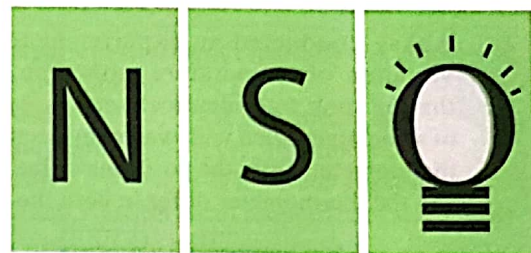


CLASS
7

LEVEL
2



**SOF NATIONAL SCIENCE
OLYMPIAD 2019-20**

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, Section, 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. In the school code column in the OMR Sheet, please fill in code allocated to your school and not the exam center code.
4. The Question Paper comprises two sections : **Science Section** (45 Questions) and **Achievers Section** (5 Questions).
Each question in Achievers Section carries 3 marks, whereas all other questions carry one mark each.
5. All questions are compulsory. There is no negative marking. Use of calculator / smart phone is not permitted.
6. There is only ONE correct answer. Choose only ONE option for an answer.
7. To mark your choice of answers by darkening the circles on the OMR Sheet, use **HB Pencil** or **Blue / Black ball point pen** only. E.g.

Q.16: In the water cycle, condensation is the process of

- A. Water vapour cooling down and turning into a liquid
- B. Ice warming up and turning into a liquid
- C. Liquid cooling down and turning into ice
- D. Liquid warming up and turning into water vapour

As the correct answer is option A, you must darken the circle corresponding to option A on the OMR Sheet.

16. ● (B) (C) (D)

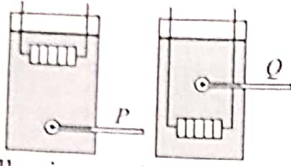
8. Rough work should be done in the blank space provided in this booklet.
9. Please fill in your personal details in the space provided on this page before attempting the paper.
10. **RETURN THE OMR SHEET AND QUESTION PAPER TO THE INVIGILATOR AT THE END OF THE EXAM.**



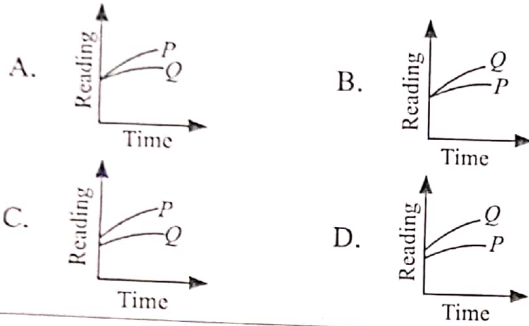
Name:.....

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

1. Abhay conducted an experiment to observe the variation of temperature with time in water. For that he took two identical set-ups each consisting of a container filled with water, an electric heater and a thermometer. Only the positions of the electric heater and the thermometer differ in both the set-ups.

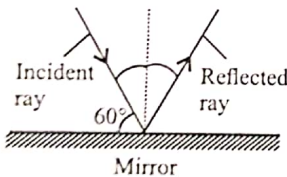


Which of the following graphs represents the approximate variations of the readings of the thermometers, P and Q with time?



2. Which of the following statements are correct?
- A nanosecond is one billionth part of a second.
 - The area under the speed-time graph on time axis is the distance.
 - Heat is exchanged between two bodies if they have different amount of heat but have same temperature.
 - In an electrical circuit, overloading occurs when a live wire is open to air.
 - When a light wave and a sound wave travel from air into water, their speeds are decreased.
- A. (i) and (ii) only B. (i), (ii) and (iii) only
C. (ii), (iii) and (iv) only D. (iii), (iv) and (v) only

3. The diagram shows a ray of light reflected at a plane mirror. Which pair of the angle of incidence and angle of reflection is correct?



	Angle of incidence	Angle of reflection
A.	30°	30°
B.	30°	60°
C.	60°	30°
D.	60°	60°

4. A sphere, a cylinder and a thin rectangular plate, all made up of same material and same mass are heated to same high temperature, then

- A. Cylinder will cool fastest
B. Sphere will cool fastest

- C. Rectangular plate will cool fastest
D. All the three will cool at the same rate.

