SciQuest

CLASS X

by Zaariya

16th November, 2019.   TIME ALLOTTED: 2 HOURS

INSTRUCTIONS TO CANDIDATES

1. The Answer Sheet is kept inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars carefully.

2. This examination paper contains **EIGHTY(80)** questions and comprises **TWENTY EIGHT(28)** printed pages. The maximum marks are 200.

3. There are **FIVE(5)** parts in this question paper A, B, C, D and E having 20, 15, 15, 15 and 15 questions respectively.

4. The **last 5 questions** of each part (except A-MAT) are worth **+FOUR(4)** marks each and a wrong answer will result in deduction of **ONE(1)** mark.

5. The remaining questions are worth **+TWO(2)** marks and a wrong answer will result in deduction of **HALF(1/2)** mark from the total score.

6. Unattempted questions will not affect your score.

7. There is only one correct response to each question. Filling up more than one response in any question will be treated as a wrong response.

8. No candidate is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.

Personal Details

Name of the Candidate

Registration Number

Centre Code

1. Which of the following options is a proper replace for '#' in this series?

$$6765, 4181, 2584, 1597, \# , 610, 377$$

   (a) 978   (b) 897   (c) 879   (d) 987

2. Find the next number in the following sequence.

$$5, 10, 35, 660,$$

   (a) 391625   (b) 390625   (c) 391285   (d) 390285

3. The following figures show the sequence of folding and then cutting a piece of paper. Which of the four options below would most closely resemble the unfold form of the paper after cutting?
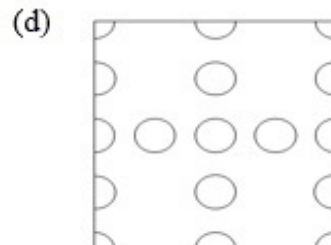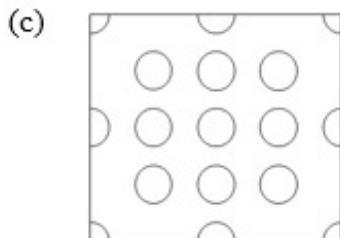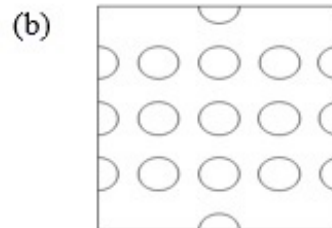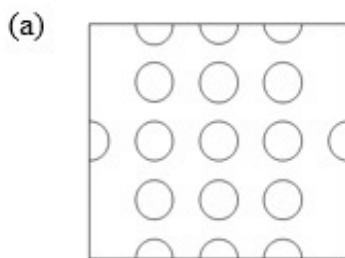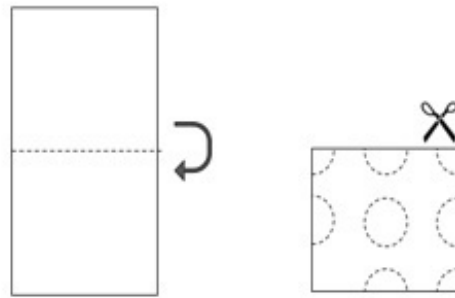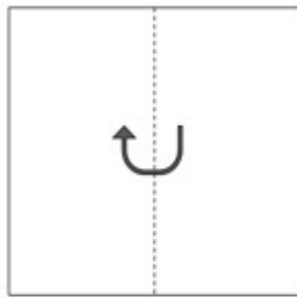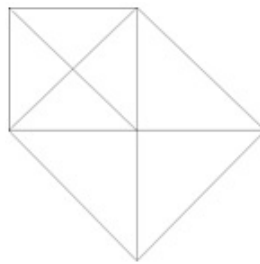

Space for rough work

4. The following grid is a game of 9 (3 × 3) game, named mini-Sudoku. The rules of the game are simple: each of the rows as well as columns have to contain all the numbers 1-3. Each number can only appear once in a row or column. Some of the numbers in the boxes are given and you have to solve the puzzle. The following is a diagram of a solved example.

