

IIT ASHRAM BRINGS...

SCIENCE APTITUDE TEST (2016-17)

SAMPLE PAPER

CLASS

9

KH  J

A Hunt for
Young Scientists..!

Time : 3 Hours

M.M. : 300

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

IMPORTANT INSTRUCTIONS

A. General:

1. This booklet consists of 100 questions.
2. Blank papers, clipboards, log tables, slide rules, calculators, cellular phones, and electronic gadgets in any form are not allowed to be carried inside the examination hall.
3. The answer sheet, a machine-readable Objective Response Sheet (OMR), is provided separately.
4. DO NOT TAMPER WITH / MUTILATE THE OMR OR THE BOOKLET.
5. Write Name and Address in capital letters of OMR sheet.
6. **Submit the OMR Sheet back to Invigilator after examination before leaving the examination hall.**

B. Question paper format:

7. The question paper consists of 4 Sections.
(I) **Mental Ability (20 Questions)**
(II) **Mathematics (30 Questions)**
(III) **Physics & Chemistry (34 Questions)**
(IV) **Biology (16 Questions)**

C. Marking Scheme :

8. For each question in **Section I, II, III and IV** you will be **awarded 3 marks** if you have darkened only the bubble corresponding to the correct answer and zero mark if no bubble is darkened. In all other cases where the answer marked is not correct, **minus one (-1) mark** will be awarded.

Name of the Candidate

Class

Roll Number

I have read all the instructions and shall abide by them

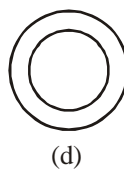
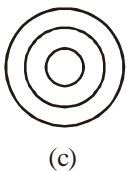
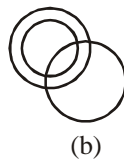
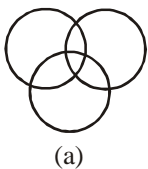
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Signature of the Candidate

I have verified all the informations filled by the candidate.

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Signature of the Invigilator

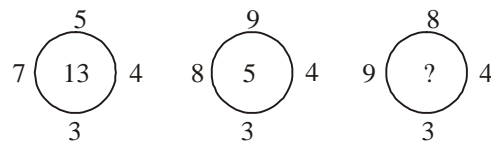
MENTAL ABILITY

- Mohan started from his house, walked 2 km North, then 3 km West, then 6 km South. How far away from his house was he then ?
 (a) 5 km (b) 6 km
 (c) 7 km (d) 8 km
- Sanjay went 70 metres in the East before turning to his right. He went 10 metres before turning to his right again and went 10 metres from this point. From here he went 90 metres to the North. How far was he from the starting point ?
 (a) 80 metres (b) 100 metres
 (c) 140 metres (d) 260 metres
- Which of the following diagrams correctly represents the relationship among Smokers, Bidi smokers, Cancer patients.



- Pointing to a man in a photograph, a woman said, "The father of his brother is the only son of my grandfather." How is the woman related to the man in the photograph ?
 (a) Mother (b) Aunt
 (c) Daughter (d) Sister
- $S \times T$ means that S is the father of T, $S + T$ means that S is the mother of T, $S - T$ means that S is the sister of T. On the basis of this information, you have to select the option which shows that A is the grandfather of T.
 (a) $A \times S \times B - T$ (b) $A \times B + C - T$
 (c) $A + C - T$ (d) $A + B - C \times T$

- 'Numismatics' is related to 'Coin' in the same way as 'Paleontology' is related to-
 (a) Earth (b) Soil
 (c) Fossils (d) Stones
- Find missing number in the following series?
 1, 6, 15, (...), 45, 66, 91
 (a) 25 (b) 26
 (c) 27 (d) 28
- This question is based on numerical calculations. Usually these are circles, the first two of which have four numbers at four points on the circle and one inside the circle. These numbers are placed according to some rules or sequence. The third circle has any four numbers with fifth missing. You are required to find this number from the given choice, according to the same rule that holds good for other two circles.



- (a) 4 (b) 8
 (c) 12 (d) 15
- Choose the numeral pair/group which is different from others.
 (a) 70 - 80 (b) 54 - 62
 (c) 28 - 32 (d) 21 - 24
- Choose the numeral pair/group which is different from others.
 (a) 71, 7, 3, 17 (b) 67, 71, 3, 5
 (c) 41, 5, 3, 47 (d) 37, 14, 19, 7
- C B _ _ D _ B A B C C B
 _ _ 1 2 4 3 _ _ ? ? ? ?
 a _ a b _ c _ b _ _ _ _
 (a) 3, 4, 4 3 (b) 3, 2, 2, 3
 (c) 3, 1, 1, 3 (d) 1, 4, 4, 1
- What will be the next term in BDF, CFI, DHL?
 (a) CJM (b) EIM
 (c) EJO (d) EMI

13. Choose the term which will continue the following series :

P 3 C, R 5 F, T 8 I, V 12 L ?