5. When current is passed through a conductor, the heat produced in it depends upon

- I. The material of the conductor
II. The current flowing through the conductor
III. The time for which the current flows.

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

6. Which of the following is the first sign of an approaching cyclone?

- A. Rain accompanied by lightning
B. Powerful water waves
C. Cool breeze and rain
D. None of these

7. Which of the following statements is not correct in case of an electric fuse?

- A. It is a safety device which prevents damages to electrical circuits and possible fires.
B. Its working is based on the principle of heating effect of electric current.
C. If a proper fuse is inserted in a circuit it will blow off if current exceeds the safe limit.
D. None of these.

8. The angle of incidence for a ray of light passing through the centre of curvature of a concave mirror is

- A. 45° B. 90°
C. 0° D. 180°

9. Robin carried out an experiment and recorded his findings in the table shown here.

Number of batteries	Observation
0	Bulb does not glow.
1	Bulb does not glow.
2	Bulb glows.
3	Bulb glows more brightly.
4	Bulb glows brightest.
5	Bulb does not glow.

Based on the given table, which of the following best explains the observation noted with five batteries?

- A. Heat produced in the bulb was minimum.
B. The bulb turned faulty when five batteries were used.
C. The batteries had reached their maximum voltage.
D. There was not enough voltage in the battery.

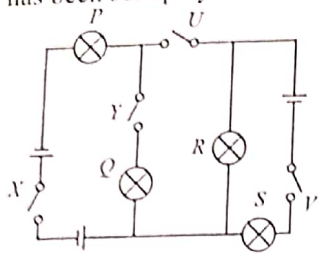
10. The details of a 10 hour journey of a bus is given here.

Duration	Distance covered
0 - 2 hours	140 km
2 - 6 hours	x
6 - 10 hours	240 km

Given that average speed of the car is 60 km h^{-1} , what is the value of x ?

- A. 220 km B. 200 km
C. 240 km D. 380 km

11. The circuit has been set up by Advi.



Which of the following pairs of switches has to be closed in order to attain the brightest light?

- A. X and Y B. U and V
C. Y and U D. X and V

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

Column I	Column II
P. 1 solar day	(i) 1000 nanosecond
Q. 1 microsecond	(ii) 36500 days
R. 1 millenium	(iii) 8760 hours
S. 1 century	(iv) 1440 minutes
T. 1 year	(v) 1000 years
A. P - (i), Q - (iv), R - (v), S - (iii), T - (ii)	
B. P - (i), Q - (iii), R - (ii), S - (v), T - (iv)	
C. P - (iv), Q - (i), R - (v), S - (ii), T - (iii)	
D. P - (iv), Q - (ii), R - (iii), S - (v), T - (i)	

13. A child is standing in front of a magic mirror. She finds the image of her head is of the same size, the middle portion of her body is bigger and that of the legs is smaller. The correct order of combinations for the magic mirror from the top to bottom is

- A. Plane, concave and convex
B. Convex, concave and plane
C. Concave, plane and convex
D. Plane, convex and concave.

14. A few substances are listed in the box.

(i) Window cleaner (ii) Washing soda (iii) Vinegar
(iv) Milk of magnesia (v) Soda water (vi) Sugar solution
(vii) Soap water

Which of the following statements are correct regarding these substances?

- I. Solutions (i), (ii), (iv) and (vii) change the colour of methyl orange indicator to red.
II. Solutions (ii), (iii) and (v) show no change in colour with phenolphthalein indicator.
III. Solutions (vi) and (vii) show no change in colour of blue litmus solution.
IV. China rose indicator turns magenta in solutions (iii) and (v).