1	2	3
2	3	1
3	1	2

Find out the minimum number of entries required in order to get a unique solution.

(a) 2   (b) 3   (c) 4   (d) 5

5. Count the total numbers of triangles in this diagram.

(a) 8   (b) 12   (c) 15   (d) 18

Space for rough work

6. A dice with six faces is marked with six numbers 1, 2, 3, 4, 5 and 6 respectively. This dice is rolled three times and three positions are shown as below. Which number will be opposite to number 4?
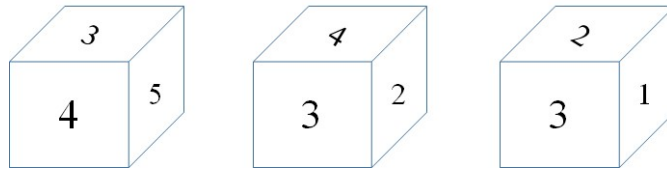
(a) 1   (b) 2   (c) 5   (d) 6

7. Which of the following figures best represents the best relation between M.P., M.L.A. and Elected house?
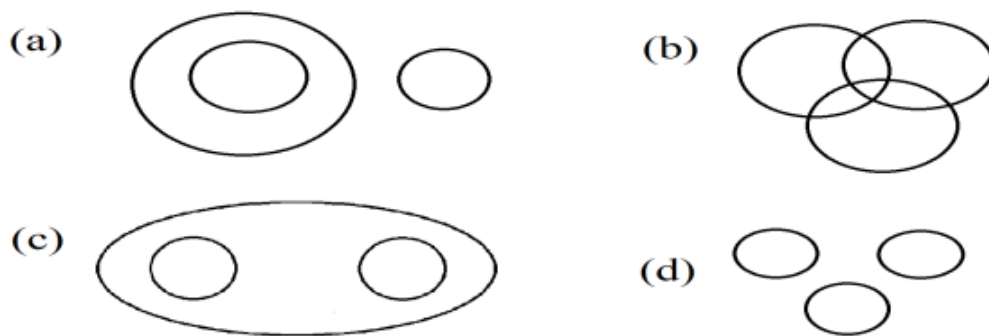
8. What will be the correct replacement for '$' ?

(a) 30   (b) 36   (c) 42   (d) None of these

Space for rough work

4

9. When is the following statement true?

   "Yesterday I saw an ice cube which had already melted due to heat of a nearby furnace."

   (a) Always

   (b) Never

   (c) Depends on the probability of speaking truth

   (d) Depends on the temperature of the furnace

10. If City of Temples : Bhubaneswar :: City of Lakes : ?

    (a) Udaipur   (b) Kochi   (c) Jaipur   (d) Chilika

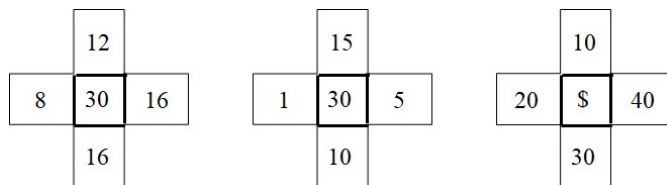   Read this paragraph carefully and answer questions 11-12, which are based on this.

    Anoushka, Prem, Smruti, Shivam, Suritra and Tanya are sitting around a round table. Suritra is sitting between Anoushka and Tanya. Smruti is sitting between Prem and Shivam. Anoushka and Shivam are facing each other. Tanya is sitting right to Shivam.

11. Who is sitting left to Anoushka?

    (a) Smruti   (b) Prem   (c) Suritra   (d) Tanya

12. Who are the neighbours of Shivam?

    (a) Prem and Suritra (b) Smruti and Prem (c) Smruti and Tanya (d) Smruti and Suritra

Space for rough work

5

13. What is the 100th letter of the sequence 'ABBCCCDDDDEEEEE...'?

   (a) M   (b) N   (c) O   (d) P

14. If in a certain coding language, BIRD is coded as WIRY, PAINT is coded as GMRZK and NICE is coded as VXRM; then how is LIGHT coded in the same language?