- (a) Y 17 O (b) X 17 M
(c) X 17 O (d) X 16 O

14. If MASTER is coded as $\bar{4}1i25\bar{9}$, then POWDER will be coded as

- (a) $\bar{7}\bar{6}\bar{5}43\bar{9}$ (b) $\bar{7}\bar{6}\bar{5}43\bar{9}$
(c) $\bar{7}\bar{6}\bar{5}45\bar{9}$ (d) $\bar{7}\bar{6}\bar{5}54\bar{9}$

15. In a certain code, a number 13479 is written as AQFJL and 5268 is written as DMPN. How is 396824 written in that code ?

- (a) QLPNKJ (b) QLPNMF
(c) QLPMNF (d) QLPNDF

16. If + means \div , - means \times , \div means + and \times means -, then

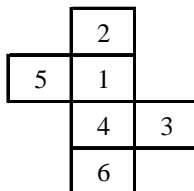
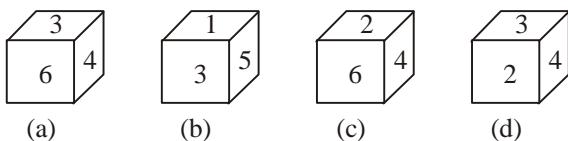
$$36 \times 12 + 4 \div 6 + 2 - 3 = ?$$

- (a) 2 (b) 18
(c) 42 (d) $6\frac{1}{2}$

17. In a certain code, '13' means 'IT'; '456748' means 'ASHRAM'. Then which of the following represents 113456748?

- (a) IITASHRAM (b) ASHRAMIIT
(c) IIT (d) ASHRAM

18. Which of the following dice is identical to the unfolded figure as shows here ?



19. In the following find the figure from the answer Set (i.e. figs. A,B,C & D) that will continue the series given in the problem Set (i.e. figs. 1, 2, 3, 4 and 5).

Problem Figures

Answer figure



20. In this question find the figure from the answer Set (i.e. figs. A, B, C and D) which will continue the series given in the problem Set (i.e. figs. 1, 2, 3, 4 and 5).

Problem Figures

Answer Figures



MATHEMATICS

1. The cost of 3 pens, 4 erasers and 5 sharpeners is Rs. 40. The cost of 5 pens, 7 erasers and 9 sharpeners is Rs.70. The total cost of one of each is

- (a) 10 (b) 8
(c) 15 (d) 9

2. Ram's present age is four years less than twice his age 16 years ago. Thrice of Shyam's present age is seven times Ram's present age. Find the age of Shyam seven years from now.

- (a) 80 (b) 91
(c) 93 (d) 92

3. If $\frac{x}{y} = \frac{3}{4}$, The value of $\frac{3x+y}{5x-y}$ is

- (a) $\frac{12}{11}$ (b) $\frac{3}{4}$
(c) $\frac{13}{11}$ (d) $\frac{11}{13}$

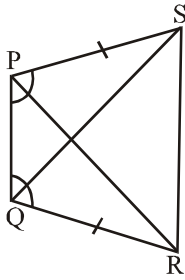
4. Two numbers are in the ratio 9 : 7. If 14 is subtracted from each, the ratio becomes 7 : 5. The numbers are

