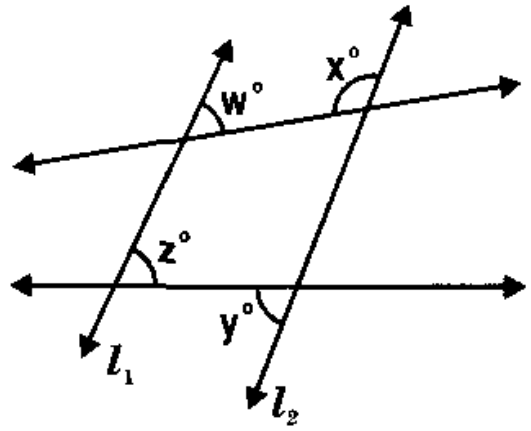
Mathematics

1. The sum of the digits of a two-digit number is 9. If 9 is added to the number, then its digits interchange their place. What is the difference in cube of the digits?

(A) 65 (B) 61 (C) 89 (D) 125

2. In the given figure if $l_1 \parallel l_2$, what is x + y in terms of w° and z° ?



(A) $180° - w° + z°$ (B) $180° + w° - z°$

(C) $180° - w° - z°$ (D) $180° + w° + z°$

3. Identify one of the factors of

$$x^2 + \frac{1}{x^2} + 2 - 2x - \frac{2}{x}$$

among the options.

(A) $x - \frac{1}{x}$ (B) $x + \frac{1}{x} - 1$

(C) $x + \frac{1}{x}$ (D) $x^2 + \frac{1}{x^2}$

4. Which option is correct with respect to the line x + 1 = 0 ?

(A) It is parallel toy-axis.

(B) It passes through (0,-1).

(C) It is parallel to x-axis.

(D) It passes through (0,0).

5. If a = 2 and b = 3, then find the value of $(a^a + b^b) - (a^b + b^a)$.

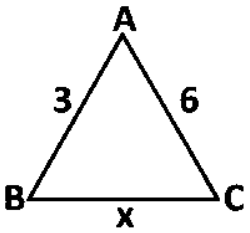
(A) 12 (B) 14 **(C)** 16 (D) 19

6. PQRS is a square. The coordinates of P, Q and S are (1,0), (4, 0) and (1, 3). Choose the point R.

(A) (3,4) (B) (4,3)

(C) (3,-4} (D) (-3,4)

7. Choose the range of values that, side BC can have.



(A) $x \in$ real number (B) $x \in [3, 6]$

(C) $x \leq 6$ (D) $3 < x < 9$

8. The radius of a cylinder is doubled and its height is halved. What is the change in its curved surface area?

(A) Halved (B) Doubled

(C) Remains the same (D) Becomes four times

9. Angles subtended by chords AC and BC at the centre O of the circle are 55° and 155° respectively. What is the measure of ∠ACB?

(A) 65° (C) 105°

(B) 75° (D) 135°

10. If AB is a chord of length 24 cm of a circle with centre O and radius 13 cm, then the distance of the chord from the centre is

(A) 5cm. (C) √407cm.

(B) 6cm. (D) 7cm.

11. In $\triangle ABC$ AB = 5 cm, BC = 6 cm and CA = 7 cm. Identify the relation between the angles.

(A) $\angle B > \angle A > \angle C$ (B) $\angle A > \angle B > \angle C$

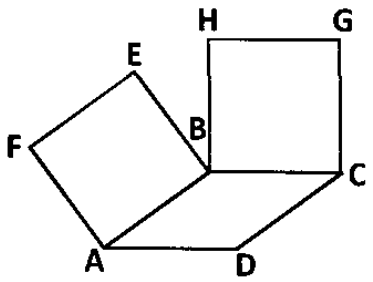
(C) $\angle B > \angle C > \angle A$ (D) $\angle C > \angle A > \angle B$

12. Reshma moves 5 units right and then 3 units downwards. She then moves 4 units to the left, finally stops at a point represented by *(-2, -2)* on the Cartesian plane. What was her starting point on the plane?

(A) (-3,1) (C) (2,-l)

(B) (1,7) (D) (-5,-3)

13. In the figure, ABCD is a Rhombus with Z BCD = 36°. ABEF and BCGH are two squares. Find the values of Z EDH + Z DHB + Z DEB. How many kilograms of tea at ^ 50 per kg should be mixed with 35 kg of tea costing T 60 per kg so as to sell the mixture at ? 57 per kg without gaining or losing anything in the transaction?