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

15. Select the correct statement regarding the properties/processes listed here.

- I. Elasticity II. Corrosion
III. Boiling point IV. Combustion
V. Density VI. Neutralisation
A. I, III and V are physical properties of substances.
B. II, IV and VI are chemical changes.
C. IV and VI are exothermic changes.
D. All of these

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

Column I	Column II
P. Quick lime	(i) Sodium hydroxide
Q. Caustic soda	(ii) Magnesium hydroxide
R. Washing soda	(iii) Calcium oxide
S. Milk of magnesia	(iv) Sodium carbonate decahydrate
A. P - (iii), Q - (iv), R - (i), S - (ii)	
B. P - (ii), Q - (iv), R - (iii), S - (i)	
C. P - (iii), Q - (i), R - (iv), S - (ii)	
D. P - (i), Q - (iv), R - (ii), S - (iii)	

17. Ms Rachna, a science teacher demonstrated the following activities in science lab :

- I. Decomposition of sodium nitrate
II. Addition of water to quick lime
III. Addition of 10 mL of sodium hydroxide to 10 mL of hydrochloric acid of equal strength.
IV. Decomposition of copper carbonate

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

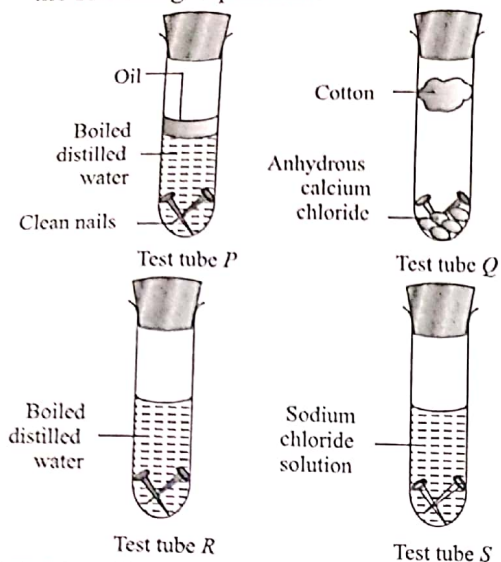
A gas which turns lime water milky is evolved in activity (i), heat is evolved in activities (ii) and absorbed in activities (iii). A gas which supports combustion is evolved in activity (iv).

	(i)	(ii)	(iii)	(iv)
A.	I	III, IV	II, III	IV
B.	IV	II, III	I, IV	I
C.	IV	I, III	II, IV	I
D.	III	I, II	II, IV	IV

18. Which of the following statements is/are incorrect?

- I. Oxalic acid is used in the manufacture of washing soda.
II. Tartaric acid is a weak acid.
III. Potassium hydroxide is used for making liquid soaps.
IV. Antacids contain aluminium or magnesium hydroxides.
V. New substance formed as a result of reaction between an acidic substance and a basic substance is always a neutral salt.
A. II and III only B. I and V only
C. IV only D. I, II and III only

19. To investigate the conditions for rusting, Neha performed the following experiment :



Which of the following statements is correct regarding this experiment?

- Iron nails rust heavily in test tube *P* as distilled water increases the process of rusting.
- Iron nails do not rust in test tubes *Q* and *R* as air is not present in both the test tubes.
- Iron nails rust heavily in test tube *S* as sodium chloride increases the rate of rusting.
- None of these

20. Which of the following options represents the compounds in increasing order of their pH values?

- Copper sulphate, sodium carbonate, zinc sulphate
- Ammonium nitrate, ammonium carbonate, potassium carbonate
- Sodium carbonate, zinc sulphate, ammonium chloride
- All of these

21. Class 7 students conducted the following experiments :

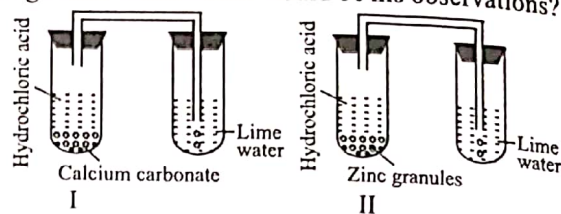
- Shristi added potassium hydroxide solution to hydrochloric acid.
- Sohail added zinc powder to copper sulphate solution.
- Raina made pure crystals of copper sulphate from the impure sample of copper sulphate.

Select the correct statement regarding these experiments.

- Chemical change takes place in experiments II and III.
- Physical change takes place in experiments I and III.
- Physical change takes place in experiment III and chemical change takes place in experiments I and II.
- Chemical change takes place in experiments I, II and III.

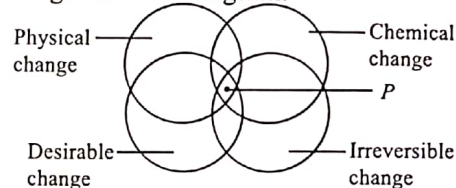
22. Kanav took two test tubes marked as I and II. In test tube I, he put calcium carbonate and hydrochloric acid while in test tube II, he put zinc granules and hydrochloric acid. He passed the gas coming out from both the test tubes

through lime water. What would be his observations?



