i>    | <i>Bryophyllum</i> | <i>Cuscuta</i>   | Grapevine |
| C. | Spinach   | Cactus           | <i>Begonia</i>     | <i>Nepenthes</i> | Pea       |
| D. | Mint      | <i>Dionaea</i>   | <i>Hibiscus</i>    | Sundew           | Pea       |

44. Refer to the given classification chart and select the correct option regarding it.



- |    | <i>P</i>   | <i>Q</i>       | <i>R</i>      | <i>S</i>       | <i>T</i>     | <i>U</i>      |
|----|------------|----------------|---------------|----------------|--------------|---------------|
| A. | Pine       | Cactus         | <i>Acacia</i> | Armadillo      | Caribou      | Spider monkey |
| B. | Willow     | <i>Opuntia</i> | Rubber tree   | Penguin        | Kangaroo rat | Toucan        |
| C. | Maple      | Fern           | <i>Lemna</i>  | Bison          | Walrus       | Raccoon       |
| D. | Tape-grass | Sundew         | Teak          | Indian gazelle | Lynx         | Arowana       |

45. The table given below shows the amount of water in five identical beakers at the start of an experiment. It also shows the time required for the water in each beaker to go down by 20 mL.

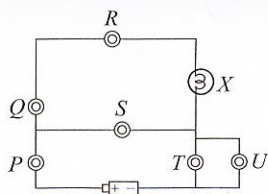
Beaker	Amount of water at beginning (mL)	Time taken for water to reduce by 20 mL (min)
<i>P</i>	60	50
<i>Q</i>	60	30
<i>R</i>	80	60
<i>S</i>	90	60
<i>T</i>	100	70

What can we conclude from the table?

- A. Water in beaker *Q* evaporates faster than in beaker *P*.  
 B. Water in beaker *T* evaporates faster than in beaker *Q*.  
 C. Water in beaker *T* evaporates faster than in beaker *P*.  
 D. Beakers *R* and *S* will have the same amount of water after 60 min.

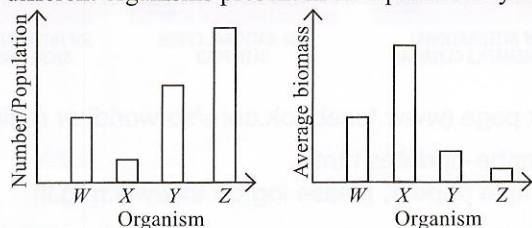
## ACHIEVERS SECTION

46. The given figure shows six bells *P*, *Q*, *R*, *S*, *T*, *U* and a bulb *X* connected in a circuit. Which of the given bells will continue to ring even if bulb *X* fuses?



- A. *Q*, *R* and *S* only  
 B. *Q* and *U* only  
 C. *P*, *S*, *T* and *U* only  
 D. *P*, *Q*, *R*, *S* and *T*

47. The given graphs show number and average biomass of different organisms present in an aquatic ecosystem.



Select the correct option regarding the food chain formed by interlinking organisms *W*, *X*, *Y* and *Z*.

- A. *X* could be a producer and forms the first link in the food chain formed by interlinking these organisms.  
 B. *Y* and *W* could be primary and secondary

consumers respectively in the food chain formed by interlinking these organisms.

- C. The correct relation of these organisms in the food chain is  $X \rightarrow W \rightarrow Z \rightarrow Y$ .  
 D. If a population of an exotic species is introduced in this community which exclusively feeds on *X*, then populations of *Z* and *W* will be negatively affected.

48. Read the given paragraph.

The human skeleton consists of many different long and short bones. The upper arm consists of a long bone called (i) whereas (ii) and (iii) are the long bones of lower arm. (iv) is the long bone of upper leg whereas lower leg consists of two long bones called (v) and (vi). Carpals, (vii) and phalanges are bones of wrist and hands whereas ankle and feet have bones called (viii), metatarsals and phalanges.

Select the option that correctly fills any four blanks in the above paragraph.

- A. (ii)-Ulna, (iv)-Fibula, (vi)-Tibia, (viii)-Tarsals  
 B. (i)-Radius, (iii)-Humerus, (v)-Tibia, (vii)-Clavicle  
 C. (i)-Humerus, (ii)-Radius, (iv)-Femur, (vii)-Metacarpals  
 D. (ii)-Ulna, (iii)-Radius, (v)-Femur, (vi)-Scapula



49. A few changes are listed in the given box.

(i) Cooking of food (ii) Dissolving washing soda in water  
(iii) Burning of wood (iv) Water to steam (v) Respiration  
(vi) Quick lime to slaked lime

Now, read the given passage and fill in the blanks by choosing an appropriate option.

