SOF NATIONAL SCIENCE OLYMPIAD 2019-20

CLASS 7

QUESTION PAPER SET B

DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

Total Questions: 50 | Time: 1 hr.

Name:.....

Section:..... SOF 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 and other information related to SOF exams on your mobile number.
3. The Question Paper comprises three sections:

   Logical Reasoning (10 Questions), **Science** (35 Questions) and **Achievers Section** (5 Questions)

   Each question in Achievers Section carries 3 marks, whereas all other questions carry one mark each.
4. All questions are compulsory. There is no negative marking. Use of calculator is not permitted.
5. There is only ONE correct answer. Choose only ONE option for an answer.
6. To mark your choice of answers by darkening the circles on the OMR Sheet, use **HB Pencil** or **Blue / Black ball point pen** only. E.g.

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

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

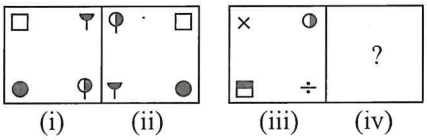
   As the correct answer is option A, you must darken the circle corresponding to option A on the OMR Sheet.

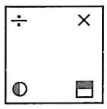
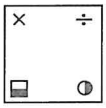
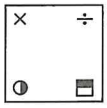
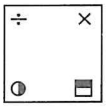
   16. ● Ⓑ Ⓒ Ⓓ
7. Rough work should be done in the blank space provided in the booklet.
8. Return the OMR Sheet to the invigilator at the end of the exam.
9. Please fill in your personal details in the space provided on this page before attempting the paper.

SCIENCE OLYMPIAD FOUNDATION

Inspiring Young Minds Through Knowledge Olympiads

1. There is a certain relationship between figures (i) and (ii). Establish the similar relationship between figures (iii) and (iv) by selecting a suitable figure from the options which will replace the (?) in figure (iv).



A. 
B. 
C. 
D. 

2. If the middle digit of the smallest number is subtracted from the middle digit of the greatest number after adding three to each of the given numbers, then which of the following numbers will be obtained?

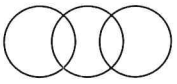
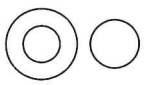
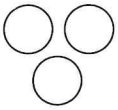
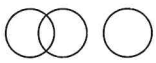
534 469 337 264 875

A. 1 B. 5
C. 2 D. None of these

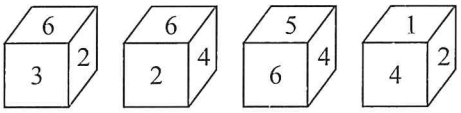
3. Find the missing number in the given number series.

A. 32 B. 60
C. 62 D. 31

4. Which of the following Venn diagrams best represents the relationship amongst, "Cars, Houses and Vehicles"?

A. 
B. 
C. 
D. 

5. Four different positions of a dice are shown below.



What is the sum of the numbers opposite to 5 and 3?

A. 7 B. 8
C. 5 D. 6

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

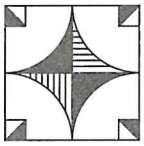
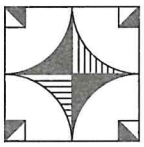
Eight friends P, Q, R, S, T, U, V and W are sitting in a circle facing the centre.

(i) P, who is sitting between V and R, is just opposite to U.
(ii) T is sitting between W and R. Also, T is second to the right of P and second to the left of U.
(iii) S is sitting second to the left of V.

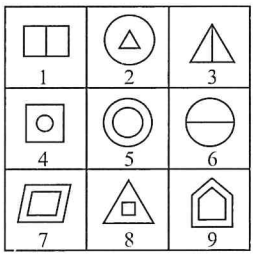
Who is sitting between W and S?

A. Q B. R
C. P D. U

7. Select the correct water image of the given figure.

A. 
B. 
C. 
D. 

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

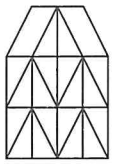


A. 1, 3, 6; 2, 4, 7; 5, 8, 9
B. 1, 3, 7; 2, 4, 8; 5, 6, 9
C. 1, 5, 7; 4, 9, 8; 2, 3, 6
D. 1, 3, 6; 2, 4, 8; 5, 7, 9

9. Abhinav started walking straight towards South. He walked a distance of 10 metres and then took a right turn and walked a distance of 20 metres. He again took a right turn and walked a distance of 45 metres. In which direction is he now from his starting point?