- The gas coming out from test tube I turned lime water milky.
- The gas coming out from test tube II turned lime water milky.
- The gases coming out from both the test tubes turned lime water milky.
- None of these

23. Study the given Venn diagram.



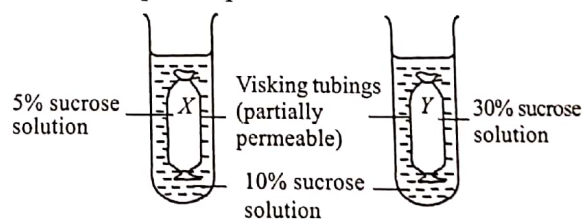
Centre point *P* represents

- Burning of kerosene in kerosene wick stove
- Burning of LPG in LPG stove in kitchen
- Burning of a candle
- All of these.

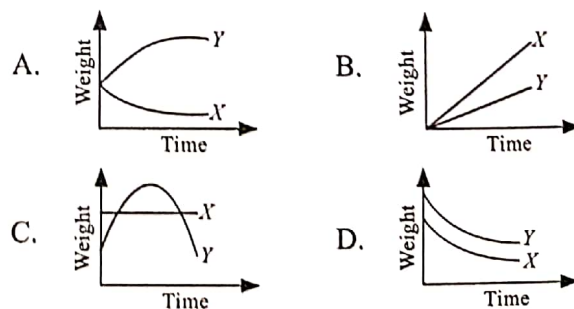
24. Select the correct statement(s).

- Nitrogen gas turns lime water milky.
 - Photosynthesis is an irreversible chemical change.
 - Carbon dioxide gas is released when calcium carbonate is heated, while carbon monoxide is released when calcium carbonate is mixed with sulphuric acid.
 - If a piece of copper wire is dipped in silver nitrate solution it gets coated with silver.
- I and III only
 - II only
 - II and IV only
 - IV only

25. Anita set up an experiment as shown below.



Which of the following graphs correctly represents the changes in weights of Visking tubings *X* and *Y* with time?



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

Column I (Water harvesting structures)	Column II (States)
(a) <i>Khadin</i>	(i) Himachal Pradesh
(b) <i>Kuhl</i>	(ii) Madhya Pradesh
(c) <i>Bandharas</i>	(iii) Rajasthan
(d) <i>Bundhis</i>	(iv) Maharashtra

A. (a) - (ii), (b) - (iii), (c) - (iv), (d) - (i)
 B. (a) - (i), (b) - (iv), (c) - (iii), (d) - (ii)
 C. (a) - (iii), (b) - (i), (c) - (iv), (d) - (ii)
 D. (a) - (iv), (b) - (ii), (c) - (i), (d) - (iii)

27. Read the given paragraph where some of the words have been italicised and select the incorrect option regarding them.

Wool is a natural and *non-biodegradable* animal fibre. The wool used for production of pashmina shawl is *Angora* wool. *Carding* is the process in which fleece is removed from the body of an animal. Fleece is then thoroughly washed to remove the dust and dirt. This process is called *scouring*. Then the hair of different textures are sorted and burrs are removed from them. The clean wool fibres are then passed through rollers whose teeth untangle the fibres and this process is called *reeling*.

- A. *Non-biodegradable* should be replaced with *biodegradable*.
 B. *Carding* should be replaced with *shearing*.
 C. *Angora* should be replaced with *Cashmere*.
 D. The positions of *scouring* and *reeling* should be interchanged.

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

Methods of reproduction	Examples
Budding	<i>L</i>
Spore formation	<i>M</i>
Fragmentation	<i>N</i>
Vegetative propagation	<i>O</i>

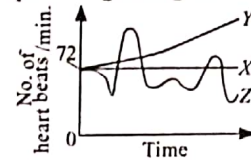
L *M* *N* *O*

- A. *Spirogyra* *Dahlia* Mushroom *Begonia*
 B. *Hydra* *Rhizopus* *Spirogyra* *Chrysanthemum*
 C. *Spirogyra* *Rhizopus* *Bryophyllum* *Dahlia*
 D. *Asparagus* Yeast *Spirogyra* *Rhizopus*

29. Most crops require a lot of nitrogen to synthesise the proteins. The bacterium *Rhizobium* helps some of the crops to get nitrogen. Which of the following statements is incorrect for *Rhizobium*?