- (a) 61, 40 (b) 65, 50
(c) 63, 49 (d) 66, 50

5. If the fraction $\frac{1}{5}, \frac{3}{16}, \frac{2}{9}, \frac{5}{26}$ and $\frac{3}{11}$ are arranged in the ascending order of their values, then which one will be the fourth ?
- (a) $\frac{9}{2}$ (b) $\frac{8}{2}$
 (c) $\frac{7}{2}$ (d) $\frac{2}{9}$
6. If $x + y = 25$ and $xy = 156$, then The value of $x^2 + y^2$?
- (a) 213 (b) 312
 (c) 314 (d) 313
7. Simplify : $\left(\frac{121}{144}\right)^{\frac{1}{2}} \times \left(\frac{1728}{1331}\right)^{\frac{2}{3}} \div \frac{11}{12}$
- (a) $\frac{144}{121}$ (b) $\frac{144}{125}$
 (c) $\frac{150}{125}$ (d) $\frac{144}{150}$
8. Simplify : $\frac{6}{4+\sqrt{7}} + \frac{3}{4-\sqrt{7}}$
- (a) $\frac{5-\sqrt{7}}{3}$ (b) $\frac{12-\sqrt{5}}{3}$
 (c) $\frac{12-\sqrt{7}}{3}$ (d) $\frac{10-\sqrt{5}}{3}$
9. 36% of a particular number is 756. What is 54% of the number is
- (a) 1135 (b) 1140
 (c) 1134 (d) 1141
10. By selling a book for Rs. 585, 30% profit is earned. The cost price of the book is
- (a) 400 (b) 450
 (c) 440 (d) 145
11. Mr. Mehta invested an amount of Rs. 24,000 at simple interest at the rate of 15% p.a. for 6 years. The total amount that he will get at the end of 6 years is
- (a) 45600 (b) 45500
 (c) 45700 (d) 46700
12. The average of three numbers is 20. If two numbers are 14 and 28, then the third number is
- (a) 17 (b) 15
 (c) 18 (d) 5
13. $\triangle ABC$ is an isosceles triangle with $AB = AC$. Side BA is produced to D such that $AB = AD$. Then $\angle BCD$ is
- (a) a right angle. (b) obtuse
 (c) acute (d) none
14. Walking at 5 kmph, a student reaches his school from his house 15 minutes early and walking at 3 kmph, he is late by 9 minutes. The distance between his school and his house?
- (a) 2 km (b) 4 km
 (c) 3 km (d) 5 km
15. How many three letter words are formed using the letters of the word TIME ?
- (a) 12 (b) 20
 (c) 16 (d) 24
16. If $x = 2 - \sqrt{3}$, $y = 2 + \sqrt{3}$, then the value of $7x^2 - 11xy - 7y^2$ is
- (a) $-11 - 56\sqrt{3}$ (b) $-11 + 56\sqrt{3}$
 (c) $11 - 56\sqrt{3}$ (d) $11 + 56\sqrt{3}$
17. If $a^{m^n} = (a^m)^n$, then the value of m in terms of n is
- (a) n (b) $n^{\frac{1}{n}}$
 (c) $n^{\frac{1}{n-1}}$ (d) $n^{\frac{1}{n+1}}$
18. Consider the following statements :
- i) If $\frac{p}{q}$ and $\frac{r}{s}$ are terminating decimals, then $\frac{p}{q} + \frac{r}{s}$ is also a terminating decimal
- ii) If $\frac{p}{q}$ and $\frac{r}{s}$ both have terminating decimal representations, then $\frac{p}{q} \times \frac{r}{s}$ is a terminating decimal

