class10

SAT
Scholastic Aptitude Test

TARGET
NTSE
National Talent Search Examination

Solved Paper
2010
Stage 2

Time : 90 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. These questions are in Science, Mathematics and Social Sciences.

5.   Please follow the instructions given on the answer-sheet for marking the answers.

6.   For questions 1-90, put a cross mark (X) on the number of the correct alternative on the answer-sheet against the corresponding question number. For questions 91 - 100, write the answers in the given space.

7.   If you do no know the answer to any question, do not waste 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 attempt them.

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.

1. When a small amount of garden soil is put into a glass jar containing water, stirred and allowed to stand for two hours, the layers from top to bottom would be:
   (1) Debris, water, sand and clay
   (2) Humus, water, clay and sand
   (3) Debris, clay, gravel and sand
   (4) Humus, clay, gravel and sand

2. Which of the following is an example of a single cell that does not function as a full-fledged organism?
   a. White blood cell (WBC)
   b. *Amoeba*
   c. WBC and *Amoeba*
   d. *Paramecium*
   (1) b only   (2) b and d
   (3) a only   (4) c and d

3. Meena had a big farm. On Sunday she went to her farm and was surprised to see a house being constructed and a wooden almirah being made out of a tree.
   This may be considered as
   a. reforestation   b. desertification
   c. deforestation   d. drought
   Which of the following is correct?
   (1) a and b   (2) a and d
   (3) c only   (4) a only

4. **Read the following.**
   a. Malaria is transmitted by a virus.
   b. Cholera is caused by *Mycobacterium*.
   c. *Salmonella typhi* spreads through soil and water.
   d. *Varicella* causes chicken pox.
   Which of the following is true?
   (1) a and c   (2) b and d
   (3) c and d   (4) a and b

5. Weeds not only use nutrients from the soil but are also
   a. harmful for some organisms including human beings
   b. useful for the crops and harmful for human beings
   c. harmful to the crops and some animals
   d. crop specific
   Select the alternative which includes all correct statements.
   (1) a, c and d   (2) b, c and d
   (3) a, b and c   (4) a, b and d

6. **Match the items in Column I with Column II.**

Column I		Column II	
A.	Mouth	a.	Protein
B.	Stomach	b.	Water
C.	Small Intestine	c.	Starch
D.	Large Intestine	d.	Fat

   Select the alternative which shows the correct matching.
   (1) A – d, B – c, C – a, D – b
   (2) A – c, B – d, C – b, D – a
   (3) A – c, B – a, C – d, D – b
   (4) A – b, B – a, C – d, D – c

7. Many breeds of sheep are available in our country and they can be distinguished by different quality of wool in different places. Keeping that in mind, match items in column I and column II.

Column I	Column II
Name of breed	State where found
I. Lohi	a. Uttar Pradesh
II. Rampur Bushair	b. Gujarat
III. Bakharwal	c. Rajasthan
IV. Patanwadi	d. Jammu and Kashmir

   Select the alternative which shows the correct matching.
   (1) I – c, II – a, III – d, IV – b
   (2) I – c, II – b, III – a, IV – d
   (3) I – b, II – a, III – d, IV – c
   (4) I – b, II – c, III – d, IV – a

8. Select the correct statements with respect to migration in animals.
   a. The same Siberian Crane can be seen in Bharatpur in two consecutive winters.
   b. Some fish lay eggs in rivers and the fingerlings gradually swim to sea.
   c. Some fish migrate from cold climate to a warmer climate to escape cold weather.
   d. Some butterflies migrate up to 10,000 kilometres to escape cold weather.
   Which of the following alternative has the correct statements?
   (1) a and b   (2) b and c
   (3) c and d   (4) a and d

9. A man was infested with germs and was taken to the hospital. On pathological tests it was found that he had
   a. low number of RBC
   b. high number of WBC and low number of RBC
   c. low number of WBC
   d. high number of platelets
   Which of the following alternative is correct?
   (1) a and b   (2) a and d
   (3) c only   (3) d only

10. Read the following about the agents of seed dispersal.
    a. *Xanthium* and *Urena* by animals.
    b. Drumstick and Maple by wind.
    c. Groundnut and Areca nut by birds.
    d. Madar and Sunflower by insects.
    Select the alternative which includes all the correct statements.
    (1) a and b   (2) a and c
    (3) c and d   (4) b and c

11. Study the following statements.
    a. Forests are complex habitats and require fertilizer use.
    b. Wild animals transfer seeds and increase forest areas.
    c. Cutting forest trees on a large scale will not disturb the decomposer cycle.
    d. Forests in our country are growing slowly.
    e. Education of people is important in forest conservation.
    Select the alternative which includes all correct statements.
    (1) a and c   (2) c and d
    (3) b and e   (4) a and d

12. Read the following statements.

a. A few rivers in India are like sewers.

b. Some cattle may die by feeding on plastic bags.

c. Installation of waste water treatment plants have cleaned up most of the rivers in India.

d. Sludge is effectively utilized in the production of biogas.

Select the alternative which includes all correct statements.

(1) a, b and c   (2) a, b and d

(3) b, c and d   (4) a, c and d

13. Consider the following statements.

a Baking soda is an acidic salt whereas washing soda is a basic salt.

b. The aqueous solution of common salt does not change the colour of either red litmus solution or blue litmus solution.

c. Amla tastes sour whereas soap solution is bitter in taste.

d. The water extract of spinach does not change the colour of blue litmus solution.

Which alternative has the correct statements?

(1) a, b and c   (2) a and c

(3) b and c   (4) b and d

14. Arrange the following in decreasing order of their acidic character.

a. Vinegar   b. Stomach acid

c. Soap solution   d. Lime water

Select the alternative which indicates the correct order.

(1) b, a, d, c   (2) c, d, a,b

(3) b, a, c, d   (4) d, c, a, b

15. Consider the following statements.

a. Natural gas can be supplied to homes and factories through pipes.

b. Natural gas is obtained by fractional distillation of crude oil.

c. Natural gas is a cleaner fuel because on burning only water is produced.

d. Natural gas is an exhaustible source of energy like fossil fuels.

Which alternative has the correct statements?

(1) a and c   (2) b and c

(3) a and d   (4) a, c and d

16. Which of the following pollute the ground water?

a. Release of factory wastes into rivers

b. Use of pesticides in fields

c. Use of chemical fertilizers

d. Use of manure

(1) b, c and d   (2) a, b and c

(3) a and b   (4) b and c

17. Match the following.

i.	Acrylic	a.	contains repeating ester units
ii.	Cellulose	b.	used for making sweaters
iii.	Polythene	c.	made up of large number of glucose units
iv	Terylene	d.	Used for making electrical switches
		e.	Used for manufacturing toys

Which of the following is the correct matching?

(1) (i)–(b), (ii)–(a), (iii)–(d), (iv)–(c)

(2) (i)–(b), (ii)–(c), (iii)–(e), (iv)–(a)

(3) (i)–(d), (ii)–(b), (iii)–(e), (iv)–(a)

(4) (i)–(d), (ii)–(c), (iii)–(b), (iv)–(e)

18. Which of the following metals on reacting with sodium hydroxide solution produce hydrogen gas?

a. Cu   b. Al

c. Fe   d. Zn

(1) b and c   (2) b and d

(3) a and d   (4) b only

19. Match the following.

| i.	Sodium	a.	On burning produces an acidic gas.
ii.	Phosphorus	b.	Reacts neither with acids nor bases.
iii.	Copper	c.	It is so soft that it can be cut with a knife.
iv.	Charcoal	d.	Burns spontaneously on exposure to air.
		e.	Acquires a dull green coating on exposure to air.

Which of the following shows the correct matching?

(1) (i)–(c), (ii)–(e), (iii)–(b), (iv)–(a)

(2) (i)–(d), (ii)–(a), (iii)–(c), (iv)–(b)

(3) (i)–(d), (ii)–(e), (iii)–(c), (iv)–(b)

(4) (i)–(c), (ii)–(d), (iii)–(e), (iv)–(a)

20. When a candle burns in air, two processes take place. First the change A takes place and then the change B. The following statements correspond to these changes. Choose the correct one.

(1) Process A is a chemical change.

(2) Process B is a chemical change.

(3) Both processes A and B are chemical changes.

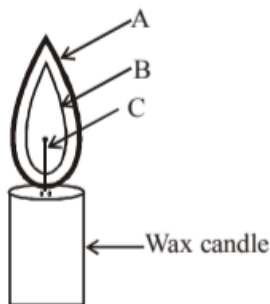(4) Process A is a chemical change whereas process B is a physical change.