A. North-East B. South
C. North-West D. South-West

10. How many triangles are there in the given figure?

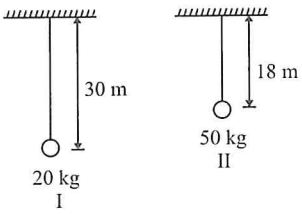


A. 28 B. 26
C. 25 D. None of these

11. A faulty laboratory thermometer gave the readings of –2°C and 98°C when inserted into melting ice and boiling water respectively, both at standard atmospheric pressure. What is the error when the same thermometer is used to measure the difference between two arbitrary temperatures?

A. –1°C B. 1°C
C. 0°C D. 2°C

12. Two pendulums of different lengths having bob of different weights are shown in diagrams. With reference to these two pendulums, identify the correct statement.



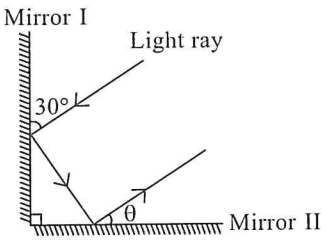
A. Pendulum I has higher time period than pendulum II.
B. Pendulum I has lower time period than pendulum II.
C. Both the pendulums have same time period.
D. Data is insufficient to compare time period.

13. Which of the following statements about cyclone is/are true?

I. Cyclones are accompanied by very strong winds.
II. The centre of cyclone is a high pressure area.
III. The diameter of eye of cyclone varies from 10 to 30 km.
IV. There is heavy rainfall in the centre of cyclone.

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

14. Two plane mirrors are placed at 90° to each other. A ray of light strikes one mirror and follows the path as shown in the figure. What is the value of angle θ?



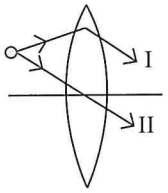
A. 20° B. 30°
C. 60° D. 50°

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

I. Mica is a bad conductor of electricity but good conductor of heat.
II. CFL stands for compact fluorescent lamp.
III. Aluminium is an alloy whose temperature can rise up to 900°C and used as heating element.

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

16. The diagram shows a point object placed at one side of a thin converging lens. What type of image will the thin converging lens produce if the rays I and II are parallel to each other?



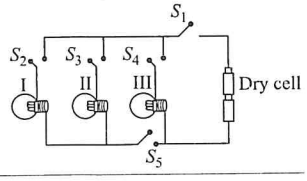
A. Virtual, diminished
B. Virtual, upright
C. Real, inverted and enlarged
D. Real, diminished

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

	Column I		Column II
(a)	Shadow of the moon	(i)	Reflection
(b)	Pinhole camera	(ii)	Solar eclipse
(c)	Full moon day	(iii)	Inverted image
(d)	Bouncing back of light	(iv)	Lunar eclipse

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

18. A circuit diagram is shown here. Which of the following switches must be closed so that only bulb I lights up?



A. S_1, S_2 and S_5 only
B. S_3 and S_4 only
C. S_2, S_3 and S_5 only
D. S_1, S_2, S_3, S_4 and S_5

19. Which of the following statements are correct?

I. Artificial magnets are made in different shapes such as horse-shoe magnet, cylindrical magnet, bar magnet etc.
II. When a bar magnet is broken then each of the broken part will have one pole.
III. In a bar magnet, magnetic attraction is more near its ends.
IV. Transparent objects allow light to pass through them partially.

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

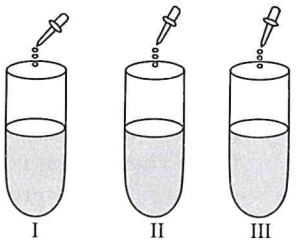
20. Read the given statements and select the correct option.

Statement 1: Convex lens can form a real and inverted image.

Statement 2: Convex lens is used as a magnifying glass.

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

21. The given figure shows the colour changes in test tubes I, II and III, when methyl orange indicator is added to them. The respective solutions in test tubes I, II and III are



A. Carbonated drink, curd, spinach juice
B. Curd, window cleaner, glucose solution
C. Lime water, lemon juice, washing soda
D. Tamarind juice, glucose solution, baking soda solution .