Processes p involve consumption of heat energy and are q in nature while processes r involve evolution of heat energy and are s in nature.

	<u>p</u>	<u>q</u>	<u>r</u>	<u>s</u>
A.	(i), (ii), (iv)	Chemical	(iii), (v), (vi)	Physical
B.	(i), (iv)	Endothermic	(ii), (iii), (v), (vi)	Exothermic
C.	(i), (iii)	Endothermic	(ii), (iv), (v), (vi)	Exothermic
D.	(i), (ii), (v)	Physical	(iii), (iv), (vi)	Chemical

50. Refer to the given paragraph where few words /phrases have been italicised and select the correct option.  
Different organisms show different adaptations to adjust in their habitats. Plants inhabiting *deserts* have

leaves with drip tips which help in draining excess *sand* sticking to their surfaces. In some plants like *Aloe vera*, leaves are reduced to spines to check transpirational loss of water. Plants inhabiting *rainforests* are normally cone shaped with sloping branches and needle like leaves, e.g., *pine* trees. Animals found in *cold mountainous regions* become generally active at night and remain deep in their burrows during daytime. They excrete *dilute* urine. Animals inhabiting *polar regions* possess *subcutaneous fat* and thick fur to protect them from cold.

- Deserts* should be replaced with *polar regions* whereas *sand* should be replaced with *water*.
- Aloe vera* should not be replaced as it is correctly mentioned whereas *pine* should be replaced with *neem*.
- The positions of *cold mountainous regions* and *rainforests* should be interchanged.
- Dilute* should be replaced with *concentrated* whereas *subcutaneous fat* should not be replaced as it is correctly mentioned.

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36. Read the given paragraph.

*X* prevents soil erosion occurring due to flowing water on hills whereas *Y* prevents soil erosion occurring due to flowing water in plains.

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

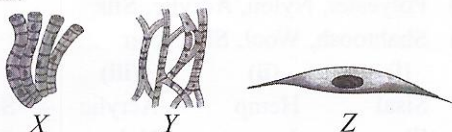
- X* is an agricultural practice wherein slopes of hills are cut into graduated terrace that are used for growing crops.
- Y* is built along river banks and prevents soil erosion by floods.
- X* is terrace farming and *Y* is deforestation.
- The amount of soil lost is less in *X* as the soil eroded from one step is deposited on the next step.

37. Which of the following matches are incorrect?

- Blowholes - *Scoliodon*
- Moist skin - Earthworm
- Spiracles - Honeybee
- Gills - Adult frog
- Lungs - Pigeon

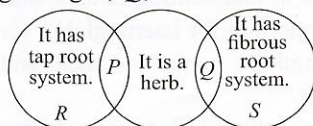
- (ii), (iii) and (v) only
- (i), (ii) and (v) only
- (iii), (iv) and (v) only
- (i) and (iv) only

38. Refer to the given figures of different muscles. Identify *X*, *Y* and *Z* and select the correct statement regarding them.



- Y* muscles are under our control.
- X* is present in blood vessels, intestine and stomach.
- Z* works continuously throughout our life.
- X* is smooth muscle, *Y* is skeletal muscle whereas *Z* is cardiac muscle.

39. Refer to the given Venn diagram and select the correct option regarding *P*, *Q*, *R* and *S*.



- |    | <i>P</i> | <i>Q</i> | <i>R</i>   | <i>S</i> |
|----|----------|----------|------------|----------|
| A. | Mustard  | Wheat    | Neem       | Palm     |
| B. | Gram     | Pea      | Sunflower  | Grass    |
| C. | Maize    | Spinach  | China rose | Barley   |
| D. | Mint     | Carrot   | Mango      | Rice     |

40. Refer to the given dichotomous key.

- (a) It is a solid waste. - Go to II  
(b) It is a gaseous waste. - Go to III
- (a) It is biodegradable. - Go to IV  
(b) It is non-biodegradable. - Go to V
- (a) It causes acid rain. - *P*  
(b) It leads to global warming. - *Q*

- (a) It can be composted. - *R*  
(b) It cannot be composted. - *S*
- (a) It can be recycled. - *T*  
(b) It cannot be recycled. - *U*

Select the option that correctly identifies *P*, *Q*, *R*, *S*, *T* and *U*.

