

# Jawahar Navodaya Vidyalaya Entrance Exam, Class-9 SOLVED PAPER-2022

## Section-I: हिन्दी

निर्देश: (प्रश्न सं. 1 से 15 तक): प्रत्येक प्रश्न के लिए चार संभावित उत्तर विकल्प दिए गए हैं, जिनमें से केवल एक सही है। सही उत्तर चुनकर उसको ओ. एम. आर. उत्तर पत्रिका पर उपयुक्त स्थान पर दर्शाना है।

1. शब्द वर्तनी वाले शब्द को पहचानिए-  
(a) अधिनियम (b) अश्विनियम  
(c) अधिनीयम (d) अधीनयम
2. जब अपराधी किसी गलत काम के लिए अपना दोष न मानकर पूछने वाले को हो दोषी बताता है तो आप किस लोकोक्ति का प्रयोग करेंगे?  
(a) मान न मान मैं तेरा मेहमान  
(b) चोर की दाढ़ी में तिनका  
(c) उलटा चोर कोतवाल को डोंटे  
(d) बद अच्छा बदनाम बुरा
3. 'ग' वर्ण का उच्चारण स्थान है-  
(a) तालव्य (b) कंठ्य  
(c) दंत्य (d) मूर्धन्य
4. वह वाक्य पहचानिए जिसमें 'चिड़िया' का शब्द बहुवचन प्रयुक्त हुआ है-  
(a) चिड़ियाँ गाना गा रही हैं। (b) चिड़ियाएँ डाल पर बैठी हैं।  
(c) सब चिड़िया उड़ गई हैं। (d) सारी चिड़ियाएँ कहाँ गईं।
5. रूप, रंग या आकार बताने वाले विशेषणों को क्या कहते हैं?  
(a) संख्यावाचक (b) परिणामवाचक  
(c) गुणवाचक (d) सार्वनामिक
6. 'मैं उस मकान में रहता हूँ, जिसमें कभी आचार्य जी रहते थे' - किस प्रकार का वाक्य है?  
(a) सरल वाक्य (b) संयुक्त वाक्य  
(c) मिश्र वाक्य (d) लघु वाक्य
7. नीचे एक वाक्य को चार खंडों में बाँटा गया है, जिनमें से किसी एक में अशुद्धि है। उसे पहचानिए।  
चौथा प्रश्न मैंने ठीक से नहीं करा।  
(1) (2) (3) (4)  
अशुद्धि किस खंड में है?  
(a) (1) (b) (2)  
(c) (3) (d) (4)

8. किस विकल्प में दोनों शब्द 'वायु' के पर्यायवाची हैं?

- (a) पवन, अनिल (b) अनल, पवन  
(c) अनिल, पावन (d) अनल, समार

9. उपयुक्त लोकोक्ति से वाक्य पूरा कीजिए।

इतने कैचे पद पर पहुँचना ..... नहीं है।

- (a) ईद का चाँद .  
(b) खाएँ हाथ का खेल  
(c) ऊँट के मुँह में जीरा  
(d) घर की मुर्गी दाल बराबर ।

10. 'नश्वर' का विलोमार्थी शब्द है-

- (a) ईश्वर (b) अनश्वर  
(c) कृत्रिम (d) लौकिक

निम्नलिखित अनुच्छेद को पढ़कर प्रश्न सं. 11 से 15 तक के लिए सर्वाधिक उपयुक्त उत्तर चुनिए।

जीवन में सफलता पाने के लिए परिश्रम बहुत आवश्यक है। निरंतर श्रम करने वाला व्यक्ति कभी असफल नहीं होता। अभ्यास करते रहना ही मनुष्य का धर्म होना चाहिए। जो लोग बिना श्रम किए सब कुछ प्राप्त कर लेना चाहते हैं वे आलसी होते हैं। परिश्रमी अपनी मेहनत के बल पर ही बहुत कुछ हासिल कर लेता है। सभी इस संसार में आकर कुशल बनते हैं। श्रम का फल हमेशा मोटा होता है, यही मान्यता है। महापुरुषों के जीवन से हमें यही प्रेरणा मिलती है कि मनुष्य को जीवन में श्रम करते रहना चाहिए। जीवन में सुख मँगाने या खरीदने से नहीं मिलते, उन्हें प्राप्त करने के लिए प्रयास करना पड़ता है। वस्तुतः श्रम जीवन की मूल्यवान कुंजी है। जीवन रूपी सुनसान जंगल में मेहनत और अभ्यास से जो चाहे अपने लिए मार्ग बना लें।

11. जीवन में परिश्रम आवश्यक है-

- (a) आरामदायक जीवन के लिए (b) धन अर्जित करने के लिए  
(c) प्रतियोगिता के लिए (d) सफलता प्राप्त करने के लिए

12. मनुष्य का धर्म है-

- (a) पूजा-पाठ करना (b) दूसरों को परास्त करना  
(c) अभ्यास करते रहना (d) चोरी करना

13. श्रम का फल सदैव ..... होता है।

- (a) बुरा (b) अच्छा  
(c) मीठा (d) खट्टा

14. 'अनमोल' के लिए अनुच्छेद में प्रयुक्त शब्द है-

- (a) अभ्यास (b) प्रेरणा  
(c) मूल्यवान (d) महापुरुष

15. लोग कुशल कहाँ बनते हैं?

- (a) घर में (b) परिवार में  
(c) विद्यालय में (d) संसार में

## Section-II: English

**Directions :** Answer questions no. 16 - 19 by choosing the most appropriate options to complete the paragraph by filling in the blanks.

Ranthambore National Park, one of the largest National Wildlife Parks of Northern India is situated 16 Sawai Madhopur in Rajasthan. It is one of the 17 places to view the majestic Indian Tiger in the jungle. Ranthambore used to be a hunting ground for the royal family in the past. Today it is a major wildlife tourist attraction. Amongst some of its other attractions 18 the imposing 10th century Ranthambore Fort, on a hill top, and the Ganesh Mandir temple. Also, in the park is a lake called Padam Talao Lake 19 is known for its abundance of water lilies.

16. (a) near (b) beside  
(c) away (d) far
17. (a) good (b) better  
(c) best (d) nice
18. (a) is (b) are  
(c) were (d) was
19. (a) what (b) whom  
(c) who (d) which
20. Choose the word similar in meaning to underlined word.  
As many as 1800 species of birds in the face the risk of extinction.  
(a) disappearance  
(b) evaporation  
(c) death  
(d) survival
21. The word which is opposite in meaning 'generous' is \_\_\_\_\_.  
(a) liberal  
(b) bountiful  
(c) stingy  
(d) sympathetic
22. The teacher has taught this lesson. Which is the following options correctly changes VOICE of this sentence?  
(a) This lesson has taught the teacher.  
(b) This lesson has been taught by the teacher.  
(c) The teacher has been taught this lesson  
(d) This lesson had been taught by the teacher.

**Directions :** (Questions no. 23-25) Answer these questions by choosing the most appropriate options to fill in the blanks.

23. The actor's latest performance is ----- her past one.

- (a) superior than  
(b) more superior than  
(c) superior to  
(d) most superior than

24. I \_\_\_\_\_ For the Swiss delegation to arrive for over an hour.

- (a) will be waiting  
(b) would love waiting  
(c) have been waiting  
(d) wait

25. \_\_\_\_\_ money she had, was also spent on medicines,

- (a) more (b) A little  
(c) much (d) The little

26. Give one word substitute for the following expression :  
'One who is all powerful'

- (a) Omnivorous (b) Omniscient  
(c) Omnipotent (d) Ophthalmologist

27. **Directions:** Select the alternative which best expresses the following sentence in indirect speech.