(A) 90' (B) 180'

(C) 36' (D) 52'

14. In $\triangle ABC$, AB = 8 cm. If the altitudes corresponding to AB and BC are 4 cm and 5 cm respectively, find the measure

(A) 6.4 cm (B) 4.6 cm

(C) 5.4 cm (D) 4.5 cm

15. How many kilograms of tea ay Rs. 50 per kg should be mixed with 35 kg of tea costing Rs. 60 per kg so as to sell the mixture at Rs. 57 per kg without gaining or losing anything in the transaction?

(A) 5 kg (C) 25 kg

(B) 7 kg (D) 15 kg

16. If an isosceles triangle has a perimeter 30 cm and sum of its two equal sides is 24 cm, then find the area of the triangle.

(A) $\sqrt{135}\,cm^2$ (B) $9\sqrt{15}\,cm^2$

(C) $15\sqrt{9}\,cm^2$ (D) $15\ cm^2$

17. If the point F lies in between M and N and C is the midpoint of MF which of the following is true ?

(A) MC + FN = MN (B) MN - FC - MC

(C) MC + FN = CF (D) FN + 2FC = MN

18. Simplify: $\dfrac{a^{\frac{1}{2}}+a^{-\frac{1}{2}}}{1-a}+\dfrac{1-a^{-\frac{1}{2}}}{1+\sqrt{a}}.$

(A) 1 (B) 0

(C) $\dfrac{2}{1-a}$ (D) 1 + a

19. For an integer n, a student states.

(I) If n is odd, $(n + I)^2$ is even.

(II) If n is even, $(n - I)^2$ is odd.

(III) If n is even, ^(n -1) is irrational.

Which of the above statements would be correct ?

(A) I and III (B) I and II

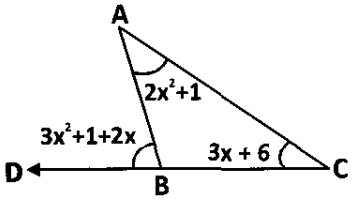
(C) I, II and III (D) II and III

20. Given four points such that no three of them are collinear, what is the number of lines that can be drawn through them ?

(A) 2 lines (B) 4 lines

(C) 6 lines (D) 8 lines

21. In the given figure, find the value of $\angle ABC$



(A) 146° (B) 126°

(C) 106° (D) 34°

22. If the angles of a triangle are in the ratio 5:3:7, what is such a triangle called?

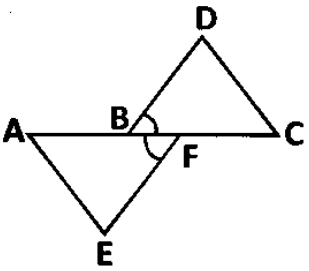
(A) An acute angled triangle

(B) An obtuse angled triangle

(C) A right angled triangle

(D) An isosceles triangle

23. **In the given figure, if AB = CF, EF = BD and ^ AFE = Z DBC. Then, *A* AFE and *A* CBD are congruent by which of the following criterion?**



(A) SAS (B) SSS

(C) ASA (D) None of these

24. Area of a parallelogram ABCD is 432 cm^2. If BC || AD and the distance between BC and AD is 20 cm, what is the measure of the side BC of parallelogram ABCD?

(A) 43.2cm (B) 10.8cm

(C) 18.2cm (D} 21.15cm

25. Find the value of the given expression when a + b + c = 3x.

$(x - a)^3 + (x - b)^3 + (x - c)^3 - 3(x - a)(x - b)(x - c)$

(A) 3 (B) 2 (C) 1 (D) 0

Physics

26. A person speaking through a long tube can be heard much more clearly by another person with his ear to the other end of the tube. This is because sound waves

(A) are reflected off the walls of the tube.

(B) travel faster when enclosed.

(C) are amplified in the tube.

(D) slow down when enclosed and become louder.

27. The engine of a car produces an acceleration of 4 m/s^2 in the car. If this car pulls another car of same mass, what is the acceleration produced?

(A) $2m/s^2$ (B) $4m/s^2$

(C) $1/2\ m/s^2$ (D) $1/4m/s^2$

28. A rectangular block has dimensions 6 cm x 10 cm x 2 cm.
If the mass of the block is 240 g, what is its density?

(A) $1gcm^{-3}$ (B) $2gcm^{-3}$

(C) $3gcm^{-3}$ (D) $4gm^{-3}$

29. A car of mass 1000 kg moving with a velocity of 54 km/hr
collides with a tree and comes to a stop in 5 seconds. What
is the force exerted by the car on the tree?