- iii) If $\frac{p}{q}$ has non-terminating repeating decimal representation and $\frac{r}{s}$ has terminating decimal representation, then $\frac{p}{q} \div \frac{r}{s}$ may have a terminating decimal representation.
- The correct option is :
- (a) only (i) is correct
 (b) only (ii) is correct
 (c) (i) and (ii) are correct
 (d) only (iii) is correct
19. The alternative that has fractions in ascending order is
- (a) $\frac{1}{3}, \frac{2}{5}, \frac{4}{7}, \frac{3}{5}, \frac{5}{6}, \frac{6}{7}$ (b) $\frac{1}{3}, \frac{2}{5}, \frac{3}{5}, \frac{4}{7}, \frac{5}{6}, \frac{6}{7}$
 (c) $\frac{1}{3}, \frac{2}{5}, \frac{3}{5}, \frac{5}{6}, \frac{4}{7}, \frac{6}{7}$ (d) $\frac{2}{5}, \frac{3}{5}, \frac{1}{3}, \frac{4}{7}, \frac{5}{6}, \frac{6}{7}$
20. The sides p, q and r of a triangle satisfy $\sqrt{p} + \sqrt{q} = \sqrt{r}$, then the triangle is
- (a) acute (b) scalene
 (c) equilateral
 (d) triangle does not exist
21. If $x + y + z = 0$ then the value of $\frac{x^2y^2 + y^2z^2 + z^2x^2}{x^4 + y^4 + z^4}$ is:
- (a) 0 (b) $\frac{1}{2}$
 (c) 1 (d) 2
22. If $f(x) = x^4 - 12x^3 + 17x^2 - 9x + 7$, then $f(x + 3)$ is
- (a) $x^4 - 37x^2 - 123x - 110$
 (b) $x^4 + 37x^2 - 123x + 110$
 (c) $x^4 + 37x^2 - 2x - 110$
 (d) $x^4 - 37x^2 + 123x + 110$
23. If $f(x) = 13x^4 + 6x^3 + 15x^2 + 4x + 9$ and $g(x) = 4x^4 + 6x^3 + 3x^2 + 4x + 5$, then degree of polynomial $\sqrt{f(x) - g(x)}$ is
- (a) 2 (b) 3
 (c) 4 (d) None of these
24. The value of the polynomial $x^2 - 4x + 6$ is 18 at $x =$
- (a) 2 (b) 3
 (c) 4 (d) 6
25. If $x^2 - 4$ is a factor of $ax^4 + 2x^3 - 3x^2 + bx - 4$, then the values of a and b are
- (a) $a = 1, b = -8$ (b) $a = 3, b = 5$
 (c) $a = 6, b = 7$ (d) $a = -1, b = 5$
26. The value of $\frac{2}{5} + 2\frac{4}{9} \div \left[\left(7\frac{5}{12} - 5\frac{3}{4} \right) \div 22\frac{1}{2} + 10 \times \frac{5}{18} \right] - \frac{4}{5}$ is
- (a) $\frac{9}{35}$ (b) $\frac{13}{35}$
 (c) $\frac{16}{35}$ (d) $\frac{19}{35}$
27. When Sarvesh travelled 33 km, he found that $\frac{2}{3}$ rd of the entire journey was still left. The length of the total journey is
- (a) 66 (b) 132
 (c) 99 (d) 100
28. The value of the expression $\frac{(0.3)^{1/3} \left(\frac{1}{27} \right)^{1/4} (9)^{1/6} (0.81)^{2/3}}{(0.9)^{2/3} (3)^{-1/2} \left(\frac{1}{3} \right)^{-2} (243)^{-1/4}}$ is
- (a) 0.3 (b) 0.9
 (c) 1.27 (d) 0.09
29. The value of $a^3 + b^3 + c^3 - 3abc$ if $a + b + c = 12$ and $ab + bc + ca = 47$.
- (a) 12 (b) 48
 (c) 72 (d) 36

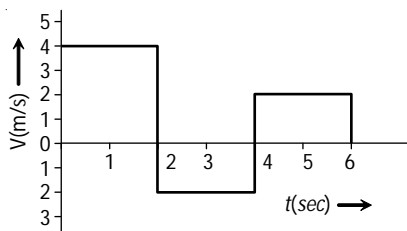
30. In Fig. PS = QR and $\angle SPQ = \angle RQP$. which of the following is true?



- (a) $PR = QS$ (b) $\angle QPR = \angle POS$.
 (c) both (a) and (b) (d) None

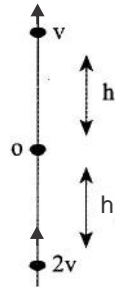
PHYSICS & CHEMISTRY

1. A particle moves for 20 seconds with velocity 3 m/s and then with velocity 4 m/s for another 20 seconds and finally moves with velocity 5 m/s for next 20 seconds. What is the average velocity of the particle?
 (a) 3 m/s (b) 4 m/s
 (c) 5 m/s (d) Zero
2. The velocity-time graph of a body moving in a straight line is shown in the figure. The displacement and distance travelled by the body in 6 sec are respectively



- (a) 8 m, 16 m (b) 16 m, 8 m
 (c) 16 m, 16 m (d) 8 m, 8 m
3. Speed of two identical cars are u and $4u$ at a specific instant. The ratio of the respective distances in which the two cars are stopped from that instant if the same braking force is applied
 (a) 1 : 1 (b) 1 : 4
 (c) 1 : 8 (d) 1 : 16

4. A body starting from rest moves with constant acceleration. The ratio of distance covered by the body during the 5th sec to that covered in 5 sec is
 (a) $9/25$ (b) $3/5$
 (c) $25/9$ (d) $1/25$
5. When a ball is h metre high from a point O, its velocity is v . When it is h m below O, its velocity is $2v$. Find the maximum height from O it will acquire.