22. Rahul took a turmeric paper and tried to draw flowers on it with the help of cotton buds dipped in solutions *P* and *Q*. The flower drawn with solution *P* was not visible while one drawn with solution *Q* turned red.

Solutions *P* and *Q* could be respectively

A. Lime water and lemon juice
B. Vinegar and soap solution
C. Common salt solution and baking soda
D. Both B and C.

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

	Column I (Mixture)		**Column II (Separation method)**
P.	Iron nails in scrap	(i)	Sieving
Q.	Wheat grains in flour	(ii)	Separating funnel
R.	Water in kerosene oil	(iii)	Evaporation
S.	Common salt in water	(iv)	Magnetic separation
		(v)	Boiling

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

24. Some examples of changes are given below :

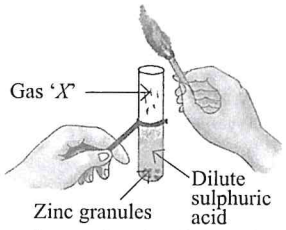
a. Sawing of wood
b. Breaking down of ozone
c. Melting of an ice cream
d. Making biogas from cowdung
e. Digestion of food
f. Baking a clay pot

Classify the above changes into

I. Irreversible physical change
II. Chemical change
III. Reversible physical change

A. I - a, f; II - b, d, e; III - c
B. I - a, b, e; II - d, f; III - c
C. I - a; II - b, d, e, f; III - c
D. I - f; II - c, e; III - a, b, d

25. Observe the given figure carefully and fill in the blanks by selecting an appropriate option.



The process shown in the figure is a/an (i) change and gas *X* is (ii) which burns with a/an (iii). The reaction involved is (iv) in nature.

	(i)	**(ii)**	**(iii)**	**(iv)**
A.	Reversible	O_2	Explosion	Endothermic
B.	Physical	CO_2	Hissing sound	Exothermic
C.	Irreversible	H_2	Effervescence	Endothermic
D.	Chemical	H_2	Pop sound	Exothermic

26. A few substances are randomly grouped together as :

Group I : Tamarind, table, clay toy, tracing paper
Group II : Honey, aluminium foil, milk, water
Group III : Mercury, stainless steel pot, gold coin, wooden block
Group IV : Sand, chalk powder, talcum powder, common salt

Select the odd one in each group.

	Group I	**Group II**	**Group III**	**Group IV**
A.	Table	Honey	Stainless steel pot	Chalk powder
B.	Clay toy	Milk	Mercury	Sand
C.	Tamarind	Aluminium foil	Wooden block	Common salt
D.	Tracing paper	Water	Gold coin	Talcum powder

27. Fill in the blanks in the given table by selecting an appropriate option.

S.No.	**Substance**	**Colour change with phenolphthalein indicator**	**Colour change with methyl orange indicator**
1.	Apple juice	(i)	Red
2.	Soda water	(ii)	(iii)
3.	Calamine solution	Pink	(iv)

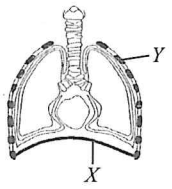
	(i)	**(ii)**	**(iii)**	**(iv)**
A.	Yellow	Colourless	Red	Pink
B.	Red	Yellow	Green	Pink
C.	Red	Red	Colourless	Pink
D.	Colourless	Colourless	Red	Yellow

28. Which of the following statements are correct?

I. When acetic acid reacts with sodium bicarbonate, carbon dioxide gas is produced.
II. Magnesium burns with a dazzling white flame.
III. When carbon dioxide is passed through lime water, it turns milky.
IV. Magnesium hydroxide is formed when ash formed by burning of magnesium in air is dissolved in water.

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

29. Which of the following statements is correct regarding the labelled parts *X* and *Y* in the given figure?



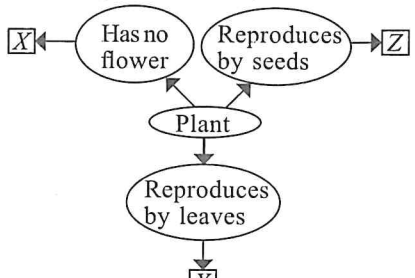
A. During inhalation, *X* becomes curved and *Y* moves downward and inward.
B. During exhalation, *X* becomes curved and *Y* moves upward and outward.
C. During inhalation, *X* becomes flat and *Y* moves upward and outward.
D. During exhalation, *X* becomes dome shaped and *Y* moves upward and outward.