(A) 4000 N (B) 1000 N (C) 3000 N (D) 2000 N

30. Arrange the following media in ascending order of the speed of sound in them.

(i) Water (ii) Steel iii) Nitrogen

(A) (iii), (ii), (i) (B) (i), (iii}, (ii)

(C) (iii), (i), (ii) (D) (ii), (i), (iii)

31. A particle is moving along a circular track of radius 1 m with uniform speed. Find the ratio of the distance covered and the displacement in half revolution.

(A) 1: 1 (B) 0 : 1 (C) π: 1 (D) π : 2

32. **Identify the correct units for both energy and power.**

	Energy	Power
(A)	Kilowatt	Joule
(B)	Joule	Kilojoule
(C)	Joule	Watt
(D)	Watt	Kilowatt

33. A fat hose pipe is held horizontal by a fireman. It delivers water through a nozzle at one litre/sec. If by increasing the pressure, the water is delivered at 2 litre/sec, the fireman now has to push

(A) forward twice as hard.

(B) forward four times as hard.

(C) forward eight times as hard.

(D) backward four times as hard.

34. In a 400 m race, a starter pistol is fired 30 m from the runners at the starting line. If the speed of sound in air is 330 m/s, how long does it take for the runner to hear the sound of the gun shot ?

(A) 0.09s (B) 3.34s (C) 1.19s (D) 2.69s

35. An athlete completes one round of a circular track of radius R in 40 sec. What will be his displacement at the end of 2 min. 20 sec ?

(A) zero (B) 2 R

(C) 2πR (D) 7πR

36. A ball of mass 2 kg and another of mass 4kg are dropped together from a 60 feet tall building. After a fall of 30 feet each towards the earth, their respective kinetic energies will be in the ratio of

(A) √2:1 (B) 1:4 (C) 1 : 2 (D) 1:√2

37 . **A concrete block has a mass of 300 kg. If the block measures 0.5 m by 1.0 m by 2.0 m, what is the minimum pressure it can exert when resting on the ground ? (g = 10 N/kg or 10 m/s^2)**

(A) 1000 Pa (B) 1500 Pa

(C) 2000 Pa . (D) 2500 Pa

38. A girl of mass 45kg runs up a flight of stairs having 15 steps in 30 *sees,* each step has a height of 24 cm. What is the power required by her?

(A) 36 W (B) 48 W (C) 54 W (D) 69 W

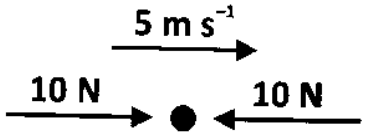
39. The Moon is 3,80,000 km away from Earth. If a spacecraft takes 60 hours to fly from the Earth to the Moon, what is its average speed?

(A) 1.52 km/s (B) 1.76 km/s

(C) 1.84 km/s (D) 2.09 km/s

40. A particle moving at a constant speed of 5 m s^{-1} is being acted on by two 10 N forces as shown below.

5ms"



The particle will

(A) stop immediately.

(B) continue to move at 5 ms^{-1}.

{C) slow down and gradually stop.

(D) increase its speed gradually.

41. If a body is accelerating, it may

(A) speed up. (B) speed down.

(C) move with same speed. (D) all the three

42. What is the mass of an object that weighs 500 N on the earth ? What will its mass and weight be on the moon ? (Take the gravitational field strength of earth to be 10 N/ kg and that of the moon to be 1.6 N/kg).

(A) 30 kg, 40 kg, 60 N (C) 50 kg, 50 kg, 80 N

(B) 40 kg, 50 kg, 70 N (D) 60 kg, 60 kg, 90 N

43. Flash and thunder are produced simultaneously. But the thunder is heard a few seconds after the flash is seen. Why?

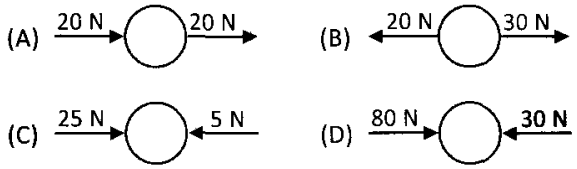
(A) The speed of sound is greater than the speed of light.