21.
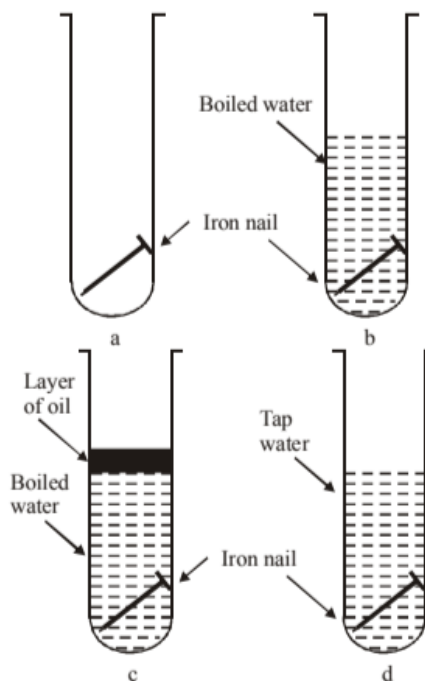
In which test tubes, the rusting of iron nail will take place?

(1) a and d   (2) a, b and d

(3) b and c   (4) b, c and d

22. The different zones of a candle flame are marked by the letters A, B and C.

Which of the following is correct?
(1) B is the hottest part of the flame.
(2) C is moderately hot.
(3) A is the hottest part of the flame.
(4) A is moderately hot whereas C is the coldest part.

23. Read the following statements.
a. Water is the best extinguisher for fires involving inflammable materials.
b. Carbon dioxide is used to extinguish fires involving oil and petrol.
c. Water is not suitable for fires involving electrical equipments.
d. Fires caused by short-circuit should be immediately put off by sprinkling water on it.

Which alternative has the correct statements?
(1) b and c   (2) c and d
(3) a and b   (4) b and d

24. Rooms are fitted with ventilators to let the air move around. The phenomenon involved in this process is
(1) Conduction   (2) Convection
(3) radiation   (4) diffusion

25. Which of the following places in India is most likely to experience cyclones?
(1) Delhi   (2) Mumbai
(3) Puri   (4) Bhopal

26. A car travels at a speed of 80 km/hr for 15 minutes and then at a speed of 40 km/hr for next 15 minutes. The average speed of the car is
(1) 15.7 ms^{-1} (2) 16.7 ms^{-1}
(3) 17.7 ms^{-1} (4) 18.7 ms^{-1}

27. Which of the following time-displacement graphs represents a uniform motion?
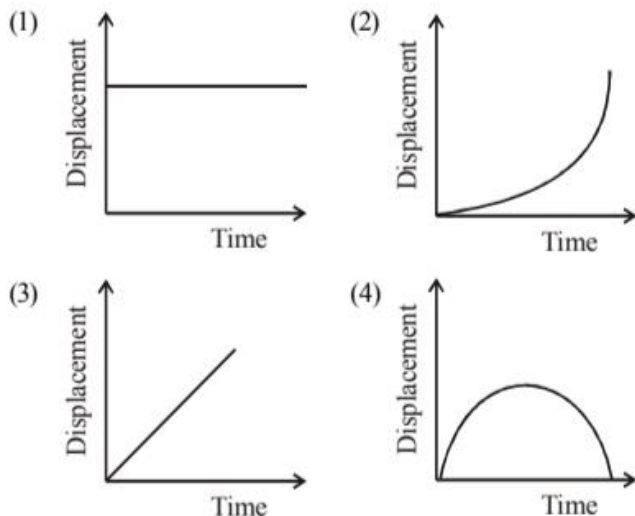

28. Match the items in Column - I with those in Column - II

Column I		Column II	
1	Electric Fuse	A	Chemical Effect
2	Relay	B	Electric Discharge
3	CFL	C	Magnetic Effect
4	Button Cell	D	Heating Effect

Which of the following shows the correct matching?
(1) 1C; 2B; 3A; 4D   (2) 1B; 2A; 3C; 4D
(3) 1D; 2C; 3B; 4A   (4) 1D; 2B; 3C; 4A

29. Of the materials listed below
A. Water (Distilled)
B. Solution of common salt
C. Mercury
D. Caustic Soda Solution
E. Glycerine

A set of materials consisting of good conductor of electricity is
(1) A, B and C   (2) A, D and E
(3) C, A and E   (4) B, C and D

30. Two mirrors M1 and M2 are placed at right angle to each others as shown. The total number of images of an object 'O' that can be seen are
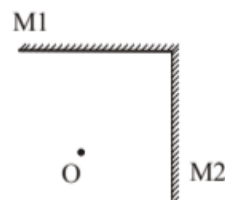
(1) Two   (2) Three
(3) Four   (4) Infinite

31. On passing through a prism, a parallel beam of sunlight splits into lights of several colours. Take a combination of two identical prisms as shown below. A parallel beam of sunlight is incident on the face AD. The emergent light from the face BC, consists of
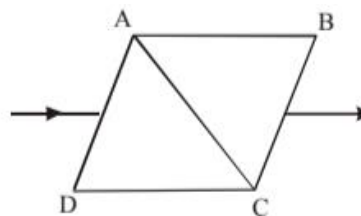
(1) a parallel beam of light of several colours
(2) a divergent beam of lights of several colours.
(3) a parallel beam of white light
(4) a divergent beam of white light.

32. A ball of mass 0.20 kg falls freely from a certain height and rebounds elastically with a speed of 40 ms^{-1}. The change in momentum of the ball is
(1) 4 kg ms^{-1} (2) 8 kg ms^{-1}
(3) 16 kg ms^{-1} (4) 40 kg ms^{-1}

33. The force of friction acting on a car on different roads in the increasing order of magnitude will be
    (1) mud, tar, concrete and gravel roads
    (2) tar, concrete, gravel and mud roads
    (3) concrete, tar, gravel and mud roads
    (4) gravel, mud, tar and concrete roads

34. Voice of which of the following creatures is likely to have maximum frequency?
    (1) Man   (2) Cow
    (3) Bird   (4) Dog

35. When we look towards the pole star, it appears stationary because
    (1) it is very far from earth as compared to other stars.
    (2) it moves with much lesser speed than others stars
    (3) it is pointing exactly in the south direction
    (4) it is pointing exactly in the north direction

36. If $(x-1)^2 + (y-3)^2 + (z-5)^2 + (t-7)^2 = 0$, then $xyzt + 16$ is equal to
    (1) 5^2 (2) 9^2
    (3) 11^2 (4) 12^2

37. $\sqrt{\dfrac{8^{10} + 4^{10}}{64^2 + 4^9 \times 16}}$ is equal to
    (1) 8   (2) 16
    (3) 36   (4) 256

38. $\sqrt{3 + 2\sqrt{2}} - \sqrt{3 - 2\sqrt{2}}$ is equal to
    (1) 2   (2) 1
    (3) $2\sqrt{2}$ (4) $\sqrt{6}$

39. If $a^x = \sqrt{b}, b^y = \sqrt[3]{c}$ and $c^z = \sqrt{a}$ then the value of xyz is
    (1) $\dfrac{1}{2}$ (2) $\dfrac{1}{3}$
    (3) $\dfrac{1}{6}$ (4) $\dfrac{1}{12}$

40. If $5\dfrac{7}{x} \times y\dfrac{1}{13} = 12$,where fractions are in their lowest terms, then $x - y$ is equal to
    (1) 2   (2) 4
    (3) 7   (4) 9

41. $1x3y6$ is a five digit number where x, y are digits and y exceeds x by 6. If this number is divisible by 18, then the value of $\dfrac{y}{x}$ is
    (1) 7   (2) 3
    (3) $\dfrac{1}{3}$ (4) $\dfrac{1}{7}$

42. A person invested 3 times as much money at 5% as he had invested at 2% per annum simple interest. Further he invested ` 6000 more at 3% than he had invested at 2%. If the total interest from the three investments after a year is ` 980, then the total amount he invested is
    (1) ` 17600      (2) ` 18000
    (3) ` 20000      (4) ` 26000

43. In a triangle ABC, AB = AC. Points D and E are on the sides BC and AC respectively such that AD = AE. If $\angle BAD = 30°$, then the measure of $\angle EDC$ is
    (1) 10°   (2) 15°
    (3) 20°   (4) 25°