   (a) GSTRO   (b) GRTSO   (c) ORTSG   (d) OSTRG

15. If 20 – 10 means 200, 8 / 4 means 12, 6 × 2 means 4 and 15 + 5 means 3; then what will (100 – 10 × 1000 / 1000 + 100 × 10) be equal to?

   (a) 0   (b) 20   (c) 1090   (d) 1900

16. On Asgard all clocks run on Edda and Dagar system instead of Hour and Minutes. 1 Edda equals to 120 Dagars and 1 Dagar equals to 120 seconds of Earth. Thor of Asgard and Iron Man of Earth matches their watches exactly at 0:00:00 in both system. If the length of day is same on both planets are same, then how would Thor translate 3 Edda 60 Dagar on his watch to Iron Man?

   (a) 2:30 AM   (b) 2:00 AM   (c) 2:30 PM   (d) 2:00 PM

Space for rough work

6

17. Rajesh's school bus is facing North when he reaches his school. After starting from Rajesh's house, it turned left twice and then once right. What direction the bus was facing when it left the bus-stop in front of Rajesh's house?

    (a) North (b) East (c) South (d) West

18. Mr Sharma is G's maternal grandfather. E is Mr Sharma's son. E has one unmarried brother, but is married himself. F is G's father. H is F's sister and G's only aunt in the entire family. F's surname is Malhotra. Assuming all males in the family took the female's surname after marriage, how many members now have the Sharma surname excluding Mr and Mrs Sharma?

    (a) 5 (b) 7 (c) 4 (d) 8

19. In evolutionary sciences, the host-pathogen interaction is defined as how microbes or viruses (pathogens) sustain themselves within host organisms. An island called Amazonia is separated from outer world. It has four populations A, B, C and D. B predates on A and C is prey for D. B and C share host-pathogen relationship. Due to an unknown reason, population of C suddenly increases. Which of the followings belongs to consequences?

    (a) Population of D increases and A decreases

    (b) Population of D and A both increases

    (c) Population of B and D both decreases

    (d) Population of B increases and D decreases

Space for rough work

7

20. In this question, two statements I and II are given, followed by conclusions I and II. Read carefully and decide which of the given conclusions directly follows from the given two statements.

Statements:

   I. No magazine is cap.

  II. All caps are cameras.

Conclusion:

   I. No camera is magazine.

  II. Some cameras are magazines.

  (a) Only conclusion I follows

  (b) Only conclusion II follows

  (c) Neither conclusion I or II follows

  (d) Either conclusion I nor II follows

Space for rough work

Part B- PHYSICS

21. Ohm's law can be written as R=V/I. In a closed-circuit, the voltage is doubled. Then which of the following is wrong?

    (a) Current will get doubled

    (b) Current will get halved

    (c) Power will increase by 4 times

    (d) Resistance will get doubled

22. In a circuit containing a cell and a 10 kΩ resistance in series, the current is found to be 0.3 mA. What work will be done to move 4C charge from positive to the negative terminal of the cell?

    (a) 3J   (b) 4J   (c) 12C   (d) 10C

23. A galvanometer can be used to detect current in the circuit. When the cell (voltage source) is reversed i.e., negative and positive terminals are interchanged then

    (a) The needle will change its direction of deflection

    (b) The needle won't show any deflection

    (c) The needle will remain at the same position as before

    (d) Insufficient information

24. Which of the following does not work on the principle of electromagnetic induction?

    (a) AC generator

    (b) Induction cooker

    (c) Electric motor

    (d) Transformer

Space for rough work

25. Which of the following is a conventional source of energy?

    (a) Solar energy   (c) Tidal energy

    (b) Geothermal energy   (d) Wind energy

26. In front of a concave mirror, you found a point on the principal axis near which the size of image formed changed from diminished to enlarged. Let this point be x cm from the pole of the mirror. The same mirror is now placed in sunlight at what distance from the pole will it converge the sunlight?

    (a) $2x$ (b) x (c) $\frac{x}{2}$ (d) $\frac{x}{4}$

27. Three lenses of focal length $8cm, 16cm$ and $-12cm$ are placed in contact linearly. What is the net focal length of the combination?