(B) The speed of sound is equal to the speed of light.

(C) The speed of light is greater than the speed of sound.

(D) The speed of light is less than the speed of sound.

44. Which object has the greatest resultant force acting on it?



45. Which material(s) will float in a tall jar containing a liquid of mass 180 g and volume 200 cm^3?

(i) Plastic foam (0.08 g/cm^3)

(ii) Cork (0.25 g/cm^3)

(iii) Glass (2.5 g/cm^3)

(iv) Copper (8.9 g/cm^3)

(A) (i) only (B) (i) and (ii) only

(C) (ii) and (iii) only (D) (iii) and (iv) only

***46.* A box is dragged across a floor by a rope which makes an angle of 45° with the horizontal. The tension in the rope is 100 N**

while the box is dragged 10 m. The work done is

(A) 607.1 J (B) 707.1 J

(C) 1414.2 J (D) 900 J

47. Which animal sounds can be heard by the human ear ?

(A) The shrill call of a bat (30 kHz)

(B) The low-pitched trumpet sound of an elephant (5 Hz)

(C) The piercing hoot of an owl (10 kHz)

(D) Both (A) and (B)

48. A body is released from the top of a tower of height *h* meters. It takes *T* seconds to reach the ground. The ball at the time *T/2* second is at ____ meters from the ground.

(A) h/2 (B) h/3 (C) 3h/4 (D) 9h/2

49. If a body of mass 3 kg is dropped from top of a tower of height 250 m, then its kinetic energy after 3 sec. will be

(A) 1126 J (B) 1048 J

(C) 735 J (D) 1296.5 J

50. Ball X with a mass of 0.3 kg travels at 4 m s^{-1} and collides with ball Y travelling at 2 ms^{-1} in the same direction. The mass of the ball Y is 0.2 kg. Ball X and ball Y move with a common velocity, v ms^{-1}, after the collision. Calculate the value of v.

(A) 3.2 ms^{-1} (B) 4.9 ms^{-1}

(C) 5.8 ms^{-1} (D) 7.6 ms^{-1}

Chemistry

51. The atom with incorrect number of sub-atomic particles is

	Atoms	Number of protons	Number of neutrons	Number of electrons
(A)	P	3	4	3
(B)	Q	11	12	12
(C)	R	12	12	12
(D)	S	19	20	19

52. What is the mass of oxygen contained in 72 g of pure water?

[Relative atomic masses: H = 1; O = 16]

(A) 16 g (B) 32 g (C) 64 g (D) 70 g

53. The smell of cooking spreads to all the rooms in a house through

(A) decomposition. (B) diffusion.

(C) displacement. (D) distillation.

54. One mole each of ethanol and ethane have same

(A) mass. (B) number of atoms.

(C) number of molecules. (D) volume at r.t.p.

55. Which substance is a mixture of compounds?

(A) Bronze (B) Sodium chloride

(C) Air (D) Sports drink

56. A piston is pushed down to compress the air in a cylinder. Which statement about the air in the cylinder is correct?

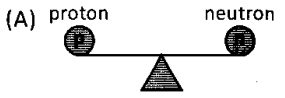
(A) The number of air molecules do not change.

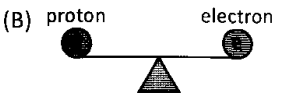
(B) The air pressure increases.

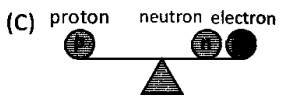
(C) The density of air increases.

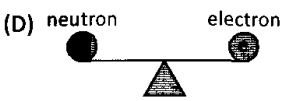
(D) All the three.

57. **Which figure of sub-atomic particles of an atom when placed on an imaginary beam balance is nearly balanced ?**

(A) 

(B) 

(C) 

(D) 

58. Ice melts at 0° C. Water boils at 100° C. When a little salt is added to pure water, the effects on the two points will be

	Melting point	Boiling point
(A)	increases	decreases
(B)	increases	increases
(C)	decreases	increases
(D)	decreases	decreases

59. The particles that have the same total number of electrons are

(A) Cl^-, Br^-, I^-

(B) F^-, Ne, Na^+

(C) K^+, Ca^{2+}, Br^-

(D) Li^+, Na^+, K^+

60. Which one does not involve the breakdown of a compound into simpler substances?

(A) Food is digested in the stomach.

