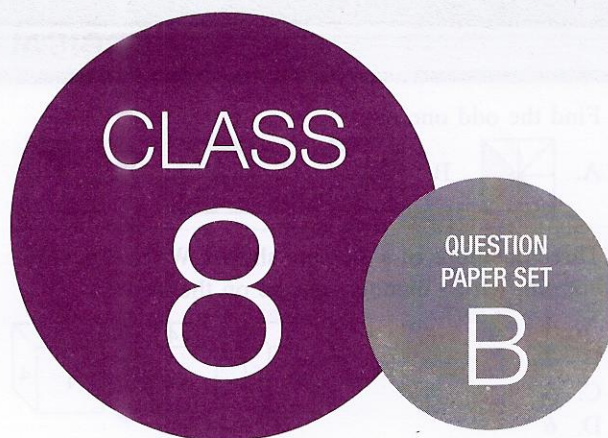


**SOF NATIONAL SCIENCE
OLYMPIAD 2017-18**



DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

Total Questions: 50 | Time: 1 hr.

Name:.....

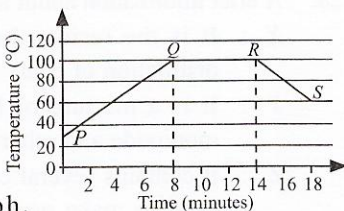
Section:..... Olympiad Roll No.:..... Contact No.:.....

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 turn to last page.

16. ● (B) (C) (D)

12. Read the given statements and select the correct option.
Statement 1 : When deep-sea fish are brought to the surface of the sea, their bodies burst.
Statement 2 : Blood in the blood vessels of the deep-sea fish flows at very high pressure.
- Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.
 - Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.
 - Statement 1 is true but statement 2 is false.
 - Statement 1 is false but statement 2 is true.

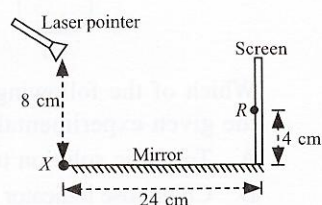
13. The given graph shows the change in temperature of water with time as it is brought to boil before being left to cool.
- 

Based on the graph, which of the following statements are correct?

- Evaporation only occurs from P to Q .
 - There is heat gain from P to R .
 - The water is boiled for 6 minutes.
 - Water exists in two different states between Q and R .
- (i) and (ii) only
 - (ii) and (iv) only
 - (i) and (iii) only
 - (ii), (iii) and (iv) only
14. A sound is played on a flute. A sound of same pitch is played on a trumpet. Which of the following correctly compares the two sound waves?

Frequency	Speed
A. Different	Different
B. Different	Same
C. Same	Different
D. Same	Same

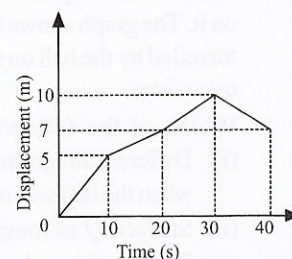
15. The ray from a laser pointer hits a plane mirror and the reflected ray strikes a screen. How far away from point X should the ray strike the mirror to cause the reflected ray to hit point R ?



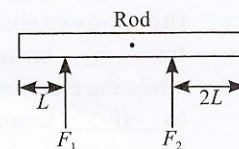
- 6 cm
 - 12 cm
 - 16 cm
 - 18 cm
16. Read the given statements and select the correct option.
- Lightning bolt occurs because air is a good conductor of electricity.
 - During lightning it is safe to take shelter under a tree.
 - When a comb is run through dry hair, the comb acquires a negative charge.
 - When a glass rod is rubbed with silk cloth, glass rod acquires positive charge.

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

17. Study the displacement-time graph of a toy car given here and choose the correct statement(s) from the following.



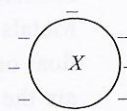
- The toy car is slowest during first 10 seconds.
 - The toy car is slowest in between 10 to 20 seconds.
 - The toy car is fastest during first 10 seconds.
 - Both B and C.
18. A 100 N uniform rod of length $6L$ is supported by two forces F_1 and F_2 as shown here. What is the ratio for F_1 to F_2 ?



- 2 : 1
 - 1 : 2
 - 3 : 1
 - 1 : 3
19. Which of the following is an incorrect match?
- | Planet | Time to orbit the sun | Time for one rotation on its axis |
|------------|-----------------------|-----------------------------------|
| A. Jupiter | 12 years | 9 h 55 m |
| B. Mars | 687 days | 24 h 37 m |
| C. Venus | 225 days | 243 days |
| D. Neptune | 265 years | 10 h 7 m |

20. Which of the following statements is/are true?
- Rainbow is formed by the refraction of sunlight by tiny droplets of water suspended in the air.
 - Apparent bending of a pencil half dipped in water is because of refraction.
 - When light ray enters from air to water, it bends towards the normal.
 - When two refracting surfaces of the glass slab is kept parallel to each other, the emerging light ray will be parallel to the incident ray.
- (i) only
 - (ii) and (iii) only
 - (ii), (iii) and (iv) only
 - (iv) only

21. The diagram shows an isolated sphere X with its charge distribution. Another similar uncharged earthed sphere Y is brought near sphere X . Which of the following diagrams shows the final charge distribution on both spheres?