    (a) $\frac{5}{48}cm$ (b) $\frac{13}{48}cm$ (c) $\frac{5}{24}cm$ (d) $\frac{11}{36}$

28. The spectacle of your friend has power -2.0. Then what is the defect in his vision and focal length of his spectacle?

    (a) Myopic, $-2m$ (c) Myopic, $-50cm$

    (b) Hypermetropic, $-2m$ (d) Hypermetropic, $-50cm$

29. The color of the sun at sunrise or sunset is red because:

    (a) Red color has high frequency and so it scatters more

    (b) Blue color has high frequency and so it scatters more

    (c) Red color has high speed so it reaches first
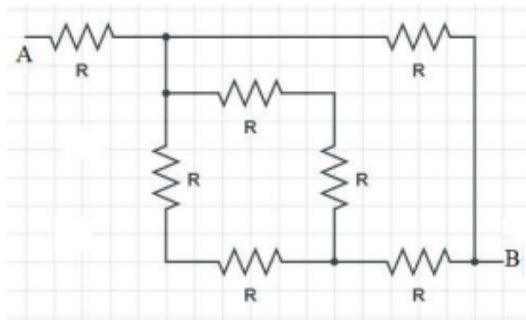
    (d) None of the above

Space for rough work

30. You want to convert an AC generator into a DC generator. What will be required for this purpose?

   (a) split-ring type commutator
   (c) slip rings and brushes
   (b) a stronger magnetic field
   (d) a rectangular wire loop

31. Find the net resistance between point A and B in the given circuit.

   (a) $\frac{5}{3}R$
   (b) $\frac{5}{2}R$
   (c) $5R$
   (d) $\frac{3}{5}R$

32. When two equal resistance wires A and B were connected in series their equivalent resistance was $4R$. Wire A (of initial length L) was stretched such that it's new length is 2L. What is the equivalent resistance of wire A and wire B when connected in parallel?

   (a) $\frac{4}{3}R$
   (b) $\frac{2}{3}R$
   (c) $\frac{8}{5}R$
   (d) R

33. The daily energy bill for four 100W bulbs and two 200W fans used for 12 hours reduced by 600.00 by replacing all the four bulbs by 20W LED bulbs. What is the cost of electricity per kWh?

   (a) 6.4
   (b) 7.2
   (c) 5.6
   (d) 4.8

Space for rough work

34. The focal length of a convex lens is 16cm. When a real image of height 6cm is formed 24 cm away from the pole what is the height of the object?

   (a) $3cm$ (b) $4cm$ (c) $6cm$ (d) $8cm$

35. The source of energy in the Sun is nuclear fusion. Which of the options describes nuclear fusion best?

   (a) conversion of hydrogen nucleus to helium nucleus

   (b) conversion of helium nucleus to hydrogen nucleus

   (c) conversion of a heavy nucleus to lighter nuclei

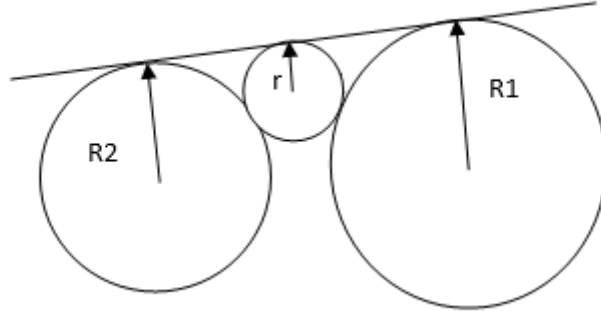   (d) conversion of lighter nuclei to heavy nucleus

Space for rough work

36. Three circles touch each other externally as shown in the figure below. If XYZ is a common tangent. Then, what is the relation between the radii?

(a) $R_1 - R_2 = r$ (b) $R_1 + r = R_2$ (c) $\frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{r}$ (d) $\frac{1}{\sqrt{R_1}} + \frac{1}{\sqrt{R_2}} = \frac{1}{\sqrt{r}}$

37. A bag contains 12 balls of which x are white. P is the probability that a white ball is drawn at random. If 6 more white balls are added, the probability of drawing a white ball is 2P. Find x.

