

class 10

TARGET

NTSE

National Talent Search Examination

Solved Paper

2018

Stage 2



Time : 120 Minutes

Max. Marks : 100

INSTRUCTIONS FOR CANDIDATES

Read the following instructions carefully before you answer the questions :

1. Answers are to be given on a separate answer-sheet.
2. Write your eight-digit Roll Number very clearly on the test-booklet and answer-sheet as given in your letter / admission card.
3. Write down the Booklet Number in the appropriate box on the answer sheet.
4. There are 100 questions in this test. All are compulsory.
5. Please follow the instructions for marking the answers given on the answer sheet.
6. For questions 1 – 100, put a cross mark (X) on the number of the correct alternative on the answer-sheet against the corresponding question number.
7. If you do not know the answer to any question, do not spend much time on it and pass on to the next one. Time permitting, you can come back to the questions, which you have left in the first instance and try them again.
8. Since the time allotted for this question paper is very limited you should make the best use of it by not spending too much time on any one question.
9. Rough work can be done anywhere in the booklet but not on the answer sheet/loose paper.
10. Every correct answer will be awarded one mark.
11. Please return the Test-booklet and answer-sheet to the invigilator after the test.

- Under which condition stated below, the six-carbon glucose molecule is broken down into three-carbon molecules pyruvate and lactic acid?
 - aerobic condition in muscle cells
 - anaerobic condition in yeast cells
 - aerobic condition in mitochondria
 - anaerobic condition in muscle cells
- Which among the following is the correct sequence regarding the flow of impulse in a neuron .
 - Dendrite → Axon → Cell body
 - Axon → Cell body → Dendrite
 - Axon → Dendrite → Cell body
 - Cell body → Axon → Nerve terminal
- In a hypertensive patient, the systolic pressure increased to 150 mm of Hg. Which part of the brain would be involved in the regulation.
 - Medulla
 - Cerebrum
 - Cerebellum
 - Hypothalamus
- Edward Jenner's contribution for the eradication of small pox is
 - his proposition that small pox had possibly spread throughout the world from India and China.
 - his discovery of transformation procedure.
 - his finding that rubbing of the skin crust of small pox victims on the arm of a healthy person, would develop resistance against small pox.
 - his finding that the cow pox infection protects the person from subsequent infection from small pox.
- Four important events given below may have led to the origin of life on the earth.
 - Formation of amino acids and nucleotides
 - Availability of water
 - Organization of cells
 - Formation of complex molecules
 - I, II, III and IV
 - II, I, IV and III
 - I, IV, II and III
 - II, III, I and IV
- Read the following statements carefully.
 - Energy transfer in the biotic world always proceeds from the autotrophs.
 - Energy flow is unidirectional.
 - Energy availability is maximum at the tertiary level.
 - There is loss of energy from one trophic level to the other.

Select the relevant statements for the forest ecosystem

 - I, II and IV
 - I, II and III
 - I, III and IV
 - II, III and IV
- In a highly pesticide polluted pond. Which of the following aquatic organisms will have the maximum amount of pesticide per gram of body mass?
 - Lotus
 - Fishes
 - Spirogyra*
 - Zooplanktons
- A farmer made an observation in a backwater paddy field of coastal Kerala that the paddy plants wilt during noon onwards everyday but appear normal next morning. What would be the possible reason for wilting?
 - The rate of water absorption is less than the rate of transpiration in the afternoon.
 - The rate of water absorption is more than the rate of transpiration in the afternoon.
 - The changes in the rate of water absorption and transpiration are not associated with wilting.
 - The rate of water absorption is not related to the rate of transpiration.
- Observe the experimental sets [A] & [B].

The diagram shows two identical experimental setups, (A) and (B). Each setup consists of a test tube containing water, with a cotton plug at the top. A plant is placed inside the test tube, with its roots submerged in the water. Setup (A) is labeled 'Day 1' and shows a small, healthy plant. Setup (B) is labeled 'Day 5' and shows a much larger, more developed plant with visible roots and leaves, indicating growth and transpiration over time.

Observe the test tube A & B. From the list given below, choose the combination of responses of shoot and root that are observed in B.

 - Positive phototropism and positive geotropism
 - Negative phototropism and positive geotropism
 - Positive phototropism and negative geotropism
 - Only negative phototropism
- Raw banana has bitter taste, while ripe banana has sweet taste. It happens because of the conversion of
 - Starch to sugar
 - Sucrose to fructose
 - Amino acids to sugar
 - Amino acids to protein
- In the flowering plants sexual reproduction involves several events beginning with the bud and ending in a fruit. These events are arranged in four different combinations. Select the combination that has the correct sequence of events.
 - Embryo, zygote, gametes, fertilization.
 - Gametes, fertilization, zygote, embryo.
 - Fertilization, zygote, gametes, embryo.
 - Gametes, zygote, embryo, fertilization.
- In pea plants, Round (R) and Yellow (Y) features of seeds are dominant over wrinkled (r) and green (y) features. In a cross between two plants having the same genotypes (RrYr), the following genotypic combinations of offspring are noticed.

A-RrYY
B-RrYY

C - rrYy

D - rryy

The phenotypic features of A, B, C, and D are given below in an order in four combinations. Select the correct combination of characters that corresponds to the genotypes,

- (1) Round & yellow; round & green; wrinkled & yellow; wrinkled & green.
(2) Round & green; wrinkled & yellow; wrinkled & green; round & yellow.
(3) Wrinkled & green; round & yellow; wrinkled & yellow; round & green.
(4) Wrinkled & yellow; round & green; wrinkled & yellow; round & yellow.
13. Eukaryotic organisms have different levels of organization. Select the combination where the levels are arranged in the descending order.
(1) DNA, chromosome, cell, nucleus, tissue
(2) Tissue, cell, nucleus, chromosome, DNA
(3) Nucleus, cell, DNA, chromosome, tissue
(4) Tissue, cell, chromosome, nucleus, DNA
14. The gaseous byproduct of a process in plants is essential for another vital process that releases energy. Given below are four combinations of processes and products. Choose the correct combination.
(1) Photosynthesis and oxygen
(2) Respiration and carbon dioxide
(3) Transpiration and water vapour
(4) Germination and carbon dioxide
15. 100 g of oxygen (O_2) gas and 100 g of helium (He) gas are taken in separate containers of equal volume at $100^\circ C$. Which one of the following statement is correct?
(1) Both gases would have the same pressure.
(2) The average kinetic energy of O_2 molecules is greater than that of He molecules.
(3) The pressure of He gas would be greater than that of the O_2 gas.
(4) The average kinetic energy of He and O_2 molecules is same.
16. At 298 K and 1 atm pressure a gas mixture contains equal masses of He, H_2 , O_2 and NH_3 . Which of the following is correct for their average molecular velocities?
(1) $He > H_2 > NH_3 > O_2$ (2) $He < H_2 < O_2 < NH_3$
(3) $H_2 < He < NH_3 < O_2$ (4) $O_2 < NH_3 < He < H_2$
17. A test tube along with calcium carbonate in it initially weighed 30.08 g. A heating experiment was performed on this test tube till calcium carbonate completely decomposed with evolution of a gas. Loss of weight during this experiment was 4.40 g. What is the weight of the empty test tube in this experiment?
(1) 20.08 g (2) 21.00 g
(3) 24.50 g (4) 2.008 g
18. Match List I (Mixture to be separated) with the List II (Method used) and select the correct option using the codes given below

List I
(Mixture to be separated)

A. Petroleum products

List II
(Method used)

I. Chromatography

B. Camphor and rock salt II. Centrifugation
C. Cream from milk III. Sublimation
D. Coloured components in a dye IV. Fractional distillation

(1) A-I, B-II, C-III, D-IV (2) A-II, B-IV, C-III, D-I
(3) A-IV, B-III, C-I, D-II (4) A-IV, B-III, C-II, D-I

19. In the balanced chemical equation :
('a' lead nitrate + 'b' aluminium chloride \rightarrow 'c' aluminium nitrate + 'd' lead chloride)

Which of the following alternative is correct?

(1) a = 1, b = 2, c = 2, d = 1 (2) a = 4, b = 3, c = 3, d = 4
(3) a = 2, b = 3, c = 2, d = 3 (4) a = 3, b = 2, c = 2, d = 3

20. The correct order of increasing number of alpha particles passing undeflected through the foils of Au, Ag, Cu and Al of 1000 atoms thickness each in a simulated alpha particle scattering experiment of Rutherford would be

(1) $Au < Ag < Cu < Al$ (2) $Al < Cu < Ag < Au$
(3) $Au < Cu < Al < Ag$ (4) $Ag < Cu < Al < Au$

21. The correct order of increasing pH values of the aqueous solutions of baking soda, rock salt, washing soda and slaked lime is

(1) Baking Soda < Rock Salt < Washing Soda < Slaked lime
(2) Rock Salt < Baking Soda < Washing Soda < Slaked lime
(3) Slaked lime < Washing Soda < Rock Salt < Baking Soda
(4) Washing Soda < Baking Soda < Rock Salt < Slaked lime

22. How many grams of oxygen gas will be needed for complete combustion of 2 moles of 3rd member of alkyne series ?

(1) 186 g (2) 256 g
(3) 352 g (4) 372 g

23. Match List I (Position of the metal in the Activity Series) with the List II (Related Reduction Process). Select the correct option using the codes given below.