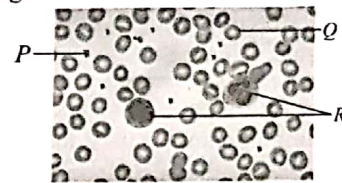
- A. It converts atmospheric nitrogen into a soluble form that the plants can absorb from soil.
 B. It can make its own food.
 C. It lives in the root nodules of leguminous plants like gram, pea, moong, etc.
 D. Leguminous plants provide food and shelter to *Rhizobium*.

30. The given graph shows heart rates of three persons X, Y and Z under different conditions over time. Select the correct option regarding it.



- A. Person X is a dead person whereas persons Y and Z are suffering from different heart diseases.
 B. Person X is sleeping, person Y is exercising whereas person Z is having irregular heartbeat due to some heart dysfunction.
 C. Person X is going through a heart attack whereas person Z has healthy heart showing changes in heart rates while walking.
 D. None of these

31. Refer to the given figure showing different types of blood cells in humans and select the incorrect option regarding them.



- A. Q lacks nucleus and is responsible for gaseous transport within human body.
 B. Average lifespan of R is about 120 days and their total count decreases in a person suffering from anaemia.
 C. R count increases in certain bacterial infections.
 D. P plays an important role in stopping excess blood loss from a wound on the body.

32. In an experiment related to the rate of percolation of water in a soil sample, Sahil found out that it took 20 minutes for 100 mL of water to percolate through the soil sample. What is the rate of percolation of the soil sample?

- A. 10 mL min⁻¹ B. 5 mL min⁻¹
 C. 20 mL min⁻¹ D. 30 mL min⁻¹

33. Read the given passage with a mistake and select the option that corrects it.

During the process of breathing in (inhalation), the diaphragm muscles contract and thus diaphragm becomes flat. At the same time, external intercostal muscles contract to pull the ribs downwards. This increases the volume of the chest cavity. Subsequently, the volume of lungs increases. As the air pressure in the lungs decreases, air moves into the lungs through the air passage.

- A. The diaphragm muscles relax and thus diaphragm becomes flat.
 B. At the same time, external intercostal muscles contract to pull the ribs upwards.
 C. As the air pressure in the lungs increases, air moves into the lungs through the air passage.
 D. Both A and B

Direction (Q. No. 34 and 35) : Refer to the given table showing comparison between photosynthesis and respiration and answer the following questions.

		Photosynthesis	Respiration
(a)	Food	(i)	(ii)
(b)	Carbon dioxide	Taken in	Given out
(c)	Oxygen	Given out	Taken in
(d)	Energy	(iii)	(iv)

34. What will come at the places marked (i) and (ii) respectively?

- A. Oxidised, synthesised
- B. Oxidised, reduced
- C. Synthesised, oxidised
- D. Reduced, oxidised

35. What will come at the places marked (iii) and (iv) respectively?

- A. Converted, converted
- B. Released, converted
- C. Stored, stored
- D. Converted, released

36. Which of the following statements is/are correct?

- (i) The hump of camel is used for storing water.
- (ii) Red-eyed frog has developed sticky pads on its feet to help it climb trees.
- (iii) The large beak of toucan helps it to reach the fruits and nuts which are not accessible to other animals.
- (iv) Large and wide paws of polar bear help it to walk easily on snow.

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

37. In which of the following groups of animals, the excretory product is uric acid?

- A. Fish, monkey and crocodile
- B. Shark, lizard and birds
- C. Lizard, cockroach and birds
- D. Monkey, cow and turtle

38. Read the following statements regarding wastewater treatment plant. Select the option that correctly completes any two statements.

- (i) _____ remove large solid materials from the wastewater and allow it to go into an _____.
- (ii) The solid waste called _____ sinks slowly at the bottom and is continuously removed by _____.
- (iii) The clarified water is passed into _____ which contains aerobic bacteria.
- (iv) The suspended microbes settle down at the bottom as _____ and _____ is used as manure.