I asked Sheela, "Why are you looking so pale today?"

- (a) I said to Sheela why was she looking so pale that day.  
(b) I was asking Sheela why she is looking so pale today.  
(c) I asked Sheela why she was looking so pale that day.  
(d) I asked to Sheela why she was looking so pale today

**Directions:** Read the following passage carefully and answer (Questions No. 28 - 30.)

Ten-year-old Everbloom K. Nongrul from Meghalaya was selected for the ICCW National Bravery Award for saving two of his friends from drowning in separate incidents last year. He is a resident of Lawryngkneng village in East Khasi district. Everbloom when asked if he felt afraid jumping into the waters, said, "No, never, I will not shy away from saving more lives in future, if it is in my ability."

28. Everbloom was given a bravery award for saving:

- (a) one of his friends from drowning.  
(b) two of his friends from drowning.  
(c) two small children from drowning.  
(d) a few of his friends from drowning.

29. Everbloom lives in a \_\_\_\_\_

- (a) city in Meghalaya  
(b) town in Meghalaya  
(c) village in Meghalaya  
(d) hill in Meghalaya

30. Everbloom rescued his friends \_\_\_\_\_

- (a) on the same day last year  
(b) on two different days last year  
(c) on two different occasions last two years  
(d) on many occasions last year



### Section-III: Mathematics

Directions: (Questions no. 31 to 65)

For each question, four possible answer choices have been given out of which one is correct. Select the correct answer and indicate it at the appropriate place in the OMR Answer Sheet.

31.  $\left(\frac{5}{3} \times \frac{7}{2}\right) - \left(\frac{11}{8} \times \frac{4}{3}\right)$  is equal to:
- (a)  $\frac{3}{8}$  (b)  $-\frac{3}{4}$   
(c) 4 (d)  $\frac{1}{4}$
32. The area of a rectangle is  $33 \text{ m}^2$ . If one of its sides is  $2\frac{3}{4} \text{ m}$ , then the perimeter of rectangle is:
- (a) 12 m (b) 48 m  
(c)  $14\frac{3}{4} \text{ m}$  (d)  $29\frac{1}{2} \text{ m}$
33. Given  $\sqrt{2401} = 49$ , the value of  $\sqrt{0.2401} + \sqrt{24.01}$  is:
- (a) 53.9 (b) 5.39  
(c) 0.539 (d) 9.8
34. A rational between  $\frac{1}{5}$  and  $\frac{1}{2}$  is:
- (a)  $\frac{1}{10}$  (b)  $\frac{3}{10}$   
(c)  $\frac{7}{10}$  (d)  $\frac{1}{10}$
35.  $[\sqrt[3]{8} + \sqrt[3]{27}]$  equals:
- (a)  $\sqrt[3]{35}$  (b)  $\sqrt[3]{216}$   
(c) 35 (d) 5
36. By what number should we multiply  $\frac{15}{-28}$  so that the product may be  $\frac{-5}{7}$ ?
- (a)  $\frac{4}{3}$  (b)  $\frac{3}{4}$   
(c)  $\frac{3}{4}$  (d)  $\frac{4}{3}$
37. Difference of two perfect cubes is 127. If the cube root of the smaller of the two numbers is 6, the cube root of the larger number is:
- (a) 4 (b) 6  
(c) 7 (d) 8
38. The sides of a rectangle are 2 m and 1.5 m. The length of its diagonal is:
- (a) 6.5 m. (b) 2.5 m.  
(c) 6.25 m. (d) 25 m.
39. By which smallest number must 675 divided so that the quotient is a perfect cube?
- (a) 5 (b) 25  
(c) 3 (d) 9
40. The volume of a cubical box is 0.512 cubic metres. The length of each side of the box is:
- (a) 8 m (b) 0.8 mm  
(c) 8 cm (d) 0.04 m
41. If 3 persons can build a wall in 4 days, the 4 persons can build the same wall in:
- (a) 6 days (b) 5 days  
(c) 3 days (d)  $5\frac{1}{3}$  days
42. The number  $4325 \times 10^{-4}$  written in standard form is:
- (a) 0.4325 (b)  $43.25 \times 10^{-2}$   
(c)  $432.5 \times 10^{-3}$  (d)  $4.325 \times 10^{-1}$
43. A can complete a work in 12 days. A and B both working together can complete the same work in 4 days. B alone can complete the work in:
- (a) 8 days (b) 6 days  
(c) 10 days (d) 2 days
44. A camp having 300 soldiers, has food sufficient for 90 days. After 20 days, 50 more soldiers arrived. How long will the remaining food last at the same rate?
- (a) 60 days (b) 77 days  
(c) 80 days (d) 81 days
45. 40% of (100-20% of 300) is equal to:
- (a) 20 (b) 16  
(c) 64 (d) 140
46. 33% marks are required to pass an examination. A student scored 158 marks and failed by 7 marks. The maximum marks in the examination are:
- (a) 400 (b) 450  
(c) 500 (d) 600
47. A TV with marked price ₹ 16000 is available on 15% discount. The selling price of TV is:
- (a) ₹ 13600 (b) ₹ 11000  
(c) ₹ 15000 (d) ₹ 14760
48. Samir purchased a pair of shoes and paid ₹ 441, including GST. If the sale price of shoes is ₹ 420, then the rate of GST is:
- (a) 12% (b) 8%  
(c) 6% (d) 5%
49. A trader marks his goods 25% above the price and gives a discount of 20% on the marked price. His gain or loss percent is:
- (a) 5% gain (b) 5% loss  
(c) 0% gain or loss (d) 10% gain

50. The sum which will amount to ₹ 8748 in 2 years at 8% per annum compound interest is:

- (a) ₹ 6000 (b) ₹ 6500  
(c) ₹ 7000 (d) ₹ 7500

51. Factorising  $12a^3b^2 - 27ab^4$  gives:

- (a)  $3a^2b(2a - 3b)(2a + 3b)$   
(b)  $3ab(3a - 2b)(3a + 2b)$   
(c)  $4ab^2(2a - 3b)(2a + 3b)$   
(d)  $3ab^2(2a - 3b)(2a + 3b)$

52. When expanded the expression  $(2x - y + 3z)^2$  is equal to:

- (a)  $4x^2 + y^2 + 9z^2 - 4xy - 6yz + 12xz$   
(b)  $4x^2 - y^2 + 9z^2 - 4xy - 6yz + 12xz$   
(c)  $4x^2 + y^2 + 9z^2 + 4xy - 12xz - 6yz$   
(d)  $4x^2 + y^2 + 9z^2 - 4xy + 6yz + 6xz$

53. Two sides of an equilateral triangle are  $(2x + 11)$  cm and  $(4x + 1)$  cm respectively. The perimeter of the triangle is:

- (a) 50 cm (b) 55 cm  
(c) 63 cm (d) 65 cm

54. The values of p and q in

$$x^2 + 4x - p = (x - q)(x + 7) \text{ are:}$$

- (a)  $p = 21, q = -3$  (b)  $p = -21, q = 3$   
(c)  $p = -21, q = -3$  (d)  $p = 21, q = 3$