	<i>P</i>	<i>Q</i>	<i>R</i>	<i>S</i>	<i>T</i>	<i>U</i>
A.	Carbon monoxide	Methane	News-paper	Tea leaves	Tin cans	Cow-dung
B.	Sulphur oxides	Carbon dioxide	Fruit-peel	Dis-carded tissue sample	Plastic bottles	Used sy-ringes
C.	Nitrogen-oxides	CFCs	Cotton shirt	Animal excreta	News-paper	Plant leaves
D.	Carbon dioxide	Carbon-mono oxide	Dis-carded blood sample	Used sy-ringes	Cotton clothes	Plastic bottles

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

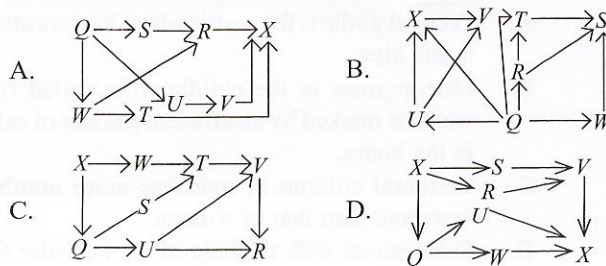
Column I	Column II
(a) Cerebrum	(i) Amplify intensity of the sound
(b) Ear ossicles	(ii) Controls all involuntary functions
(c) Brain stem	(iii) Controls our thinking, memory, learning ability and basic intelligence
(d) Nerves	(iv) Transmit messages between the brain and the body

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

42. The given table categorise few organisms present in a community on the basis of their feeding habits.

Producer	Herbivore	Carnivore	Omnivore
<i>Q</i>	<i>R</i> <i>U</i> <i>W</i>	<i>S</i> <i>V</i>	<i>T</i> <i>X</i>

Which of the following shows the correct food web that is formed by interlinking of these organisms?





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

Column I	Column II
P. Air	(i) Insulator
Q. Aluminium	(ii) Transparent
R. Wood	(iii) Opaque
S. Milk	(iv) Magnetic
T. Iron	(v) Conductor

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

22. Which of the following statements are incorrect?

- I. Evaporation of water at ordinary temperature is a physical and slow change.  
 II. Germination of seeds is a chemical and fast change.  
 III. Bursting of balloon is a chemical and fast change.  
 IV. Glowing of a bulb is a physical and fast change.  
 V. Digestion of food is a physical and slow change.

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

23. Various substances around us are grouped as follows :

Group I : Book, copper, aluminium, gold

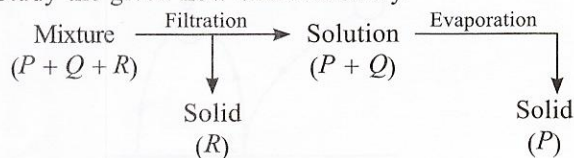
Group II : Cotton ball, silk cloth, sponge, silver spoon

Group III : Paper, petrol, CNG, lemonade

Identify the odd-one out in each group and its property which makes it odd.

Group I	Group II	Group III
A. Aluminium (Non-lustrous)	Silver spoon (Hard)	Paper (Solid)
B. Book (Non-lustrous)	Silver spoon (Metallic)	CNG (Gas)
C. Gold (Noble-metal)	Cotton ball (Soft)	Lemonade (Liquid)
D. Book (Non-metallic)	Silver spoon (Hard)	Lemonade (Incombustible)

24. Study the given flow chart carefully.

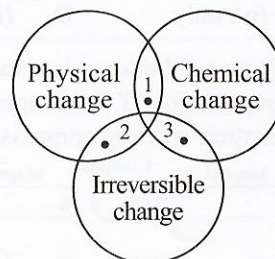


P, Q and R could be respectively

- A. Chalk powder, water and sawdust  
 B. Salt, water and sugar  
 C. Sugar, water and sawdust  
 D. Sawdust, water and sugar.
25. A rectangular block of substance X has a length of 20 cm, breadth 10 cm and height 5 cm. The mass of the block is 2.7 kg. If density of water is 1 g/cm<sup>3</sup> then, which of the following statements is correct?