(a) 5 (b) 2 (c) 3 (d) 4

38. Five male employees and 3 female employees are the only available candidates for a managerial post. Let P_1 be the probability that a man is chosen and P_2 be the probability that a woman is chosen. Given that no male candidates were eligible, what is the value of $|P_2 - P_1|$?

(a) $\frac{3}{8}$ (b) $\frac{7}{8}$ (c) $\frac{5}{8}$ (d) $\frac{12}{36}$

Space for rough work

39. Find the roots of $\frac{x-1}{x-2} + \frac{x-3}{x-4} = \frac{10}{3}$, where $x \neq 2, 4$

   (a) 5 and $\frac{27}{13}$ (b) 16 and $\frac{5}{2}$ (c) 5 and $\frac{5}{2}$ (d) 3 and 7

40. Let $f(\theta) = 2sin^2(\theta) + sin(\theta) = 2$ and $sin(5) = 0.087$
What is a possible interval for solution of $f(\theta)$ in degrees?

   (a) $(30, 40)$ (b) $(50, 60)$ (c) $(45, 50)$ (d) None

41. $cos^2(\theta) + cos(\theta) = 1$, then what is the value of $sin^2(\theta) + sin^4(\theta)$?

   (a) $\frac{\sqrt{3}+1}{4}$ (b) $sin(\frac{\pi}{4})$ (c) $\frac{\sqrt{3}}{2}$ (d) 1

42. In a triangle ABC, $AC^2 - AB^2 = BC^2$
If M is a point on AC such that BM is perpendicular to AC.
Then, what is a possible value of BM^2?

   (a) $AC \times CM$ (b) AM^2 (c) $CM \times MA$ (d) $\frac{AC \times BC^2}{AB}$

Space for rough work

14

43. What are the minimum and maximum values of $sin^6(\theta) + cos^6(\theta)$?

    (a) $1, 0.25$ (b) $1, 0.75$ (c) $1, 0$ (d) $1, 0.5$

44. If $sin\alpha$ and $cos\alpha$ are the roots of $px^2 + qx + r = 0$, then

    (a) $p^2 - q^2 + 2pr = 0$ (c) $p^2 + q^2 + 2pr = 1$
    (b) $p^2 + q^2 + 2pr = 0$ (d) None

45. $f(x) = ax^{2019} + bx^{2017} + c^{2015} - 5$
    If $f(-7) = 2019$, then $f(7)$ is

    (a) 2019 (b) -2024 (c) -2032 (d) -2029

46. $17x^2 = 25x + p$ has roots A and B.
    If $(A, 0), (0, B)$, and $(1, 1)$ are collinear, what is the value of p?

    (a) 17 (b) 2 (c) -25 (d) -5

Space for rough work

47. If $f^1(x) = \frac{1}{1-x}$ and $f^n = f(f^{n-1})$ for all $n > 1$.
    Find the value of $f^{2019}(2018)$

    (a) 2018
    (b) $-\frac{1}{2017}$
    (c) $\frac{2017}{2018}$
    (d) None

48. $x + \frac{1}{y} = 4$, $y + \frac{1}{z} = 1$ and $z + \frac{1}{x} = \frac{7}{3}$
    If x, y and z are positive numbers then what is xyz?

    (a) 1
    (b) 1.5
    (c) 0.5
    (d) $\frac{2}{3}$

49. Let $f(x) = \frac{c(x-a)(x-b)}{(c-a)(c-b)} + \frac{a(x-a)(x-b)}{(a-b)(a-c)} + \frac{b(x-c)(x-a)}{(b-c)(b-a)}$, where a, b, and c are all distinct real numbers.
    Then, what is $f(2019)$

    (a) 1
    (b) 1.5
    (c) 0.5
    (d) $\frac{2}{3}$

50. If b is the diameter of a circle . A and C be diametrically opposite points such that the distance to any point P be a and c respectively.
    If $(a + c)^2 = b^2 + (a - c)^2$,
    Then how many roots does $ax^2 + bx + c$ have?