- A. (i) - Bar screens, Aeration tank; (ii) Sludge, Skimmer
- B. (ii) - Sludge, Scrapers; (iii) Aeration tank

- C. (iii) - Grit and sand removal tank; (iv) - Dried sludge, Activated sludge
- D. (i) - Bar screens, Aeration tank; (iv) - Activated sludge, Dried sludge

39. A thick outer ring is removed from the trunk of a tree as shown in the given figure. Which of the following is likely to be observed after several days?



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

40. Nikita took a twig of *Petunia* plant and dipped it in a beaker containing dissolved coloured dye safranin. She left it for 1-2 hours. Then she prepared a section of this twig and observed it under the microscope. Which of the following is correctly representing the T.S. of stem? (Note: The dark area is the place where the red colour is present.)

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

41. Read the given paragraph and select the option that correctly fills the blanks in it.

The female silk (i) lays egg which hatches into a tiny caterpillar. It feeds on (ii) and grows. When it is ready to enter the next stage in its life cycle, it first weaves a net to hold itself by secreting a proteinaceous fibre which (iii) on exposure to air. This is the silk fibre. The silkworm covers itself completely with this fibre to form a (iv). At this stage, the larva is called a (v).

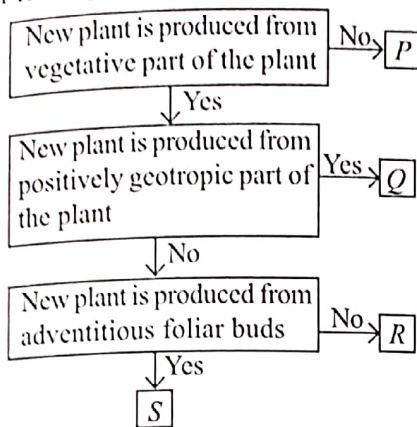
- | | (i) | (ii) | (iii) | (iv) | (v) |
|----|-------|--------|---------|--------|--------|
| A. | Moth | Seeds | Hardens | Pupa | Cocoon |
| B. | Larva | Leaves | Softens | Pupa | Cocoon |
| C. | Moth | Leaves | Hardens | Cocoon | Pupa |
| D. | Moth | Stem | Softens | Cocoon | Pupa |

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

- | Column I | Column II |
|--------------------|------------------------------------|
| (a) Emergent layer | (i) Decomposition takes place here |
| (b) Canopy | (ii) Thickest layer |
| (c) Understorey | (iii) The layer is hot and humid |
| (d) Forest floor | (iv) Trees get lot of sunlight. |

- A. (a) - (i), (b) - (iii), (c) - (iv), (d) - (ii)
 B. (a) - (iii), (b) - (iv), (c) - (i), (d) - (ii)
 C. (a) - (iv), (b) - (ii), (c) - (iii), (d) - (i)
 D. (a) - (ii), (b) - (iii), (c) - (iv), (d) - (i)

43. Refer to the given flow chart.



Select the correct option regarding P - S.

- A. Q could be *Dahlia* and sweet potato whereas S could be turmeric and ginger.
 B. P could be *maize* whereas R could be *Bryophyllum*.
 C. Q could be carrot whereas R could be *Eichhornia*.
 D. P could be papaya whereas S could be onion.

44. In the given table, identify the correct matches of name of breed of sheep, quality of wool and state where the breed is found.

	Name of breed of sheep	Quality of wool	State where found
(i)	Lohi	Good quality wool	Rajasthan, Punjab
(ii)	Rampur Bushair	For woollen shawls	Jammu and Kashmir
(iii)	Patanwadi	Coarse wool	Uttar Pradesh, Himachal Pradesh
(iv)	Nali	Carpet wool	Rajasthan, Haryana

- A. (i) and (ii) only B. (i) and (iv) only
 C. (ii) and (iii) only D. (iii) and (iv) only
45. The breaking of rocks into smaller pieces over thousands of years is called weathering. What are the agents that cause weathering of rocks?
 A. Wind and water
 B. Extreme temperatures
 C. Living things
 D. All of these