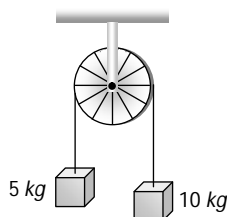


- (a) $\frac{1}{2}$ (b) $\frac{5h}{3}$
 (c) $\frac{3h}{2}$ (d) $2h$
6. Time taken by an object falling from rest to travel through the height of h_1 and h_2 is respectively t_1 and t_2 then the ratio of t_1 to t_2 is
 (a) $h_1 : h_2$ (b) $\sqrt{h_1} : \sqrt{h_2}$
 (c) $h_1 : 2h_2$ (d) $2h_1 : h_2$
7. If a bullet of mass 5 gm moving with velocity 100 m/sec, penetrates the wooden block upto 6 cm. Then the average force imposed by the bullet on the block is
 (a) 8300 N (b) 417 N
 (c) 830 N (d) Zero
8. A body is moving with a velocity 1 ms^{-1} and a force F is needed to stop it within a distance x . If the speed of the body is 3 ms^{-1} , the force needed to stop it within the same distance (x) will be
 (a) $1.5 F$ (b) $3 F$
 (c) $6 F$ (d) $9 F$

9. At a certain instant of time the mass of a rocket going up vertically is 100 kg. If it is ejecting 6 kg of gas per second at a speed of 400 m/s, the acceleration of the rocket would be (taking $g = 10 \text{ m/s}^2$)

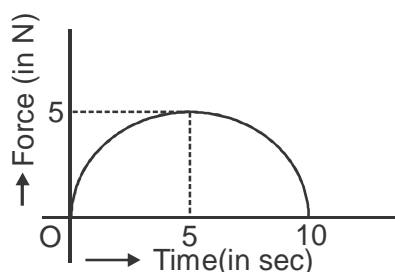
- (a) 24 m/s^2 (b) 10 m/s^2
(c) 14 m/s^2 (d) 4 m/s^2

10. Two masses of 5 kg and 10 kg are connected to a pulley as shown. What will be the acceleration of the system ($g =$ acceleration due to gravity)



- (a) g (b) $\frac{g}{2}$ (c) $\frac{g}{3}$ (d) $\frac{g}{4}$

11. A particle of mass m , initially at rest, is acted upon by a variable force F for a brief interval of time 10 sec. It begins to move with a velocity u after the force stops acting. F is shown in the graph as a function of time. The curve is a semicircle.



- (a) $u = \frac{25\pi}{2m}$ (b) $u = \frac{50\pi}{2m}$
(c) $u = \frac{100\pi}{2m}$ (d) $u = \text{Zero}$

12. A satellite of the earth is revolving in a circular orbit with a uniform speed v . If the gravitational force suddenly disappears, the satellite will

- (a) Continue to move with velocity v along the original orbit
(b) Move with a velocity v , tangentially to the original orbit

- (c) Fall down with increasing velocity
(d) Ultimately come to rest somewhere on the original orbit

13. Two sphere of mass m and M are situated in air and the gravitational force between them is F . The space around the masses is now filled with a liquid of relative density 3. The gravitational force will now be

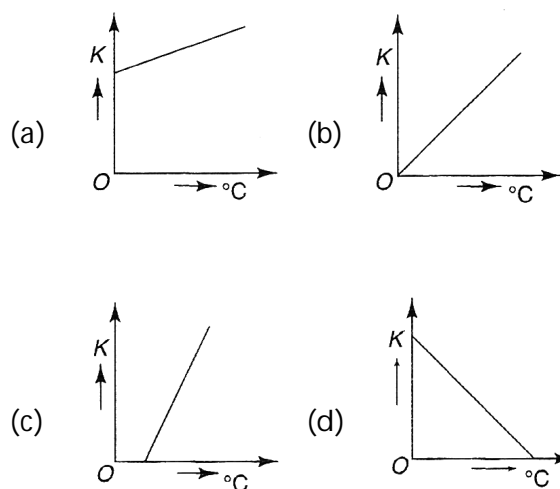
- (a) F (b) $\frac{F}{3}$ (c) $\frac{F}{9}$ (d) $3F$

14. If the change in the value of ' g ' at a height h above the surface of the earth is the same as at a depth x below it, then (both x and h being much smaller than the radius of the earth)

- (a) $x = h$ (b) $x = 2h$

- (c) $x = \frac{h}{2}$ (d) $x = h^2$

15. A graph was plotted taking the temperature in $^{\circ}\text{C}$ along the X-axis and the corresponding temperature in Kelvin along the Y-axis. Which of the curves in Fig. most correctly represents this behaviour?