    (a) 0
    (c) 2
    (b) 1
    (d) More information is required

Space for rough work

51. Ruhi is a paleontologist whose work is to classify fossils. She recently found two fossils with their entire body intact. She wants to classify them as Herbivore or Carnivore. Which of the following body characters she should focus on?

    (a) Tooth types
    (b) Brain size

    (c) Size of the alimentary canal
    (d) Both a and c

52. Coliform bacteria are commonly present in the human intestine. The concentration of the bacterium can be used as an indicator of water pollution. Data for four samples A, B, C, and D are given(in colony-forming units per 100 mL):

    A = 138 CFU/100 mL
    B = 2 CFU/ 100 mL
    C = 32 CFU/ 100 mL
    D > 200 CFU/ 100 mL

    Which sample would cause minimal damage to your body if you drank the water sample and which may be the one from the sewage tank of your society?

    (a) A, D   (b) D, B   (c) B, D   (d) B, C

53. Any two characters in the mendelian cross assort independently of each other because:

    (a) They are present in a single DNA molecule
    (b) They are present in two different DNA molecules
    (c) They don't like each other
    (d) None of the above

Space for rough work

54. Consider the following statements regarding evolution:

I. The frequency of certain genes in a population change over generations.
II. Natural selection is directing in nature.
III. Genetic drift provides diversity with adaptation.
IV. Acquired characters cannot be passed to the next generation.

Which of the above statements is/are True?

(a) I, II, IV   (b) I, IV   (c) III only   (d) II only

55. A reflex action does not involve:

(a) Brain   (b) Spinal cord   (c) Neurons   (d) Muscle fiber

56. The first enzyme that the food encounters in the human digestive system is:

(a) Pepsin   (b) Ptyalin   (c) Trypsin   (d) Lipase

57. In Frogs, body proportions do not change with their growth. A frog that is half as long as another will be lighter by approximately

(a) One-eighth   (b) One-fourth   (c) Half   (d) One-fifth

58. A diabetic individual becomes unconscious after injecting insulin into his body. What should be immediately done to revive the individual?

(a) Provide him sugar   (b) Provide him lots of water

(c) Provide him salt solution   (d) Give him more insulin

Space for rough work

59. When the leaf of 'touch-me-not'(*Mimosa pudica*) plant is touched, the leaf droops because:

   (a) The temperature of the plant increases

   (b) A nerve signal passes through the plant

   (c) The plant dies

   (d) Water is lost from the cells at the base of the leaves

60. Which, among grass, goat, tiger, and vulture, in a food chain, will have the maximum concentration of harmful chemicals in its body due to contamination of pesticides in the soil?

   (a) Grass since it grows in contaminated soil

   (b) Goats since it eats the grass

   (c) Tiger since it feeds on the goat which feeds on the grass

   (d) Vulture since it eats the tiger, which in turn eats the goat, which eats the grass

61. A random mutation gives rise to an allele that causes its host to develop an extra lens in the eye, forming in front of the original, and having the same curvature as the first. If the person had normal vision earlier, choose the correct statement:

   (a) He should use a biconvex lens.

   (b) He should use a biconcave lens.

   (c) He should do nothing, as his vision is still normal.

   (d) His vision can only be rectified by surgical means.

Space for rough work

62. Naruto was sitting outside Area 51 for a long time, waiting for the raid. When he realized that the raid wasn't happening, then, he got up, but experienced numbness in his feet which is often called "going to sleep". What do you think was the reason?

   (a) Sasuke was hiding in the bushes, and he wanted to compete with Naruto for the title of Hokage, so, he used a Jutsu against him.

   (b) Kurama was trying to overpower Naruto.

   (c) Reduced blood flow in the lower limbs.

   (d) His heart was pumping blood slowly.

63. Enzymes are protein molecules which is indispensable to the living world. They act as a catalyst to bring about a specific biochemical reaction. Each enzyme has a range of pH it is functional at. That's why our body has acidic and basic regions to activate certain enzymes. Keeping these pieces of information in mind, which of the following statements is/are **false**?