44. Population of a town increased by 1200 persons in a year and then this new population decreased by 11% during the next year. If the town now has 32 persons less than it had before the increase, then the original population of the town is
    (1) 9968   (2) 10000
    (3) 11232   (4) 12000

45. How much per cent above the cost price should a shopkeeper mark his goods so that after allowing a discount of 20% on the marked price, he still has a gain of 10% ?
    (1) 10   (2) 25.5
    (3) 30   (4) 37.5

46. If in a group of goats and hens, the number of legs is 24 more than twice the number of heads, then the number of goats in the group is
    (1) 18   (2) 16
    (3) 14   (4) 12

47. The expression
    $$\dfrac{bx(a^2x^2 + 2a^2y^2 + b^2y^2) + ay(a^2x^2 + 2b^2x^2 + b^2y^2)}{(ax + by)^2}$$
    is equal to
    (1) $a(x + y)$ (2) $bx + ay$
    (3) $ax + by$ (4) $b(x + y)$

48. The lengths of the sides of a right angled triangle are all given in natural numbers. If two of these numbers are odd and they differ by 50, then the least possible value for the third side is
    (1) 61   (2) 60
    (3) 51   (4) 50

49. E is the midpoint of diagonal BD of a parallelogram ABCD. If the point E is joined to a point F on DA such that $DF = \dfrac{1}{3}$ DA, then the ratio of the area of ΔDFE to the area of quadrilateral ABEF is
    (1) 1 : 3   (2) 1 : 4
    (3) 1 : 5   (4) 2 : 5

50. An equilateral triangle and a regular hexagon have equal perimeters. If the area of the triangle is 12 dm^2, then the difference of their areas (in dm^2) is
    (1) 2   (2) 4
    (3) 6   (4) 8

51. The cost of diamond varies directly as the square of its weight. A diamond weighing 10 decigrams costs ` 8,000. If it breaks into two pieces whose weights are in the ratio 3 : 2, then the loss incurred (in rupees) is
    (1) 3840   (2) 3960
    (3) 4040   (4) 4160

52. Area of the four walls of a room is 108 m^2. If the height and length of the room are in the ratio of $2 : 5$ and the height and breadth in the ratio $4 : 5$, then the area, in m^2, of the floor of the room is
(1) 72   (2) 54
(3) 45   (4) 24

53. Four pipes each of 5 cm in diameter are to be replaced by a single pipe discharging the same quantity of water. If the speed of water remains same in both the cases, then the diameter (in cm) of the single pipe is
(1) 5   (2) 6
(3) 10   (4) 12

54. If there are n numbers of which one is $\left(1 - \dfrac{1}{n}\right)$ and all the others are 1's, then the arithmetic mean of these numbers is less than 1 by
(1) n^2 (2) n
(3) $\dfrac{1}{n^2}$ (4) $\dfrac{1}{n}$

55. If the mean of three numbers a, b and c is 3, then $\sqrt[3]{(7^{a+b-c})(7^{b+c-a})(7^{c+a-b})}$ equals
(1) $7^{\frac{1}{3}}$ (2) $7^{\frac{2}{3}}$
(3) 7^2 (4) 7^3

56. Match the names of foreign chroniclers with the names of Indian rulers whose period became the theme of their description.
i.   Megasthenes   a.   Alauddin Khilji
ii. Fahien   b.   Harsha Vardhana
iii. Ziauddin Barani   c.   Chandragupta Maurya
iv. Hiuen Tsang   d.   Chandragupta II
Which of the following is the correct matching ?
(1) i-c ; ii-b ; iii-a ; iv-d
(2) i-a ; ii-b ; iii-c ; iv-d
(3) i-c ; ii-d ; iii-a ; iv-b
(4) i-d ; ii-c ; iii-b ; iv-a

57. What lands were assigned for the maintenance of educational institutions under the Cholas ?
(1) Brahmadeya   (2) Shalabhoga
(3) Tirunanattukkani   (4) Vellanvagai

58. Match the names of the following tribes with the areas of their settlement.
i.   Khokhar   a.   Malabar
ii. Kurichayyas   b.   Punjab
iii. Gonds   c.   Maharashtra
iv. Kolis   d.   Madhya Pradesh
Which of the following is the correct matching ?
(1) i-b ; ii-a ; iii-d ; iv-c   (2) i-a ; ii-b ; iii-c ; iv-d
(3) i-b ; ii-d ; iii-a ; iv-c   (4) i-c ; ii-a ; iii-d ; iv-b

59. If you lived in Agra during Shahjahan's time what would you witness the most ?
(1) Rebellion of Rajputs
(2) A lot of construction activity
(3) Peasant rebellions
(4) Flourishing banking activities

60. If you are interested in knowing the economic history of a period, which of the following sources can help you the most?
a.   coins   b.   holy texts
c.   inscriptions   d.   architecture
Find the alternative that indicates the correct set.
(1) a, b, c   (2) b, c, d
(3) a, c, d   (4) a, b, d

61. Surat and Masulipatnam were important trading towns in 17th century. However in the 18th century they lost their importance.
Which of the following was NOT responsible for their decline ?
(1) Loss of market and productivity because of the decline of the Mughal Empire
(2) Control of sea-routes by the Portugese and competition from Bombay
(3) Fierce competition among various trading groups like Golconda nobles, Persian merchants etc.
(4) Shifting of company trade centres to Bombay, Calcutta and Madras

62. The worst effect of the agricultural indebtedness was
(1) the acquisition of land by money lenders.
(2) distribution of the debtor's land to others by money-lenders.
(3) social boycott of the debtor by villagers.
(4) intervention by the Government.

63. Western education proved to be significant because it
(1) changed the habits of Indians.
(2) led to industrialization of India.
(3) established democracy in India.
(4) changed the thinking and outlook of the Indians.

64. The Indigo farmers (ryots) were facing oppressive conditions for a long time. However, they decided to rebel against the planters in 1859 because
(1) ryots had to sign an agreement for planting indigo against a loan.
(2) planters forced the ryots to plant indigo on the best soil meant for cultivating rice.
(3) the price that the ryots got for the indigo, was very low and the cycle of loans never ended.
(4) ryots had the support of local zamindars, village headmen as well as of the British Government.

65. The Revolt of 1857 was a landmark in the history of India because it
a.   taught Indians to fight against a common enemy.
b.   gave confidence, courage and hope to the Indian people.
c.   transferred the power from the company to the British Crown.
d.   spread all over India and involved all Indians.
Which of the following alternative has the correct reasons?
(1) a, b and c   (2) a, b and d
(3) a, c and d   (4) b, c and d

66. Which of the following was NOT the reason for the decline of Indian textiles at the end of 18th century ?

(1) The Indian textiles with traditional intricate patterns had lost their demand amongst the rich and middle classes.

(2) Indian textiles had to compete with British textiles in the European and American markets.

(3) Exporting textiles to England became difficult due to high import duties.

(4) English cotton mills started producing cheap cloth to oust Indian textiles from Indian market.

67. **Match the following.**

a.	William Jones	i.	Respect for ancient cultures
b.	Thomas Macaulay	ii.	Critic of English Language
c.	Rabindranath Tagore	iii.	Learning in a natural environment
d.	Mahatma Gandhi	iv.	Promotion of English language

Which of the following is the correct matching ?

(1) a-i, b-ii, c-iii, d-iv   (2) a-i, b-iv, c-iii, d-ii

(3) a-i, b-iii, c-ii, d-iv   (4) a-iv, b-i, c-ii, d-iii

68. People were afraid of sending the girls to schools in mid-nineteenth century for many reasons. Which of the following was NOT true ?

(1) People feared that schools would take girls away from home.

(2) Schools would prevent girls from doing their domestic duties.

(3) People felt that education would improve the condition of women.

(4) Traveling to school might have corrupting influence on girls.

69. **Read the following.**

The late nineteenth and early twentieth centuries witnessed the rise of nationalism in many Afro-Asian countries. The freedom movement in one African country was led by Convention People's Party through strikes, boycotts and mass rallies. In 1957 that country became the first sub-Saharan African country to gain independence.

In view above which pair is correct ?

(1) Nelson Mandela and South Africa

(2) Col. Nasir and Egypt

(3) Col. Gaddafi and Libya

(4) Kwame Nkrumah and Ghana

70. Mahatma Gandhi called off the Non-cooperation Movement after the Chauri Chaura incident because

(1) he intended to avoid probable arrest.

(2) Moplah peasants in Kerala opposed him.

(3) the movement had turned violent.

(4) of growing opposition to his leadership within Congress.