55. After 12 years I shall be 3 times as old as I was 4 years ago. My present age is:

- (a) 21 years (b) 12 years  
(c) 8 years (d) 20 years

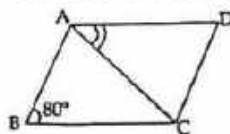
56. The solution of linear equation

$$\frac{2x - 3}{5} + \frac{x + 3}{4} = \frac{2x + 3}{4} \text{ is:}$$

- (a) 1 (b) 2  
(c) 3 (d) 4

57. ABCD is a rhombus in which  $\angle ABC = 80^\circ$ .

The measure of  $\angle CAD$  is:



- (a)  $45^\circ$  (b)  $50^\circ$   
(c)  $80^\circ$  (d)  $100^\circ$

58. A regular polygon has 20 sides. The measure of an exterior angle of this polygon.

- (a)  $162^\circ$  (b)  $36^\circ$   
(c)  $72^\circ$  (d)  $18^\circ$

59. The area of a trapezium is 68 sq. cm and height is 8 cm. If one of the parallel sides 10 cm long, then the length of other parallel side is:

- (a) 7 cm (b) 17 cm  
(d) 12 cm (c) 6 cm

60. The edges of a cuboid are in the ratio 1:2:3 and its total surface area is  $198 \text{ cm}^2$ . The volume of the cuboid is:

- (a)  $27 \text{ cm}^3$  (b)  $36 \text{ cm}^3$   
(c)  $81 \text{ cm}^3$  (d)  $162 \text{ cm}^3$

61. A cylindrical tank has a capacity (volume) of 6160 cu.cm. If its radius is 14 cm, then its depth (in cm) is:

- (a) 5 (b) 10  
(c) 15 (d) 50

62. A rectangular sheet of paper  $22 \text{ cm} \times 12 \text{ cm}$  can be carved to form the lateral surface of a right circular cylinder in two ways.

Taking  $\pi = \frac{22}{7}$ , the difference between the volumes of the two cylinders thus formed is:

- (a)  $200 \text{ cm}^3$  (b)  $210 \text{ cm}^3$   
(c)  $252 \text{ cm}^3$  (d)  $462 \text{ cm}^3$

63. A survey of 15000 people found that 3000 of them like coffee. In a pie chart, what would be the sector angle of this group?

- (a)  $120^\circ$  (b)  $90^\circ$   
(c)  $72^\circ$  (d)  $60^\circ$

64. A die is rolled. The probability of getting an even prime number is:

- (a)  $\frac{1}{6}$  (b)  $\frac{1}{3}$   
(c)  $\frac{1}{2}$  (d)  $\frac{2}{3}$

65. One letter is chosen at random from the letters of the word 'NITISH'. The probability of getting 'I' is:

- (a)  $\frac{2}{5}$  (b)  $\frac{1}{6}$   
(c)  $\frac{1}{2}$  (d)  $\frac{1}{3}$

### Section-IV: General Science

Directions: (Questions no: 66 to 100) For each question, four possible answer choices have been given out of which only one is correct. Select the correct answer and indicate it at the appropriate place in the OMR Answer Sheet.

66. Food cannot be preserved by:

- (a) keeping food covered with platem room temperature.  
(b) by boiling and then suddenly cooling to a very low temperature and then sealing the content.  
(c) by storing and packing in sealed and tight packets.  
(d) by adding common salt, sugar, vinegar or oils and pasteurisation in packaging in air tight packets.



67. Which one is a wrong statement?
- Protozoa causes dysentery and malaria
  - Yeast decreases the volume of a mixture of yeast, sugar, flour and warm water
  - Viruses cause cold, influenza, polio chicken pox.
  - Bacteria causes typhoid and tuberculosis.
68. The correct sequence of agricultural practice for growing crops is:
- Ploughing - Manuring, - Irrigating - Sowing - Weeding - Harvesting
  - Ploughing - Sowing - Manuring - Irrigating - Weeding - Harvesting
  - Ploughing - Sowing - Manuring Weeding - Irrigating - Harvesting
  - Ploughing - Sowing - Irrigating - Manuring - Weeding - Harvesting
69. The crops grown in rainy season are known as:
- Rabi crops
  - Summer crops
  - Monsoon crops
  - Kharif crops
70. Which pair of elements contain metal and non-metal both present in liquid state at room temperature?
- Iron, Gold
  - sodium, Bromine
  - Bromine, Mercury
  - Graphite, Mercury
71. Cloth material similar in appearance as silk but is not silk. This cloth material is:
- nylon
  - polyester
  - rayon
  - acrylic
72. Which one is biodegradable?
- PVC bag
  - Aluminium
  - Bakelite
  - Paper
73. Which set of fibres is of natural fibre only?
- Cotton, Acrylic, Nylon
  - Cotton, Silk, Wool
  - Rayon, Silk, Terylene
  - Rayon, Polyester, Nylon
74. If you burn 1 kg each of the following fuels in an efficient system, you will get maximum amount of heat when you burn:
- hydrogen
  - methane
  - diesel
  - coal
75. Three constituents of petroleum are:
- Kerosene, Petrol, Natural gas
  - Diesel, LPG, Coal gas
  - Bitumen, Lubricating oil, Paraffin wax
  - LPG, Explosives, Paints
76. Which one is not a fossil fuel?
- Coal
  - Petroleum
  - Natural gas
  - Wood
77. For the conversion of dense forest (which get buried under the soil) into forest (Coal) the essential conditions required are:
- High pressure and low temperature
  - High pressure and high temperature
  - Low pressure and high temperature
  - Low pressure and low temperature
78. Which fuel has highest calorific value?
- Methane
  - CNG
  - LPG
  - Hydrogen
79. One of the natural causes of Deforestation: drought
- heavy rainfall
  - severe
  - earthquake
  - landslides
80. Which organelle is present in plant cell but not in animal cell?
- nucleus
  - cytoplasm
  - plastids
  - vacuole
81. The area where animals are kept for public exhibition is:
- Wildlife Sanctuary
  - National Park
  - Biosphere Reserve
  - Zoo
82. Select correct statement from the following
- Viviparous animals lay eggs.
  - External fertilisation takes place in sparrow.
  - Amoeba reproduces by binary fission
  - Zygote is a single cell.
83. External fertilization occurs in:
- Hen
  - Dogs
  - Fish
  - Cows
84. The hormone produced by pancreas is:
- Adrenalin
  - Estrogen
  - Insulin
  - Testosterone
85. Two forces each of 20 N act simultaneously on a body, the maximum net force and minimum net force are:
- 40 N and 0 N
  - 20 N and 0 N
  - 20 N and 10 N
  - 40 N and 20 N
86. "A ball is moving on a floor (surface) along a straight path with a uniform speed." State the conclusion you can draw from this statement:
- The force acting on the ball is zero.
  - No gravitational force is acting on the ball.
  - A non-contact force is acting on the ball against frictional force.
  - No frictional force acts on the rolling objects.
87. Which one is not the unit of pressure?
- pascal
  - $\text{N m}^{-2}$
  - $\text{dyne cm}^{-2}$
  - $\text{N m}^{-1}$
88. A dark muscular structure of human eye which gives it its distinctive colour is:
- iris
  - cornea
  - pupil
  - eye lens