16. When a light ray is reflected repeatedly by a set of parallel plane mirrors, the intensity of the light ray decreases after some reflections. This is because of

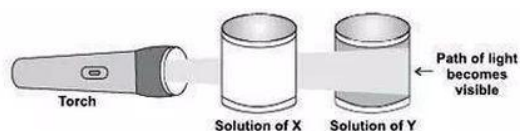
- (a) poor reflection from mirrors
(b) absorption of some amount of light by mirrors
(c) dispersion of light when the rays travel through the atmosphere
(d) scattering of light by the mirrors

17. V_V , V_R , V_G are the velocities of a violet, red and green light respectively passing through a prism after the dispersion of white light. Which among the following is a correct relation?

- (a) $V_V = V_R = V_G$ (b) $V_V > V_R > V_G$
 (c) $V_V < V_G < V_R$ (d) $V_V < V_R < V_G$

18. Light is passed through the solution of X and solution of Y. The following figure shows the observation.

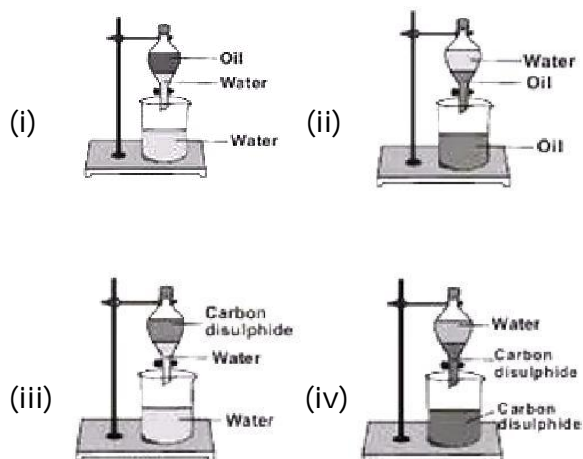
What could be X and Y?



- (a) X = Milk Y = Mud
 (b) X = Mud Y = Milk
 (c) X = Milk Y = Copper sulphate
 (d) X = Copper sulphate Y = Milk

19. Two mixtures containing mustard oil and water, and carbon disulphide and water are poured into separating funnels and kept undisturbed for some time. Two layers separate out according to their densities.

Which of the following observation do you think is correct?



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

20. Which of the following involves fractional distillation?

- I. Separation of constituents from liquefied air.
 II. Separation of constituents from crude petroleum.
 III. Separation of carbon tetrachloride from water.
 IV. Separation of naphthalene from common salt.
- (a) I and II (b) I and IV
 (c) II and IV (d) I and III

21. Statement I : Soap solution appears cloudy.

Statement II : Soap micelles are large enough to scatter light.

- (a) Both statement I and II are true, statement II is correct explanation for statement I.
 (b) Both statements I and II are true, statement II is not the correct explanation for statement I
 (c) Statement I is true and Statement II is false.
 (d) Statement I is false and statement II is true.

22. The freezing and boiling points of a substance 'P' are -220°C and -185°C respectively.

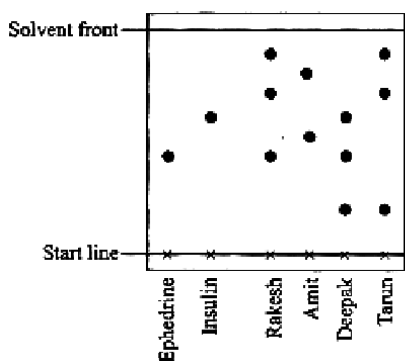
At which of the following range of temperature will 'P' exist as a liquid?

- (a) Between -175°C and -210°C
 (b) Between -190°C and -225°C
 (c) Between -200° and -160°C
 (d) Between -195°C and -215°C

23. Use of drugs like ephedrine and insulin by athletes is banned.

Rakesh, Amit, Deepak and Tarun were asked by a trainer to give their urine samples for the tests.

Chromatogram of their urine samples and drugs is shown below.

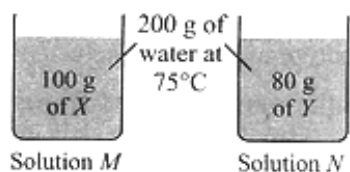


Study the given chromatogram carefully and choose the incorrect statement among the following.

- (a) Deepak used both the drugs
 (b) Rakesh and Deepak used insulin
 (c) Rakesh used ephedrine.
 (d) Amit and Tarun did not use any of the given drugs.
24. The solubility of two substances, X and Y at 35°C and 75°C is given in the table

Temperature (°C)	Maximum amount (g) that can dissolve in 100 g of water	
	Substance X	Substance Y
35	30	40
75	70	50

Two solutions, M and N are shown below.