List-I
(Position of the Metal in the Activity Series)

A. The bottom of the series
B. The top of the series
C. The lower regions of the series
D. The middle of the series

List - II
(Related Reduction Process)

I. Electrolysis
II. Reduction by heat alone
III. Found in native state
IV. Reduction using carbon or some other reducing agent

(1) A-II, B-III, C-IV, D-I (2) A-II, B-I, C-IV, D-III
(3) A-III, B-I, C-II, D-IV (4) A-III, B-I, C-IV, D-II

24. Which of the following statement can help a chemistry student to predict chemical properties of an element?

I. Position of element in the periodic table
II. Atomic number of the element
III. Number of shells in the atom
IV. Number of electron in the outer most shell

(1) I, II and III (2) I, II and IV
(3) I, III and IV (4) II, III and IV

25. Consider the elements A, B, C and D with atomic numbers 6, 7, 14 and 15, respectively. Which of the following statements are correct concerning these elements?

I. D will lose electron more easily than C.
 II. C will gain electron more easily than B.
 III. The element with highest electronegativity is D.
 IV. The element with largest atomic size is C.

- (1) I and II (2) II and III
 (3) II and IV (4) III and IV

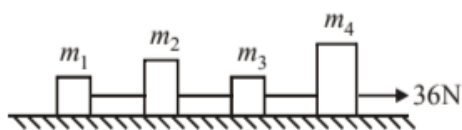
26. A hydrocarbon 'A' (C_3H_8) on treatment with chlorine in presence of sunlight yielded compound 'B' as major product. Reaction of 'B' with aqueous KOH gave 'C' which on treatment with concentrated H_2SO_4 yielded 'D'. Hydrogenation of 'D' gave back 'A'. The sequence of reactions involved in above conversion is:

(1) Substitution, substitution, addition, dehydration
 (2) Substitution, substitution, dehydration, addition
 (3) Substitution, dehydration, addition, addition
 (4) Addition, substitution, dehydration, substitution.

27. An organic liquid 'A' with acidified potassium dichromate gave product 'B'. The compound 'B' on heating with methanol in presence of concentrated sulphuric acid formed compound 'C' which on subsequent treatment with sodium hydroxide formed two product 'D' and 'E'. The product 'D' is known to affect the optic nerve causing blindness. Intake of 'D' in very small quantities can cause death. What are compound 'A', 'B', 'C', 'D' and 'E'?

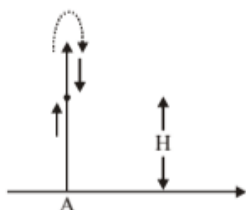
- (1) A = Ethanol, B = Ethanoic acid, C = Methanol
 D = Sodium acetate, E = Methyl ethanoate
 (2) A = Ethanol, B = Ethanoic acid, C = Methyl ethanoate
 D = Methanol, E = Sodium acetate
 (3) A = Sodium acetate, B = Ethanoic acid, C = Methyl ethanoate, D = Methanol, E = Ethanol
 (4) A = Ethanol, B = Ethanoic acid, C = Methyl ethanoate, D = Sodium acetate, E = Methanol

28. Four blocks of different masses ($m_1 = 1$ kg, $m_2 = 2$ kg, $m_3 = 1$ kg and $m_4 = 5$ kg) are connected with light, inextensible strings, as shown in figure. This system is pulled along a frictionless surface by a horizontal force of 36 N. The force pulling the block of mass m_1 will be:



- (1) 2 N (2) 4 N (3) 12 N (4) 36 N

29. A ball is thrown vertically up from the point A (see figure). A person, standing at a height H on the roof of a building, tries to catch it. He misses the catch, the ball overshoots and simultaneously the person starts a stop-watch.



The ball reaches its highest point and he manages to catch it upon its return. By this time, a time interval T has elapsed as recorded by the stop-watch. If g is the acceleration due to gravity at this place, the speed with which the ball was thrown from point A will be:

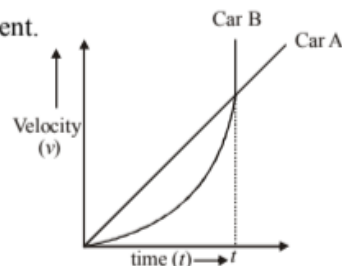
- (1) $\sqrt{gH} + gT$ (2) $\frac{(\sqrt{g^2T^2 + 4gH})}{2}$
 (3) $\frac{(\sqrt{g^2T^2 + 8gH})}{2}$ (4) $(\sqrt{g^2T^2 + 2gH})$

30. A cart of mass M moves at a speed u on a frictionless surface. At regular intervals of length L, blocks of mass $m = \frac{M}{2}$ drops vertically into the cart. How much time is taken to cover a distance of $\frac{9}{2}L$?

- (1) $\frac{9L}{2u}$ (2) $\frac{5L}{2u}$ (3) $\frac{19L}{2u}$ (4) $\frac{17L}{2u}$

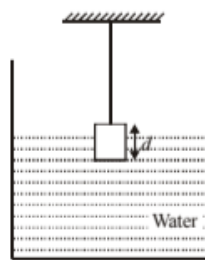
31. The velocity-time graph of motion of two cars A and B is shown in the figure

Choose the correct statement.

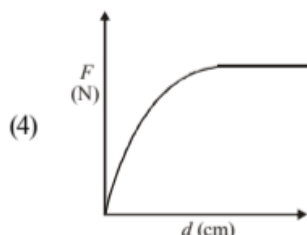
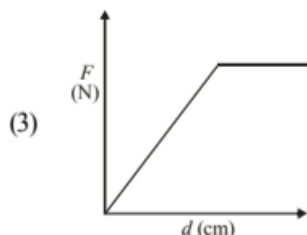


- (1) Accelerations of two cars are equal to each other at time $t = t_0$
 (2) Accelerations of two cars are equal to each other at an instant greater than t_0
 (3) Accelerations of two cars are equal to each other at an instant earlier than t_0
 (4) At no instant in the interval $0 \leq t \leq t_0$, the two accelerations are equal.

32. A metallic cubical solid block of side L is slowly lowered continuously in a large vessel, filled with water. Let d be the depth of the lower surface of the block, measured from the surface of the water, at some instant. The graph which represents correctly the variation of the buoyant force F with depth d is:



- (1) (2)

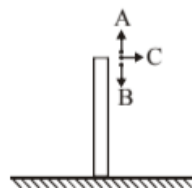


33. On the basis of the following features identify the correct option.

- (I) It is used as a moderator in Nuclear Reactor
 (II) It is used to slow down the fast moving neutrons to control the chain reaction in the Reactor
 (1) Heavy water (D_2O) (2) Graphite rod
 (3) Both (1) and (2) (4) Neither (1) nor (2)

34. Three balls A, B and C of same size but of different masses, are thrown with the same speed from the roof of a building, as shown in figure. Let v_A , v_B and v_C be the respective speeds with which the balls A, B, and C hit the ground. Neglecting air resistance, which one of the following relations is correct?

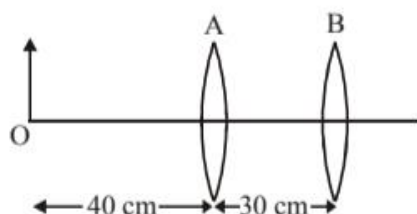
- (1) $v_A > v_C > v_B$
 (2) $v_C > v_A > v_B$
 (3) $v_A > v_B > v_C$
 (4) $v_A = v_B = v_C$



35. A sound wave is sent simultaneously through a long hollow pipe AB and a solid pipe CD of same length and having same cross-sectional area. A person standing at point P as shown in the figure will hear the sound.



- (1) at the same time from pipes, AB and CD
 (2) First from pipe CD and then from pipe AB
 (3) first from pipe AB and then from pipe CD
 (4) From pipe AB only and not from pipe CD
36. Two convex lenses A and B each of focal length 30 cm are separated by 30 cm, as shown in the figure. An object O is placed at a distance of 40 cm to the left of lens A.



What is the distance of the final image formed by this lens system?