71. Which of the following is the correct sequence of the process of precipitation ?

(1) unsaturated air, condensation, dew point, precipitation

(2) dew point, condensation, unsaturated air, precipitation

(3) unsaturated air, dew point, condensation, precipitation

(4) condensation, dew point, unsaturated air, precipitation

72. **Read the following statements.**

a. Ozone in found mostly in the stratosphere.

b. Ozone layer lies 55-75 kms above the surface of the earth.

c. Ozone absorbs ultraviolet radiation from the Sun.

d. Ozone layer has no significance for life on the earth.

Which set of the statements is correct ?

(1) a and c   (2) b and d

(3) b and c   (4) a and d

73. Which of the following group of industries belongs to sunrise industries ?

(1) I.T., knowledge, aircraft, ship building

(2) Ship building, health, I.T., synthetic fibre

(3) I.T., knowledge, health, hospitality

(4) Knowledge, aircraft, hospitality, I.T.

74. Which of the following pairs is correctly matched ?

(1) Elbe - Caspian Sea   (2) Rhone - Baltic Sea

(3) Ural - White Sea   (4) Danube - Black Sea

75. Which of the following is correctly matched ?

(1) Shimla Hills - Snowclad mountains

(2) Aravalli - Oldest mountain

(3) Nanda Devi - Located in outer Himalayas

(4) Satpura Hills - Lie north of the Vindhyas

76. The dotted areas in the given rough outline map of India indicate the distribution of
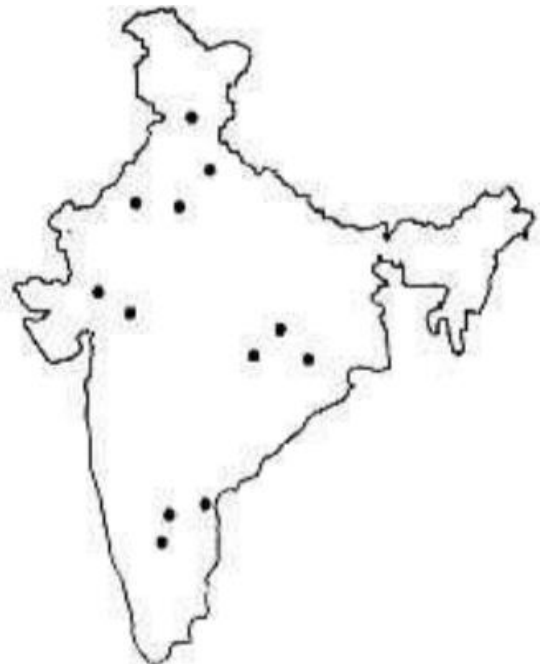
(1) Coal fields   (2) Hydel power plants

(3) Iron ore deposits   (4) Copper ore deposits

77. Which of these are positive influences of human beings on the ecosystem ?
   A. Declaring areas as wildlife sanctuaries.
   B. Increasing biodegradable packing materials that can be recycled.
   C. Removing pollutants from toxic industrial smoke.
   D. Using the natural resources intensively.
   (1) A and B
   (2) B and C
   (3) A, B and C
   (4) B, C and D

78. **Match list I (Forest types) with list II (Types of trees)**

List-I	List-II
A-Tropical Evergreen	I-Oak, pine, *Eucalyptus*
B-Temperate Evergreen	II-Oak, ash, beech
C-Tropical Deciduous	III-Rosewood, ebony, mahogany
D-Temperate Deciduous	IV-Sal, teak, shisham

   Which of the following is the correct matching ?
   (1) A-II, B-IV, C-III, D-I
   (2) A-IV, B-II, C-I, D-III
   (3) A-I, B-III, C-II, D-IV
   (4) A-III, B-I, C-IV, D-II

79. Which of the following is the correct sequence of countries from high to low with reference to annual rate of natural increase of population ?
   (1) Angola, Iran, Canada, Pakistan
   (2) Angola, Pakistan, Iran, Canada
   (3) Pakistan, Angola, Canada, Iran
   (4) Pakistan, Canada, Angola, Iran

80. Identify the pair of countries which has subsistence intensive agriculture.
   (1) India and Argentina
   (2) Brazil and Canada
   (3) Myanmar and Indonesia
   (4) Bangladesh and France

81. **Assertion (A) :** Bangalore has developed as the major IT centre in India.
   Reason (R) : The Government of Karnataka was the first to pass and announce an IT Policy in 1992.
   Select the correct answer from the given alternatives.
   (1) A is false, R is true
   (2) A is true, R is false
   (3) Both A and R are true
   (4) Both A and R are false

82. Which of the following describes the common property resource ?
   (1) Forests owned by the state
   (2) Pastures, grazing lands used by community
   (3) Woodlots, orchards used by cooperatives
   (4) Fruit orchards, grasslands owned by individual

83. **Read the following statements.**
   a. Unity in spite of dissimilarities implies 'unity in diversity'.
   b. Indians' diverse dress and food habits threaten national unity.
   c. There has been a feeling of general unity among Indians since ancient time.
   d. Communalism weakens 'unity in diversity'.
   Which alternative has all the correct statements ?
   (l) a, b and d
   (2) a, c and d
   (3) a, b and c
   (4) b, c and d

84. A 'republic' is a state in which the Head of the State is
   (1) nominated by the Prime Minister.
   (2) elected, directly or indirectly, by the people.
   (3) selected by the ruling party.
   (4) self-appointed.

85. India is a federal state because its Constitution provides for
   (1) dual citizenship.
   (2) division of powers between the Union and the States.
   (3) a written constitution.
   (4) election of members of Parliament by the people.

86. The appeal of Democracy is based on the fact that Democracy
   a. upholds freedom of conscience.
   b. offers the opportunity of free thinking and expression.
   c. guarantees equal opportunity to have jobs in the public sector.
   d. protects the privileges of the elites.
   Which pair of answers is true ?
   (1) a and b
   (2) b and c
   (3) c and d
   (4) a and d

87. Independence of judiciary is possible only under
   (1) Communism
   (2) Fascism
   (3) Liberalism
   (4) Military dictatorship

88. Which Fundamental Right of the citizens of India was violated in the Bhopal Gas Tragedy (1984) ?
   (1) Right to Equality
   (2) Right to Freedom
   (3) Right to Life
   (4) Right against Exploitation

89. State-controlled media is inconsistent with the ideology of
   (1) Democratic State
   (2) Communist State
   (3) Fascist State
   (4) Theocratic State

90. India's Constitution has specifically ensured cultural justice for the minorities through
   (1) Preamble
   (2) Fundamental Rights
   (3) Directive Principles of State Policy
   (4) Free Elections

Directions (91-100) : For the following questions write your answers in the given spaces in the answer sheet. Your answer would be only in single number. Do not write in words.

91-94 : In the paragraph given below fill in the numbered blanks by choosing words from the given box. Write the number of the word against the question number in your answer sheet.

1	confiscated	2	territory
3	relatives	4	annexed
5.	empire	6.	sovereign
7.	heirs	8.	emperor

At the end of 1859, the British introduced some changes in their policies. One important change was that all ruling chiefs of the country were assured that their (91) .... would never be (92) .... in future. They were allowed to pass on their kingdom to their (93) .... including adopted sons. However, they were made to acknowledge the British Queen as their (94) .... paramount.

95. Below are given some measures that people can take to protest against injustice. Which of these is NOT a way of public protest ?

(1) Writing letters to the concerned ministers.

(2) Organizing a rally.

(3) Starting a signature campaign.

(4) Blocking roads.

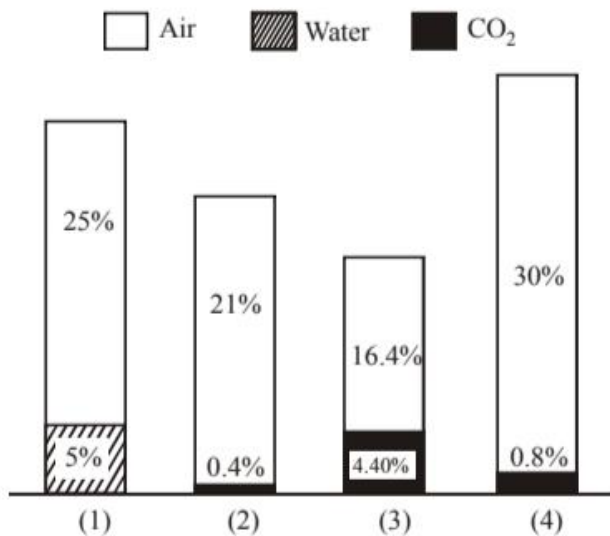Write the number of your answer in the answer sheet ?