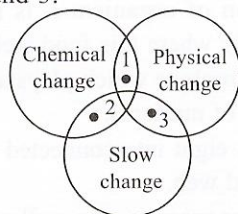


- Diagram A: Sphere X has positive charges on the left and negative on the right. Sphere Y has positive charges on the left and negative on the right.
- Diagram B: Sphere X has positive charges on the left and negative on the right. Sphere Y has positive charges on the left and negative on the right.
- Diagram C: Sphere X has positive charges on the left and negative on the right. Sphere Y has positive charges on the left and negative on the right.
- None of these

No reaction will take place in beaker(s)

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

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



- | 1 | 2 | 3 |
|-------------------------------------|--------------------------------------|--------------------------|
| A. Burning of a kerosene wick stove | Tarnishing of silver jewellery | Bursting of balloon |
| B. Setting of milk to form curd | Extraction of metals by electrolysis | Slaking of lime |
| C. Burning of LPG in kitchen | Rusting of iron | Evaporation of water |
| D. Burning of a candle | Breaking of glass | Depletion of ozone layer |

32. Shreya, a class 8 student listed the properties and uses of a few fibres in the given table.

Fibre	Properties	Used for making
W	Absorbs moisture, can be woven like silk fibres	Reinforced tyres, bandages
X	Soft like wool, less expensive and does not shrink	Blankets, shawls
Y	Strong, long lasting, water and wrinkle-resistant	Dress material, soft drink bottles
Z	Elastic, very strong, light and wrinkle-resistant	Socks, fishing nets

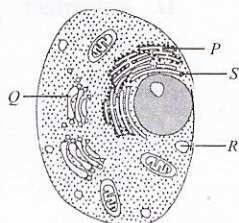
W, X, Y and Z are respectively

- A. Rayon, acrylic, polyester and nylon
B. Wool, cotton, nylon and acrylic
C. Polyester, cotton, nylon and rayon
D. Acrylic, polyester, cotton and nylon.

33. Which of the following statements are correct?

- I. Yellow flames are ideal for heating.
II. The substances which vaporise during burning give flames.
III. Luminous zone contains unburnt carbon particles.
IV. The non-luminous zone has the highest temperature.
A. I, II and III only
B. II and IV only
C. II, III and IV only
D. I, III and IV only

34. Refer to the given ultrastructure of an animal cell. Identify the labelled parts (P-S), match them with their functions and select the correct option.



- (i) Synthesising proteins from amino acids

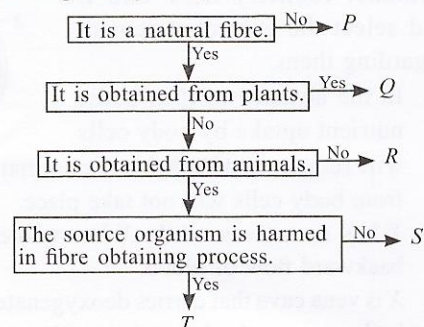
(ii) Synthesising lipids

(iii) Packaging of materials synthesised in cell

(iv) Secreting digestive enzymes

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

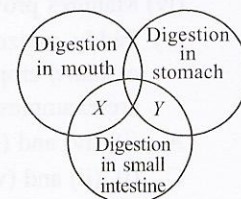
35. Refer to the given flow chart and select the correct statement regarding P, Q, R, S and T.



- (i) Q is cellulosic whereas S is proteinaceous in nature.
(ii) S could be obtained from a viviparous animal whereas T could be obtained from an oviparous animal with four stages in its life cycle.
(iii) P and S are non-biodegradable fibres.
(iv) P and R are petroleum based fibres.
(v) Organisms providing S generally inhabit desert lands whereas those providing Q generally inhabit polar regions.

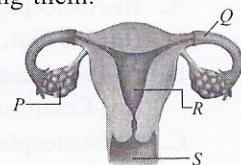
- A. (i), (ii) and (iii) only
B. (i) and (ii) only
C. (i), (iv) and (v) only
D. (i), (ii), (iv) and (v) only

36. Refer to the given Venn diagram. Identify the food components X and Y, and select the incorrect statement regarding them.



- A. Excess of X could be stored in the cells of liver.
B. Pancreas secretes digestive juices which acts on Y only.
C. Y could be a food component required for body building and repair of damaged tissues or a food component that cannot be digested properly in the body if liver stops manufacturing bile.
D. Products of digestion of Y could be glycerol and fatty acids.

37. Refer to the given figure. Identify P - S and select the correct statements regarding them.



- (i) If both P are surgically removed from a female's body then she will not menstruate but can still produce eggs.
(ii) R is a very small organ in a female which serves as a site of formation, implantation and further development of zygote.

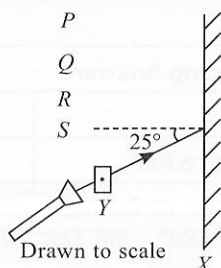
45. The period of crop harvesting is celebrated with great joy and happiness in all parts of India. Special festivals are associated with the harvest season. Which among the following group of festivals is associated with harvest season?

- A. Pongal, Holi, Diwali, Nabanna
B. Diwali, Christmas, Eid, Pongal
C. Pongal, Eid, Holi, Nabanna
D. Pongal, Baisakhi, Eid, Nabanna

ACHIEVERS SECTION

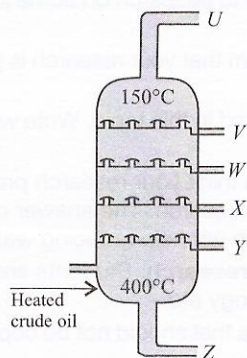
Direction (Q. No. 46 and 47): Refer to the given passage and answer the following questions.

The given figure shows a plane mirror X placed in front of a torch. A small cardboard piece Y with a hole is illuminated by the torch as shown in the figure.