- (1) 120 cm to right of lens A
 (2) 90 cm to right of lens A
 (3) 22.5 cm to right of lens B
 (4) 45 cm to right of lens B

37. A ray of light of pure single colour is incident on the face of a prism having angle of the prism 30° at an angle of incidence 45° . The refracted ray does not change its direction as it crosses the other face and emerges out of the prism. The refractive index of the material of the prism is:

- (1) $2/\sqrt{3}$ (2) 2 (3) $\sqrt{2}$ (4) $\sqrt{3}$

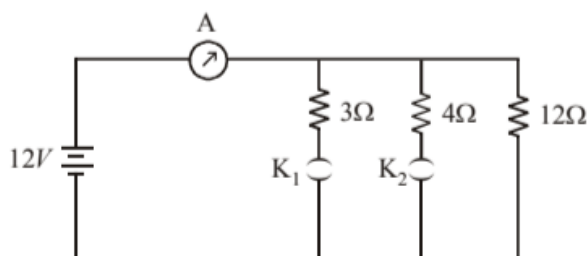
38. Two nichrome wires A and B, each of length 5 cm and of radius 1 cm and 3 cm respectively are connected to each other in series. If a current of 5 A flows through the combination of wires, the ratio of potential difference across wire A to that across wire B will be:

- (1) 1 : 3 (2) 3 : 1 (3) 9 : 1 (4) 1 : 9

39. Three electric bulbs of rating 40 W – 200 V, 50 W – 200 V and 100 W – 200 V are connected in series to a 600 V supply. What is likely to happen as the supply is switched on?

- (1) Only 50 W bulb will fuse
 (2) Both 40 W and 50 W bulbs will fuse.
 (3) All the three bulbs will emit light with their rated powers.
 (4) 100 W bulb will emit light of maximum intensity.

40. An electrical circuit, shown below, consists of a battery, an ammeter, three resistors and two keys.



Consider two cases:

- (i) The key K_1 is closed and the key K_2 is open.
 (ii) The key K_2 is closed and the key K_1 is open.

The ratio of respective currents in those two cases will be:

- (1) 3 : 4 (2) 4 : 3 (3) 4 : 5 (4) 5 : 4

41. Given that $\frac{1}{7} = 0.\overline{142857}$, which is a repeating decimal having six different digits. If x is the sum of such first three

positive integers n such that $\frac{1}{n} = 0.\overline{abcdef}$, where a, b, c, d, e and f are different digits, then the value of x is

- (1) 20 (2) 21 (3) 41 (4) 42

42. Which of the following digits is ruled out in the units place of $12^n + 1$ for every positive integer n ?

- (1) 1 (2) 3 (3) 5 (4) 7

43. The rational roots of the cubic equation $x^3 + 14kx^2 + 56kx - 64k^3 = 0$ are in the ratio 1 : 2 : 4. The possible values of k are

- (1) 0 only (2) 1 only
 (3) 2, 0 (4) -2, -1

44. The odd natural numbers have been divided in groups as $(1, 3); (5, 7, 9, 11); (13, 15, 17, 19, 21, 23), \dots$

Then the sum of numbers in the 10th group is

- (1) 4000 (2) 4003
(3) 4007 (4) 4008
45. If the polynomial $x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + k$, the remainder comes out to be $x + a$, then the value of a is

- (1) -1 (2) -5
(3) 1 (4) 5

46. The values of k , so that the equations $2x^2 + kx - 5 = 0$ and $x^2 - 3x - 4 = 0$ have one root in common, are

- (1) $3, \frac{27}{2}$ (2) $9, \frac{27}{4}$
(3) $-3, \frac{-27}{4}$ (4) $3, \frac{4}{27}$

47. The value of $\cos x^\circ - \sin x^\circ$ ($0 \leq x \leq 45$) is

- (1) 0
(2) positive
(3) negative
(4) sometimes negative and sometimes positive

48. A vertical pole of height 10 metres stands at one corner of a rectangular field. The angle of elevation of its top from the farthest corner is 30° , while that from another corner is 60° . The area (in m^2) of rectangular field is

- (1) $\frac{200\sqrt{2}}{3}$ (2) $\frac{400}{\sqrt{3}}$
(3) $\frac{200\sqrt{2}}{\sqrt{3}}$ (4) $\frac{400\sqrt{2}}{\sqrt{3}}$

49. A circle is inscribed in a square and the square is circumscribed by another circle. What is the ratio of the areas of the inner circle to the outer circle?

- (1) 1 : 2 (2) $1 : \sqrt{2}$
(3) $\sqrt{2} : 4$ (4) $1 : \sqrt{3}$

50. The surface of water in a swimming pool, when it is full of water, is rectangular with length and breadth 36 m and 10.5 m respectively. The depth of water increases uniformly from 1 m at one end to 1.75 m at the other end. The water in the pool is emptied by cylindrical pipe of radius 7 cm at the rate of 5 km/h. The time (in hours) to empty water in the pool is

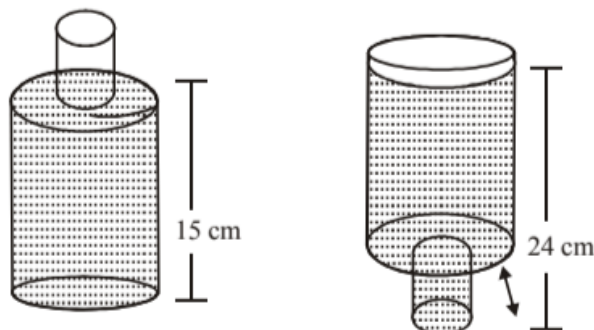
(take $\pi = \frac{22}{7}$)

- (1) $6\frac{1}{4}$ (2) $6\frac{1}{2}$
(3) $6\frac{3}{4}$ (4) $6\frac{4}{5}$

51. There is a right circular cone of height h and vertical angle 60° . A sphere when placed inside the cone, it touches the curved surface and the base of the cone. The volume of sphere is

- (1) $\frac{4}{3}\pi h^3$ (2) $\frac{4}{27}\pi h^3$
(3) $\frac{4}{9}\pi h^3$ (4) $\frac{4}{81}\pi h^3$

52. Sealed bottle containing some water is made up of two cylinders A and B of radius 1.5 cm and 3 cm respectively, as shown in the figure. When the bottle is placed right up on a table, the height of water in it is 15 cm, but when placed upside down the height of water is 24 cm. The height of the bottle is

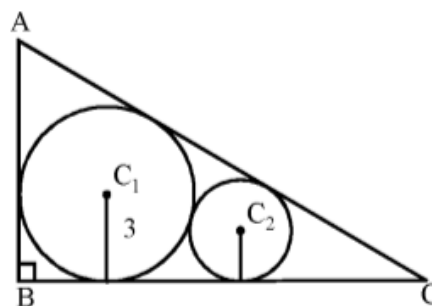


- (1) 25 cm (2) 26 cm
(3) 27 cm (4) 28 cm

53. Let l be the length of each equal side of an isosceles triangle. If the length of each equal side is doubled, keeping its height unchanged, then the difference of the squares of bases of the new triangle and the given triangle is

- (1) 0 (2) $4l^2$
(3) $9l^2$ (4) $12l^2$

54. In the adjoining figure, ABC is a triangle in which, $\angle B = 90^\circ$ and its incircle C_1 has radius 3. A circle C_2 of radius 1 touches sides AC, BC and the circle C_1 . Then length AB is equal to



- (1) $3 + 6\sqrt{3}$ (2) $10 + 3\sqrt{2}$
(3) $10 + 2\sqrt{3}$ (4) $9 + 3\sqrt{3}$

55. In $\triangle ABC$, $AB = AC$, P and Q are points on AC and AB respectively such that $BC = BP = PQ = AQ$. Then, $\angle AQP$ is equal to (use $\pi = 180^\circ$)

- (1) $\frac{2\pi}{7}$ (2) $\frac{3\pi}{7}$
(3) $\frac{4\pi}{7}$ (4) $\frac{5\pi}{7}$