89. The angle between incident ray and reflected ray is  $120^\circ$ , then angle of incidence is:  
 (a)  $240^\circ$  (b)  $60^\circ$   
 (c)  $930^\circ$  (d)  $90^\circ$
90. The to and fro or back and forth motion of an object about its mean position, which produces sound is called:  
 (a) pitch (b) frequency  
 (c) amplitude (d) vibration
91. Chemical effect of current is not used in  
 (a) Electrolysis  
 (b) Electroplating  
 (c) Electrotyping  
 (d) Glowing of a bulb by current
92. Which one does not involve chemical effect of electric current?  
 (a) Electrolysis of acidified water  
 (b) Electroplating  
 (c) Movement of needle of magnet compass when placed near an electric wire carrying current  
 (d) Electrotyping
93. A student uses his tester to find out whether the following liquids/solutions conduct electricity or not. For this using all necessary precautions he dips the free ends of his tester one by one in each of the given solutions and he finds that the only liquid which deflects the compass needle is:  
 (a) distilled water (b) lemon juice  
 (c) sugar solution (d) vegetable oil
94. Instrument used for recording the intensity of earthquake is:  
 (a) Gold leaf electroscope (b) Seismograph  
 (c) Speedometer (d) Odometer
95. The gas that does not cause green house effect is:  
 (a)  $\text{CO}_2$  (g) (b)  $\text{H}_2\text{O}$  (g)  
 (c)  $\text{CH}_4$  (g) (d)  $\text{N}_2$  (g)
96. Which are natural sources of air pollution?  
 (a) Smoke and gases from industries  
 (b) Poisonous gases, smoke from vehicles  
 (c) Burning of plant waste  
 (d) Smoke and dust arising from forest fires and volcanic eruption
97. Venus is a planet of our solar system but it is often called a morning or an evening star (although it is not a star) Venus appears in the:  
 (a) eastern sky as an evening star  
 (b) western sky as a morning star  
 (c) eastern sky as well as western sky as a morning star  
 (d) western sky as an evening star
98. The density of water is  $1000 \text{ kg/m}^3$ . A planet of our solar system has density lesser than this value. The name of this planet is:  
 (a) Mercury (b) Venus  
 (c) Saturn (d) Uranus
99. A star is 60 light years away from the Earth. How much time does it take for the light from the star to reach the earth?  
 (a) 60 years (b) 15 years  
 (c) 20 years (d) 30 years
100. Which constellation appears to move around the pole star from east to west and looks like a question mark?  
 (a) Orion (b) Cassiopeia  
 (c) Leo major (d) Great bear

## Answers with Explanations

- (a) अधिनियम शुद्ध वर्तनी वाला शब्द है। इसका अर्थ विधान के अन्तर्गत बनाया गया नियम, ऐक्ट होता है।
- (c) उल्टा चोर कोतवाल को डाँट : जब अपराधी किसी काम के लिये दोष न मानकर पूछने वाले को ही दोषी बताये।
- (b) ग शब्द का उच्चारण स्थान कंठ से होता है। इस वर्ग की सभी ध्वनियाँ कंठ से उच्चारित होती हैं।  
जैसे-क, ख, ग, घ, ङ (व्यंजन)
- (a) चिड़ियाँ का बहुवचन रूप चिड़ियाँ होता है।  
शुद्ध रूप → चिड़ियाँ गाना गा रही हैं।
- (c) गुण वाचक विशेषण-जिस विशेषण से किसी संज्ञा अथवा सर्वनाम का गुण प्रकट हो जैसे-अच्छा, बुरा, गौरा, काला, लंबा, छोटा, आदि तो उसे गुणवाचक विशेषण कहते हैं।
- (c) मिश्र वाक्य-मिश्र वाक्य में एक प्रधान वाक्य होता है और शेष वाक्य उसके कपर आश्रित होते हैं। जैसे-मैं उस मकान में रहता हूँ; जिसमें कभी आचार्य जी रहते थे। इसमें दूसरा वाक्य पहले पर आश्रित है अतः यह मिश्र वाक्य होगा।
- (d) चौथा प्रश्न मैंने ठीक से नहीं करा।  
'नहीं करा' अशुद्ध है। इसके स्थान पर 'नहीं किया' का प्रयोग होना चाहिए।
- (a) वायु के पर्यायवाची : पवन, अनिल
- (b) बाएँ हाथ का खेल : इतना आसान न होना  
इतने ऊँचे पद पर पहुँचना बाएँ हाथ का खेल नहीं है।
- (b) नश्वर का विशेषण 'अनश्वर' होगा।
- (d) सफलता प्राप्त करने के लिए जीवन में परिश्रम करना आवश्यक है। निरंतर श्रम करने वाला व्यक्ति कभी असफल नहीं होता।



12. (c) अभ्यास करते रहना मनुष्य का धर्म होता है। अभ्यास मनुष्य के निरंतर विकास में सहायक होता है।
13. (c) श्रम का फल सदैव **मीठा** होता है। श्रम करना कभी व्यर्थ नहीं जाता उसका अच्छा परिणाम मनुष्य को मिलता ही है।
14. (c) अनमोल शब्द के लिए अनुच्छेद में प्रयुक्त सर्वश्रेष्ठ शब्द मूल्यवान है। इसका अर्थ दुर्लभ से लगाया जाता है।
15. (d) लोग संसार में आकर संस्कृति के साथ कुशल बनते हैं।
16. (a) near  
away is not correct since it will take preposition 'from' after it. Beside means 'at the side of'. It is unsuitable since this expression/word is usually used when something is placed next to another thing. 'For' again is incorrect as it would take preposition 'from' after it.
17. (c) best  
Actually, if comparison is to be made within items of a groups all of which are of same nature and superlative degree is to be emphasized, 'one of the best' expression is used. 'Better' word is used when comparing between two items, whereas 'good' and 'nice' are not use alone for comparison.
18. (b) are  
'Are' here is preceded by 'attractions', which is plural. Hence, use of word 'is' is omitted. 'Was' is not used since description is in present tense. For the same reason, 'were' too is not used as both 'was' and 'were' are used for describing an item/event of the past.
19. Which  
'What' is used when there are a lots of possible options or when one doesn't know how many options exist. 'Which' is often used as a function word to introduce a non-restrictive clause and precisely this role it is playing here. 'Who' and 'Whom' are used for living entities, usually humans.
20. (a) 'Extinction' refers to dying out or extermination of species. On this case 'birds' face the risk of getting permanently wiped out from the earth. Hence, 'disappearance' is closest in meaning.  
Whereas, evaporation refers to conversion of water into water vapour; 'survival' is completely a misfit due to its meaning and 'death' is near in meaning but not exactly what 'extinction' refers to.
21. (c) 'Generous' means ready to give more of something, especially money. 'Liberal' refers to someone who is accommodative in accepting others' views. Bountiful is of same meaning as generous. Sympathetic means have a soft feeling towards one. 'Stingy' means not willing to part with money easily.
22. (b) Rules for changing  
We should change the format of the line so that object in active voice becomes the subject in passive voice.  
In passive voice, action of the statement is highlighted.  
Object + has/have = 3rd form of verb + by + subject.
23. (c) 'Superior' should not be used with than. Hence, options, (a) and (b) are incorrect. 'Most superior than' too is wrong on the above ground and also because most is used for comparison between more than two items.
24. (c) 'Will be waiting' is in future continuous form and hence, inappropriate. There is no such form as 'would be waiting'. Similarly, 'I wait' is also incorrect as it does not follow any tense pattern.  
'I have been waiting' is in present perfect continuous form and is right since it refers to an action that began in past and is continuing in the present.
25. (d) 'More' is inappropriate since it refers to degree of comparison. 'Much' is also incorrect as it does not suit the context. 'A little' refers to amount appreciable in nature. However, 'The little' is the only correct option since it means that 'whatever money she had, also got spent'.
26. (c) 'Omnivorous' are those living beings/animals which eat everything. 'Omniscient' is a person who knows everything. 'Ophthalmologist' is a doctor of eyes who deals with correction of vision.
27. (c) When the reporting verb of direct speech is in past tense then all the present tenses are changed to the corresponding past tense in the indirect speech. Moreover, the first person in direct speech changes as per subject of the speech. Hence, 'why are you' changes to 'why she was' and 'today' to 'that day'.
28. (b) Everbloom saved two of his friends from drowning in separate incidents.
29. (c) More precisely, Everbloom is a resident of Mawngkneng village in East Khasi District of Meghalaya.
30. (b) He did so on two different days last year, as they were separate incidents. Option (c) is not possible since it is clearly mentioned in the passage 'last year'. Option (d) also is not possible. Since only two people/friends were rescued; hence, the use of word 'many' is inappropriate.
31. (c) 
$$\left(\frac{5}{3} \times \frac{7}{2}\right) - \left(\frac{11}{8} \times \frac{4}{3}\right) = \left(\frac{35}{6}\right) - \left(\frac{44}{24}\right)$$
$$= \frac{35(4) - 44(1)}{24} = \frac{140 - 44}{24}$$
$$= \frac{96}{24} = 4$$
32. (a) Let length and breadth of the given rectangle be denoted by 'l' and 'b' and further let  $b = 2\frac{3}{4}m$  i.e.  $\frac{11}{4}m$   
Now, given, area of rectangle =  $33m^2$   
By formula, area of a rectangle =  $l \times b$   
Therefore,  $l \times \frac{11}{4} = 33 \Rightarrow l = \frac{33 \times 4}{11}$ 
$$= 3 \times 4 = 12m$$