46. At which point should the eye be placed so that the reflected ray from the mirror X can be seen?
A. P B. Q
C. R D. S
47. If you place a sufficiently long mirror Z perpendicular to mirror X then the angle of reflection for the ray reflected from mirror Z will be
A. 25° B. 45°
C. 65° D. 115°

48. The given figure represents a fractionating column used in refineries.

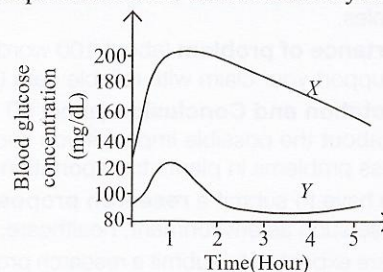


Which of the following statements are correct?

- I. Substance U has the highest boiling point among all the fractions while substance Z has the lowest boiling point.
II. Substance U is used as a domestic fuel while substance Z is used for lubrication.
III. U , V , W and X all are used as fuels.
IV. V is used in power stations while X is used as a fuel for lamps and stoves.
- A. I and IV only B. II and III only
C. I, III and IV only D. I, II, III and IV
49. Refer to the given dichotomous key. Identify P – T and select the incorrect statement.

- I. (a) It is unicellular organism. – Go to II
(b) It is multicellular organism. – Go to IV
II. (a) It possesses well organised nucleus. – Go to III
(b) It lacks well organised nucleus. – P
III. (a) Nutrition is parasitic. – Q
(b) Nutrition is mixotrophic. – R
IV. (a) It possesses chlorophyll. – S
(b) It lacks chlorophyll. – T
- A. P can convert lactose sugar of milk into lactic acid.
B. R could be *Euglena* which possesses cilia that helps in movement.
C. Q could be *Plasmodium* which causes malaria or it could be *Entamoeba* which causes amoebic dysentery in humans.
D. S could be a plant like pondweed whereas T could be a scavenger like vulture or a decomposer like *Rhizopus*.

50. Refer to the given graph representing the blood glucose concentration of two persons X and Y after eating a meal.
[Note : Both persons X and Y are not under any medication.]



Select the incorrect statement(s) regarding blood glucose concentration in both the persons X and Y .

- (i) Both persons X and Y had insulin released into their blood stream by their pancreas after the meal.
(ii) Person X is healthy individual while person Y can be hypoglycemic.
(iii) Lowering of blood glucose level in X is brought about by utilisation of glucose in respiration and excretion through urine.
- A. (ii) and (iii) only B. (i) only
C. (i) and (iii) only D. (i) and (ii) only

SPACE FOR ROUGH WORK



INNOVATION CHALLENGE - INTRODUCTION

Innovation Challenge (IC) is being conducted by Techfest IIT Bombay in association with SOF. Students studying in classes 8, 9 or 10 may appear in the IC provided they have registered for SOF NSO during 2017-18. Appearing in the IC is not compulsory. In case you wish to appear in the IC, please visit www.techfest.org/innovationchallenge. No registration fee / any other formality is required to be fulfilled. To appear in IC, please read the question given below and upload your answer at the above site as per following schedule:

Time Slots for Uploading Answer		
Class 8 th	Class 9 th	Class 10 th
28 th Nov : 3 PM to 8 PM	27 th Nov : 3 PM to 8 PM	26 th Nov : 3 PM to 8 PM

Each participant will be awarded a Participation Certificate from Techfest IIT Bombay - SOF. Top 15 rank holders will be invited to IIT Bombay with an accompanying adult to participate in the finals on 29th - 30th Dec 2017. Travel reimbursement, boarding and lodging will be provided by IIT Bombay.

Winners will be awarded with Trophies, Gifts, Certificates and visit to Vikram Sarabhai Space Centre to witness a rocket launch – with all expenses paid.

Please visit www.sofworld.org/sof-techfest-iit-bombay-innovation-challenge or call 0124-4951200 for additional information.

INNOVATION CHALLENGE - PROBLEM

Student may attempt the following problem as part of Innovation Challenge.

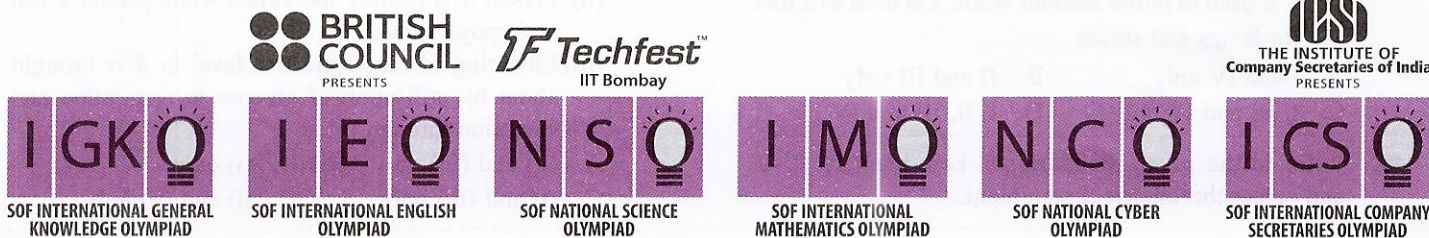
Research Proposal

Any important discovery needs thousands of researches. Imagine you are a scientist and you want to do a research of your own. Due to very heavy investment in researches you seek monetary help. In order to get help from the concerned authorities, you have to submit your own research proposal. The format of research proposal (for online submission) is as follows:

- **Title of the proposal** (in about 20 words) : For example, Proposal to (research on some ink materials) devise a process that can be used to remove ink from printed materials.
- **Problem statement** (about 50 words) : Briefly describe the problem that your research is going to address. You can also present examples.
- **Importance of problem** (about 100 words) : Why are you interested in this topic. Write why your research proposal is important and support your claim with reliable data (if possible).
- **Expectation and Conclusion** (about 50 words) : Justify why you think your research proposal has a good chance of success. Write about the possible impact if you succeed in your proposed research. The answer can be as simple as "This research will address problems in plants transportation theory" or "This research will help reducing water borne disease in rural areas".