56. A line from one vertex A of an equilateral $\triangle ABC$ meets the opposite side BC in P and the circumcircle of $\triangle ABC$ in Q. If BQ = 4 cm and CQ = 3 cm, then PQ is equal to
- (1) 7 cm (2) $\frac{4}{3}$ cm
(3) $\frac{12}{7}$ cm (4) 2 cm
57. How many points (x, y) with integral co-ordinates are there whose distance from (1, 2) is two units ?
- (1) one (2) two
(3) three (4) four
58. If the vertices of an equilateral triangle have integral co-ordinates, then
- (1) such a triangle is not possible
(2) the area of the triangle is irrational
(3) the area of the triangle is an integer
(4) the area of the triangle is rational but not an integer.
59. A box contains four cards numbered as 1, 2, 3 and 4 and another box contains four cards numbered as 1, 4, 9 and 16. On card is drawn at random from each box. What is the probability of getting the product of the two numbers so obtained, more than 16?
- (1) $\frac{5}{8}$ (3) $\frac{1}{2}$
(3) $\frac{3}{8}$ (4) $\frac{1}{4}$
60. The mean of a group of eleven consecutive natural numbers is m . What will be the percentage change in the mean when next six consecutive natural numbers are included in the group ?
- (1) $m\%$ (2) $\frac{m}{3}\%$
(3) $\frac{m}{300}\%$ (4) $\frac{300}{m}\%$
61. The Swaraj flag designed by Mahatma Gandhi had the spinning wheel in it. What did it symbolize?
- (1) Ideal of self-help
(2) Symbol of defiance to the British rule.
(3) Greatness of India in pre-colonial time
(4) Ahimsa (non-violence) in contemporary world
62. Which of the following statements regarding the Silk Routes are correct?
- I. They also meant cultural links.
II. They spread over land and by sea
III. They connected Asia with Europe and Africa
IV. Besides textiles gold and silver got exported from Asia to Europe through these routes.
- (1) I, II and III (2) I, II and IV
(3) II, III and IV (4) I, II, III and IV
63. Which of the following statements regarding the impact of Depression of 1929 are correct ?
- I. India's exports increased but imports decreased.
- II. India's export of gold increased.
III. Urban India suffered more than the rural India.
IV. Industrial investment grew in India.
- (1) I, II and III (2) I, III and IV
(3) II, III and IV (4) II and IV
64. Which of the following statements about the French in Vietnam are correct?
- I. The Vietnamese teachers generally twisted the school curriculum given by the French
II. The students protested the undue dominance by the colons.
III. The Annamese Student was a French journal for enlisting the students support
IV. The French had to counter the Chinese influence.
- (1) I, II and III (2) I, II, IV
(3) I, III and IV (4) II, III and IV
65. Read the statements about the impact of forest rules on tribal communities in the 19th century. Which of the following statements are incorrect?
- I. Jhum cultivators could carry out their activities in village forests.
II. Jhum cultivators took to plough cultivation with ease.
III. Tribal people could collect wood and graze cattle in the forests.
IV. Tribal people had access to protected forests for collecting wood for fuel and house building.
- (1) I and II (2) I and III
(3) II and III (4) III and IV
66. Which of the following statements about the Non-Cooperation Movement are correct ?
- I. The Justice Party participated in the elections in Madras.
II. The nationalist lawyers did not join back the courts.
III. The taluqdars were targeted.
IV. The import of foreign cloth declined and the export of Indian textiles increased manifold.
- (1) I and II (2) I and IV
(3) I, II and III (4) II, III and IV
67. Which of the following regarding the Constitution of 1791 and the status of women in France are correct?
- I. It made them active citizens.
II. Provisions were made for schools for both boys and girls.
III. Divorce rules were made stringent.
IV. Provisions were made for training women for jobs.
- (1) I, II and III (2) III and IV
(3) III and IV (4) II, III and IV
68. Arrange the following historical developments in a chronological sequence
- I. Rowlatt Act
II. Kheda Satyagraha
III. Champaran Movement
IV. Ahmedabad Mill Strike
- (1) I, II, III, IV (2) II, I, III, IV
(3) III, I, IV, II (4) III, II, IV, I

69. Consider the following statements and identify the correct response from the options given thereafter:
Statement I: In the 19th century, London was a colossal city.
Statement II: London had many large factories.
(1) Statement I is false and Statement II is true.
(2) Statement I is true and Statement II is false.
(3) Both Statement I and Statement II are true and Statement II is the correct explanation of Statement I.
(4) Both Statement I and Statement II are true but Statement II is not the correct explanation of Statement I.
70. **Statement-I** : Indians not taking off their turban before colonial officials was considered offending.
Statement-II : Turban was a sign of respectability in India.
(1) Statement I is true, Statement II is false.
(2) Statement I is false, Statement II is true.
(3) Both statements are true, and Statment II provides explanation to Statement I.
(4) Both statements are true, but Statement II does not provide explanation of Statement I.
71. **Statement-I** : Louis Blanc built a cooperative community.
Statement-II : He believed the community could produce goods together and divide the profits among the members.
(1) Statement I is true, Statement II is false.
(2) Statement I is false, Statement II is true.
(3) Both statements are true, and Statment II provides explanation to Statement I.
(4) Both statements are true, but Statement II does not provide explanation of Statement I.
72. **Statement-I** : Hand printing developed in China.
Statement-I : The Chinese state printed textbooks in vast numbers.
(1) Statement I is true, Statement II is false.
(2) Statement I is false, Statement II is true.
(3) Both statements are true, and Statment II provides explanation to Statement I.
(4) Both statements are true, but Statement II does not provide explanation of Statement I.
73. **Statement-I**: Rainfall is low in the western parts of Deccan Plateau and East of Sahyadris.
Statement-II: Western Ghats cause convectional rainfall.
(1) Statement I is true, Statement II is false.
(2) Statement I is false, Statement II is true.
(3) Both statements are true, and Statment II provides explanation to Statement I.
(4) Both statements are true, but Statement II does not provide explanation of Statement I.
74. **Statement-I** : A large part of Deccan plateau is occupied by black soil.
Statement-II : Black soil in this part was formed by denudation of basaltic rocks overtime.
(1) Statement I is true, Statement II is false.
(2) Statement I is false, Statement II is true.
(3) Both statements are true, and statement II provides explanation to Statement-I
(4) Both statements are true, but statement II does not provide explanation of Statement-I
75. If the local time at Varanasi, located at 83°E longitude is 23 : 00 hour then what will be the local time at Kibithu located at 97°E longitude (Arunachal Pradesh) and Jodhpur, located at 73°E longitude ?
(1) 00 : 00 hour, 22 : 00 hour (2) 22 : 20 hour, 23 : 56 hour
(3) 23 : 56 hour, 22 : 20 hour (4) 22 : 56 hour, 23 : 20 hour
76. Which one of the following statements are true about latitudes and longitudes
I. All latitudes are angular distances measured towards the Pole from the Equator
II. All longitudes do not join at poles.
III. All Parallels and Meridians are imaginary lines.
IV. Latitudes are used to determine the time of a place.
(1) I and II (2) I and III
(3) I, II and III (4) II, III and IV
77. If the current climatic condition of Srinagar (J & K) with average annual temperature of 13.5° C and annual average precipitation 710 mm get modified and become similar to that of Ranchi (Jharkhand) with annual average temperature 23.7°C and precipitation 1430 mm, which one of the following types of vegetation will become predominant in Srinagar ?
(1) Tropical Semi Evergreen
(2) Tropical Moist Deciduous
(3) Tropical Dry Deciduous
(4) Tropical Dry Evergreen
78. On a school field trip, a student spotted tigers, turtles, gharials and snakes in their natural habitats. Name the ecological region (delta) where that student had gone.
(1) Cauvery (2) Mahanadi
(3) Godavari (4) Ganga-Brahmaputra
79. A person travelling by road (shortest distance) from Mangaluru to Machilipatnam will be able to observe natural vegetation types in which of the following sequence ?
(1) Montane forest - Tropical Deciduous Forest - Tropical Evergreen Forests
(2) Tropical Evergreen Forests - Tropical Thorn Forests - Tropical Deciduous Forests
(3) Tropical Deciduous Forest - Tropical Evergreen Forests - Mangrove Forests
(4) Tropical Evergreen Forest - Tropical Deciduous Forests - Mangrove Forests
80. Which of the following statement(s) is /are true with respect to monsoons in India ?
I. The southwestern Monsoon takes longer duration as compared to retreating Monsoon in covering India.
II. The Southwestern Monsoons has a shorter duration as compared to retreating Monsoon in covering India.
III. Both the Monsoons take almost the same duration in covering India.
IV. The Southwestern Monsoon is propelled by the depressions while retreating Monsoons results from the movement of Air Masses.
1. I and IV
2. II only
3. III only
4. II and IV

81. Which one of the following regions marked on the sketch is an ideal representation with the following characteristics.



- I. The approximate date for arrival for the southwestern monsoon is June 15th
 II. Well developed in Thermal and Nuclear energy production
 III. Rich in the production of oil and natural gas.
 IV. Well developed Textile Industry.
- (1) I (2) II
 (3) III (4) IV
82. With increasing urbanization, the main activity which leads to loss of bio-diversity is
 I. rural-urban migration.
 II. rapid increase in built-up area.
 III. increased vehicular pollution.
 IV. development of big industrial complexes.
- (1) I and III (2) I and IV
 (3) II and IV (4) III and IV
83. Which one of the following statement is NOT Correct about the shaded part on the given outline of India ?



- (1) It has high potential for hydel-power generation.
 (2) It has the lowest degree of urbanization.
 (3) Ragi is an important millet grown here.
 (4) It is famous for religious tourism.
84. Chandimal, Jaysurya and Umesh left their respective villages in Sri Lanka for Chennai in India. Who among the following could be a refugee?
- I. Chandimal, who is an IT professional, could not find a job in Sri Lanka.
 II. Jaysurya, who left his village due to ethnic conflicts.
 III. Umesh, whose land and house were destroyed due to Tsunami.
- (1) Only Jaysurya (2) Only Chandimal
 (3) Jaysurya and Umesh (4) Chandimal and Jaysurya

85. Consider the following statements about the United Nations Security Council (UNSC) :

- I. UNSC consists of 15 members.
 II. US, Russia and Germany are among the permanent members.
 III. China is the only Asian nation among the permanent members
 IV. All members of the UNSC have veto power.

Which of the above statements are correct?

- (1) I and II (2) I and III
 (3) I and IV (4) III and IV

86. Which of these statements about the Election Commission of India are true ?

- I. It conducts and controls the election process in the country.
 II. It gets the voters list updated before the elections.
 III. It also conducts the Panchayat elections in the country.
 IV. It approves the election manifestoes of political parties.