   (a) Pepsin will digest proteins in a test tube containing HCl solution with a pH value of 2

   (b) Pancreatic enzymes are functional at low pH

   (c) Bile juice contains no enzymes

   (d) All of the above

Space for rough work

64. Which of the following option correctly replaces (a), (b), (c), and (d) respectively in the following pathways of glucose break-down?
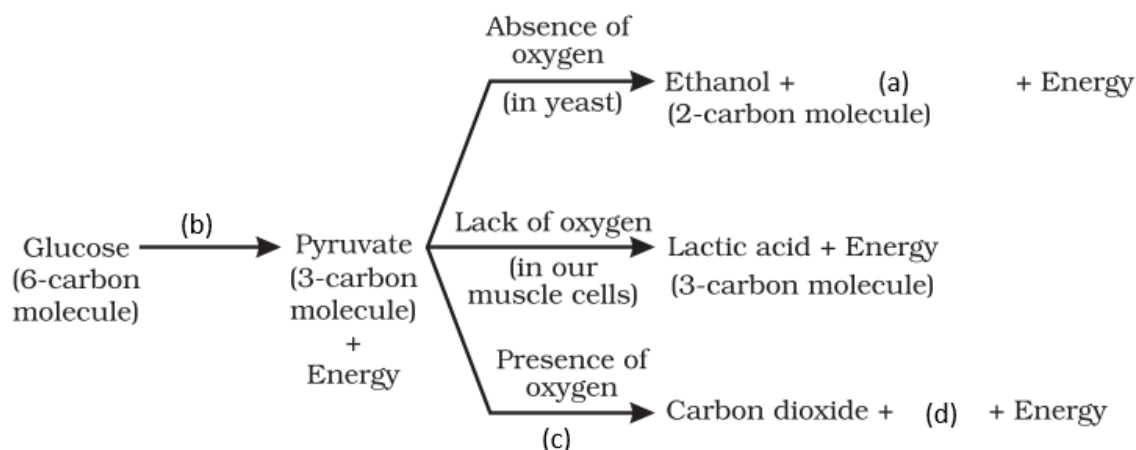
(a) H2O; In cytoplasm; In cytoplasm; H2O

(b) CO2; In mitochondria; In cytoplasm; H2O

(c) CO2; In cytoplasm; In mitochondria; H2O

(d) H2O; In cytoplasm; In mitochondria; H2O

65. A Mendelian experiment consisted of breeding tall pea plants bearing violet flowers and wrinkled seeds(P_1) with short pea plants bearing white flowers and round seeds(P_2). The progeny all bore violet flowers, but almost half of them were short and further only half of all short plants had round seeds. Which of the following w.r.t. this cross is true?

(a) P_1 genotype: TtWWrr

(b) P_2 genotype: ttwwRr

(c) Tall plant : wrinkled seed plant $= 1 : 1$
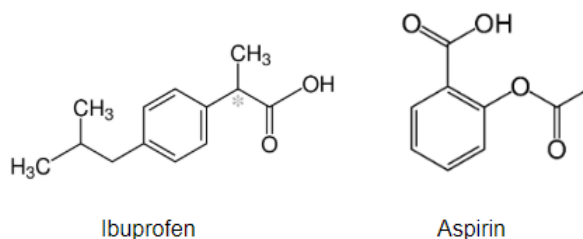
(d) Both a and c