Note: You have to submit a **research proposal only, not an actual research**. Students are free to choose any category/topic for this purpose such as environment, healthcare, technology, space, biology etc.

Students are expected to submit a research proposal based on new idea that should not be copied from internet. You are not expected to do an actual research.



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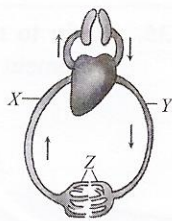
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Note: Please address all communication to the National Office only.

- (iii) When embryo implants and develops in Q , it is removed by medication or invasive surgical procedures as it could be life threatening for mother.
 (iv) Labelled part S receives sperms and also serves as birth canal.

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

38. Refer to the given schematic representation of circulation in humans. Identify X , Y and Z and select the correct statement regarding them.



- A. In the absence of Z in body, nutrient uptake by body cells will remain unaffected but elimination of waste from body cells will not take place.
 B. Y has no valves while X has valves to prevent backward flow of blood.
 C. X is vena cava that carries deoxygenated blood from body parts to the left atrium of heart.
 D. Through Y , the medicines reach the heart from where they are pumped all over the body.

39. Which of the following statements are correct?

- (i) Water logging increases the amount of salt in the soil that reduces soil fertility.
 (ii) 2, 4-D, MCPA and butachlor are common weedicides.
 (iii) Leguminous crops (like pea and beans) cannot be grouped in combination with cereals (like wheat and rice) under mixed cropping as both use large amount of nitrogen from the soil.
 (iv) Manures provide specific nutrients to the soil.
 (v) Paddy, maize, cotton and groundnut are examples of *kharif* crops while wheat, gram, pea and mustard are examples of *rabi* crops.

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

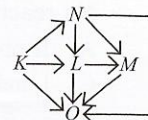
40. Rectify the given statements by replacing the underlined words and select the correct option.

- (i) The viscous fluid present in the nucleus is called cytoplasm.
 (ii) Vacuoles are rod shaped structures which oxidise food to provide energy.
 (iii) Mitochondria contain green pigment chlorophyll and take part in photosynthesis.

- (iv) Lysosomes take part in synthesis of proteins.

A. (i)-Nucleoplasm, (ii)-Lysosomes,
 (iii)-Plastids, (iv)-Centrosomes
 B. (i)-Protoplasm, (ii)-Ribosomes,
 (iii)-Centrosomes, (iv)-Golgi bodies
 C. (i)-Nucleoplasm, (ii)-Mitochondria,
 (iii)-Chloroplasts, (iv)-Ribosomes
 D. (i)-Protoplasm, (ii)-Plastids,
 (iii)-Chloroplasts, (iv)-Ribosomes

41. Refer to the given food web and select the correct statement regarding it.



- (i) N could be a herbivore whereas O could be an omnivore.
 (ii) Stability of this food web will be affected if entire population of organism L is removed from the community where this food web is functional.
 (iii) K is a saprophyte which plays an important role in recycling of nutrients.
 (iv) There are eight interconnected food chains in the given food web.
 (v) N serves as secondary as well as tertiary consumer in the given food web.

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

42. Refer to the given list of fruits/seeds.

(i) <i>Hiptage</i>	(ii) <i>Acer</i>	(iii) <i>Xanthium</i>
(iv) <i>Urena</i>	(v) Coconut	(vi) Dandelion
(vii) Lotus	(viii) Balsam	(ix) Pea
(x) Guava		

Select the option which correctly matches these fruits/seeds with their dispersal agents, wind (P), water (Q), animals (R) and explosion (S).

	P	Q	R	S
A.	(i), (ix), (v)	(vii), (viii)	(iii), (iv), (x)	(ii), (vi)
B.	(i), (ii), (ix)	(v), (vii)	(iii), (iv), (x)	(vi), (viii)
C.	(i), (iii), (viii)	(v), (vii)	(ii), (iv), (x)	(vi), (ix)
D.	(i), (ii), (vi)	(v), (vii)	(iii), (iv), (x)	(viii), (ix)

43. Select the pair of diseases that are caused by contaminated water.

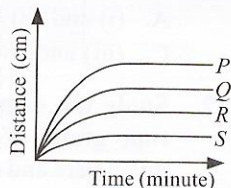
A. Cholera and typhoid
 B. Diarrhoea and common cold
 C. Pneumonia and typhoid
 D. Malaria and pneumonia

44. Read the given paragraph and select the correct option regarding P , Q , R and S .

According to Red list of International Union for Conservation of Nature (IUCN), P is an extinct animal, Q is an endangered animal, R is a vulnerable animal whereas S is a critically endangered animal.

	P	Q	R	S
A.	Olive ridley turtle	Passenger pigeon	Asian elephant	Giant panda
B.	Passenger pigeon	Golden langur	Giant panda	Silvery pigeon
C.	Dodo	Indian rhinoceros	Sloth bear	Blue whale
D.	Silvery pigeon	Chinkara	Desert kangaroo rat	Two banded chameleon

22. A ball rolled on four wooden surfaces of different roughness when a similar push was applied on it. The graph shows the distance travelled by the ball on the surfaces over time.



Which of the following conclusion is/are correct?

- (i) Different magnitudes of the friction were produced when the ball was rolling on different wooden surfaces.
 (ii) Surface *Q* is rougher than surface *R*.
 (iii) Surface *S* has the least roughness.
- A. (i) only
 B. (ii) only
 C. (iii) only
 D. (i) and (iii) only

23. Read the following passage and select the option which correctly fills the blanks.

If a metal wire is connected through a battery then the conventional current in the wire flows from (i) terminal to (ii) terminal of the battery while the electronic current flows from (iii) terminal to (iv) terminal of the battery.