- (1) I and II (2) II and III
 (3) II and IV (4) III and IV

87. Consider the following statements about the Indian Parliament :

- I. It is the ultimate authority to make laws in India.
 II. It consists of the President, the Lok Sabha and the Rajya Sabha.
 III. It consists of only the Lok Sabha and the Rajya Sabha.
 IV. Lok Sabha members are chosen by the people through elections.

Which of the above statements are correct?

- (1) I only (2) I and III
 (3) II and III (4) I, II and IV

88. Which of the following is the inspiring philosophy of the Constitution of India?

- I. Secularism, Equality, Communism, Democratic Republic
 II. Democratic Republic, Sovereignty, Fraternity
 III. Secularism, Equality, Justice
 IV. Equality, Fraternity, Communalism, Secularism

- (1) I and II (2) I and III
 (3) II and III (4) II and IV

89. Which of the following features of the Indian Judiciary are true?

- I. Integrated Judicial system.
 II. The Supreme Court is the highest court of appeal.
 III. only the Supreme Court can interpret the Constitution.
 IV. Public interest litigation (PIL) can be filed only in the Supreme court and the High courts.

- (1) I, II and III
 (2) I, II and IV
 (3) I, II and IV
 (4) II, III and IV

90. Which of the following statements is NOT true about Indian federalism?

- (1) The Union government is vested with more financial powers than the state governments.
- (2) Power to legislate on residuary subjects is vested in the Union government.
- (3) The name and boundaries of a State can be changed by the Union government without the consent of the concerned State.
- (4) The Union legislature can amend any provision of the Constitution without the consent of the state governments.

91. Democracy promotes equality through the following :

- I. Universal adult franchise
- II. Equality before law and equal protection of law.
- III. Reservation for scheduled Castes, Scheduled Tribes and women
- IV. Independent and impartial media.

- (1) I and II
- (2) I, II and III
- (3) I, III and IV
- (4) II and IV

92. Read the following statements and select one of the four options given below.

Statement I : Enjoyment of pollution free water is fulfillment of right to life.

Statement II : Release from forced labour is a fulfillment of right to life.

- (1) Only I is correct.
- (2) Only II is correct
- (3) Both I and II are correct
- (4) Both I and II are incorrect

93. The daily wage of a person in urban areas is ` 300. The poverty line for a person is fixed at ` 1000 per month for the urban areas. The following table shows the details of employment of four families living in Mumbai city.

Family	Total Days of Employment got in a Month by the family	Members of the family
--------	---	-----------------------

Hari	12	3
Tenzin	15	4
Bala	15	5
Phulia	20	5

Identify the family living below poverty line.

- (1) Hari
- (2) Tenzin
- (3) Bala
- (4) Phulia

94. In a particular year, the price of wheat in market is ` 15 per kg and a farmer produces 100 kgs of wheat. In the next year the price of wheat has fallen to ` 10 per kg and the farmer produces 120 kgs. If the government wishes to stabilize the income of the farmer, then what will be the minimum support price ?

- (1) ` 12 per kg
- (2) ` 12.5 per kg
- (3) ` 13 per kg
- (4) ` 13.5 per kg

95. A country has four groups of people. The table below describes some social indicators of these groups. Identify the group that is the most vulnerable.

Group	Literacy Rate (%)	Life Expectancy (years)	Unemployment rate (%)
A	74	82	5
B	93	80	10

C	63	78	15
D	65	78	10

- (1) A
- (2) B
- (3) C
- (4) D

96. Which of the following statements are correct?

- I. Bank deposits share the essential features of money.
- II. Any depositor may demand his deposit at any point of time from a bank.
- III. Bank must retain all deposits by itself.

- (1) I and II are true, but III is false.
- (2) I is true, but II and III are false.
- (3) I and II are false, but III is true.
- (4) All statements I, II and III are true

97. Bira and his wife Sheena have two daughters aged 12 and 16. Sheena's mother and father, aged 65 and 72, also live with them. Bira is currently looking for work, but can't find any. His elder daughter completed class 10 and prefers to look for work. Sheena prefers to stay at home to look after house works. How many unemployed members does Bira's family have ?

- (1) 1
- (2) 2
- (3) 3
- (4) 4

98. Which of the following statements are correct?

- I. Globalization has led to increased flow of capital across countries.
- II. Increase in flows of labour across countries has been larger than the increase in flows of capital.
- III. MNCs spread their production and work with local producers in various countries across the globe.

- (1) I and II
- (2) I and III
- (3) II and III
- (4) I, II and III

99. In a village Puranpur, 200 families are living. Eighty five families work on their own piece of land, 60 families work on the field of other farmers, 5 families run their own shops and 50 families work in a nearby factory to earn their livelihood. What percentage of Puranpur village depends on the secondary sector ?

- (1) 20
- (2) 25
- (3) 35
- (4) 55

100. Identify the correct pairs from List-I (Rights) and List-II (Violation of rights) and select the correct option using the codes given below.

List I (Rights)

A. Right to choose

B. Right to be informed

C. Right to safety

D. Right to Seek

List-II (Violation of rights)

I. Raman buys a packet of milk on which the company's name, manufacturing date, and expiry date were missing.

II. Sakina wants a particular channel from her cable operator but operator offers some other channel as part of a complete package.

III. Joseph bought a television from a shop. He suffered electric shock while using it.

IV. Murli fell ill and was admitted in the hospital because of stale food served in the restaurant

- (1) A-I and C-III
- (3) B-II and D-IV

- (2) B-II and C-III
- (4) C-III and D-IV

ANSWER KEY

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

Hints & Explanations

1. (4) Under anaerobic conditions, incomplete oxidation of glucose takes place. In animal cells like muscles during exercise, when oxygen is inadequate for cellular respiration pyruvic acid is reduced to lactic acid. Accumulation of lactic acid causes soreness and pain in muscle.
2. (4) Transmission of impulse through neurons is a electro-chemical phenomenon. Within neuron impulse is conducted electrically in unidirectional pathway i.e. dendrite → cell body → axon → nerve terminal.
3. (1) medulla is the region in hind brain which is responsible for controlling involuntary actions such as blood pressure, vomiting, sneezing, salivation etc.
4. (4) In 1796, Edward Jenner inserted pus taken from Sarah Nelmes (milkmaid with cowpox) into a cut made in the arm of a local boy, James Phipps. Several days later, Jenner exposed the boy to smallpox. He was found to be immune. Jenner called his new method 'vaccination' after the Latin word for cow (vacca).
5. (2) 6. (1) 7. (2)
8. (1) When rate of water absorption is less than the rate of transpiration, plant cells loose water and thus plants wilt in the afternoon.
9. (1)
10. (1) During ripening, there is breakdown of starch to simple sugars (such as glucose, fructose, sucrose) which increases sweetness of banana.
11. (2)
12. (1) According to the law of dominance, the dominant character expresses itself in heterozygous condition. Hence, R₋ will become round and Y₋ will become yellow. Homozygous recessive rr and yy will code for wrinkled and green respectively. Therefore, RrYy- round and yellow
Rrry- round and green
rrYy- wrinkled and yellow
rryy- wrinkled and green.
13. (2)
14. (1) Photosynthesis is an enzyme regulated anabolic process of manufacture of organic compounds inside

the chlorophyll containing cells from CO₂ & H₂O with the help of sunlight. Oxygen is a byproduct of this process which is essential for other living beings.

15. (3) According to ideal gas equation,
PV = nRT
∴ P ∝ n at constant V and T

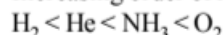
$$n_1(\text{O}_2) = \frac{100}{32} = 3.125 \text{ mole}$$

$$n_2(\text{He}) = \frac{100}{4} = 25 \text{ mole}$$

As $n_2 > n_1$; thus $P_{\text{He}} > P_{\text{O}_2}$

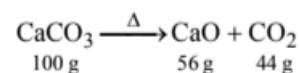
16. (4) Average molecular velocities $\propto \frac{1}{\sqrt{\text{Molecular mass}}}$

Increasing order of molecular mass



Thus the correct order is: $\text{O}_2 < \text{NH}_3 < \text{He} < \text{H}_2$

17. (1) On thermal decomposition of calcium carbonate



∴ 44 g CO₂ is formed from 100 g CaCO₃

$$\therefore 4.40 \text{ g CO}_2 \text{ is formed from } \frac{100}{44} \times 4.4 = 10 \text{ g CaCO}_3$$

If mass of CaCO₃ is 10 g, then weight of empty test tube = 30.08 – 10.0 = 20.08 g

18. (4)

19. (4) Balanced reaction is



So, a = 3, b = 2, c = 2, d = 3

20. (1) Number of α-particles deflected $\propto Z^2$

That means more the atomic number, more will be the deflection. Thus, in gold, number of undeflected particles will be smallest. Hence option (1) is correct.