33. (b) Given  $\sqrt{2401} = 49$

$$\begin{aligned}\text{Now, } \sqrt{0.2401} + \sqrt{24.01} &= \sqrt{\frac{2401}{10000}} + \sqrt{\frac{2401}{100}} \\ &= \frac{\sqrt{2401}}{\sqrt{10000}} + \frac{\sqrt{2401}}{\sqrt{100}} \\ &= \frac{49}{100} + \frac{49}{10} = \frac{49+490}{100} \\ &= \frac{539}{100} = 5.39\end{aligned}$$

34. (b)  $\frac{1}{5} = \frac{1}{5} \times \frac{2}{2} = \frac{2}{10}$  and  $\frac{1}{2} = \frac{1}{2} \times \frac{5}{5} = \frac{5}{10}$

So, at least  $\frac{3}{10}$  and  $\frac{4}{10}$  are any 2 rational numbers between given numbers  $\frac{1}{5}$  and  $\frac{1}{2}$ .

So, we can choose  $\frac{3}{10}$ , which is one of the given options.

35. (d)  $\sqrt[3]{8} + \sqrt[3]{27} = (8)^{\frac{1}{3}} + (27)^{\frac{1}{3}}$   
 $= (2) + (3) = 2 + 3 = 5$

36. (d) Let us multiply  $\frac{15}{\sqrt{-28}}$  by  $x$  to obtain  $-\frac{5}{7}$  as product

$$\text{Then, } \frac{15}{-28} \times x = -\frac{5}{7}$$

$$\text{or } \frac{-15}{28} \times x = -\frac{5}{7} \text{ or } \frac{15}{28} \times x = \frac{5}{7}$$

$$\text{i.e. } x = \frac{5}{7} \times \frac{28}{15} = \frac{4}{3}$$

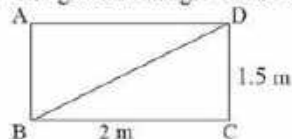
37. (c) Given cube not of smaller of the two number is 6, then that number is 216 (i.e.,  $6^3$ )

Let the larger number be  $x$

$$\begin{aligned}\text{As per the given condition, } x - 216 &= 127 \\ \Rightarrow x &= 127 + 216 = 343\end{aligned}$$

Now  $\sqrt[3]{343} = 7$ . Hence, cube root of the larger number is 7.

38. (b) The given rectangle can be shown thus,



Since angle  $C$  is  $90^\circ$ ,  $BD$  acts as hypotenuse and  $BD$  also serves as one of the diagonals.

$$\begin{aligned}\text{Using Pythagoras Theorem, } BD^2 &= (2)^2 + (1.5)^2 = 4 + 2.25 = 6.25 \\ \Rightarrow BD &= \sqrt{6.25} = 2.5\text{m}\end{aligned}$$

In fact, the other diagonal would also be of the same length.

39. (b) On factorising 675, we have  $675 = 5 \times 5 \times 3 \times 3 \times 3$

Now, if we divide 675 by  $5 \times 5$  i.e. 25, we will be left with would yield a cube root to us. Hence, the required number is 25.

40. (b) On case of a cube of side length  $a$

$$\text{Volume of cube} = (a)^3$$

$$\text{Hence, } a^3 = 0.512$$

$$\begin{aligned}\text{or } a &= \sqrt[3]{0.512} = (0.512)^{\frac{1}{3}} = \frac{(512)^{\frac{1}{3}}}{(1000)^{\frac{1}{3}}} \\ &= \frac{8}{10} = 0.8\text{m}\end{aligned}$$

41. (c) Given that 3 persons take to build a wall in 4 days.

Then one person would take to build that wall in 12 days ( $3 \times 4$  days)

$$\text{Hence, one person's one day work} = \frac{1}{12}$$

$$\text{Now, four person's one day work} = 4 \times \frac{1}{12} = \frac{1}{3}$$

So, four person would take 3 days to complete the wall.

In this case, it is presumed that all persons have same capacity.

$$\begin{aligned}42. (d) \quad 4325 \times 10^{-4} &= 4.325 \times 10^{-3} \times 10^{-1} \\ &= 4.325 \times 10^{-1}\end{aligned}$$

A number in standard notation is when digit before the decimal is between 1 and 9 and after it, a whole number and its expressed as a power of 10.

43. (b) Given A can complete the work in 12 days

$$\text{A's one day work} = \frac{1}{12}, \text{ i.e., } \frac{1}{A} = \frac{1}{12}$$

Also, A and B together can complete the work in 4 days

$$(\text{A and B})'s \text{ one day work} = \frac{1}{4} \text{ or } \frac{1}{A} + \frac{1}{B} = \frac{1}{4}$$

Subtracting above two equations from each other,

$$\begin{aligned}\frac{1}{B} + \frac{1}{4} &= \frac{1}{12} \\ \frac{1}{B} &= \frac{3-1}{12} = \frac{1}{6}\end{aligned}$$

$$\text{Hence, B's one day work} = \frac{1}{6}$$

i.e., B can complete the work in 6 days.

44. (a) Originally, the available food is just sufficient for 300 soldiers

Once the food is consumed for 30 days, it remains sufficient for only 70 days.

Hence, the situation is:	Soldiers	Days
	300	70
	350	$x$



These being an inverse relationship between soldiers and food consumption.

$$\text{Hence } x = \frac{300}{350} \times 70 = 60 \text{ i.e., 60 days}$$

45. (b) Following BODMAS Rule,

$$\begin{aligned} 40\% \text{ of } [100 - 20\% \text{ of } 300] &= \frac{40}{100} \text{ of } \left[ 100 - \left( \frac{20}{100} \times 300 \right) \right] \\ &= \frac{40}{100} \text{ of } [100 - 60] \\ &= \frac{40}{100} \text{ of } 40 = \frac{40}{100} \times 40 \\ &= 16 \end{aligned}$$

46. (c) Given that, student obtained 158 marks and failed by 7 marks.