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

	Column I (Food)		**Column II (Major nutrient present)**
(a)	Bread, chapati, potato	1.	Calcium
(b)	Sardine, shrimp	2.	Carbohydrate
(c)	Cod-liver oil, egg yolk, mushroom	3.	Iodine
(d)	Egg, milk and milk product	4.	Vitamin E
		5.	Vitamin D

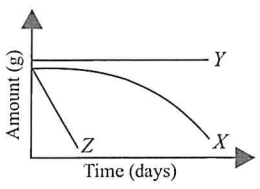
A. (a)-3; (b)-2; (c)-5; (d)-4
B. (a)-4; (b)-3; (c)-5; (d)-2
C. (a)-3; (b)-2; (c)-4; (d)-5
D. (a)-2; (b)-3; (c)-5; (d)-1

31. Refer to the given flow chart and select the option which correctly identifies *X*, *Y* and *Z*.



	X	*Y*	*Z*
A.	Moss	*Bryophyllum*	Maize
B.	Pineapple	Moss	*Begonia*
C.	*Bryophyllum*	*Begonia*	Moss
D.	Moss	Papaya	Pineapple

32. The given graph shows the changes in amount of solid wastes *X*, *Y* and *Z* dumped in an open ground over time.



Select the incorrect statement regarding *X*, *Y* and *Z*.

A. *Z* could be cooked rice whereas *X* could be jute bag.
B. *X* could be cotton cloth whereas *Y* could be metal can.
C. *X* could be metallic frame whereas *Y* could be newspaper.
D. *X* could be wooden chair whereas *Z* could be vegetable peels or tea leaves.

33. The given table shows the amount of water in five identical beakers at the beginning 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 the beginning (mL)**	**Time taken for water to reduce by 20 mL (min.)**
P	60	50
Q	60	30
R	80	60
S	90	60
T	100	70

From the given table we can conclude that

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

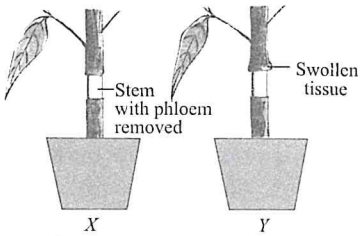
34. Read the given statements and select the correct option.

Statement 1 : Yeasts are single celled organisms which are used in baking and brewing industry.

Statement 2 : Yeasts carry out aerobic respiration *i.e.*, fermentation and release ethyl alcohol and carbon dioxide.

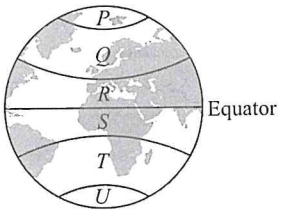
A. Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.
B. Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.
C. Statement 1 is true but statement 2 is false.
D. Both statements 1 and 2 are false.

35. The given figure shows a setup at the start of an experiment (*X*) and after a few days (*Y*). The change observed in setup *Y* is due to



A. Upward movement of food getting blocked
B. Downward movement of food getting blocked
C. Upward movement of water getting blocked
D. Downward movement of water getting blocked.

36. Refer to the given figure showing different temperature zones of the Earth and select the incorrect statement.



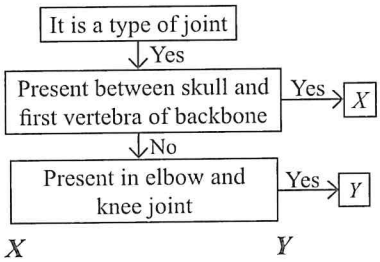
A. Labelled parts *Q* and *T* are torrid zones.
B. Labelled parts *R* and *S* are temperate zones.
C. Labelled parts *P* and *U* are frigid zones.
D. Both A and B

37. The given passage is based on the production of cotton fabric. It has some errors, one of which is underlined for your reference. Select the number of errors in it, excluding the given error.

Cotton is a soft fibre that grows inside the seed of the cotton plant (cotton bolls). After maturing, cotton bolls are burst open, the seeds are then separated from the cotton fibres by shearing. This process was earlier done by machines, nowadays it is done by hands. The fibre that is obtained is called burr. The fibre is then untwisted to form cotton yarn. This process of making yarn is known as weaving and it can be done by *charkha*.