21. (2) Rock Salt (NaCl) < Baking Soda (NaHCO₃) < Washing Soda (Na₂CO₃) < Slaked lime (CaCO₃)

22. (3) $2\text{C}_4\text{H}_6 + 11\text{O}_2 \longrightarrow 8\text{CO}_2 + 6\text{H}_2\text{O}$

For 2 moles of hydrocarbon, 11 moles of O₂ is

required

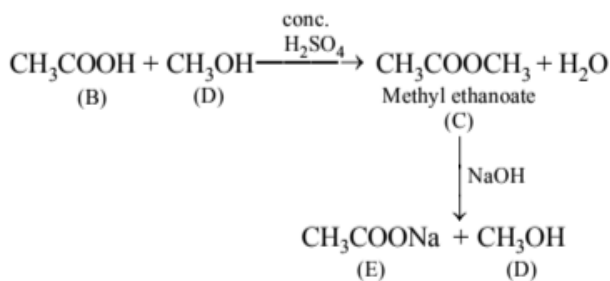
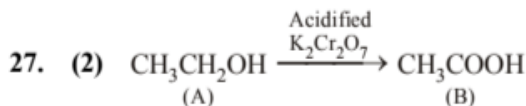
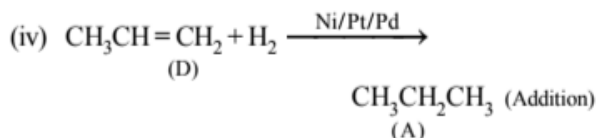
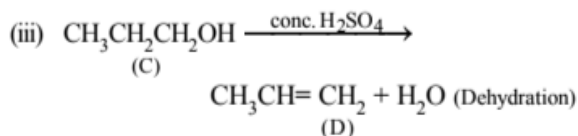
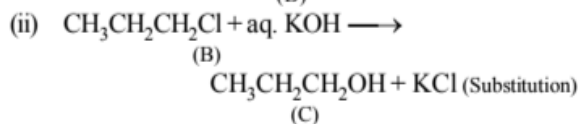
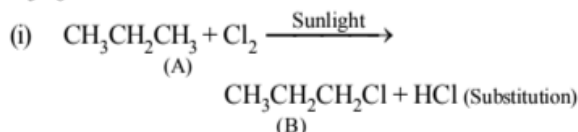
$$\therefore 11 \text{ moles} = 11 \times 32 = 352 \text{ g}$$

23. (3)

24. (2) Position, atomic number and number of electrons in the outer most shell of an element predicts its chemical properties.

25. (3)

26. (2) C_3H_8 (A) is propane.



28. (2) Acceleration of the system, $a = \frac{F}{m_1 + m_2 + m_3 + m_4}$

$$\Rightarrow a = \frac{36}{1+2+1+5} = 4 \text{ m/s}^2$$

For body 1 $\boxed{\text{m}} \xrightarrow{4 \text{ m/s}^2} \text{F}$

$$F = m \times a = 1 \times 4 = 4 \text{ N}$$

29. (3) $v = u - g(T/2)$ ($\because v = 0$)

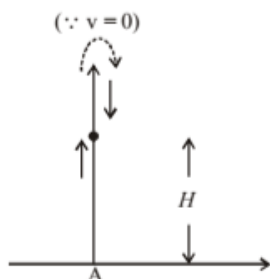
$$\Rightarrow u' = \frac{gT}{2}$$

$$\therefore v^2 = u^2 + 2gH$$

$$\text{or, } (u')^2 = u^2 - 2gH$$

$$\frac{g^2 T^2}{4} + 2gH = u^2$$

$$\text{or, } u = \frac{\sqrt{g^2 T^2 + 8gH}}{2}$$



30. (4)

31. (3) Slope of car A is constant and slope of car B will be same between origin to t_0 . Hence, accelerations of two cars are equal to each other at an instant earlier than t_0 .

32. (3) Pressure = $\frac{\text{thrust}}{\text{area}} = \frac{\text{buoyant force (B)}}{\text{area (a)}}$

$$\Rightarrow B = A \rho g p \quad (\because P = \rho g d)$$

Here, A, g & ρ are constant

So $B \propto d$

Thus, when it is dipped completely then B becomes constant

33. (3) In a nuclear reactor, after each fission reaction huge amount of energy is released along with active neutrons. These neutrons are fast and have to be slowed down by help of moderators like Heavy water, and graphite.

34. (4) Let u is the initial velocity at height H. By conservation of Mechanical energy.

$$\text{For ball A: } \frac{1}{2} m u^2 + mgh = \frac{1}{2} m v_A^2 \Rightarrow V_A = \sqrt{u^2 + 2gH}$$

$$\text{For ball B: } \frac{1}{2} m u^2 + mgh = \frac{1}{2} m v_B^2 \Rightarrow V_B = \sqrt{u^2 + 2gH}$$

$$\text{For ball C: } \frac{1}{2} m u^2 + mgh = \frac{1}{2} m v_C^2 \Rightarrow V_C = \sqrt{u^2 + 2gH}$$

Clearly, $V_A = V_B = V_C$

35. (2) Speed of sound $V_{\text{solid}} > V_{\text{liquid}} > V_{\text{gas}}$

36. (3) For lens A, $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

$$\Rightarrow \frac{1}{30} = \frac{1}{v} - \left(-\frac{1}{40}\right)$$

$$\Rightarrow \frac{1}{30} = \frac{1}{v} + \frac{1}{40}$$

$$= \frac{40-30}{1200} = \frac{10}{1200} \text{ or, } v = 120 \text{ cm.}$$

For lens B, $u = 90 \text{ cm}$

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \Rightarrow \frac{1}{30} = \frac{1}{v} - \frac{1}{90}$$

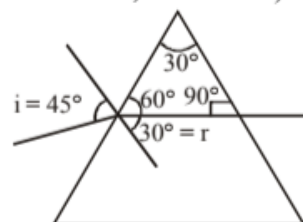
$$\frac{1}{v} = \frac{1}{30} + \frac{1}{90} = \frac{3+1}{90}$$

or, $v = 22.5 \text{ cm}$

Which is positive so that it is 22.5 cm from lens B.

37. (3) Using Snell's law, refractive index, $\mu = \frac{\sin 45^\circ}{\sin 30^\circ} =$

$\frac{2}{\sqrt{2}} = \sqrt{2}$ (Doesn't change means incident at 90° on another surface, so $\angle r = 30^\circ$)



38. (3) From Ohm's law $V_A = IR_A = \frac{I\rho\ell_A}{\pi(r_A)^2}$

$$\left(\because R = \rho \frac{\ell}{A} \right)$$

$$\text{and } V_B = \frac{\rho\ell_B I}{\pi(r_B)^2}$$

$$\text{So } \frac{V_A}{V_B} = \frac{I\rho\ell_A}{\pi(r_A)^2} \times \frac{\pi(r_B)^2}{I\rho\ell_B} \quad (\because \ell_A = \ell_B = 5 \text{ cm})$$

$$= \frac{(r_B)^2}{(r_A)^2} = \frac{9}{1} \quad (\because r_B = 3 \text{ cm} \text{ \& } r_A = 1 \text{ cm})$$

39. (2) Resistance of 40 W – 200 V, 50 W – 200 V, 100 W – 200 V are respectively.

$$R_{40} = \frac{V^2}{P_{40}} = \frac{200 \times 200}{40} = 1000 \Omega$$

$$R_{50} = 800 \Omega \text{ and } R_{100} = 400 \Omega$$

$$I = \frac{600}{100 + 800 + 400} = \frac{600}{2200} = 0.2727 \text{ A}$$

$$I_{40} = \frac{P_1}{V} = \frac{40}{200} = 0.2 \text{ A}$$

$$I_{50} = \frac{P_2}{V} = \frac{50}{200} = \frac{5}{20} = 0.25 \text{ A}$$

$$I_{100} = \frac{P_3}{V} = \frac{100}{200} = .5 \text{ A}$$

Clearly, 0.2 A & 0.25 A < 0.27 A hence both 40 W and 50 W bulbs will fuse.

40. (4) (i) When K_1 is closed and K_2 is open

$$R_{eq} = \frac{R_1 R_2}{R_1 + R_2} = \frac{3 \times 12}{3 + 12} = \frac{12}{5} \Omega$$

$$\therefore I_1 = \frac{V}{R_{eq}} = \frac{12}{\frac{12}{5}} = 5 \text{ A}$$

- (ii) When K_2 is closed and K_1 is open

$$R_{eq} = \frac{4 \times 12}{16} = 3 \Omega$$

$$\therefore I_2 = \frac{V}{R_{eq}} = \frac{12}{3} = 4 \text{ A} \text{ So, } \frac{I_1}{I_2} = \frac{5}{4}$$

41. (3) $\frac{1}{7} = 0.\overline{142857}$

The second positive integer whose reciprocal have six different repeating decimals is

$$\frac{1}{13} = 0.\overline{076923}$$

And the third positive integer whose reciprocal have six different repeating decimals is

$$\frac{1}{21} = 0.\overline{047619}$$

Therefore, the values of x are 7, 13, 21

Hence, the required sum is $= 7 + 13 + 21 = 41$

42. (1) Since, the unit digit of $(12)^n$ for positive integer n are 2, 4, 6, 8

Then, the unit digit of $12^n + 1$ will be 3, 5, 7, 9

Hence, 1 is ruled out in the unit place because $12^n + 1$ can not have 1 as its unit digit.