Therefore, if he would have got (158 + 7) marks, he could pass

$$\text{i.e., passing marks} = 165$$

Also, passing marks is same as 33% of total marks (T) for which assessment is made.

$$\begin{aligned} \text{Hence, } 33\% T &= 165 \quad \text{or} \quad \frac{33}{100} \times T = 165 \\ \Rightarrow T &= \frac{165 \times 100}{33} = 500 \end{aligned}$$

47. (b) Marked Price = ₹16000

Discount = 15%

$$\text{Price after discount } 16000 \times \frac{85}{100} = ₹13600$$

$$\text{Thus, } P = ₹13600$$

The TV is sold at a price of ₹13600 after discount.

48. (d) Sale Price + GST = Selling Price

GST is levied on Sale Price. In this case, let it be  $x\%$

$$\text{Then, } \left( 420 + \frac{x}{100} \times 420 \right) = 441 \text{ as per the question}$$

$$\Rightarrow 420 + \frac{42x}{100} = 441$$

$$\Rightarrow \frac{42x}{100} = 441 - 420 = 21$$

$$\Rightarrow x = \frac{21 \times 100}{42} = 5\%$$

49. (c) Let the cost price of goods be CP

Since the trader marks their value 25% above actual value

$$\text{Revised CP} = \text{CP} + \frac{25}{100} \text{CP} = \frac{125}{100} \text{CP} = \frac{5}{4} \text{CP}$$

Now, on this revised CP, he gives a discount of 20%

So, this raised CP becomes 80% of its value,

$$\text{i.e., } \frac{5}{4} \text{CP} \times 80\% = \frac{5}{4} \text{CP} \times \frac{80}{100} = \text{CP}$$

Thus, there is no gain or no loss.

50. (d) Let the sum be P. Given that, Time(t) = 2 years, Rate of interest (R) = 8% and Amount(A) = ₹ 8748

$$\text{Now in case of compound interest, } A = P \left( 1 + \frac{R}{100} \right)^t$$

$$\begin{aligned} \text{i.e. } 8748 &= P \left( 1 + \frac{8}{100} \right)^2 \\ &= P \left( \frac{108}{100} \right)^2 = P \left( \frac{27}{25} \right)^2 \end{aligned}$$

$$\begin{aligned} \text{i.e. } P \left( \frac{27}{25} \right)^2 &= 8748 \\ \Rightarrow P &= \frac{8748 \times (25)^2}{27 \times 27} = 12 \times 625 \\ &= 7500 \end{aligned}$$

$$\begin{aligned} 51. (d) \quad 12a^3b^2 - 27ab^4 &= 3(4a^3b^2 - 9ab^4) \\ &= 3(ab^2[4a^2 - 9b^2]) \\ &= 3(ab^2[(2a)^2 - (3b)^2]) \\ &= 3ab^2(2a + 3b)(2a - 3b) \end{aligned}$$

$$\text{Since } x^2 - y^2 = (x + y)(x - y)$$

$$52. (a) (a + b + c)^2 = (a)^2 + (b)^2 + (c)^2 + 2(ab + bc + ca)$$

Comparing  $(2x - y + 3z)^2$  with left hand side of this expression

$$a = 2x, \quad b = -y \quad \text{and} \quad c = 3z$$

$$\text{Therefore } [2x + (-y) + (3z)]^2$$

$$\begin{aligned} &= (2x)^2 + (-y)^2 + (3z)^2 + 2\{(2x)(-y) + (-y)(3z) + (3z)(2x)\} \\ &= 4x^2 + y^2 + 9z^2 + 2(-2xy - 3yz + 6zx) \end{aligned}$$

$$= 4x^2 + y^2 + 9z^2 - 4xy - 6yz + 12xz$$

53. (c) In case of an equilateral triangle, all sides are of same length. This implies that  $2x + 11$  and  $4x + 1$  are one and the same,

$$\text{i.e. } 2x + 11 = 4x + 1$$

$$\text{or } 10 = 2x \quad \Rightarrow x = 5$$

$$\text{Now } 2x + 11 \text{ or } 4x + 1 \text{ is } 21$$

Hence, each side of given equilateral triangle is of 21 cm.

Now perimeter of triangle = Sum of its 3 sides

$$= 21 + 21 + 21 = 63 \text{ cm.}$$

$$54. (d) x^2 + 4x - p = (x - q)(x + 7)$$

$$= x^2 + 7x - qx - 7q = x^2 + (7 - q)x - 7q$$

Equating coefficients of  $x$  and constant parts from both sides

$$4 = 7 - q \quad \Rightarrow 7 - q = 4 \quad \Rightarrow -q = 4 - 7 = -3$$

$$\text{or } q = 3$$

Also,  $-p = -7q$

$\Rightarrow p = 7q = 7(3) = 21$

55. (b) Let the person's present age be  $p$

After 12 years, his age =  $p + 12$

4 years ago his age =  $p - 4$

As per the question,  $p + 12 = 3(p - 4)$

$\Rightarrow p + 12 = 3p - 12$  or  $p - 3p = -12 - 12$

i.e.  $-2p = -24$  or  $p = 12$

Person's present age is 12 year's

56. (d) Given  $\frac{2x-3}{5} + \frac{x+3}{4} = \frac{2x+3}{4}$

$\Rightarrow \frac{2x-3}{5} = \frac{2x+3}{4} - \left(\frac{x+3}{4}\right)$   
 $= \frac{2x+3-x-3}{4} = \frac{x}{4}$

Thus  $\frac{2x-3}{5} = \frac{x}{4}$  or  $4(2x-3) = 5x$

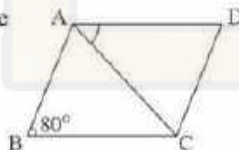
or  $8x - 12 = 5x$  or  $8x - 5x = 12$

i.e.  $3x = 12 \Rightarrow x = 4$

57. (b) Redrawing the figure, we have

since it is a rhombus, it is

also a parallelogram at the same time [By property]



Therefore,  $AD \parallel BC$  and  $AB \parallel DC$

Now,  $\angle B = \angle D$  (opposite angles of a rhombus are same)

Also,  $\angle A + \angle B + \angle C + \angle D = 360^\circ$  (sum of all angles of a quadrilateral is  $360^\circ$ )

or,  $\angle A + 80^\circ + \angle C + 80^\circ = 360^\circ$

$\angle A + \angle C = 200^\circ$

Now,  $\angle$  and  $\angle C$  all of equal measure, i.e.  $\angle A = \angle C$

$2\angle A = 200^\circ \Rightarrow \angle A = 100^\circ \Rightarrow \angle DAC = 50^\circ$

since diagonal of rhombus divides its angle in two equal parts.

58. (d) Exterior angle of a regular polygon with  $n$  sides is given by formula  $\frac{360^\circ}{n}$ ,

In this case,  $n = 20$

Hence, exterior angle =  $\frac{360^\circ}{20} = 18^\circ$

59. (b) Let the other parallel side be  $P_2$

Now, area of a trapezium =  $\frac{1}{2}$  (sum of its parallel sides)  $\times$  height

As per the given question,

$68 = \frac{1}{2}(10 + P_1) \times 8$  i.e.  $68 = (10 + P_1) \times 4$

or  $(10 + P_1) \times 4 = 68$

$\Rightarrow 10 + P_1 = \frac{68}{4} = 17$

$\Rightarrow P_1 = 17 - 10 = 7$  cm

60. (d) Given that ratio of the edges of given cuboid is 1: 2: 3

So, let the edges be  $x$ ,  $2x$  and  $3x$  respectively.