- | | (i) | (ii) | (iii) | (iv) |
|----|----------|----------|----------|----------|
| A. | Positive | Positive | Negative | Positive |
| B. | Positive | Negative | Negative | Positive |
| C. | Negative | Positive | Negative | Positive |
| D. | Negative | Negative | Positive | Negative |

24. In an experiment to determine the speed of sound, a student stands 150 m from a wall and claps. When he claps once, what is the time interval between the sound of the clap and its echo heard by the student, in terms of v , the speed of sound?

- A. $\frac{150 \text{ m}}{v}$ B. $\frac{200 \text{ m}}{v}$ C. $\frac{300 \text{ m}}{v}$ D. $\frac{335 \text{ m}}{v}$

25. The artificial satellites sent into space by India in ascending order of their launching dates are

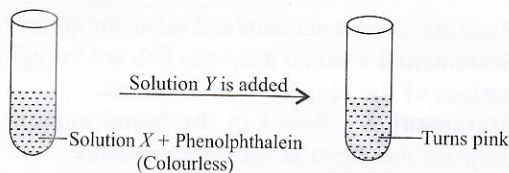
- A. APPLE, EDUSAT, ROHINI, INSAT 4B
 B. EDUSAT, ROHINI, APPLE, INSAT 4B
 C. ROHINI, APPLE, EDUSAT, INSAT 4B
 D. INSAT 4B, EDUSAT, APPLE, ROHINI.

26. Read the given passage and fill in the blanks by choosing an appropriate option.

Metals have high densities except (i) which can even float on water. Metals are malleable and ductile. (ii) are the most malleable and ductile metals. All metals conduct heat and electricity. (iii) is the best conductor while (iv) is a poor conductor.

- | | (i) | (ii) | (iii) | (iv) |
|----|-----------|-----------|-------|------|
| A. | K and Ca | Fe and Cu | Al | Ag |
| B. | Cu and Pb | Cu and Al | Cu | Au |
| C. | Na and K | Au and Ag | Ag | Hg |
| D. | Na and Mg | Zn and Cu | Zn | Na |

27. Observe the given experimental set-up carefully and choose the correct statement.



- A. Solution *X* is soap solution and solution *Y* is vinegar.
 B. Solution *X* is nitric acid and solution *Y* is baking soda.
 C. Solution *X* is carbonic acid and solution *Y* is sugar solution.
 D. None of these

28. A brief information about a few substances is given as :
X : It is the residue left behind after destructive distillation of coal.

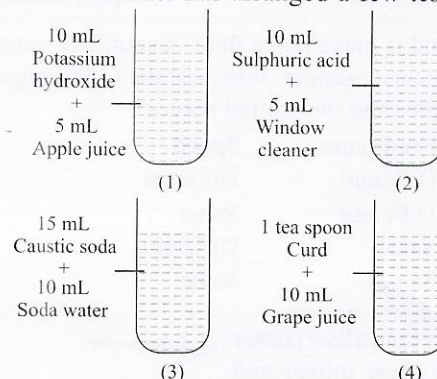
Y : It is a mixture of hydrogen, methane, carbon monoxide and other gases.

Z : It contains several carbon compounds which are used to make pesticides, explosives, synthetic fibres, perfumes, etc.

X, *Y* and *Z* are respectively

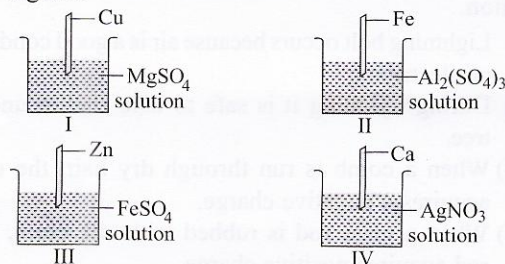
- A. Kerosene, CNG and ammoniacal liquor
 B. Bitumen, coal gas and coal tar
 C. Coke, coal gas and coal tar
 D. Petrol, CNG and bitumen.

29. A science teacher has arranged a few test tubes as :



Which of the following statements is incorrect about the given experimental set-up?

- A. Turmeric solution turns red in test tubes 1 and 3.
 B. China rose indicator turns green in test tubes 2 and 4.
 C. Methyl orange turns yellow in test tubes 1 and 3.
 D. Phenolphthalein remains colourless in test tubes 2 and 4.
30. Four experimental set-ups are shown in the given figure.



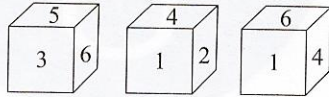
LOGICAL REASONING

1. Find the odd one out.



2. Three positions of a dice are shown. When 3 is at the bottom, which number will be on the top?

- A. 4
B. 2
C. 5
D. 6



3. All the letters which occur at odd places in the word EXCITEMENT are placed at odd places such as first letter is placed at third place, third letter at fifth place and so on. Similarly, the letters at even places are placed. Last two letters i.e., letter at odd place is placed at first place and letter at even place is placed at second place. Now, which of the following letters will be seventh from the right end in the new arrangement?

- A. T B. E C. X D. M

4. Which of the following figures will complete the pattern given in Fig. (X)?

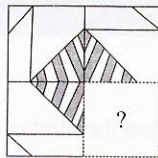
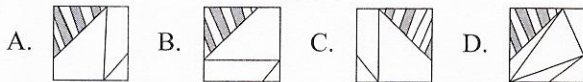


Fig. (X)



5. If P \$ Q means P is the father of Q, P # Q means P is the mother of Q and P * Q means P is the sister of Q, then N # L \$ P * Q shows Q is _____ of N.