43. (*) None

44. (1) Since, the general term of sum of odd natural number in the group is $= n(2n)^2 = 4n \times n^2 = 4n^3$

Hence, the required sum of numbers in the 10th group $= 4 \times 10^3 = 4000$

45. (2) The remainder when the polynomial $x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by $x^2 - 2x + k$ is $(2k - 9)x + (k^2 - 8k + 10)$

But, the remainder is $x + a$

Then,

$$(2k - 9)x + (k^2 - 8k + 10) = x + a$$

Compare the coefficients of x and constant term on both the sides.

$$\text{Then, } 2k - 9 = 1 \text{ and } k^2 - 8k + 10 = a$$

$$2k = 10$$

$$k = 5$$

Now

$$a = k^2 - 8k + 10$$

$$= 25 - 40 + 10 = 35 - 40 = -5$$

Hence, the required value of a is -5 .

46. (3) Let the common root be t

Then, the equation becomes

$$2t^2 + kt - 5 = 0 \quad \dots(1)$$

$$t^2 - 3t - 4 = 0 \quad \dots(2)$$

Multiply equation (2) by 2 and then subtract from equation (1)

$$2t^2 + kt - 5 = 0$$

$$2t^2 - 6t - 8 = 0$$

$$- + +$$

$$(k + 6)t + 3 = 0$$

$$t = -\frac{3}{k + 6}$$

Now, put the value of t in equation (1)

$$2\left(\frac{-3}{k + 6}\right)^2 + k\left(\frac{-3}{k + 6}\right) - 5 = 0$$

$$\frac{18}{(k + 6)^2} + \frac{-3}{k + 6} - 5 = 0$$

$$18 - 3k(k + 6) - 5(k + 6)^2 = 0$$

$$18 - 3k^2 - 18k - 5k^2 - 180 - 60k = 0$$

$$-8k^2 - 78k - 162 = 0$$

$$8k^2 + 78k + 162 = 0$$

$$4k^2 + 39k + 81 = 0$$

$$4k^2 + 27k + 12k + 81 = 0$$

$$k(4k + 27) + 3(4k + 27) = 0$$

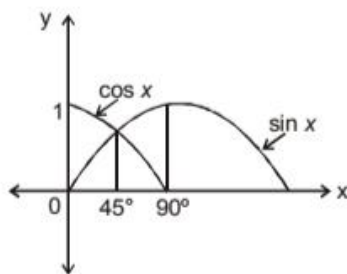
$$(k + 3)(4k + 27) = 0$$

$$k = -3, -\frac{27}{4}$$

47. (2) $\frac{1}{\sqrt{2}} < \cos x \leq 1$ for $0 \leq x < 45^\circ$

$$0 \leq \sin x < \frac{1}{\sqrt{2}},$$

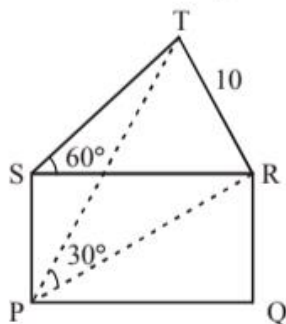
$$\text{for } 0 \leq x < 45^\circ$$



It is clear from the graph that $\cos x > \sin x$ when $0 \leq x < 45^\circ$

$$\therefore \cos x - \sin x > 0$$

48. (1) Let PQRS be the rectangular field with length l and width b and RT be the vertical pole.



In ΔPRT ,

$$\tan 30^\circ = \frac{RT}{PR}$$

$$\frac{1}{\sqrt{3}} = \frac{10}{PR}$$

$$PR = \sqrt{l^2 + b^2} = 10\sqrt{3}$$

$$l^2 + b^2 = 100 \times 3 = 300 \quad \dots (1)$$

In ΔSRT ,

$$\tan 60^\circ = \frac{10}{SR} \Rightarrow \sqrt{3} = \frac{10}{SR}$$

$$SR = \frac{10}{\sqrt{3}} = l \Rightarrow l^2 = \frac{100}{3} \quad \dots (2)$$

Use equation (2) in (1), then

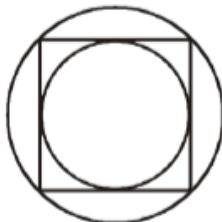
$$b^2 = 300 - \frac{100}{3} = \frac{800}{3}$$

$$\text{Now, } l^2 b^2 = \frac{100}{3} \times \frac{800}{3} = \frac{80000}{9}$$

$$lb = \sqrt{\frac{80000}{9}} = \frac{200\sqrt{2}}{3}$$

Hence, the required area of rectangular field is $\frac{200\sqrt{2}}{3}$

49. (1)



Let the side of square be a .

Then, radius of inner circle = half of side square = $\frac{a}{2}$

$$\begin{aligned} \text{Therefore, the area of inner circle} &= \pi(\text{radius})^2 \\ &= \pi\left(\frac{a}{2}\right)^2 = \pi\frac{a^2}{4} \end{aligned}$$

Since, the diagonal of the square = $\sqrt{2}a$

Then, radius of outer circle = half of diagonal of square = $\frac{\sqrt{2}a}{2}$

$$\text{Hence, the area of outer circle} = \pi\left(\frac{\sqrt{2}a}{2}\right)^2 = \pi\frac{2a^2}{4}$$

Hence, the required ratio of the areas of inner circle to outer

$$\text{circle is} = \frac{a^2}{4} : \frac{2a^2}{4} = 1 : 2$$

50. (3) Let r be the radius of cylindrical pipe

$$\text{Then, } r = 7 \text{ cm} = \frac{7}{100} \text{ m}$$

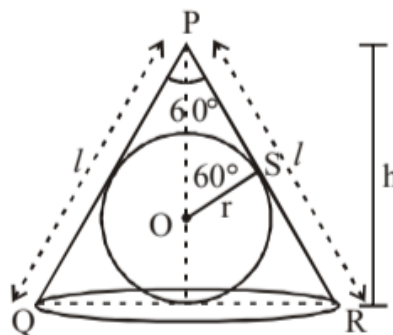
Volume of water in swimming pool
= Area of cross section \times Speed \times Time

$$\left[\frac{1}{2}(1+1.75) \times 36\right] \times 10.5 = \pi r^2 \times \text{speed} \times \text{time}$$

$$\left[\frac{1}{2}(1+1.75) \times 36\right] 10.5 = \frac{22}{7} \times \frac{7}{100} \times \frac{7}{100} \times 5000 \times t$$

$$t = \frac{27}{4} = 6\frac{3}{4} \text{ hours}$$

51. (4) Since vertical angle of the cone = 60°



$$h = \frac{\sqrt{3}}{2}l \Rightarrow l = \frac{2h}{\sqrt{3}}$$

$$\therefore \angle OPS = 30^\circ$$

$$\therefore \text{In } \Delta OPS, PS = \frac{l}{2} = \frac{h}{\sqrt{3}} \quad \dots (1)$$

$$\text{In } \Delta POS, \tan 30^\circ = \frac{OS}{PS}$$

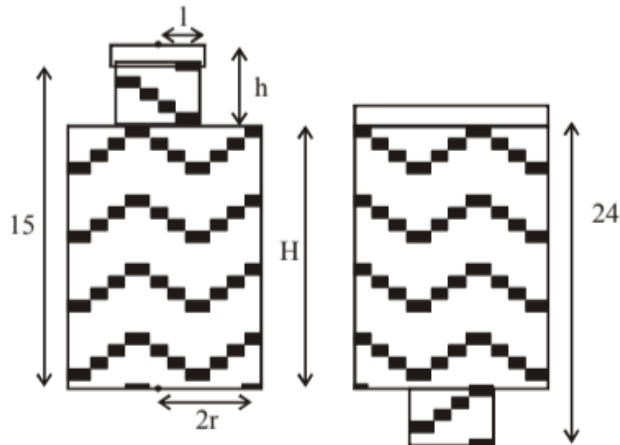
$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{OS}{PS} \Rightarrow OS = \frac{PS}{\sqrt{3}} = \frac{h}{\sqrt{3}\sqrt{3}} = \frac{h}{3}$$

Therefore, the radius of sphere is $r = OS = \frac{h}{3}$

Hence, the required volume of sphere = $\frac{4}{3}\pi r^3$

$$= \frac{4}{3}\pi \left(\frac{h}{3}\right)^3 = \frac{4\pi h^3}{81}$$

52. (3)



Let the height of cylinder A be h and height of cylinder B be H . Since, in both the situation, the volume of the water in the bottle remains same, then

$$\pi(2r)^2 H + \pi r^2 (15 - H) = \pi r^2 h + \pi(2r)^2 (24 - h)$$

$$\pi r^2 [4H + (15 - H)] = \pi r^2 [h + 4(24 - h)]$$

$$4H + 15H - H = h + 4(24 - h)$$

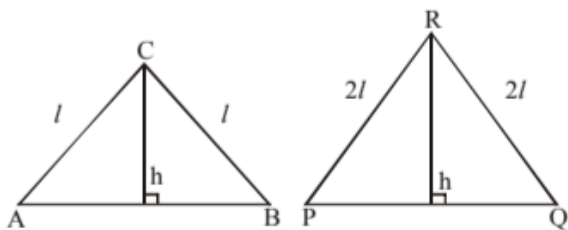
$$3H + 15 = h + 96 - 4h$$

$$3H + 15 = 96 - 3h$$

$$H + 5 = 32 - h$$

$$H + h = 27 \text{ cm}$$

53. (4) Let A be the base of isosceles triangle whose equal side have length l and B be the base of changed isosceles triangle whose equal side are of length $(2l)$.