A. 4 B. 6
C. 8 D. 5

38. Refer to the given flow chart and select the correct option.



	X	*Y*
A.	Pivot joint	Hinge joint
B.	Gliding joint	Hinge joint
C.	Ball and socket joint	Pivot joint
D.	Hinge joint	Ball and socket joint

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

(i) Humidity is the measure of amount of air in the atmosphere.
(ii) Polar bears have small ears to reduce the heat loss from body.
(iii) Red-eyed frog and lion-tailed macaque are adapted to live on the trees.
(iv) Blubber is present in the animals such as camel, fennec fox and kangaroo rat.

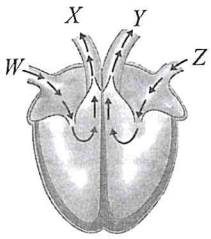
	(i)	(ii)	(iii)	(iv)
A.	F	F	T	T
B.	T	F	F	F
C.	T	F	T	T
D.	F	T	T	F

40. Sarita noticed that her potted plant was not healthy. She put few earthworms into the pot. After few days, she noticed that her plant looked healthier.
Which of the following could not be the possible reason for this?

(i) The earthworms ate up all the pests and weeds in the soil.
(ii) The earthworms helped the plant to absorb more carbon dioxide from atmosphere.
(iii) The earthworms synthesised nitrogen for the plant.
(iv) The earthworms improved the texture of pot soil, increased the air content of the soil and nutrient availability to the plant.

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

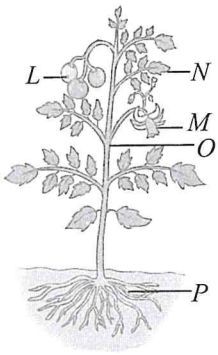
41. The given diagram shows blood circulation pathway in the heart.



Which of the following statements is correct regarding blood vessels *W*, *X*, *Y* and *Z*?

A. *W* receives oxygenated blood from lungs.
B. *Y* supplies oxygenated blood to all the body parts.
C. *X* and *Z* carry deoxygenated blood and *X* takes it to the lungs.
D. None of these

42. Identify parts *L*, *M*, *N*, *O* and *P* in the given figure of plant and select the incorrect statement regarding them.



A. In *Gloriosa*, *N* is modified into tendril to give support whereas in *Nepenthes*, it is modified into pitcher to catch insects.
B. In *Bougainvillea*, *O* is modified into thorns to protect it from being eaten away by animals whereas in grapevine it is modified into tendril to give support.
C. *P* is modified to store food in sweet potato and radish whereas *L* is edible in peach.
D. *M* is modified to store food in broccoli and cabbage whereas *P* is modified to store food in onion.

43. Which enzymes are likely to act on the baked potatoes eaten by a man, starting from the mouth as they move down the alimentary canal?

A. Salivary amylase → Pancreatic amylase → Disaccharidases
B. Pancreatic amylase → Salivary amylase → Lipase
C. Salivary maltase → Lipase → Trypsinogen
D. Salivary maltase → Pancreatic amylase → Trypsin

44. Study the given relationship.

Linen : Kapok : Shahtoosh

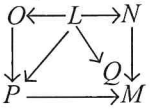
Select the option which correctly identifies the same relationship.

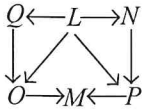
A. Cotton : Sisal : Nylon
B. Rayon : Hemp : Wool
C. Jute : Cotton : Silk
D. Coir : Polyester : Mohair

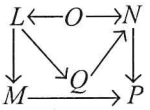
45. The given table classifies organisms *L*, *M*, *N*, *O*, *P* and *Q* according to their feeding habits. These animals live in the same habitat.

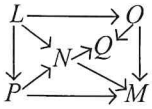
Producer	Herbivore	Carnivore	Omnivore
L	*O*	*M*	*N*
	P	*Q*	

Which of the following shows their correct interlinking with respect to their feeding habits?

A. 

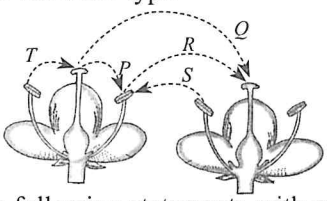
B. 

C. 

D. 

ACHIEVERS SECTION

46. The given figure shows the longitudinal section of two flowers of the same type.



Study the following statements with reference to the given figure.