(B) When black powder Q. is heated with yellow powder R, a black solid forms.

(C) White crystal S changes into a black solid upon gentle heating.

(D) Two different gases are obtained when electricity passes through liquid T.

61. **Which group is made up of matter only?**

(A) Cloud, snow and wind

{B) Air, thunder and water

(C) Chair, sand and shadow

(D) Cotton, feather and music

62. The atoms $^{31}_{15}P$ and $^{32}_{16}S$ have the same

(A) nucleon number.

(B) number of electrons.

(C) number of neutrons.

(D) number of protons.

63. What mass of limestone is needed to produce 84 kg of calcium oxide?

(A) 150kg

(B) 840kg

(C) 1000kg

(D) 1500kg .

64. The table given below shows the capacity of each container and the amount of air pumped into them. Which container has the smallest volume of air in it ?

	Capacity of container (cm^3)	Volume of air pumped into the container (cm^3)
(A)	800	200
(B)	300	400
(C)	500	600
(D)	750	800

65. Which statement about the formation of sodium chloride (ionic compound) is true ?

(A) There are more sodium atoms/ions in the reactant (sodium) than in the product {sodium chloride).

(B) The properties of sodium chloride are different from those of sodium and chlorine.

{C) Sodium metal burns in air to form sodium chloride.

(D) Sodium chloride cannot be broken down to form sodium and chlorine again.

66. **Identify a false statement.**

(A) Salt is made up of sodium and chlorine.

{B) Sugar is made up of carbon, hydrogen and oxygen.

(C) Sand is made up of silicon and hydrogen.

(D) Ammonia is made up of nitrogen and hydrogen.

67. A liquid boils at a temperature of 100° C. Which other property of the liquid proves that it is a pure substance ?

(A) It does not leave a residue when boiled.

(B) It freezes at 0°C.

(C) It is neither acidic nor alkaline.

(D) It turns white anhydrous copper(ll) sulphate blue.

68. A crystal of potassium permanganate was placed at the bottom of a beaker of water. The beaker was left undisturbed for 20 minutes. Which figure correctly shows the appearance of the beaker of water after 30 minutes?

(A)  (B)  (C)  (D) 

69. One mole of hydra ted copper(ll) sulphate, $CuSO_4.5H_2O$, is dissolved in water. How many moles of ions does the solution contain?

(A) 3 (B) 9 (C) 6 (D) 7

70. Syringe 1 is filled with X while syringe 2 is filled with Y. When the nozzles of these syringes are blocked, the plunger of syringe 1 can be pushed inwards but the plunger of syringe 2 cannot be pushed inwards in the same manner. What can X and Y be ?

(A) X-carbon dioxide gas, Y-oxygen gas

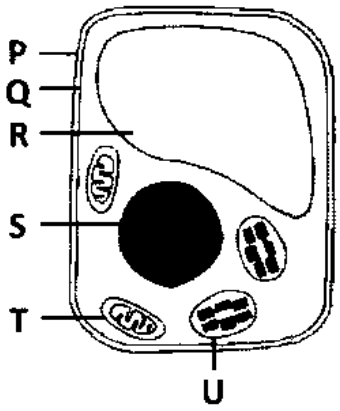
(B) X-milk, Y-glue

{C) X-nitrogen gas, Y-cooking oil

(D) X-tap water, Y-water vapor

Biology

71. **A student observed the cell shown below and said that the cell shown is a plant cell and not an animal cell, based on the presence of certain organelles. Which labeled organelles made him to arrive at this conclusion?**



(A) P and R only (B) P and S only

(C) P, R and T only (D) P, R and U only

72. A girdled tree (up to bast) may survive for some time but it will eventually die because

(A) water will not move upwards.

(B) water will not move downwards.

(C) sugars and other organic materials will not move downwards and roots die due to starvation.

(D) sugars and other organic materials will not move upwards.

73. Plastids differ from mitochondria due to the presence of

(A) two layers of membrane.

(B) pigments.

(C) DNA.

(D) plastids are present only in plant cell while mitochondria are present only in animal cell.