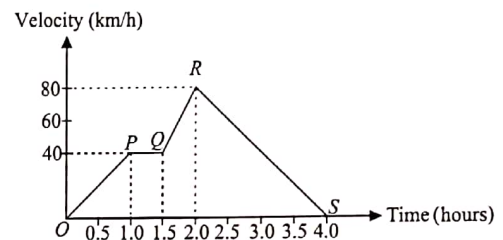
ACHIEVERS SECTION

46. Study the given table and fill in the blanks by selecting an appropriate option.

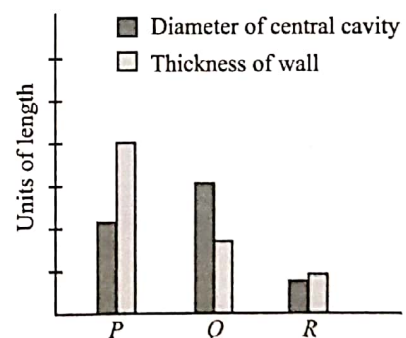
Salt	Parent acid	Uses
(i)	Nitric acid	In fertilisers and explosives
Baking soda	(ii)	Used in medicines and baking
Potash alum	(iii)	Purification of water
(iv)	Nitric acid	Developing photographic films

- | | (i) | (ii) | (iii) | (iv) |
|----|------------------|-------------------|-------------------|------------------|
| A. | Silver nitrate | Carbonic acid | Hydrochloric acid | Ammonium nitrate |
| B. | Sodium nitrate | Hydrochloric acid | Carbonic acid | Silver nitrate |
| C. | Potash alum | Sulphuric acid | Nitric acid | Sodium nitrate |
| D. | Ammonium nitrate | Carbonic acid | Sulphuric acid | Silver nitrate |

47. A truck travels on a straight road from one place to another in 4.0 hours. Its velocity-time graph during this motion is shown in the figure. The maximum acceleration during this journey is _____.



- A. 140 km/h^2 B. 80 km/h^2
 C. 60 km/h^2 D. 160 km/h^2
48. The given graph shows measurements of different types of blood vessels P, Q and R. Select the incorrect statement regarding these vessels.

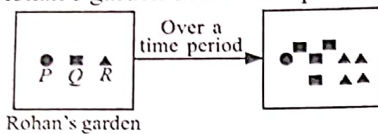


- A. Blood vessels of type P have valves.
 B. Blood vessels of type Q distribute blood from the heart to different parts of the body.
 C. R represents a capillary which forms an artery and it has thick walls.
 D. All of these

49. Refer to the given figure illustrating different types of pollination in plants.



Rohan planted three different types of plants (*P*, *Q* and *R*) in his garden whose seeds are dispersed by explosive mechanism. The given figure shows distribution of these plants in Rohan's garden over a time period.



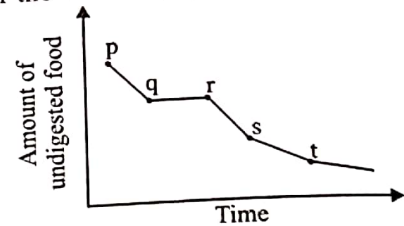
Select the correct statement regarding it.

- A. *P* undergoes process *X* only whereas *Q* and *R* undergo processes *Y* and *Z* only.
- B. *P* could be a male plant of species undergoing only process *Z* whereas *Q* and *R* plants could undergo any of the processes *X*, *Y* or *Z* depending upon the type of species.
- C. *P* is a plant undergoing only process *Y* so its population does not increase with time in the

absence of other plant of the same species in the garden.

- D. Plants *Q* and *R* are unisexual plants which can undergo only processes *X* and *Y* thereby assuring fertilisation and seed setting in absence of other plants of their species.

50. Study the given graph showing the amount of undigested food in the human digestive system over time and answer the following questions.



- (i) Which part of the digestive system does point q to point r represent?
 - (ii) Which component of food is broken from point p to point q?
- A. (i) - Stomach, (ii) - Protein
 - B. (i) - Oesophagus, (ii) - Starch
 - C. (i) - Oesophagus, (ii) - Fat
 - D. (i) - Small intestine, (ii) - Glucose

SPACE FOR ROUGH WORK



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