96. The relationship of the following three is

    Nitrogen - Bacteria Plants

Considering this, which of the following statements is true? Write its number in the space provided.

(1) Plants absorb nitrogen from the atmosphere.

(2) Bacteria are not necessary for plants to make use of nitrogen.

(3) Bacteria change the form of nitrogen to facilitate plants to use it.

(4) Plants change the form of nitrogen on their own to make use of it.

97. The bar graph given below shows the composition of the inhaled air in humans. A person is standing in an open field. Write the number of the correct bar of the inhaled air by that person.
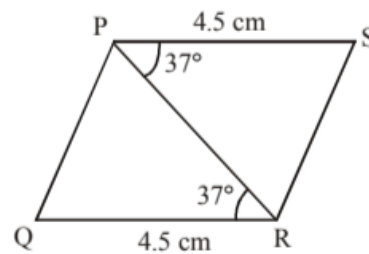

98. Pairs of triangles are given in each of the alternatives 1, 2, 3 and 4. Which pair of triangles is not congruent by SAS congruence criterion ? Write the number of your answer in the answer sheet.
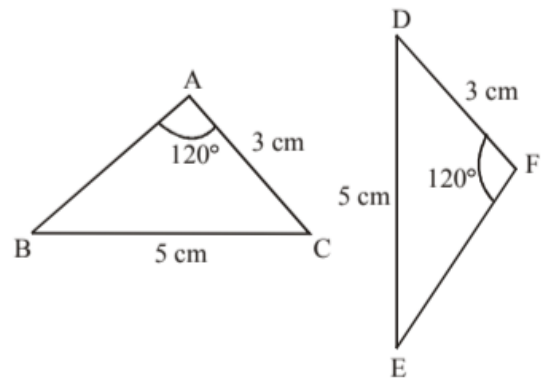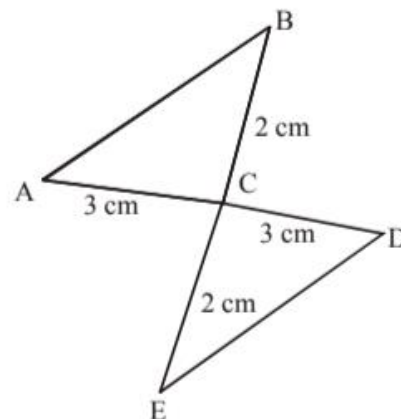
(1)
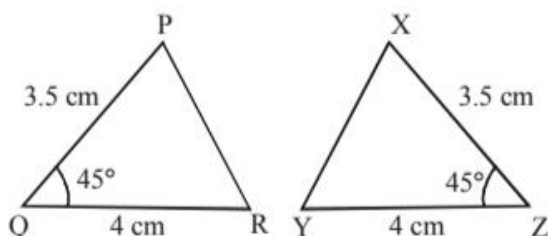
(2)

(3)

(4)

99. 24 carat gold is known as pure gold. 22 carat gold is prepared by mixing 22 parts of pure gold with 2 parts of either silver or copper. Now-a-days 22 carat hallmarked jewellery is marked by a number (916) which indicates its purity. Which number should be marked on 19 carat jewellery. Write the number of correct alternative in the answer sheet.

(1) 913   (2) 833

(3) 792   (4) 750

100. Mohan has two identical balloons, one is white and one is black. Both are filled with the same amount of air and are tied so that no air can get in or out. What will happen if both balloons are put in direct sunlight ?

A. The black balloon will become larger than the white balloon.

B. The white balloon will become larger than black balloon.

C. Both balloons will stay the same size.

Write the number of correct alternative in the answer sheet.

(1) A only   (2) B only

(3) C only   (4) Both A and B

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

Hints & Explanations

1. **(2)** Garden soil contains various components like sand, clay and humus. When we put the garden soil into a glass containing water, stirred and allowed to stand for two hours, the layers from top to bottom would be humus, water, clay and sand as per their relative size. The lightest part humus floats over water and the heavier sand settle at the bottom.
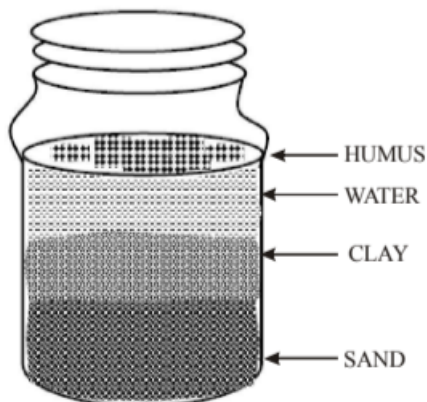
2. **(3)** WBCs are blood corpuscles involve in defending the body against both infectious diseases and foreign materials but they are not able to survive independently unlike *Amoeba* and *Paramecium*, which are acellular protozoans and complete their life processes like digestion, respiration, circulation, excretion etc. within a single cell.

3. **(3)** As the land was used for construction of house and the trees are cut for timber, it is an example of deforestation. Other examples of deforestation include conversion of forestland to farms, ranches, or urban use.

4. **(3)** **Malaria** is a mosquito borne infectious disease of human and other animals caused by protists (a type of microorganism) of the genus *Plasmodium*. It is transmitted by female *Anopheles* mosquito.
    Cholera is an infection of the small intestine that causes a large amount of water diarrhoea. It is caused by *Vibrio cholerae*, a bacterium.

Typhoid fever is spread by food and water contaminated by urine and/or faeces of infected individuals. Polluted water is the most common source of contamination. The causal organism is *Salmonella typhi*, a bacterium.
Chickenpox is a highly contagious illness caused by primary infection with *Varicella zoster* virus. It usually starts with vesicular skin rashes mainly on the body and head and becomes itchy.

5. **(1)** Weeds are unwanted plants that reduce available moisture, nutrients, sunlight and growing space needed by crop plants, e.g. dandelion, wild carrot, bermuda grass etc. Livestock can be poisoned or injured by certain unwanted plants while grazing or fed in stored feed, e.g. poison hemlock (*Conicum maculatum*).

6. **(3)** **Saliva** is a watery substance located in the mouth of organisms secreted by the salivary glands. It contains **ptyalin** (salivary amylase), which digests starch.
    Stomach glands secrete **pepsin**, which is a protein digesting enzyme.
    Small intestine receives pancreatic juice which has pancreatic **lipase**, a fat digesting enzyme.
    The **large intestine** (or colon) is the last part of the digestive system in vertebrate animals. Its function is to absorb water from the remaining undigestible food matter, and then to pass useless waste materials from the body.

7. **(1)** On the basis of geographical distribution of indigenous varieties of sheep:
    Lohi sheep is found mainly in Rajasthan region. It is used for its carpet quality wool and meat production.
    Rampur Bushair in Uttarakhand and Uttar Pradesh. It gives brown coloured superior carpets quality wool that is used for making nice quality of carpetes.
    Bakharwal in Jammu and Kashmir and give wool which is used for making woollen shawls.
    Patanwadi in Gujarat region. Patanwadi wool is used for hosiery.

8. **(4)** The **Siberian cranes**, used to arrive Bharatpur Bird Sanctuary, Rajasthan every year during winter time between the months of Oct. to March/April. The Siberian cranes had made Bharatpur Bird Sanctuary their home for more than two centuries during the winter months to escape the harsh winter in their home town in Western Siberia and used to fly over 2,500 kms to reach Rajasthan and other parts of India for warmer winters.

The species has become endangered due to the fact that it is hunted on its migratory route, which is located in Iran and Afghanistan and also due to destruction of wetlands.

Some butterflies migrate in the south, central America, or they may even go to Mexico, to escape from the harsh and cold winter. In the spring they flutter back to their warm homes in the United States and Canada. One of these butterflies that migrates is **monarch.** It is the winner of long distance. The monarch can travel as far as 2000 miles, from Canada and the Northern States to California, Florida, and Mexico. The butterflies spend most of their winter time resting and saving up energy for their flight to return in the spring.

Many types of fish migrate on a regular basis, on time scales ranging from daily to annual, and over distances ranging from a few meters to thousands of kilometers. Fish usually migrate because of diet or reproductive needs and not to escape cold weather.

9. **(1)** White blood cells (WBCs) are cells of the immune system involved in defending the body against both infectious diseases and foreign materials. Therefore, an **abnormally high level of WBC** may agree with the suspicion that an infection is present and the doctor will order further tests.