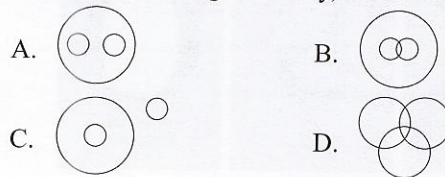
- A. Nephew B. Grandson
C. Granddaughter D. Data inadequate

6. Find the water image of given combination of letters/numbers/symbols.

N56#38AB\$&

- A. N2Q#38VB2\$ B. 32BA8E#d2N
C. N2Q#38AB2\$ D. N26#38VB\$&

7. Which of the following Venn diagrams best depicts the relationship amongst, "Paddy, Wheat and Rabi-Crop"?

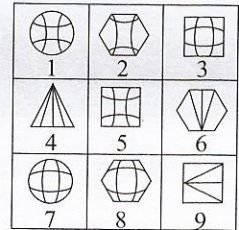


8. Which of the following indicates similar relationship as 'NORMAL' has with 'LMPOCN'?

- A. RESCUE : PCQAWG B. BRANCH : DTCLAF
C. NATION : LYRGMK D. FRIEND : DPGGPF

9. Group the given figures into three classes on the basis of their identical properties using each figure only once.

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



10. Two rows of numbers are given. The resultant number in each row is to be worked out separately based on the following rules and the question below the rows of numbers is to be answered. The operations on numbers progress from left to right.

Rules:

- (i) If an odd number is followed by a two digit even number, then they are to be added.
- (ii) If an odd number is followed by a two digit odd number, then the first number is to be subtracted from the second number.
- (iii) If an even number is followed by a number which is a perfect square of a number, then the second number is to be divided by the first number.
- (iv) If an even number is followed by a two digit even number, then the first number is to be multiplied by the second number.

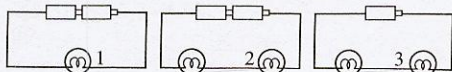
4	12	144
7	18	45

What is the product of the resultant numbers of both the rows?

- A. 60 B. 80 C. 40 D. 90

SCIENCE

11. The given diagrams show three different circuits. In each circuit, similar batteries and bulbs of the same wattage are used. When the electric circuits are connected, all the bulbs light up.



Which of the following options is true about the bulbs 1, 2 and 3?

	Bright	Brighter	Brightest
A.	1	2	3
B.	3	2	1
C.	2	3	1
D.	2	1	3

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8th Std.

ANSWER KEY

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

NSO-SOF NATIONAL SCIENCE OLYMPIAD 2017-18
CLASS-8 / SET-B / LEVEL - SOLUTIONS

1. Difficulty : Medium

Topics :

Logical Reasoning.

Triangles are not shaded vertically opposite in A, B, D not in (C).

2. Difficulty : Medium

Topics :

Logical Reasoning,

Because 6 is adjacent to 3 and 1 is adjacent to 4. So, 3 and 4 are opposite to each others.

3. Difficulty : Medium

Topics :

Logical Reasoning,

EXC I T EME|NT

N T E X C I T E| M E \rightarrow (X), 7 from right and when last 2 digits not re-ordered
1 2 3 4 5 6 7 8 9 10

4. Difficulty : Medium

Topics :

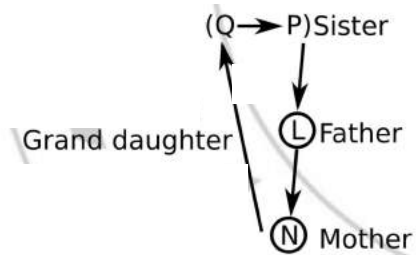
Logical Reasoning

- (A) Strips will be in right
- (B) Line diagonal are parallel
- (C) Lines adjacent one

5. Difficulty : Medium

Topics :

Logical Reasoning,



6. Difficulty : Medium

Topics :

Logical Reasoning,

Water image taken with mirror as x axis.

7. Difficulty : Medium

Topics :

Logical Reasoning,

Wheat and Paddy are difference from each other but wheat is a rabi crop.

8. Difficulty : Medium

Topics :

Logical Reasoning,

Last 3 letters → differ on 2 letter in forward direction
First 3 letters → differ on 2 letter in backward direction

9. Difficulty : Medium

Topics :

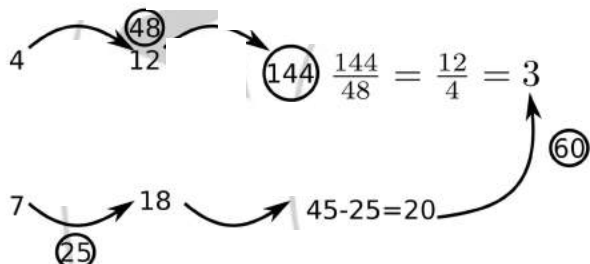
Logical Reasoning,

Similar classes inside the figure of (1, 2, 5) (3, 7, 8) (4, 6, 9).

10. Difficulty : Easy

Topics :

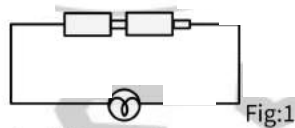
Logical Reasoning,



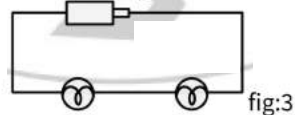
11. Difficulty : Medium

Topics :

Science,



Two cell in series are used to light a single bulb so it will be Brightest.



One cell is used to light two bulbs so the bulbs, will not glow to its full power. So it will be Bright.

12. Difficulty : Medium

Topics :

Science,

Blood in the blood vessels of the deep-sea fish flows at high pressure because in deep sea the water pressure is very high. [Concept of biology]. As the fishes are brought to surface the water pressure reduces and hence the blood vessels burst.