Space for rough work

66. Helium has the lowest value of electron gain enthalpy than any other noble gas, why?

   (a) Because it is a noble gas

   (b) Due to its small size

   (c) Due to its highest ionization enthalpy

   (d) Because added electron is close to nucleus

67. Which of the functional groups are common to both aspirin and ibuprofen?

Ibuprofen   Aspirin

   (a) Carboxylic acid   (b) Acetyl group   (c) Hydroxyl group   (d) Phenol group

68. Nitrogen is a relatively stable element because

   (a) Its atom has a stable electronic configuration

   (b) It has a low atomic radius

   (c) Its electronegativity is high

   (d) Dissociation energy of the molecule is high

Space for rough work

69. Chlorine is evolved by the reaction of

    (a) H_2SO_4 on NaCl

    (b) HCl on K_2SO_4

    (c) HCl on $KMnO_4$

    (d) HNO_3 on KCl

70. Which is not an allotropic form of sulphur?

    (a) Poll sulphur

    (b) Monoclinic Sulphur

    (c) Plastic Sulphur

    (d) Rhombic Sulphur

71. Amongst LiCl, RbCl $BeCl_2$ and $MgCl_2$, compounds with greatest and least ionic character are

    (a) LiCl and RbCl   (b) RbCl and $BeCl_2$

    (c) $MgCl_2$ and $BeCl_2$ (d) RbCl and $MgCl_2$

72. Chemically, rust is

    (a) Hydrated Ferrous oxide   (b) Ferrous Oxide

    (c) Hydrated Ferric Oxide   (d) None

Space for rough work

73. Which one of the following is an acidic indicator?

    (a) Phenolphthalein

    (b) Methyl Orange

    (c) Both (a) and (b)

    (d) None

74. Hardness of water is a very important parameter to validate if a given sample of water is suitable for drinking and cleansing processes. Out of the following 4 given compounds, which substance doesn't contribute to the hardness of water:

    (a) Calcium Carbonate   (b) Sodium Nitrate

    (c) Magnesium Carbonate   (d) Ferrous Chloride

75. You must be knowing about the different functional groups like alkane, alkene, alkyne, carboxylic acid, aldehyde, ketones, amide, etc. Assume you're working in a lab and you suddenly come across an unknown compound. After conducting several experiments, you come to know that the organic compound is a clear liquid having a molecular formula C_4H_8O. It has an open chain structure without any carbon-carbon double bond. The compound can be
(1) an alchohol, (2) an ester, (3) an aldehyde, (4) a ketone.
The combination of possible compounds are

    (a) (1) and (2)   (b) (3) and (4)

    (c) (2) and (4)   (d) (4) and (1)

76. Xenon is used for ion thrusters. This new technology of ionizing the fuel and then using it's energy is being used in rockets to move in space. What could be a good substitute of Xenon for this purpose?

    (a) Cesium   (b) Hydrogen   (c) Aluminium   (d) Helium

Space for rough work

77. While treating algal growth with a powder on the walls of his home where rainwater is seeping from above, Nitish notices that The colour of the walls change from a deep red to a faint red. What can be the possible reason of the side effect?

   (a) The powder was mainly calcium hydride; it liberates H_2 gas.

   (b) The powder was mainly calcium chloride; it liberates free chlorine

   (c) The powder was mainly sodium hydrogencarbonate; it liberates CO

   (d) The powder was mainly calcium hypochlorite; it forms chlorine water

78. Due to a fault in a machine at the factory, a certain chemical was not added to a batch of baking Powder. Unfortunately, you bought a box from this batch. When your mother made a cake, it tasted very bitter and had a metallic tinge to it. Assume that only the baking powder is at fault here. In the same order, what chemical is missing, and which chemical made the cake bitter?

   (a) Tartaric acid; Sodium bicarbonate

   (b) Sodium carbonate; Carbon dioxide

   (c) Tartaric acid; Sodium carbonate

   (d) Sodium bicarbonate; Tartaric acid

79. A solution was made by mixing C_4H_4OS with a solvent. The mass by mass percentage of the solution is 3.0303. Calculate the number of molecules of the organic solute present in 30ml of this solution.[density of the solution is 1.1g/ml]

   (a) 6.022×10^{23} (b) 6.022×10^{21} (c) 3.011×10^{20} (d) 3.011×10^{10}

80. Penicillamine is used in the treatment of arthritis. One molecule of penicillamine contains a single sulphur atom and the weight percentage of sulphur in penicillamine is 21.49. Molecular weight of penicillamine in g mol^{-1} is

   (a) 85.40   (b) 68.76   (c) 125.2   (d) 149.2

Space for rough work

Space for rough work

Space for rough work

Space for rough work

END OF QUESTIONS