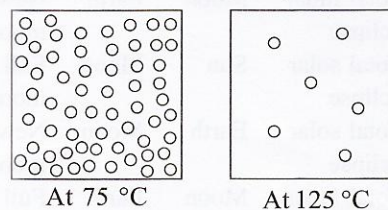
- A. The block will float in water as its density is 0.027 g/cm<sup>3</sup>.  
 B. The block will sink in water as its density is 2.7 g/cm<sup>3</sup>.  
 C. The block will sink in water as its density is 2.7 kg/cm<sup>3</sup>.  
 D. The block will float in water as its density is 0.0027 g/cm<sup>3</sup>.

26. Study the given Venn diagram carefully and identify points 1, 2 and 3.



- | 1                            | 2                  | 3                      |
|------------------------------|--------------------|------------------------|
| A. Occurrence of new moon    | Growth of plants   | Falling of trees       |
| B. Shredding of paper        | Baking of cake     | Occurrence of eclipses |
| C. Burning of a candle       | Falling of trees   | Inflation of tyre      |
| D. Burning of LPG in kitchen | Breaking of an egg | Burning of crackers    |

27. The given figures show arrangement of particles of a substance X at different temperatures.



Which of the following statements is correct?

- A. The boiling point of the substance X is between 75 °C and 125 °C.  
 B. The melting point of the substance X is below 75 °C.  
 C. Particles of substance X at 125 °C have more kinetic energy than at 75 °C.  
 D. All of these
28. Ms Rashmita, a science teacher has written a few properties of substances X, Y and Z on the blackboard as :
- X : Floats on water, bad conductor of heat  
 Y : Soft, floats on water, opaque in nature  
 Z : Hard, sinks in water, transparent

Which of the following correctly matches with the descriptions of X, Y and Z?



## LOGICAL REASONING

1. Find the missing number, if a certain rule is followed either row-wise or column-wise.

A. 6  
B. 5  
C. 8  
D. 9

3	6	8
4	7	?
5	8	4

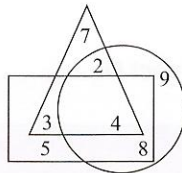
2. A square transparent Sheet (X), with a pattern and a dotted line on it is given. Find the figure from the options as to how the pattern would appear when the transparent sheet is folded along the dotted line.



Sheet (X)



3. In the given Venn diagram, triangle represents healthy people, rectangle represents old persons and circle represents males. Which of the following numbers represent healthy females who are old?



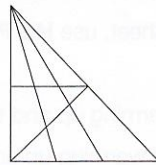
A. 3  
B. 5  
C. 7  
D. 2

4. In a line of boys facing North, Atul is 19<sup>th</sup> from the right end and Shubham is 20<sup>th</sup> from the left end. If there are 6 boys between them and Atul is in the left of Shubham, what is the total number of boys in the line?

A. 34  
B. 31  
C. 29  
D. 32

5. Find the total number of triangles formed in the given figure.

A. 22  
B. 24  
C. 23  
D. None of these



6. Study the following information and answer the question that follows.

- Kavya, Sonam and Rachit are intelligent.
- Chetna, Kavya and Ajay are hard-working.

- Chetna, Rachit and Ajay are ambitious.
  - Kavya, Sonam and Ajay are honest.
- Who among the following persons is neither hard-working nor ambitious but is honest?

A. Rachit  
B. Kavya  
C. Ajay  
D. Sonam

7. Select a figure from the options which satisfies the same conditions of placement of the dots as in Fig. (X).

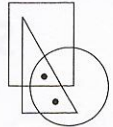
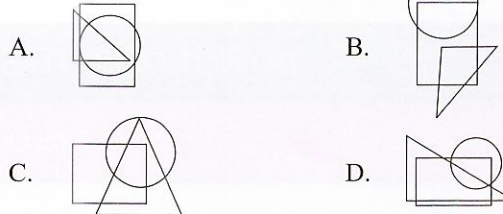


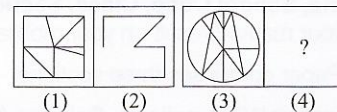
Fig. (X)



8. In a certain code language, TRAINING is written as RTYKLLI. How will INACTIVE be written in the same code language?

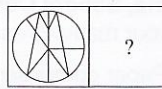
A. GPYERKTG  
B. GOCVGTG  
C. GOYAVGXG  
D. GPCEVGXC

9. There is a certain relationship between figures (1) and (2). Establish the similar relationship between figures (3) and (4) by selecting a suitable figure from the given options that would replace the (?) in figure (4).