13. Difficulty : Medium

Topics :

Science,

Sensible heat is used to increase/decrease the temperature of matter while, latent heat is used to phase transformation.

$P \rightarrow Q \Rightarrow$ sensible heat (temperature increases)

$Q \rightarrow R \Rightarrow$ Latent heat (water to vapour)

$R \rightarrow S \Rightarrow$ Sensible heat (temperature decreases)

14. Difficulty : Medium

Topics :

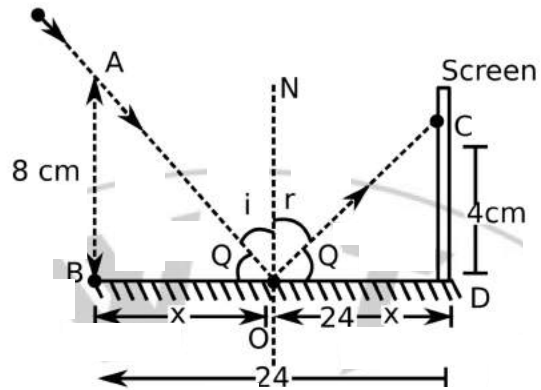
Science.

Same pitch means frequency of the vibrating body is same. and velocity is also same.

15. Difficulty : Medium

Topics :

Science,



For plane mirror

$\angle i = \angle r$ [angle of incidence = angle of reflection]

In $\triangle ABO$;

$$\tan \theta = \frac{8}{x} \dots\dots\dots(1)$$

In $\triangle CDO$

$$\tan \theta = \frac{4}{(24 - x)} \dots\dots\dots(2)$$

but (1) = (2)

$$\frac{8}{x} = \frac{4}{(24 - x)}$$

$$2(24) - 2x = x$$

$$3x = 48$$

$$x = \frac{48}{3}$$

$$x = 16 \text{ cm}$$

16. Difficulty : Medium

Topics :

Science,

Discipation of ions.

17. Difficulty : Medium

Topics :

Science,

$$\text{During 0-10 seconds; Speed} = \frac{5 - 0}{10 - 0} = 0.5 \text{ ms}^{-1}$$

$$10-20 \text{ Seconds; Speed} = \frac{20 - 10}{10 - 7} = \frac{2}{3} = 0.2 \text{ ms}^{-1}$$

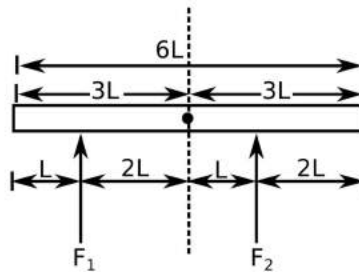
$$20-30 \text{ Seconds; Speed} = \frac{30 - 20}{10 - 7} = \frac{3}{10} = 0.3 \text{ ms}^{-1}$$

$$30-40 \text{ seconds; Speed} = \frac{40 - 30}{10 - 7} = \frac{3}{10} = 0.3 \text{ ms}^{-1}$$

18. Difficulty : Medium

Topics :

Science,



$$\therefore F_1 \times 2L = F_2 \times L$$
$$\frac{F_1}{F_2} = \frac{1}{2}$$

19. Difficulty : Medium

Topics :

Science,

Meteorological data

20. Difficulty : Medium

Topics :

Science,

(ii), (iii) and (iv) only

21. Difficulty : Medium

Topics :

Science,

Positive charge will attract all the negative charge.

22. Difficulty : Medium

Topics :

Science,

Since different surface has different roughness so the magnitude of friction will be different. **More distance travelled on lesser rough surface.**

23. Difficulty : Medium

Topics :

Science,

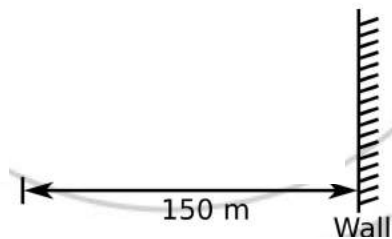
Electrons flows from -ve terminal to +ve terminal.

24. Difficulty : Medium

Topics :

Science,

Student claps



$$\text{So, } v = \frac{d}{t}; \quad t = \frac{d}{v}$$
$$t = \frac{(150 + 150)}{v}$$
$$t = \frac{300}{v}$$

25. Difficulty : Medium

Topics :

Science,

- (1) ROHINI \rightarrow 1st Rohini ($RS - 1$) \rightarrow 18th July 1985
- (2) APPLE \rightarrow 19th June 1981
- (3) EDUSAT \rightarrow also called ' $GSAT - 3'$ ' \rightarrow 20th Sept 2004
- (4) INSAT 4B \rightarrow 12th March 2007

26. Difficulty : Medium

Topics :

Science,

- (i) Na and K can float on water.
- (ii) Au and Ag are malleable and ductile
- (iii) Ag is the best conductors
- (iv) Hg is a poor conductor.

27. Difficulty : Medium

Topics :

Science,

None of the options are correct as - Solution X + Phenolphthalein - Colourless, only in case that if X is a acid (or) neutral (or) weak base.

In optio (A), X is a weak base and Y is an acid which results in the acidic solution.

Both (B) and (C) are acidic solution as Y is weak base and neutral in option (B) and (C) respectively.

28. Difficulty : Medium

Topics :

Science,

'X' can be coke, as it is the residue left behind destructive distillation of coal

'Y' is coal gas, as coal gas is a mixture of hydrogen, Methane, Carbon monoxide and same other gases.

'Z' can be coal tar as it contains several carbon compounds which used to make explosive and perfumes.

29. Difficulty : Medium

Topics :

Science,

Statements (A), (C) and (D) are correct.

In statement (B), test tubes 2 and 4 contains acidic solution which turns Red-bwawn in presence of china rose while base turns green.