An abnormally low level of RBC may signal to the physician that the patient may be suffering from anemia, which might have caused by any intestinal worm infestation, like Hook worm.

Although total WBC count falls in viral infections, but viruses are not considered as germs, which have infected the subject (man).

10. **(1)** Fruits of *Xanthium strumarium* and *Urena* have hooked tips therefore dispersed by attaching to the fur of mammals or feathers of birds.

Seeds and fruits dispersed by wind have wings like that of the seed of the **Drumstick** and the seed of the **Maple**. Maple seeds have a one-sided wing that causes them to swirl propeller-like after they are released from a parent tree. This structure allows maple seeds to be carried by even light breezes some distance from their parent before they hit the ground.

Some seeds have tufts of hair like that of **Madar**, therefore their dispersal occurs through wind.

In **sunflower**, seed dispersal relies on seed eating birds, like the haloen and animals, and the large bright petals help to attract them.

Areca nut does not spread readily, likely due to lack of a suitable dispersal agent for the large fruits and seeds.

Groundnuts do not disperse their seeds they actively bury the fertilized flower ovary so the pod forms underground. Achory, restricting seed dispersal, is a way for the plant to take over more of a good site and protect its progeny. Both the peanut (*Arachis hypogaea*) & a clover (*Trifolium subterraneum*) use achoric seed burial.

11. **(3)** • In a forest, the decomposing leaves and bark will feed the soil and give ferns (growing below the trees) enough fertilizer to live on.

• Wild animals are also one of the modes of seed dispersal.

• Decomposer cycles are operated by micro-organisms on that act upon the dead matter and change it into simpler form and leave behind the manuré which makes the soil fertile and provides suitable conditions for the plants to grow but they are not affected by cutting forests.

• Forests are decreasing in our country due to deforestation. People should aware of the consequences of deforestation. So, education of people is important in forest conservation.

12. **(2)** Waste water treatment involves physical, chemical and biological processes to remove contaminants from waste water generated from human consumption and is not helpful in cleaning the entire river. Rivers such as Ganga, Yamuna, Kaveri etc. are like sewers. When plastic bags are ingested by cattles they get clogged in cattle's stomach or in small / large intestine resulting in improper digestion. Biogas is produced by fermentation of sludge which is further used for heating, lighting etc.

13. **(3)** Baking Soda ($NaHCO_3$) is an acidic salt but washing soda (Na_2CO_3) is not basic salt. The aqueous solution of common salt is neutral in nature.
$$NaCl(s) + H_2O(l) \rightarrow Na^+(aq) + Cl^-(aq)$$
Amla contains ascorbic acid and soap contains base (caustic soda or sodium hydroxide) spinach contains oxalic acid and thus its aqueous solution change colour of blue litmus to red.

14. **(3)** Vinegar is aqueous solution of acetic acid (CH_3COOH). Acetic acid is a weak acid as it does not dissociate completely in aqueous solution. Acid present in stomach is HCl it is strong acid as it gets completely dissociated in aqueous solution. Soap solution contains NaOH whereas lime water is aqueous solution of $Ca(OH)_2$. Lime water is a stronger base in comparison to soap solution.

15. **(3)** Natural gas which is majorly methane found in deep underground natural rock formations or associated with other hydrocarbon reservoirs in coal beds. By fractional distillation of crude oil petroleum gas (C_1 to C_3) is obtained. Burning of natural gas majorly releases carbon dioxide and water in air whereas coal oil and other fossil fuels are chemically more complicated. On combustion they discharge wide variety of harmful chemicals into air. Natural gas is exhaustible source of energy.

16. (2) Fertilizers and some potentially toxic pesticides are soluble in water. Thus they trickle down through layers of soil into deeper layers of earth and ultimately are added to the underground stores of water.

17. (2) Acrylic fibres are used for making woollen wears. Cellulose is a polysaccharide consisting of a linear chain containing several hundred to over ten thousand glucose units. Polyethylene being durable and versatile used in the manufacturing of toys. Terylene is a synthetic polyester fibre.

18. (2) $2NaOH + Zn \longrightarrow Na_2ZnO_2 + H_2$

$2NaOH + 2Al + 2H_2O \longrightarrow 2NaAlO_2 + 3H_2$

19. (4) Phosphorus have low ignition temperature. Phosphorus burns in air to form phosphorus pentaoxide. Copper corrodes to form a basic green carbonate (combination of the hydroxide $Cu(OH)_2$ and carbonate $CuCO_3$). CO_2 is an acidic gas produced on burning charcoal.

20. (4) Process A burning of candle is a chemical change whereas process B melting of candle wax is a physical change.

21. (2) Rusting of iron takes place only in presence of oxygen and water vapours. In figure (c) rusting is not possible as supply of oxygen is blocked by oil layer.

22. (3) This zone of flame is called outermost zone it is thin and blue in colour. It is the hottest zone of the flame. The temperature of this zone is maximum around 1800°C.

23. (1) The fire extinguisher cuts off the supply of air, or decrease the temperature of the fuel or both. The most common fire extinguisher is water but it is not suitable for fires involving oil and petrol, electrical equipments and inflammable materials. For such fires CO_2 is the best extinguisher.

24. (2) In convection, material moves due to difference in density. Here the more heated and less dense parts of the air rise and are replaced by the cooler parts of the air.

25. (3) Among the four places, Puri is the most likely to experience cyclones, it is due to its geographical location low pressure is easily created. Therefore high air pressure comes in great speed, it creates cyclones.

26. (2) Average speed $= \dfrac{\text{Total distance travelled}}{\text{Total time}}$

$= \dfrac{80 \times \frac{1}{4} + 40 \times \frac{1}{4}}{\frac{2}{4}} = 30 \times 2 = 60 \text{km/hr}$

$= 60 \times \dfrac{5}{12} = \dfrac{50}{3} \text{ m/s} = 16.7 \text{m/s}$

27. (3) In uniform motion, object covers equal distances in equal intervals of time, however small these time intervals may be in the same fixed direction.

28. (3) Electric fuse is used to protect electric appliances. When current larger than specified value flows through the circuit, the temperature of the fuse wire increases. This melts the fuse wire and breaks the circuit. In relay transmission electromagnetic waves are used. CFL works on electric discharge. In button cell electrolytes are the sources of ions.

29. (4) To conduct electricity liquid materials need free ions. In case of distilled water and glycerine no free ions are available.

30. (2) When two plane mirrors are inclined to each other at an angle θ then no. of images formed, $n = \left(\dfrac{360°}{\theta} - 1\right)$;

if $\dfrac{360°}{\theta}$ is an even integer.

Number of image $= \dfrac{360°}{90°} - 1 = 4 - 1 = 3$

31. (3) On passing through a prism, white light breaks into seven colours VIBGYOR. If the second identical prism is placed in an inverted position w.r.t. the first prism the colours of the spectrum recombine and emerges as a parallel beam of white light.

32. (3) In this case, change in momentum,
$\Delta p = 2mv = 2 \times 0.2 \times 40 = 16 \text{ kg-ms}^{-1}$

33. (1) Friction is the retarding force between the surfaces in contact. Retarding force $F = \mu R$ where μ is the coefficient of friction between the two surfaces. Its value depends upon the nature of surfaces in contact.

34. (3) Among the four creatures birds voice has higher pitch than other three. Higher pitch means higher frequency. Pitch determines the shrillness of sound.

35. (4) When we look towards the pole star, it appears stationary because it is pointing exactly in the north direction. The earth spins on its axis and the pole star is almost exactly above this axis of the earth. Hence it appears stationary.