(1)

(2)



(3)

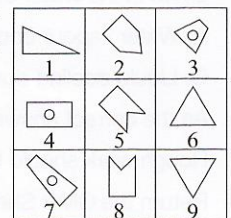


(4)



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

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



## SCIENCE

11. Four groups of everyday objects were made by Vijeta. Out of these only one group has the same type of machines. Identify this group and select the correct option.

A. Lift, escalator, pliers  
B. Nutcracker, wheelbarrow, bottle opener  
C. Door knob, handle of an eggbeater, see saw  
D. Axe, lift, door knob



## NSO - SOF - 2017- 18

### 6th Std.

#### ANSWER KEY

- |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|
| 1. [A]  | 2. [D]  | 3. [A]  | 4. [B]  | 5. [B]  | 6. [D]  |
| 7. [D]  | 8. [A]  | 9. [B]  | 10. [B] | 11. [B] | 12. [D] |
| 13. [C] | 14. [D] | 15. [A] | 16. [C] | 17. [C] | 18. [B] |
| 19. [B] | 20. [A] | 21. [C] | 22. [D] | 23. [D] | 24. [C] |
| 25. [B] | 26. [C] | 27. [D] | 28. [D] | 29. [D] | 30. [D] |
| 31. [D] | 32. [D] | 33. [C] | 34. [D] | 35. [C] | 36. [C] |
| 37. [D] | 38. [*] | 39. [A] | 40. [B] | 41. [C] | 42. [B] |
| 43. [C] | 44. [B] | 45. [A] | 46. [C] | 47. [D] | 48. [C] |
| 49. [B] | 50. [C] |         |         |         |         |



# NSO-SOF NATIONAL SCIENCE OLYMPIAD 2017-18

## CLASS-6 / SET-B / LEVEL - SOLUTIONS

1. Difficulty : Easy

Topics :

Mental Ability,

$$\frac{3 + 5}{2} = 4$$

3	6	8
4	7	?
5	8	4

$$\frac{8 + 4}{2} = \frac{12}{2} = 6$$

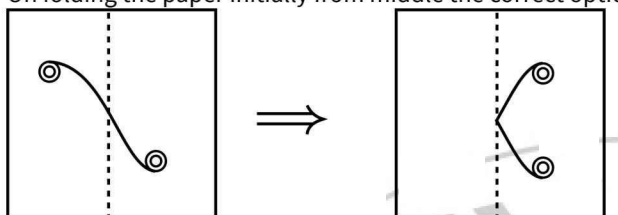


2. Difficulty : Medium

Topics :

Mental Ability,

On folding the paper initially from middle the correct option is (D)

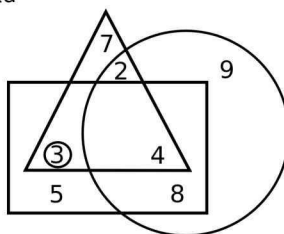


3. Difficulty : Medium

Topics :

Mental Ability,

This section represent healthy females who are old

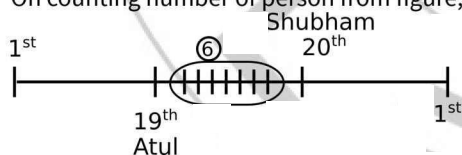


4. Difficulty : Medium

Topics :

Mental Ability,

On counting number of person from figure, there are 31 person in line option (B)



5. Difficulty : Medium

Topics :

Mental Ability,

On counting total triangle in figure, there are 24 triangles in the figure option (B)



6. Difficulty : Medium

Topics :

Mental Ability,

	Intelligent	Hard-working	Ambitious	Honest
Kavya	✓	✓		✓
Sonam	✓			✓
Rachit	✓		✓	
Chetna		✓	✓	
Ajay		✓	✓	✓

So from above table, correct option is (D) Sonam

7. Difficulty : Medium

Topics :

Mental Ability,

One dot is inside 3 figure and second is inside 2 figure so the correct option is (D)

8. Difficulty : Medium

Topics :