If the temperature of solutions M and N is dropped to 35°C, then amount of X and Y crystallized out will be___

- (a) 40g, 30 g (b) 25g, 80g
 (c) 40g, 0g (d) 80g, 55 g

25. Few properties of gases X, Y and Z are given. Gases X and Y dissolve in rain water and produce acid rain. Identify gases X, Y and Z respectively on the basis of the given properties.

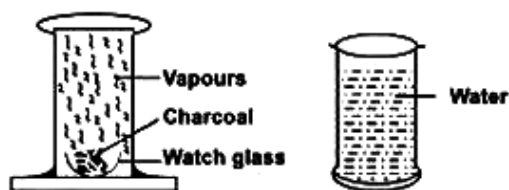
Gas X : An extremely suffocating and corrosive gas, released by burning coal and diesel.

Gas y : Given off by petrol engines

Gas Z : Produced by incomplete combustion of fuels.

- (a) CO_2 , H_2 , SO_2 (b) SO_2 , NO_2 , CO
 (c) NO_2 , SO_2 , CO (d) H_2 , SO_2 , CO

26. A piece of charcoal is burnt and kept in a watch glass. The burning charcoal is covered by an inverted gas jar. It is observed that the charcoal stops burning after some time. Take out the jar and add some water to it. Test the solution with red and blue litmus paper. What do you observe?



- (a) Solution turns red litmus blue, hence the oxide formed by burning of charcoal was basic oxide.
 (b) Solution turns blue litmus red, hence the oxide formed by burning of charcoal was acidic oxide.
 (c) Solution does not change the colour of litmus paper, hence the oxide formed by burning charcoal was neutral.
 (d) Solution turns blue litmus red, hence the oxide formed by burning charcoal was basic oxide.
27. Rakesh was preparing a true solution of sugar in water in a beaker, By chance he added sugar in excess. He kept stirring the solution for some-time but the sugar settled down in the beaker. He filtered the solution. What will be the nature of the filtrate?
- (a) Unsaturated solution
 (b) Saturated solution
 (c) Colloidal solution (d) Suspension

28. Study the table carefully and select the appropriate options.

Sample	Conductor of electricity	Malleability	Lustrous
W	√	√	√
X	√	x	√
Y	√	x	√
Z	√	x	√

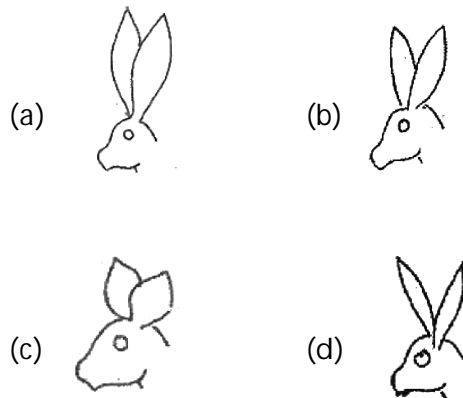
- | | | | | |
|--|---|---|---|---|
| | W | X | Y | Z |
|--|---|---|---|---|
- (a) Potassium Sodium Graphite Aluminium
 (b) Graphite Aluminium Sodium Potassium
 (c) Sodium Aluminium Potassium Graphite
 (d) Aluminium Sodium Graphite Potassium
29. Identify the incorrect statement from the given definitions of solids, liquids and gases in terms of melting and boiling points.
- (a) A substance is said to be in solid state if under normal pressure, its melting point is above the room temperature.
 (b) A substance is said to be in liquid state if under normal pressure, its melting point is below the room temperature.
 (c) A substance is said to be in gaseous state if under normal pressure, its boiling point is below the room temperature.
 (d) A substance can exist in solid, liquid and gaseous state under normal pressure and room temperature.
30. A gas which is combustible and can support combustion is
- (a) oxygen.
 (b) nitrous oxide.
 (c) nitric oxide.
 (d) carbon monoxide.
31. An acidic oxide X with water gives Y. This Y with $\text{Cu}(\text{OH})_2$ gives a blue colored solution. Identify X.
- (a) SO_2 (b) SO_3
 (c) NO_2 (d) CO_2
32. What is the amount of solute required to make 40g of a saturated solution if the solubility of the solute is 10?
- (a) 10g (b) 3.6g
 (c) 4g (d) 5g

33. What could be the freezing point and boiling point of saline water?
- (a) 0°C , 100°C (b) -5°C , 110°C
 (c) -5°C , 98°C (d) $+3^\circ\text{C}$, 97°C
34. If the solubility of sodium chloride is 36.5 at 20°C , then its solubility at 50°C is
- (a) 36.9. (b) 34.0.
 (c) 41.0. (d) 39.4.