30. Difficulty : Medium

Topics :

Science,

On the basis of metal reactivity series, reaction will not take place in I and II flask.

31. Difficulty : Medium

Topics :

Science,

As burning of LPG is a chemical change, rusting of iron is a slow process and evaporation of water is a physical change. So Venn diagram is correct for option (C).

32. Difficulty : Medium

Topics :

Science,

On the basis of physical properties and used : -

X can be = Acrylic

Y can be = Polyester

Z can be = Nylon

W can be = Rayon

So, option (A) is correct.

33. Difficulty : Medium

Topics :

Science,

Statements (II), (III) and (IV) are correct. But statement (I) is incorrect as yellow flame has low temperature so its not ideal for heating.

34. Difficulty : Medium

Topics :

**Cell: The Unit of Life ,
Science,**

(i) Synthesising proteins from Amino acids - Ribosomes (P)

(ii) Synthesising lipids - Smooth Endoplasmic Reticulum (SET) (S)

(iii) Packaging of materials synthesised in cell - Golgi Apparatus (Q)

(iv) Secreting digestive enzymes - Lysosomes (R)

35. Difficulty : Medium

Topics :

Science,

It is a natural fibres \xrightarrow{NO} P - Artificial fibres eg. Nylon

$\downarrow NO$

It is obtained from plants \xrightarrow{Yes} Q - Cellulosic fibres cotton Jute

$\downarrow NO$

It is obtained from animals \xrightarrow{NO} R - Geological fibres

\downarrow

The source of organism is harmed in fibre obtaining process \xrightarrow{Yes} S - Wool

$\downarrow Yes$

T - Silk

S - Wool obtained from sheep which is a viviparous animal.

T - Silk. As the process to obtain it requires killing of cocoon and pupa. The silk - insect shows egg, larvae, pupa (cocoon) and adult as 4 stage in its life cycle.

36. Difficulty : Medium

Topics :

Science,

Topic : Nutrition in Animals

As the digestion of X takes place in mouth and small intestine, it is Starch.

As the digestion of Y takes place in stomach as well as small intestine, its protein or fat.

(B) is incorrect as pancreas secrete digestive enzyme for digestion of starch, proteins and fats.

37. Difficulty : Medium

Topics :

HUMAN REPRODUCTION.

Science,

P is ovary,

Q is fallopian tube

R is Uterus

S - Cervix / vagina

(iii) and (iv) are correct.

(i) and (ii) are incorrect, as removed of ovaries leads to no formation of eggs and uterus is not a very small organ in a female.

38. Difficulty : Medium

Topics :

Science,

Topic : Circulation

X is vein (Vena cava)

Y is artery (Aorta)

Z is Capillary

A is incorrect as absence of Z (Capillary) will affect the nutrient uptake as well as elimination of waste by the body.

C is incorrect as vena cava carries deoxygenated blood from body parts to the right atrium of heart.

D is incorrect as, through X (veins), medicines reach the heart from where they are pumped all over the body.

39. Difficulty : Medium

Topics :

Science,

Topic : Crop Production and Management

(i), (ii) and (v) are correct.

(iii) is incorrect as leguminous crops can be grouped in combination with cereals.

(iv) is incorrect as manures do not provide specific nutrient to the soil.

40. Difficulty : Easy

Topics :

**Cell: The Unit of Life ,
Science.**

(i) Viscous fluid in the nucleus is nucleoplasm.

(ii) Mitochondria are rod shaped structure which provides energy.

(iii) Chloroplast contains green pigment chlorophyll.

(iv) Ribosomes take part in protein synthesis.

41. Difficulty : Easy

Topics :

Science,

Topic : Ecology

(v) is incorrect as N serves as primary consumer only.

42. Difficulty : Medium

Topics :

Science,

Topic : Reproduction

Dispersion by wind (P) - Hiptage, Acer, Dandelion

Dispersion by water - Coconut, lotus

Dispersion by animals - Xanthium, urena, guava

Dispersion by explosion - Balsam pea

43. Difficulty : Medium

Topics :

Science,

Cholera caused by *Vibrio cholerae* and typhoid by *Salmonella typhi* is spread by contamination of water.

44. Difficulty : Difficult

Topics :

Science,

Topic : Ecology

Dodo is an extinct animal. Indian rhinoceros is an endangered animal. Sloth bear is a vulnerable animal. Blue whale is a critically endangered animal.

45. Difficulty : Medium

Topics :

Science,

Pongal - South Indian harvest festival.

Baisakhi - North Indian harvest festival.

Nabanna - Bengali harvest festival.

46. Difficulty : Easy

Topics :

Science,

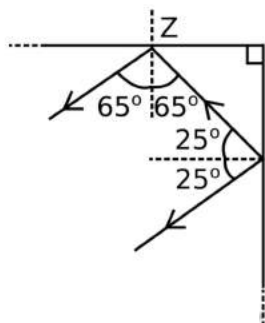
$$\angle i = \angle r$$

\therefore Probably it passes through Q.

47. Difficulty : Easy

Topics :

Science,



Via ray tracing and geometry we can find angle is 65°

48. Difficulty : Medium

Topics :

Science,

Statement (I) is incorrect as substance U should have lowest boiling point. On the basis of this as compare to given options only (B) can be a correct option.

49. Difficulty : Medium

Topics :

Science,

Topic : Microbial World

R is Euglena, but it posses flagella that helps in movement, but not cilia.

50. Difficulty : Medium

Topics :

Science,

Topic : Life processes

(ii) is incorrect as Y is normal and X is hyperglycemic.

(iii) is incorrect as lowering of blood glucose is brought about by utilization of glucose in respiration and its conversion into glycogen.