Mental Ability,

A	2	3	4	5	6	7	8	9	10	11	12	13
B	C	D	E	F	G	H	I	J	K	L	M	
Z	Y	X	W	V	U	T	S	R	Q	P	O	N
26	25	24	23	22	21	20	19	18	17	16	15	14

T	R	A	I	N	I	N	G
20	10	1	9	14	9	14	7
-2↓	+2↓	-2↓	+2↓	-2↓	+2↓	-2↓	-2↓
18	20	25	11	12	11	12	12
R	T	Y	K	L	K	L	L

I	N	A	C	T
9	14	1	3	20
-2↓	+2↓	-2↓	+2↓	-2↓
G	P	Y	E	R
K	T	G		



9. Difficulty : Medium

**Topics :**

**Mental Ability,**

Correct option is (B)



10. Difficulty : Medium

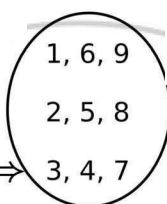
**Topics :**

**Science,**

I<sup>st</sup> Class consists of 3 lines  $\Rightarrow$

II<sup>nd</sup> Class consists of 5 lines  $\Rightarrow$

III<sup>rd</sup> Class consists of circle inside figure  $\Rightarrow$

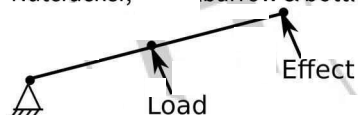


11. Difficulty : Medium

**Topics :**

**Science,**

Nutcracker, Wheelbarrow & bottle opener are the 2<sup>nd</sup> class levers



12. Difficulty : Medium

**Topics :**

**Science,**

(II) & (III) are incorrect

The dark part of a shadow that receives no light from the source is called u

13. Difficulty : Medium

**Topics :**

**Science,**

If strength (Magnetic) is more than attractive & repulsive force are more compare to weak magnetic strength



14. Difficulty : Medium

**Topics :**

**Science,**

By basic concept of lunar eclipse & Solar eclipse

15. Difficulty : Medium

**Topics :**

**Science,**

10 decades = 1 century [1 decades = 10 years]

1 millennium = period of 1000 years

$\therefore$  100 centuries = 10000 years  $\neq$  1 millennium

$\rightarrow$  10 millimetres = 1 centimeters

16. Difficulty : Medium

**Topics :**

**Science,**

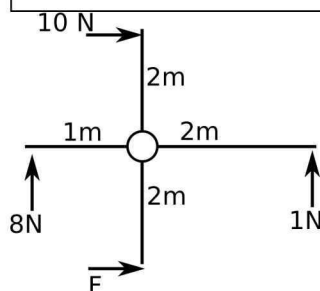
For windmill stationary

Sum of moments = 0

$$+(10 \times 2) - (2 \times 1) - (F \times 2) + (8 \times 1) = 0$$

$\therefore F = 13 \text{ N}$

Moment = Force  $\times$  1<sup>st</sup> distance





17. Difficulty : Medium

**Topics :**

**Science,**

Statement 1 is true & statement 2 is false because size of the shadow is does not depend on the system.

18. Difficulty : Medium

**Topics :**

**Science,**

Same as its actual position

When light falls normally on the boundary surface then ( $i=0$ ) (incident angle)

According to shells law,  $\mu_1 \sin i = \mu_2 \sin r$

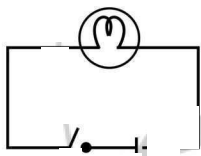
So, there will be no refraction (ie  $r=0$ )

Thus, when observed from outside the apparent position of the dot will remain the same & will be independent of the refractive index of the sphere

19. Difficulty : Medium

**Topics :**

**Science,**



$I = 0$   
if ckt open

(ii) Dry cell always convert chemical energy into electrical energy while discharging.

(iii) Current always flow from +ve terminal to -ve terminal of the cell

(iv) Pure water is the bad conductor of electricity

20. Difficulty : Medium

**Topics :**

**Science,**

Here, height of the ball before & after strong the ground is not same. (i.e. there is energy loss due to friction at the time of collision).