BIOLOGY

1. Large no. of Ribosomes are present in cell that specialize in producing which of the following-
- (a) lipids (b) steroids
 (c) starch (d) proteins
2. A cow's herbivorous diet indicates that it is a(n)
- (a) primary consumer.
 (b) secondary consumer.
 (c) autotrophs (d) decomposer
3. To recycle nutrients, the minimum an ecosystem must have
- (a) producers
 (b) producers and decomposers
 (c) producers, primary consumers and decomposer
 (d) producers, primary, secondary consumer and top carnivores
4. Which of the following relationship between cell structure and their respective functions is correct?
- (a) cell wall -Protein production
 (b) chloroplast chief sites of photosynthesis
 (c) lysosomes ATP formation.
 (d) Chromosomes power house of cell
5. Which of the following has maximum protein value?
- (a) gram (b) papaya
 (c) orange (d) honey
6. Secondary growth is:-
- (a) Increase in length.
 (b) Root elongation
 (c) Increase in width (Girth)
 (d) fruiting

7. An electromicroscope (resolution 1nm) can visualize structure smaller than 100 nm. Which structure could you only see with the aid of an electron microscope ?
1. A frog egg
 2. A plant chloroplast
 3. A virus particle
 4. A protein molecule
- (a) 1, 2 and 3 (b) 2 and 3
(c) 3 and 4 (d) 4 only
8. DNA is found in
- (a) Mitochondria (b) Nucleus
(c) Chloroplast (d) All of the above
9. Totipotency is a:
- (a) Power of cell
(b) Its a honey bee nector.
(c) Ability of cell to form any type of cell.
(d) Dance step of mountain people
10. Fish gills are
- (a) only respiratory in function
(b) only excretory in function
(c) osmoregulatory in function
(d) all of the above
11. Involuntary muscles are not found in
- (a) iris
(b) bronchi of the lungs
(c) tongue
(d) heart
12. Different microorganisms taking part in nitrogen cycle are -
- (i) Rhizobia in root nodules
 - (ii) Ammonifying bacteria
 - (iii) Nitrifying bacteria
 - (iv) Denitrifying bacteria
- Which of them work strictly under anaerobic conditions ?
- (a) only iv (b) i and iv
(c) i, ii and iv (d) none of these
13. A cell when viewed under the microscope clearly revealed nucleus, glycogen granules and cell wall. The cell most likely belongs to
- (a) a bacterium (b) a plant cell
(c) fungal cell (d) a protist
14. Which group of organelles is involved in anabolic processes in a cell ?
- (a) lysosome, vacuole, ribosome
(b) ribosome, rough ER, smooth ER
(c) vacuole, rough ER, smooth ER
(d) smooth ER, ribosome, vacuole
15. Green manure involves growing leguminous plants and plowing them in. It ensures enrichment of soil since:
- (a) root nodules on them add nitrogen salts.
(b) legumes grow faster and accumulate phosphate.
(c) legumes incorporate higher amount of potassium.
(d) all of the above.
16. Accompanying pictures show the closely related species inhabiting environments varying mainly in temperatures. Which of them seems to be from the warmest habitat ?



ANSWER KEY

MENTAL ABILITY		MATHEMATICS		PHYSICS & CHEMISTRY		BIOLOGY	
1.	A	1.	A	21.	B	1.	D
2.	B	2.	B	22.	A	2.	A
3.	B	3.	C	23.	A	3.	C
4.	D	4.	C	24.	D	4.	B
5.	A	5.	D	25.	A	5.	A
6.	C	6.	D	26.	C	6.	C
7.	D	7.	A	27.	C	7.	C
8.	C	8.	C	28.	A	8.	D
9.	B,D	9.	C	29.	D	9.	C
10.	D	10.	B	30.	C	10.	D
11.	C	11.	A	11.	A	11.	C
12.	C	12.	C	12.	B	12.	A
13.	C	13.	A	13.	A	13.	C
14.	C	14.	C	14.	B	14.	B
15.	B	15.	D	15.	A	15.	D
16.	C	16.	A	16.	B	16.	A
17.	A	17.	C	17.	C		
18.	A	18.	C	18.	D		
19.	D	19.	A	19.	C		
20.	C	20.	D	20.	A		

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