74. Which of the following *is/are* example(s) of complex tissues?

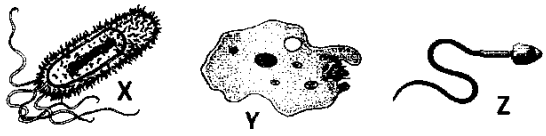
(1) Parenchyma **(3) Mesenchyma**

(2) Xylem **(4) Phloem**

(A) 3 only (B) 2 and 4 only

(C) 2, 3 and 4 only (D) *1, 2, 3,* and 4

75. Identify X, Y and Z.



(A) X - Fungal, Y - Neuron cell, Z - Paramecium

(B) X - Algal cell, Y - Bone cell, Z - Euglena

(C) Z - Sperm, Y - Amoeba, X - Bacterial Cell

(D) X - Bacterial cell, Y - Amoeba, Z - Sperm

76. Which bacteria is present in the root nodules of legumes ?

(A) Mycoplasma (B) Rhizobium

(C) Lactobacillus (D) Salmonella typhi

77. Which among the following have open circulatory system ?

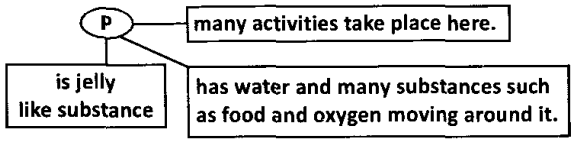
(I) Arthropoda **(II) Mollusca**

(III) Annelida **(IV) Echinodermata**

(A) I and III (B) III and IV

(C) I, II and IV (D) II, III and IV

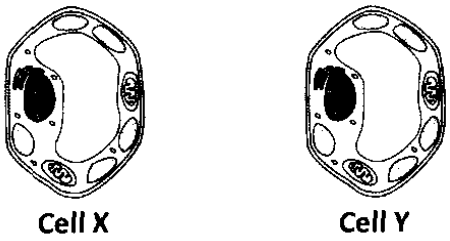
78. Identify P in the given concept map.



(A) Cell membrane (C) Chloroplast

(B) Cytoplasm (D) Nucleus

79. In order for water molecules to move from cell X to cell Y by osmosis, which of the following conditions must be met?



(A) X must have a lower water potential than Y.

(B) X and Y must have the same water potential.

(C) Y must be less concentrated than X

(D) Y must have lower water potential than X.

80. Which statement relates to Hydra ?

(A) It is Porifera and diploblastic, but coelomate and has tissue level of organisation

(B) It is a Coelenterate found in warm places and uses pseudopodia for locomotion.

(C) It is a Coelenterate and has a central cavity or gastrovascular cavity.

(D) It is a Nematode and has two tentacles on it.

81. Identify a leucocyte from the given cells.

(A)  (B)  (C)  (D) 

82. Which tissue lines the nasal passage and oviducts?

(A) Stratified epithelium

(B) Columnar epithelium

(C) Ciliated epithelium

(D) Cuboidal epithelium

83. Match the following characteristic features of animals in Column - I to their phylums in Column - II.

	Column I		Column II
(p)	Pore bearing animals	(i)	Arthropoda
(q)	Diploblastic	(ii)	Coelenterata
(r)	Metameric segmentation	(iii)	Porifera
(s)	Jointed legs	(iv)	Annelida

(A) p-iv, q-iii, r-i, s-ii (B) p-iii, q-i, r-iv, s-ii

(C) p-iii, q-ii, r-iv, s-i (D) p-i, q-ii, r-iii, s-iv

84. Choose the correct option that shows the diseases given below with the pathogens that cause diseases.

(i) Typhoid	**(vi) Common cold**
(ii) Athlete's foot	**(vii) Amoebic dysentery**
(iii) Tuberculosis	**(viii) Yellow vein mosaic**
(iv) Anthrax	**(ix) Influenza**
(v) Malaria	**(x) Pneumonia**

(A) Viral - vi, Protozoan - vii, Bacterial - iv, Fungal - ii

(B) Viral - i, Protozoan - vi, Bacterial - vii, Fungal - iii

(C) Viral - v, Protozoan - vii, Bacterial - x, Fungal - ii

(D) Viral - x, Protozoan - vi, Bacterial - ix, Fungal - iii

85. Identify the feature that is related to fungus.

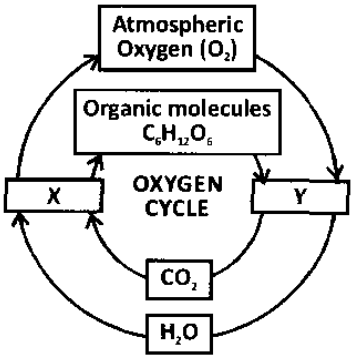
(A) It lacks chlorophyll.