36. (3) $x = 1, y = 3, z = 5$ and $t = 7$
$\Rightarrow xyzt + 16 \Rightarrow 1 \times 3 \times 5 \times 7 + 16 = 121 = 11^2$

37. (2) $\sqrt{\dfrac{8^{10} + 4^{10}}{64^2 + 4^9 \times 16}} = \sqrt{\dfrac{(4 \times 2)^{10} + 4^{10}}{4^6 + 4^{11}}}$

$= \sqrt{\dfrac{4^{10}(2^{10} + 1)}{4^6(2^{10} + 1)}} = \sqrt{4^4} = 16$

38. (1) $x = \sqrt{3 + 2\sqrt{2}} - \sqrt{3 - 2\sqrt{2}}$
Squaring on both sides

$x^2 = \left(\sqrt{3 + 2\sqrt{2}} - \sqrt{3 - 2\sqrt{2}}\right)^2$

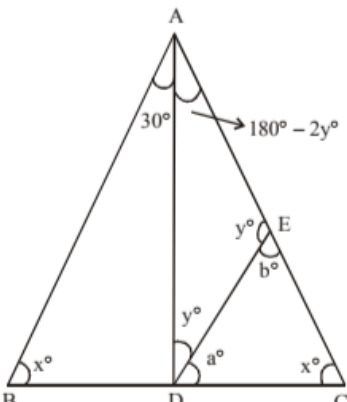$x^2 = 3 + 2\sqrt{2} + 3 - 2\sqrt{2} - 2(3 + 2\sqrt{2})(3 - 2\sqrt{2})$
$x^2 = 4$
$x = 2$

39. (4) $a^x = \sqrt{b}, b^y = \sqrt[3]{c}$ and $c^z = \sqrt{a}$
$a^{2x} = b, b^{3y} = c, c^{2z} = a$

$\left(a^{2x}\right)^{3y} = c \Rightarrow \left(a^{6xy}\right)^{2z} = a$

$a^{12xyz} = a$

$\Rightarrow xzy = \dfrac{1}{12}$

40. (3) $5\dfrac{7}{x} \times y\dfrac{1}{13} = 12$

By Hit and Trial method.
Let $x = 9, y = 2$
where the fractions are in their lowest terms, then x should be maximum possible single digit and y is minimum possible single digit.
Putting this value in equ. (1)

$5 \times \dfrac{7}{9} \times 2 \times \dfrac{1}{13} = \dfrac{52}{9} \times \dfrac{27}{13} = 12$

$\therefore \ x - y = 7$

41. (1) 1x3y6 is divisible by 18 then it is also divisible by 9

$1+x+3+y+6=10+x+y(x+y=8)$

$y-x=6$ ...(1) [Given]

$y+x=8$ ...(2)

Subtracting (1) from (2)

$y+x=8$

$y-x=6$

$2y=14$

$y=7 \Rightarrow x=1$

$\dfrac{y}{x}=7.$

42. (4) Let he invested x amount of ` at 2%

then $\dfrac{3x\times5}{100}+\dfrac{2x}{100}+\dfrac{(x+6000)\times3}{100}=980$

$\Rightarrow 15x+2x+3x+18000=98000$

$20x+18000=98,000$

$20x=80,000$

$x=4000.$

Total amount he invested is $3x+2x+x+6000$

$=12000+8000+4000+6000=26000$

43. (2)

$AB=AC$

$\Rightarrow \angle B=\angle C=x°$

$AD=AE$

$\Rightarrow \angle D=\angle E=y°$

In $\Delta DEC < y$ is external angle

$\Rightarrow y°=a+x° \Rightarrow a°=y-x°$

In ΔABC

$2x°+30°+180°-2y°=180°$

$2(y-x)=30°$

$y-x=15°=a°$

$\therefore \angle EDC=15°$

44. (2) Let 'x' be the number of original population

$\dfrac{(x+1200)\times11}{100}=1200+32$

$(x+1200)=\dfrac{1232\times100}{11}$

$x=11200-1200$

$x=10,000$

45. (4) Let C.P. $=100$

Let the marked price is ` x

$\Rightarrow \left(x-\left(\dfrac{x\times20}{100}\right)\right)=110$

$\dfrac{4x}{5}=110$

$x=\dfrac{110\times5}{4}=137.5$

$\Rightarrow$ C.P. $=100$

Marked price $=137.5$

Required increase $=137.5-100=37.5$

46. (4) Let x be the number of goats

Let y be the number of hens

According to question

$4x+2y=2(x+y)+24$

$4x+2y=2x+2y+24$

$2x=24$

$x=12$

Hence the number of goats are 12.

47. (2)

$\dfrac{bx(a^2x^2+2a^2y^2+b^2y^2)+ay(a^2x^2+2b^2x^2+b^2y^2)}{(ax+by)^2}$

$\dfrac{(a^2x^2(ay+bx)+b^2y^2(ay+bx)+2a^2y^2bx+2b^2x^2ay)}{(ax+by)^2}$

$\dfrac{a^2x^2(ay+bx)+b^2y^2(ay+bx)+ay(2axby)+bx(2axby)}{(ax+by)^2}$

$\dfrac{(a^2x^2+2axby+b^2y^2)(ay+bx)}{(a^2x^2+b^2y^2+2axby)}=(ay+bx)$
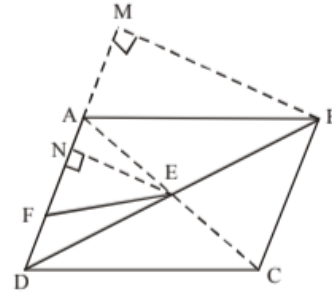
48. (2) By Hit and Trial Method

$P^2+B^2=H^2$

$60^2+11^2=61^2$

Since 61, 11 are odd and 61 is hypotenuse

$61-11=50.$

So, least possible value of third side is 60.

49. (3)

As, $\Delta DEN \sim \Delta DBM$

$\therefore BM=2EN$

$ar(\Delta DFE)=\dfrac{1}{2}DF\times EN$

$=\dfrac{1}{2}\left(\dfrac{1}{3}DA\right)\times\dfrac{1}{2}BM$

$=\dfrac{1}{12}(DA\times BM)$

$ar(\Delta DFE):ar(\Delta ABD)$

$=\dfrac{1}{12}(DA\times BM):\dfrac{1}{2}(DA\times BM)=1:6$

$ar(\Delta ABD)=6(\Delta DEF)$

As, $ar(\Delta ABD)=ar(\Delta DFE)+ar(ABEF)$

$6(\Delta DEF)=ar(\Delta DFE)+ar(ABEF)$

$5[ar(\Delta DFE)]=ar(ABEF)$

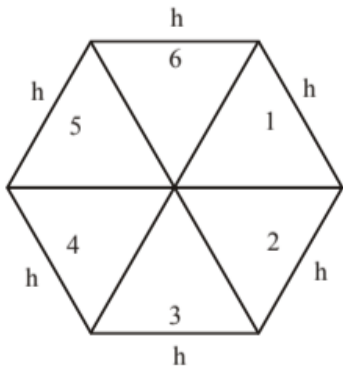$\therefore \dfrac{ar(\Delta DFE)}{ar(ABEF)}=\dfrac{1}{5}$

50. (3) Let 'a' be the side of equilateral triangle

$$\therefore \frac{\sqrt{3}}{4}a^2 = 12$$
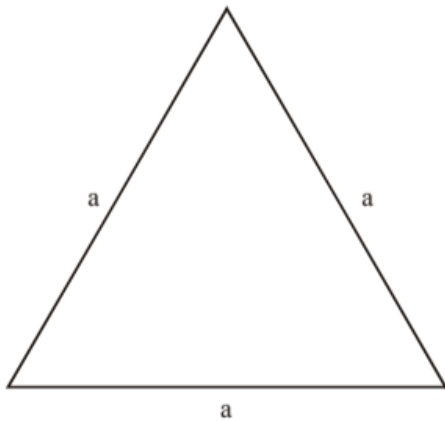
Perimeter of triangle = 3a = Perimeter of Hexagon

∴ 3a = 6h (where h is the side of hexagon)

$$\Rightarrow h = \frac{1}{2}a$$

The area of the hexagon = $6 \times \frac{\sqrt{3}}{4}h^2$

$$= 6 \times \frac{\sqrt{3}}{4}\left(\frac{a}{2}\right)^2 = \frac{6}{4} \times \left(\frac{\sqrt{3}}{4}a^2\right) = \frac{6}{4} \times 12 = 18$$

Difference in their areas = 18 − 12 = 6m^2

51. (1) Cost of diamond = K (weight)^2

$8000 = k(10)^2$

$$k = \frac{8000}{100} = 80$$

Diamond was broke into two pieces = 3x + 2x = 10

$5x = 10 \Rightarrow x = 2$

$3x \Rightarrow 6 ; 2x = 4$

Ist part ; cost $\Rightarrow 80 \times 36 = 2880$

IInd part ; cost $\Rightarrow 80 \times 16 = 1280$

Total cost = 2880 + 1280 = 4160

So loss = 8000 − 4160 = 3840

52. (3) Let l – length, b – breadth, h – height

Area of four walls = 2 h (l + b) = 108m^2

h : l = 2 : 5, h : b = 4 : 5 (Given)

∴ h : l : b = 4 : 10 : 5

h = 4x, l = 10x , b = 5x

$2 \times 4x(15x) = 108$

$$x^2 = \frac{108}{120}$$

Then the area of the floor is $l \times$ b = 10x × 5x = 50x^2

$$= 50 \times \frac{108}{120} = 45m^2$$

53. (1) Four pipes each of 5cm in diameter

$\Rightarrow$ radius (r) = 2.5cm

volume = $\pi r^2 h$ (since, we are considering the height (length) of the pipe as constant or same)

Let the height is h

Volume v = $\pi(2.5)^2 h$

$4 \times \pi \times (2.5)^2 \times h = \pi r_1^2 h$ (r_1 is required pipe radius)

$r_1^2 = 4 \times (2.5)^2$

$r_1 = 2 \times (2.5) = 5$ cm.