No, surface area of a cuboid =  $2(lb + bh + hl)$

where  $l$ ,  $b$  and  $h$  are length, breadth and height, respectively.

So,  $2[3x \times 2x + (2x \times x) + (x \times 3x)] = 198$

$\Rightarrow 2[6x^2 + 2x^2 + 3x^2] = 198$

$\Rightarrow 11x^2 = \frac{198}{2} = 99 \Rightarrow x^2 = \frac{99}{11} = 9$   
 $x = 3$  cm

Now, volume of cuboid =  $lbh = (x)(2x)(3x) = 6x^3$

i.e.  $6(3)^3$  or  $6(27)$  i.e.  $162$  cm<sup>3</sup>

61. (b) Volume of a cylinder =  $\pi r^2 h$

where,  $r$  is radius of circular bases and  $h$  is its height

On this case,  $V = 6160$  cm<sup>3</sup>,  $r = 14$  cm,  $h = 7$

Thus,  $6160 = \frac{22}{7} (14)^2 \times h$

or  $\frac{22}{7} (14)^2 (h) = 6160$

$\Rightarrow h = \frac{6160 \times 7}{22 \times 14 \times 14} = 10$  cm

62. (b) Case I Lateral surface with 12 cm as height and 22 cm as radius of circular base of cylinder formed

$2\pi r_1 = 22 \Rightarrow r_1 = \frac{22}{2\pi} = \frac{11}{\pi}$ , where  $r_1$  is radius of circular base

Volume of cylinder so formed ( $V_1$ ) =  $\pi \left(\frac{11}{\pi}\right)^2 (12) = \frac{(11)^2 (12)}{\pi}$

Case II Lateral surface with 22 cm as height and 12 cm as radius of circular base of cylinder formed

$2\pi r_2 = 12 \Rightarrow r_2 = \frac{12}{2\pi} = \frac{6}{\pi}$ , where  $r_2$  is radius of circular base

Volume of cylinder so formed ( $V_2$ ) =  $\pi \left(\frac{6}{\pi}\right)^2 (22) = \frac{(6)^2 (22)}{\pi}$

Difference between volumes =  $\frac{(11)^2 (12)}{\pi} - \frac{(6)^2 (22)}{\pi}$

=  $\frac{(11 \times 6)}{\pi} [(11 \times 2) - (6 \times 2)]$



$$= \frac{11 \times 6 \times 10 \times 7}{22} = 210$$

63. (c) Total people surveyed = 15000

In a pie chart, in terms of degrees, this number represents  $360^\circ$

$$\begin{aligned} \text{So, 3000 people would represent } & \frac{3000}{15000} \times 360^\circ \\ & = \frac{360^\circ}{5} = 72^\circ \end{aligned}$$

64. (a) Total number of possible outcomes on rolling a die are 6 i.e. 1, 2, 3, 4, 5 or 6

Out of these outcomes, even numbers are, 2, 4, 6.

Of these three numbers, the only even prime number is 2

Hence, the probability of getting an even prime number is

$$\frac{1}{6}$$

65. (d) The word 'NITISH' has 6 letters

So, in normal course getting a particular letter from out of these letters is six

Now, there is a repetition of letter 'I' twice.

So, our total outcomes in favour of getting I is 2

$$\text{Hence probability of getting I is } \frac{2}{6} = \frac{1}{3}$$

66. (a) While the method given in option A helps in protecting food from flies, etc. sitting on it, it is not a method of food preservation.

Boiling and then rapidly cooling the food helps in killing germs in it. Sealed tight packs also help in preservation as it avoids/minimizes oxidation of food content. Option (d) is a common method used in homes in making/presenting pickles, etc. and preserving milk for long.

67. (b) Other disease caused by protozoans is trypanosomiasis, leishmaniasis, toxoplasmosis, etc.

Yeast, in fact, increases the volume of the dough/mixture described in option (b), which happens due to production of carbon dioxide, and the process is called fermentation.

68. (b) Process of loosening and turning the soil is called ploughing. Sowing entails planting or scattering seeds for growing. Manure is decomposed form of dead plants/animals and it is applied to soil to increase productivity.

Irrigation involves watering the crop. It is usually done using tubewells. Weeding is the practice of removing unwanted plants that grow along with the crop and compete with it for nutrients, etc. Harvesting involves cutting down the crop after it has matured.

69. (d) Kharif crops are grown in wet and hot conditions for instance, rice, maize, bajra, corn and pea are few kharif crops

of India. Rabi crops are grown either with rainwater that has percolated into the ground or using irrigation. Some of major rabi crops are wheat, barley, mustard and sesame.

70. (c) Mercury and gallium are two metals that are liquid at room temperature.

Bromine is the only non metal which is liquid at room temperature.

Gold is very malleable and ductile metal

Sodium is a highly reactive metal and catches fire if exposed to air.

Iron is a very sturdy metal, and graphite is a form of carbon.

71. (c) Rayon is a semi-synthetic fiber, made from natural sources of regenerated cellulose. It has good breathability because of its fine threads and absorbent fibers.

Nylon is a synthetic polyamide polymer with low tissue reactivity, excellent elasticity and high tensile strength.

Polyester is a synthetic fiber usually desired from petroleum.

Acrylic is a transparent plastic material with great strength and stiffness.

72. (d) Biodegradable substances are those that decompose easily through the action of bacteria, fungi and other living organisms.

These substances usually include materials used in day-to-day usage, for instance, food refuse tree leaves and grass clippings. Paper is biodegradable because it is made from plant materials.

73. (b) Cotton Fibre is a plant seed fibre that is harvested and then separated from the seed. Silk is obtained from the cocoons of the larvae of mulberry silkworm reared in captivity. Wool is manufactured from the raw fibre that is obtained from stuff sheared from skin of the sheeps.

Nylon, rayon, polyester, and terylene are synthetic fibers Acrylic is also a hard synthetic transparent material which is used to make many equipment.

74. (a) Calorific value of hydrogen is around 130 MJ per kg, while that of methane is around 55 MJ per kg. The calorific value of diesel is around 45 MJ per kg, and that of coal is about 30 MJ per kg.

In fact, hydrogen and methane are very clean sources of energy as they cause very less pollution of air in burning. However, hydrogen being highly combustible isn't preferred as source of fuel.



75. (c) Different constituents of petroleum are petrol, diesel, kerosene, lubricating oil, LPG, paraffin wax, and bitumen. These constituents are obtained in course of refining petroleum.

Natural gas is obtained from subsurface rock formations via drilling. Coal gas is formed by destructive distillation of bituminous coal.

Parents and explosives are usually made using chemical processes.

76. (d) A fossil fuel is a hydrocarbon-containing material formed underground from the remains of dead plants and animals that humans extract and burn as fuel. Fossil fuels are extracted through mining and drilling. They are, however, non-renewable sources of energy.

Coal is not a fossil fuel since it is obtained by cutting trees. Nevertheless, it is used as a fuel mostly in villages.

77. (b) Coal is the result of huge forests covered by earth during catastrophic millions of years ago and remaining buried in this state. As a result of high temperature and pressure and anaerobic conditions together with action of anaerobic bacteria on the vegetative matter, coal was formed.