(B) It does not have a cell wall.

{C) It is always unicellular.

(D) Its reserve food material is starch.

86. What are X and Y in the given figure?



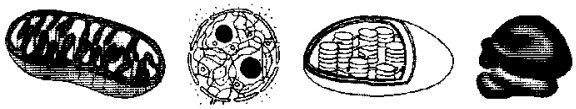
(A) X - Combustion, Y - Respiration

(B) X - Respiration, Y - Transpiration

(C) X - Photosynthesis, Y - Evaporation

(D) X - Photosynthesis, Y - Respiration

87. Pick the odd one out and identify the reason from the given options.



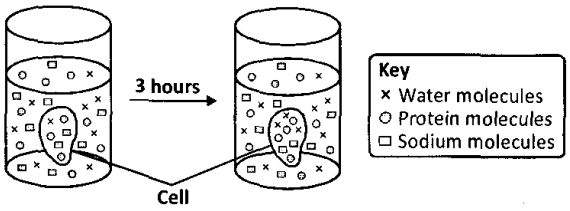
(A) S, because the others are double membrane bound autonomous cell organelles.

(B) P, because the others are involved in cell secretion.

(C) R, because the others are involved in protein storage.

(D) Q, because the others are involved in energy production.

88. **In the given experiment, which molecule moves into a cell due to osmosis?**



(A) Sodium molecule

(B) Protein molecule

(C) Water molecule

(D) All of these

89. The technique used to obtain new variety with high yield and other desirable characters is called

(A) Mimicry (B) Speciation

(C) Hybridization (D) Mutation

90. Match the following figures in Column - I with their functions in Column- II.

	Column I		Column II
(p)		(i)	Produce antibodies
(q)		(ii)	Blood clotting
(r)		(iii)	Transport of oxygen

(A) p-i, q-ii, r-iii (B) p-ii, q-iii, r-i

(C) p-i, q-iii, r-ii (D) p-iii, q-i, r-ii

General Awareness

91. Who won the Nobel Prize in physics in 2016?

(A) David thouless (B) Duncan Haldane

(C) Michael Kosterlrtz (D) All of these

92. Dr. Zakir Hussain was

(A) the first Muslim president of India.

(B) first vice president of India.

(C) first president of Indian National **Congress.**

(D) first speaker of LokSabha.

93. Jude Felix is a famous Indian player in which of the fields?

(A) Volleyball (B) Tennis

(C) Football (D) Hockey

94. Who is known as Indian Bismarck ?

(A) Kamaraj (B) SardarVallabhai Patel

(C) Nehru (D) Rajaji

95. Who is the father of Geometry ?

(A) Aristotle (B) Euclid

(C) Pythagoras (D) Kepler

96. The "arrow" in the logo of Amazon is from _____.

(A) A-N (B) A-Z (C) A-A (D) A-0

***97.* Guess the given logo.**

(A) Robot (C) Android

(B) Microsoft (D) Virus

98. Which planet has 21 moons ?

(A) Mercury (B) Saturn

(C) Uranus (D) Mars

99. Who discovered Electrocardiogram (ECG) ?

(A) Willem Einthoven (B) Adam Smith

(C) Jonas Salk (D) Stephen Hawking

100. Which branch of Science deals with the study of living things - plants and animals ?

(A) Anthropology (B) Ethology

(C) Biology (D) Geology

**** Answer Key ***

1. B	2. A	3. C	4. A	5. B	6. B	7. D	8. C	9. B	10. A
11. A	12. A	13. C	14. A	15. D	16. B	17. D	18. C	19. B	20. C
21. A	22. A	23. A	24. Del	25. D	26. A	27. A	28. B	29. C	30. C
31. D	32. C	33. B	34. A	35. B	36. C	37. B	38. C	39. B	40. B
41. D	42. C	43. C	44. D	45. B	46. B	47. C	48. C	49. D	50. A
51. B	52. C	53. B	54. C	55. D	56. D	57. A	58. C	59. B	60. B
61. A	62. C	63. A	64. B	65. B	66. C	67. B	68. C	69. D	70. C
71. D	72. C	73. B	74. B	75. C,D	76. B	77. C	78. B	79. D	80. C
81. B	82. C	83. C	84. A	85. A	86. D	87. A	88. C	89. C	90. D
91. D	92. A	93. D	94. B	95. B	96. B	97. C	98. C	99. A	100. C