$$AB^2 = 4(\ell^2 - h^2)$$

$$PQ^2 = 4(4\ell^2 - h^2)$$

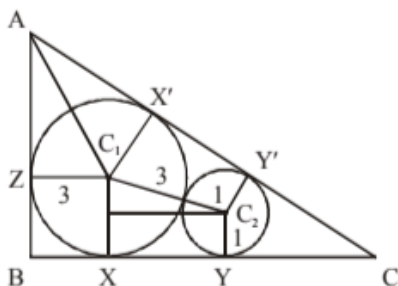
$$PQ^2 - AB^2 = 4(4\ell^2 - h^2) - 4(\ell^2 - h^2)$$

$$= 4[4\ell^2 - h^2 - \ell^2 + h^2] = 4[3\ell^2] = 12\ell^2$$

54. (4) In $\Delta C_1 C_2 Z$

$$\cos \theta = \frac{2}{4} = \frac{1}{2}$$

$$\Rightarrow \theta = 60^\circ$$



Similarly

$$\angle X'C_1 C_2 = 60^\circ$$

$$\text{So } \angle ZC_1 X' = 360 - (60 + 60 + 90) = 150$$

$$\therefore \angle BAC = 180 - 150 = 30$$

$$\angle ZAC_1 = 15^\circ$$

In ΔZAC_1

$$\tan 15^\circ = \frac{3}{AZ}$$

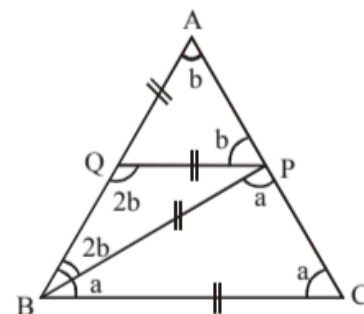
$$\frac{\sqrt{3} - 1}{\sqrt{3} + 1} = \frac{3}{AZ}$$

$$AZ = \frac{\sqrt{3} + 1}{\sqrt{3} - 1} \times 3 = \left(\frac{4 + 2\sqrt{3}}{2} \right) \times 3$$

$$= (2 + \sqrt{3}) \times 3 = 6 + 3\sqrt{3}$$

$$\text{So, } AB = AZ + BZ = 6 + 3\sqrt{3} + 3 = 9 + 3\sqrt{3}$$

55. (4)



In ΔABC

$$AB = AC$$

$$\Rightarrow \angle C = \angle B$$

$$\Rightarrow \angle B = \angle C = a$$

By angle sum properly in ΔABC ,

$$b + a + a = 180$$

$$\Rightarrow b + 2a = 180^\circ$$

...(1)

In ΔQPB

$$\Rightarrow \angle QPB = 180 - 4b$$

Since 'APC' is a straight line

$$\Rightarrow 180 - 4b + a + b = 180$$

$$\Rightarrow a = 3b$$

...(2)

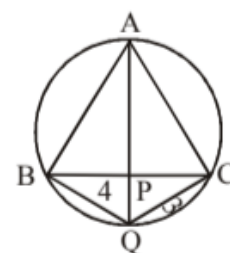
From equation (1) & (2)

$$b + 2(3b) = 180$$

$$b = \frac{180}{7}$$

$$\angle AQP = 180^\circ - 2\left(\frac{180}{7}\right) = \frac{5}{7}\pi$$

56. (3)



Since, we know that

$$\frac{1}{PQ} = \frac{1}{BQ} + \frac{1}{CQ} = \frac{1}{4} + \frac{1}{3} = \frac{3+4}{12} = \frac{7}{12}$$

$$\therefore PQ = \frac{12}{7}$$

57. (4) Since, the distance between the points (x, y) and $(1, 2)$ is 2 units, then
 $(x-1)^2 + (y-2)^2 = 4$

This is possible only when,

Case I

$$(x-1)^2 = 0 \text{ and } (y-2)^2 = 4$$

$$\Rightarrow x = 1 \text{ and } y = 0, 4$$

So the points are $(1, 0), (1, 4)$

Case II

$$(x-1)^2 = 4 \text{ and } (y-2)^2 = 0$$

$$\Rightarrow x = 3, -1 \text{ and } y = 2$$

So the points are $(3, 2), (-1, 2)$

Hence, there are total 4 points with integral co-ordinates.

58. (1) Let the vertex be (x_r, y_r) , $r = 1, 2, 3$, where both x_r and y_r are integers.

Hence, area of triangle

$$= \frac{1}{2} \sum x_i (y_2 - y_3) = \text{rational number} \quad \dots (1)$$

Let a be the side of equilateral triangle, then

$$a^2 = (x_1 - x_2)^2 + (y_1 - y_2)^2 = \text{a positive integer.}$$

$$\text{But, the area of an equilateral triangle} = \frac{\sqrt{3}}{4} a^2.$$

$\therefore \text{Area} = \left(\frac{\sqrt{3}}{4} \right) a^2$, which is irrational, since a^2 is a positive integer.

Thus the two statements (1) and (2) for area are contradictory.

Hence, such type of a triangle is not possible.

59. (3) Possible products are 1, 4, 9, 16, 2, 8, 18, 32, 3, 12, 27, 48, 4, 16, 36, 64

Then number of possible outcomes = 16

The numbers which are product of two numbers and more than 16 are 18, 27, 32, 36, 48, 64.

Then, number of favourable outcomes = 6

So, required probability of getting the product of the

$$\text{two numbers so obtained is} = P(E) = \frac{6}{16} = \frac{3}{8}$$

60. (4) Since, the mean of a group of eleven consecutive natural numbers is m , then

$$\frac{x + x+1 + \dots + x+10}{11} = m$$

$$11x + 55 = 11m$$

$$x + 5 = m$$

$$x = m - 5$$

Let n be the mean when next six consecutive natural numbers are included in the group then

$$\frac{x + x+1 + \dots + x+16}{17} = n$$

$$17x + \frac{16 \times 17}{2} = 17n$$

$$17x + 8 \times 17 = 17n$$

$$m - 5 + 8 = n \Rightarrow n = m + 3 \quad (\because x = m - 5)$$

Hence, required percentage change in the mean

$$= \frac{n-m}{m} \times 100 = \frac{m+3-m}{m} \times 100 = \frac{300}{m} \%$$

61. (1) Swaraj flag designed by Gandhiji was of tricolour (red, green and white) has spinning wheel in the centre. It represented ideal of self-help.
62. (1) Silk route, considered as a good example of vibrant pre-modern trade and cultural links between distant parts of the world gold and silver flowed from Europe to Asia rather than from Asia to Europe.
63. (4) India's export increased but import decreased in incorrect. The rural India suffered more as compared to urban India.
64. (2) Teachers and students did not blindly follow the curriculum, sometimes there was open opposition at other times silent resistance. The Annanese journal was Vietnamese journal and not the French.
65. (3) 66. (1) 67. (2)
68. (4) The correct order is Champaran Satyagraha, Kheda satyagraha, Ahmedabad Mill Strike, Rowlatt Act.
69. (2) In nineteenth century, London was a colossal city with a population of about 675,000. The city of London attracted migrant populations, even though it did not have large factories.
70. (4) 71. (2) 72. (4)
73. (1) 74. (3)
75. (3) The difference between longitude of kibithu and varanasi is 14 degrees and varanasi and Jodhpur is 10 degrees. Thus, the time difference will be +56 and -40 respectively.
76. (2) 77. (2) 78. (4)
79. (4) 80. (2)
81. (3) The area depicted with 3 on the map in on ideal representation that satisfied all characteristics.
82. (3) 83. (3)
84. (4) The refugees are these who left the country because of ethnic conflicts or natural calamity.
85. (2) Germany is not the permanent member of UNSC.
86. (3) In India election Commission does not Conduct Panchayat Raj election rather state election Commission conducts.
87. (4)
88. (3) The philosophy of Indian Constitution does not contain Communalism and Commission. It is hot the inspirers philosophy.
89. (3) The consultation can be interpreted both by the Supreme Court and High Court.
90. (4) The Union Government can amend only some provisions of the constitution without the consent of the state government.
91. (2) 92. (1) 93. (3)
94. (2) The minimum support price should be Rs. 12.5 per kg to stabilise the income of the farmers.
95. (3) Among the four groups, group c is found to be most vulnerable group.
96. (1) Banks has to retain 15% of all deposits by itself.
97. (2)
98. (2) The flow of capital has been larger than flow of labour.
99. (2) In village Purampur, 25 per cent of people depend on the secondary sector.
100. (4)