$\therefore$  Energy is not conserved [In this case]

21. Difficulty : Medium

**Topics :**

**Science,**

Air → Transparent  
Aluminium → Conductor  
Wood → Transparent  
Milk → Opaque  
Iron → Magnetic

22. Difficulty : Medium

**Topics :**

**Science,**

II, III & V statements are incorrect

23. Difficulty : Medium

**Topics :**

**Science,**

Book → Non-metallic  
Silver spoon → Hard  
Lemonade → Incombustible

24. Difficulty : Medium

**Topics :**

**Science,**

P → Sugar  
Q → Water  
R → Saw dust

25. Difficulty : Medium

**Topics :**

**Science,**

$$\begin{aligned}\text{Value of block} &= (20 \times 10 \times 5) \text{ cm}^3 \\ &= 1000 \text{ cm}^3 \\ \text{Mass of block} &= 2700 \text{ g} \\ \text{Density of block} &= \frac{2700}{1000} \text{ g/cm}^3 = 2.79 \text{ g/cm}^3\end{aligned}$$



26. Difficulty : Medium

**Topics :**

**Science,**

Burning of LPG  $\rightarrow$  **Physical** & **Chemical change**  
First Liquid LPG changes in Gas      Burning of LPG

27. Difficulty : Medium

**Topics :**

**Science,**

At  $75^{\circ}C \rightarrow$  Liquid phase  
At  $125^{\circ}C \rightarrow$  Gaseous phase

28. Difficulty : Medium

**Topics :**

**Science,**

X  $\rightarrow$  Plastic Mug

29. Difficulty : Medium

**Topics :**

**Science,**

P  $\rightarrow$  Sawdust & water  
Q  $\rightarrow$  Heterogeneous Solid-Solid mixture  
Q  $\rightarrow$  Distillation  
S  $\rightarrow$  Separating funnel

30. Difficulty : Medium

**Topics :**

**Science,**

As per given graphical representation seeds of 'Z' are small & light weighted so the number of seeds move away from the parent plant easily. So, the distance from the parent plant & these small & light weight seeds is more & so there number of seeding at 'Z' point are more.

31. Difficulty : Medium

**Topics :**

**Science,**

Snail moves with the help of its muscular foot.

NOTE : Pectoral girdle is the region where

A. forelimbs are attached to the shoulder

B. Rickets is the vitamin D deficiency disorder seen in children where as osteoporosis is caused mainly because of deficiency of estrogen hormone in post menopausal women.

32. Difficulty : Medium

**Topics :**

**Science,**

'P' - is incorrect as Animals do not get P(nitrogen) directly from atmospheric air to manufacture their proteins. They obtain nitrogen ( $N_2$ ) by eating plants & other animals that contain nitrogen

33. Difficulty : Medium

**Topics :**

**Science,**

(i) Wool - Animal originated fibre. Rest all are plant originated

(ii) Cotton - Fibres from seed. All trees are xylem fibres

(iii) Silk - Natural fibres. All other are synthetic fibres

(iv) Coir - Plant originated fibre all trees are animal originated fibres

34. Difficulty : Medium

**Topics :**

**Science**

$P - I_2, Q - ADH, R - Fe, S - \text{Vitamin C}$

Vitamin 'C' strengthens bones & teeth, helps blood clotting & also helps fight infections by stimulating the production of antibodies & keeps the skin & mouth healthy



35. Difficulty : Medium

**Topics :**

**Science,**

As per the given relationship Pumpkin :: Rose :: Pea

Pumpkin is a rind-fruit

Rose is a flower

Pea is a plant which has tendrils for climbing

So in given options, option 'C' watermelon :: Hibiscus :: Betel satisfies the same relationship as per the given relationship in the question as watermelon is a rind fruit, Hibiscus is a flower & Betel plant

36. Difficulty : Medium

**Topics :**

**Science,**

Following statements are false. Terrace farming prevents erosion occurring due to flowing water on hills whereas Deforestation results in soil erosion occurring due to flowing water on plains.

37. Difficulty : Medium

**Topics :**

**Science,**

The correct options are (ii), (iii), (v).

Note : Scoliodon i.e. Shark which is cartilaginous fish respire by gills not by Blowholes, blowholes are for whale & adult frog respire by lungs not by gills.