54. (3) Arithmetic mean of 'n' numbers

$$= \frac{1 - \frac{1}{n} + 1 + 1 + 1 \,...(n-1)\,\text{times}}{n} = \frac{(n-1) + 1 - \frac{1}{n}}{n}$$

$$= \frac{n - \frac{1}{n}}{n} = \frac{n^2 - 1}{n^2} = 1 - \frac{1}{n^2}$$

The arithmetic mean of these numbers is less than 1 by

$$\frac{1}{n^2}.$$

55. (4) $\sqrt[3]{\left(7^{a+b-c}\right)\left(7^{b+c-a}\right)\left(7^{c+a-b}\right)}$

$$= \sqrt[3]{\left(7^{a+b-c+b+c-a+c+a-b}\right)}$$

$$= \sqrt[3]{\left(7^{a+b+c}\right)} = \left(7^{\frac{a+b+c}{3}}\right) = 7^3$$

$$\therefore \quad \left[\frac{a+b+c}{3} = \text{mean} = 3\right]$$

56. (1) Megasthenes was a ancient Greek historian and author of "Indica" visited India during the Chandragupta Maurya regime in 4th century B.C.

Hiuen Tsang (or Yuan Chwang) a chinese pilgrim, visited India during the reign of Harsha Vardhana in first half of 7th century A.D. He stayed for 15 years visited all the places associated with Budha. Ziauddin Barani mentions the official history of Alauddin Khilji reign during 14th century.

57. **(2)** Shalabhoga were the lands assigned for the maintenance of educational institutions under the cholas.

58. **(1)** Khokhar is a agricultural tribe of Punjab and north-western India. Kurichayyas or Malai-Brahmins are a matrilinear tribe of Kerala. The Gonds are the largest tribal group of India and originally belongs to Madhya Pradesh but spread all over the Deccan's penninsula. Koli is a fisherman tribe of Maharashtra.

59. **(2)** Some of the famous Mughal buildings were built in this period like Taj Mahal, Redfort, Jama Masjid (Delhi) etc.

60. **(3)** Coins, inscriptions and architecture help to know about the economic history as they present the economic activities of a state.

61. **(3)** This is not an appropriate reason.

62. **(1)** The farmers were caught in the cycle of debt where they ended losing their land.

63. **(4)** Education changed the thinking process. Malpractices like sati, casteism, no education for women were brought to an end to a large extend.

64. **(4)** The local zamindar and village headmen mobilized the indigo peasants and fought pitched battles with the lathiyals.

65. **(1)** The influence of the rebel was confined to North India. Moreover, it was a revolt that saw unity among various sects of the Indian society.

66. **(1)** Indian textiles were always popular with Europeans. Moreover, since they were available at cheap prices the demand for these was always more.

67. **(2)** William Jones was a Orientalist who had great respect for ancient cultures. Macaulay had played a major role in reforming education in India. He supported English as official language and its use as medium of instruction in schools. Tagore's theory of education is marked by naturalistic and aesthetic values.

68. **(3)** Amongst all this is the most appropriate option. Moreover, the women in Indian society did not enjoy rights & liberties as men did.

69. **(4)** The Convention People's Party (CPP) is a socialist political party in Ghana, based on the ideas of former President Kwame Nkrumah.

70. **(3)** M K Gandhi never supported non-violence. Chauri Chaura is a town near Gorakhpur, Uttar Pradesh. The town is known most for an event in February 1922 during the British Raj when a police chowki (station) was set on fire by a mob of angry citizens, killing 22 policemen inside.

71. **(3)** This is the correct sequence of precipitation.

72. **(1)** Ozone layer also called ozonosphere contains relatively high concentrations of ozone (O_3) molecules. Approximately 90% of atmospheric ozone occurs in stratosphere, the region extending from 10-18 km to 50 km above the earth's surface. The ozone layer effectively blocks certain types of ultraviolet and other forms of radiations that could injure or kill most living things.

73. **(3)** This group of industries belongs to the sunrise industries. A sunrise industry is a colloquial term for a sector or business that is in its infancy, but is growing at a rapid pace. (e.g. the telecom industry in the mid-1990s) and is expected to be increasingly important in the future.
    Sunrise industries generally have plenty of "buzz" surrounding them as public awareness about the sector increases and investors get attracted to its long-term growth prospects.

74. **(4)** Danube is second longest river after Volga. It rises in Black forest mountain of Germany and passes through nine countries — Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Bulgaria, Romania and Ukraine.

75. **(2)** The Aravalli range are the oldest fold mountains in India. Stretching about 800 km it crosses Indian states of Gujarat, Rajasthan, Haryana and Delhi.

77. **(3)** Adopting environment friendly lifestyle like using of biodegradable packing material, removing toxic pollutants, protecting forests and wildlife, using natural resources sustainably not intensively etc. are the positive influences of human beings on the ecosystem.

78. **(4)** Tropical evergreen forests are dense forests usually found in areas receiving more than 200 cm of rainfall and having a temperature of 15ºC to 30ºC. Temperate evergeen forests don't shed their leaves and remain evergreen throughout the year. It lies in temperate zones i.e. region from tropic of Cancer/Capricorn to Artic/Antarctic circle. Pine group of trees dominates in these forests. Temperate deciduous forests are found in middle latitudes around the globe and lose their leaves every year.

79. **(2)** Angola is a southern African country with population growth rate of 2.9%. Pakistan is the world's sixth most populous country with population growth rate of 1.6% Iran shows drastic decrease in their population growth of 1.1% whereas Canada shows 0.9% growth rate of population.

80. **(1)** Subsistence intensive agriculture practised in very densely populated countries like India, China, Argentina. Farmers use simple tools in their small land holdings to obtain maximum yield from the available lands by intensifying cultivation techniques.

81. (3) Bangalore popularly known as the "Silicon Valley of India" is the headquarters of many of the IT companies in India.

82. (2) Community property resources are natural resources owned and managed collectively by a community or society. Pastures or grazing lands is one of the example. Rivers, lakes, oceans are the other examples.

83. (2) India is a vast country with huge diversity but united with a common cultural heritage.

84. (2) A 'republic' is a state in which the head of the State is directly or indirectly or appointed by the people. Currently, 135 of the world's 206 sovereign states use the world republic as the part of their official names.

85. (2) India has burrowed the concept of fedrealism from Canada. In this system there is clear division of powers between the union and states.

86. (2) Democracy is a form of government that supports the growth as well as development of the individual and of nation at large.

87. (3) Liberalism is a political setup founded on ideas of liberty and equality. They support ideas such as free and fair elections, civil rights, independent judiciary, freedom of the press, religion etc.

88. (3) Right to life is a fundamental right under Article 21 was violated in Bhopal Gas Tragedy (1984).

89. (1) State controlled media does not support democracy.

90. (2) Fundamental right ensures cultural justice. Moreover, fundamental rights are given to every individual irrespective of his/ her caste, creed, religion, region etc.

91. 2   92. 4   93. 7   94. 6

95. 1 This does not include in mass public protest.

96. 3 Rhizobium a nitrogen - fixing bacterium present in the root nodules of a leguminous plant. This bacterium converts atmospheric nitrogen into nitrates and nitrites which are further assimilated by plants.

97. 2 The proportion of gases in atmosphere is O_2: 20.8%, N_2: 79% and CO_2 : 0.03%. The second bar is representing the most appropriate proportion of gases in atmosphere, which the person inhales.

98. 3 Figure (3) not satisfying the SAS criterion.

99. 3 $\dfrac{22}{24} = 0.916$

Satisfying $\dfrac{19}{24} = 0.792$.

792 should be marked on 19 carat jewellery.

100. 1. Among colours, black is the best absorbent as well as radiant of heat. Therefore, the black balloon will absorb more heat and hence will expand more.