78. (d) The calorific value of hydrogen is 130 MJ per kg, that of methane is around 55 MJ per kg, of CNG is around 50 MJ per kg and that of LPG, it is 45 MJ per kg.

Calorific value is the energy contained in a fuel, determined by measuring heat produced by the complete combustion of unit mass of the fuel.

Hydrogen though has high calorific value, it is unsuitable as fuel due to its explosive nature.

79. (a) Main causes of natural deforestation are floods, exotic animals, forest fires, and climate change. Nevertheless, human activities are among the main causes of deforestation globally. These activities include agricultural expansion, urbanization, etc.

Use of recycled products, planting more and more trees, and restricting use of paper are some of the methods of avoiding deforestation.

80. (c) Plastid is a membrane-bound organelle found in the cells of plants, algae and some other eukaryotic organisms. Examples include chloroplasts, chromoplasts and leucoplasts. Plastids are primarily responsible for activities related to making and storing food in plants.

Since animals lack plastids, they can't make their own food and so are termed as heterotrophs.

81. (d) A wildlife sanctuary is an area where animal habitats and their surroundings are protected from any sort of disturbance. A national park is an area set aside by a national government for the preservation of the natural environment.

A protected area reserved for conservation of endangered species of flora (plants) and fauna (animals) in their natural habitats is termed as biosphere reserve.

82. (d) Oviparous animals lay eggs. Some examples are birds, platypus, crocodile, etc. Viviparous animals give birth to their young ones. Nearly all mammals, many reptiles and a few fishes are viviparous.

Birds, including sparrow, reproduce by internal fertilization. Amoeba reproduces asexually through binary fission. Some bacteria too reproduce.

Zygote begins as a single cell but divides rapidly later following fertilization.

83. (c) External fertilization is a mode of reproduction in which a male organism's sperm fertilizes a female organism's egg outside of the female's body. Internal fertilization, on the other hand, involves introduction of sperm which combines with an egg inside the body of a female organism. Fish, salmon, frog, etc. depict external fertilization.

84. (c) Pancreas mainly produces insulin and glucagon, which regulate the level of glucose in the blood.

Adrenaline gland secretes adrenaline, which is released in case of stress. Estrogen is a sex hormone responsible for development and regulation of the female reproductive system.

Testosterone is a male sex hormone which plays a role in development of male reproductive organs.

85. (b) Both the forces ( $F_1$  and  $F_2$ ) are of 20 N each. Maximum net force would be generated when the angle between both forces is  $0^\circ$ , i.e., they act in the same direction. Magnitude of net force in such a case would be  $20\text{ N} + 20\text{ N}$ , i.e.,  $40\text{ N}$ .

When both these forces act in opposite directions to each other, with an angle of  $180^\circ$  between them, net force will be least, which will be  $20\text{ N} - 20\text{ N}$ , i.e.,  $0\text{ N}$ .

86. (a) Since the ball is moving with uniform speed, frictional force acting on it can be ignored and hence, force (or net force) acting on the ball is zero.

Gravitational force is acting on the ball which is towards the downward direction.

Ball being in contact with the floor (surface), a contact force can be said to act on it.

Frictional force acts on rolling objects due to which gradually they come to rest due to getting slowed down.

87. (d) Pressure =  $\frac{\text{Force}}{\text{Area}}$

Since SI unit of force is Newton (N) and that of area is  $\text{m}^2$ , hence SI unit of pressure is  $\text{N/m}^2$  or  $\text{Nm}^{-2}$ .

$1\text{ N/m}^2$  is also referred to as pascal or Pa.

The CGS Unit of pressure is  $\text{dyne/cm}^2$  or  $\text{dyne cm}^{-2}$ .



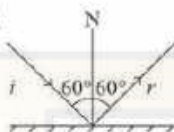
88. (a) The iris is a coloured ring around the pupil which gives eyes its individual colouring. This colour can be blue, brown, green, etc.

The round opening in the centre of the iris is called pupil. It changes size to let light into the eyes.

The transparent part of the eye that covers the iris and the pupil and allows the light to enter inside is called cornea.

The eyelens is suspended behind iris and focuses light rays onto the retina.

89. (b) In case of reflection, the normal at the point of incidence makes an equal angle with the incident ray and the reflected ray. Thus if  $\angle i$  is angle of incidence and  $\angle r$  is angle of reflection, then given that  $\angle i + \angle r = 120^\circ$ .



or  $2\angle i = 120^\circ$  i.e.  $\angle i = 60^\circ$ , which is same as  $\angle r$

90. (d) Vibration is the mechanical oscillations of an object about an equilibrium point.

The sensation of frequency is commonly referred to as pitch.

High pitch corresponds to high frequency and low pitch to low frequency.

Amplitude is the maximum displacement of a vibrating object from its mean position.

Frequency is the number of waves that pass fixed point in unit time.

91. (d) In glowing of a bulb, electrical energy changes to light energy. Electrolysis refers to chemical decomposition produced by passing an electric current through a liquid or solution containing ions. Electroplating method involves coating a metal object by electrolytic deposition with metals like silver, chromium, etc. Electrotyping is a chemical method for forming metal parts that exactly reproduce a model.

92. (b) Distilled water cannot conduct electricity because it does not contain ions, which are essential for conduction of electric current.

Lemon juice is a good conductor of electricity because it contains citric acid, which yields ions for conduction.

Sugar solution and vegetable oils for the above reason of lack of ions or charges also do not conduct electricity.

93. (c) A current carrying conductor always produces a magnetic field around it, which causes a magnetic compass needle to deflect kept near it. Thus, a current carrying conductor behaves like magnet. This is called magnetic effect of electric current. This phenomenon was first observed by Oersted.

94. (b) A gold leaf electroscope is used to detect the presence of electric charges on a body and its relative amount. It can thus detect ionizing radiations.

Speedometer is an instrument that indicates the speed of a vehicle.

Odometer is used to measure the distance travelled by a vehicle.

95. (d) Greenhouse gases are those which contribute to greenhouse effect by absorbing infrared radiations. Nitrous oxide, ozone, chlorofluorocarbons are some of the greenhouse gases other than what are given in the options A, B and C of the question.

Nitrogen is not a greenhouse gas since it is transparent to infrared light and hence does not absorb it.

96. (d) Air pollution is contamination of air due to presence of substances in the atmosphere that are harmful to health of living beings or cause damage to climate. Organic compounds from plant, sea salt, suspended soils and dusts are some other natural sources of air pollution.

Unlike manmade sources of air pollution, natural methods of air pollution are difficult or impossible to control.

97. (d) Venus appears either in the eastern sky before sunrise or in the western sky after sunset. Hence, it is both a morning star as well as an evening star with respect to western sky.

In fact, Venus is the brightest planet in the solar system. However, depending on its orbit, it may or may not be visible.

98. (c) Saturn is mainly composed of the two lightest known gases, hydrogen and helium. Saturn is the only planet in our solar system whose density is less than water. The actual density of Saturn is  $687 \text{ kg/m}^3$ .

Earth is the densest planet of solar system since it does not have gaseous components and all of its mass is concentrated and compact.

99. (a) One light year is the distance travelled by light in a year. Thus, it is not a unit of time but rather a measurement of distance. Since, in this case, the star is 60 light years away from the Earth, light from it would take 60 years to reach Earth's surface.

100. (d) Ursa Major, also called Big Dipper, the Great Bear, or Saptarishi appears like a big ladle or question mark.

It appears to revolve around the pole star.

Orion constellation is shaped like letter 'W'.

Leo Major constellation resembles the shape of a lion.

□□□