38. Difficulty : Medium

**Topics :**

**Science,**

Smooth muscles are smooth muscles

39. Difficulty : Medium

**Topics :**

**Science,**

Mustard & wheat are herbs in which mustard and Neem have well developed Tap-root system & palm tree & wheat have fibrous root

40. Difficulty : Medium

**Topics :**

**Science,**

- P - The gaseous waste causing acid rain is  $SO_2$
- Q - The gaseous waste causing global warming  $3CO_2$
- R - Fruit peel is biodegradable and can be composted
- S - Discarded tissue sample is biodegradable but cannot be composted
- T - Plastic bottles are non-biodegradable & these can be recycled
- U - Used syringes are non-biodegradable & cannot be recycled

41. Difficulty : Medium

**Topics :**

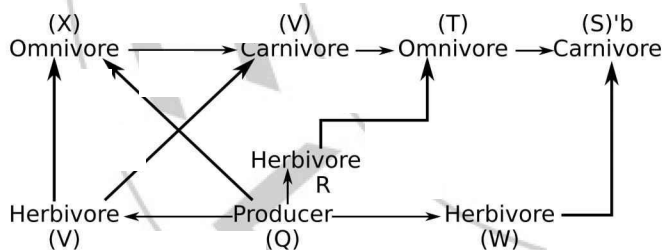
**Science,**

- Cerebrum - controls our thinking, memory, learning ability & basic intelligence.
- Ear ossicles / Auditory ossicles - Amplifies intensity of sound
- Brain stem - consists of midbrain, pons varolii & Medulla oblongata which controls all involuntary activities such as breathing, swallowing, heart rate, B. Pe. etc
- Nerves - Transmit messages between the brain & the body

42. Difficulty : Medium

**Topics :**

**Science,**



43. Difficulty : Medium

**Topics :**

**Science,**

- P - Edible leaf spinach
- Q - Cactus is not edible & its leaf is reduced to spine
- R - In Begonia natural vegetative propagation occurs through leaf
- S - Nephenthes is pitcher plant which helps to catch & digest insects
- T - In Pea (*Pisum sativum*) terminal leaflets are modified into green thread like sensitive structures called tendrils which help in climbing ground the support



44. Difficulty : Medium

**Topics :**

**Science,**

Willow - Deciduous trees & shrubs found in polar region (Northern hemisphere)

Opuntia - Habitat Desert (Xerophytic plant)

Rubber plant - Tropical Rainforest, large tree in southeast Asia

Penguin - Habitat restricted to pack ice & water of Antarctica

45. Difficulty : Medium

**Topics :**

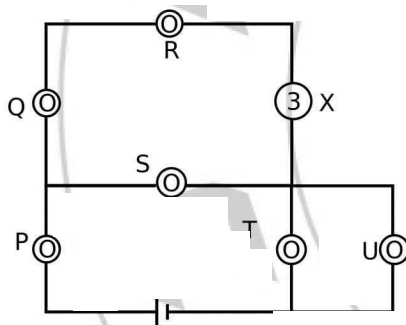
**Science,**

All the statements given in options are correct

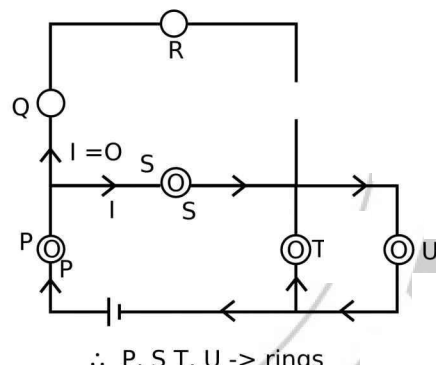
46. Difficulty : Medium

**Topics :**

**Science,**



If  
Bulb X  
fuses



47. Difficulty : Medium

**Topics :**

**Science,**

Introduction of exotic species which exclusively feeds on X, will leads to competition among other Individuals who feed upon X also.

48. Difficulty : Medium

**Topics :**

**Science,**

The upper arm consists of a long bone called humerus whereas Radius (ii) & Ulna (iii) are long bones of lower arm. Femur (iv) is long bone of upper leg whereas lower leg consists of two long bones called Tibia (v) & fibula (vi). Carpals, Metacarpals (vii) & phalanges are bones of wrist & hands whereas ankle & feet have bones called. Tarsals (viii), metatarsals & phalanges.

49. Difficulty : Medium

**Topics :**

**Science,**

Processes such as Cooking of food & water to steam (p) involves consumption of heat energy & are endothermic (q) in nature which processes such as dissolving washing soda in water & Buring of wood (r) involve evolution of heat energy & are exothermic (s) in nature.

50. Difficulty : Medium

**Topics :**

**Science,**

The correct statement should be plants inhabiting cold mountainous regions are normally cone shaped with sloping branches & needle like leaves eg. Pine tree & Animals found in rainforest become generally active at night & remain deep in their burrows during day time. So, in the given paragraph cold mountainous regions and rainforest words has to be interchanged.