(i) *R* shows cross pollination, whereas *T* shows self pollination.
(ii) *Q* and *T* show transfer of pollen grains that will result in fruit formation.
(iii) *P* and *T* show self pollination, while *R* and *S* show cross pollination.
(iv) *R* and *T* show pollination that will result in fruit formation.
(v) *Q* and *S* show cross pollination.

Which of the given statements are true or false?

A. (i) and (iv) are true; (ii), (iii) and (v) are false.
B. Only (v) is true; rest are false.
C. (i), (ii), (iii) and (v) are true; only (iv) is false.
D. (ii) and (v) are false; (i), (iii) and (iv) are true.

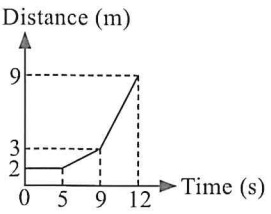
47. Read the given statements.

(a) During _____, the sheared skin of sheep with hair is washed to remove grease, dust and dirt.
(b) _____ is an occupational disease associated with wool industry.
(c) The clean and selected wool fibres are passed through rollers having thin wired teeth that untangle the fibres and arrange them into a flat sheet called _____.
(d) Pashmina shawls are made from wool obtained from the undercoat of _____.

Select the option which correctly fills the blanks in any two of these statements.

A. (a)-Carding, (c)-Web
B. (b)-Anthrax, (d)-Angora goat
C. (b)-Asthma, (c)-Sliver
D. (a)-Scouring, (d)-Cashmere goat

48. The distance-time graph of the motion of a cycle is shown here.

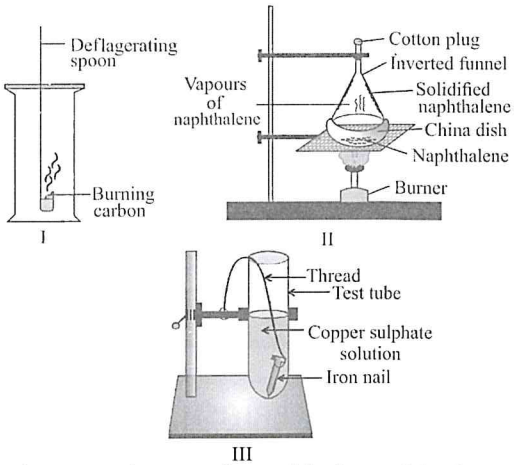


Which of the following statements is/are correct regarding the given situation?

I. Cycle starts moving at 5 seconds.
II. Speed of the cycle is maximum during time interval 9 seconds to 12 seconds.
III. The average speed of cycle over a time period of 12 seconds is 2 m s^{-1}.

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

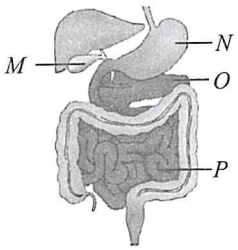
49. Observe the given figures and fill in the blanks by selecting an appropriate option.



The new substance formed in figure I is also produced when (i) is heated. A (ii) change is taking place in figure(s) (iii) while a (iv) change is taking place in figure(s) (v).

	(i)	(ii)	(iii)	(iv)	(v)
A.	Soda water	Chemical	I, II	Physical	III
B.	Washing soda	Chemical	I, II	Physical	III
C.	Baking soda	Physical	II	Chemical	I, III
D.	Slaked lime	Physical	II	Chemical	I, III

50. Refer to the given figure of human digestive system and select the incorrect statements regarding parts labelled as *M*, *N*, *O* and *P*.



(i) *M* and *O* secrete and pour their digestive enzymes in *N* for digestion whereas *N* secretes HCl which kills germs in food.

(ii) Digestion of both carbohydrates and proteins takes place in *N* whereas digestion of only fats takes place in *P*.

(iii) *N*, *O* and *P* secrete digestive enzymes but *M* only stores a digestive juice that emulsifies fats.

(iv) *P* does not secrete any digestive enzyme but receives digestive enzymes from *M*, *N* and *O* for complete digestion of food.

(v) If *M* is removed in a person then he can find difficulty in digesting fats present in his food.

(vi) *N* secretes digestive enzymes and mucus and *O* secretes digestive enzymes and hormones.

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

SPACE FOR ROUGH WORK