



# UNIFIED COUNCIL

An ISO 9001:2015 Certified Organisation



## NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION (UPDATED)

CLASS - 8

Question Paper Code : UN444

### KEY

1. B	2. D	3. A	4. A	5. A	6. B	7. A	8. B	9. C	10. C
11. C	12. D	13. C	14. C	15. B	16. C	17. D	18. C	19. C	20. B
21. A	22. B	23. A	24. B	25. D	26. D	27. A	28. A	29. D	30. A
31. C	32. A	33. C	34. B	35. D	36. D	37. D	38. A	39. A	40. C
41. C	42. B	43. D	44. A	45. A	46. B	47. C	48. D	49. B	50. ABC
51. C	52. D	53. C	54. D	55. A	56. B	57. B	58. Del	59. D	60. B

### SOLUTIONS

#### MATHEMATICS

1. (B) HCF of 2, 12, 3 is 1  
LCM of 15, 5, 4 is 60

$$\therefore \text{HCF of } \frac{2}{15}, \frac{12}{5}, \text{ and } \frac{3}{4} \text{ is } \frac{1}{60}$$

2. (D) Multiplicative }  
inverse of  $\frac{a}{a^2-1}$  } =  $\frac{a^2-1}{a} = \frac{a^2}{a} - \frac{1}{a} = a - \frac{1}{a}$

3. (A)  $9x + 15 = 2x + 1$   
 $7x = -14$   
 $x = -2$

4. (A) Given  $4x + 6x = 5x + 55$   
 $5x = 55$   
 $x = 11$   
 $\therefore 6x = 66$

5. (A) Given  $5x + 9 = 2(7x - 9)$   
 $5x + 9 = 14x - 18$   
 $27 = 9x$   
 $x = 3$

$$\therefore \text{Monu's ages} = 7x = 7 \times 3 = 21 \text{ years.}$$

6. (B)  $(0.03125)^{\frac{2}{5}} = (0.5)^{5 \times \frac{2}{3}} = (0.5)^{-2} = \frac{1}{(0.5)^2} = \frac{1}{0.25} = 4$

7. (A) Given  $a^x = b^y = c^z = k$

$$a = k^{\frac{1}{x}}, b = k^{\frac{1}{y}}, c = k^{\frac{1}{z}}$$

Given  $abc = 1$

$$k^{\frac{1}{x}} k^{\frac{1}{y}} k^{\frac{1}{z}} = k^0$$

$$k^{\frac{1}{x} + \frac{1}{y} + \frac{1}{z}} = k^0$$

$$\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 0$$

$$\frac{xy + yz + zx}{xyz} = 0$$

$$xy + yz + zx = 0$$

8. (B) Given  $x : y = 8 : 7 = 8a : 7a$

$$\therefore x = 8a \text{ \& } y = 7a$$

$$\therefore (3x + 4y) : (x + 2y)$$

$$= (24a + 28a) : (8a + 14a)$$

$$= 52a : 22a$$

$$= 26 : 11$$

9. (C) Given the ratio of money divided

$$= \frac{1}{2} : \frac{1}{3} : \frac{1}{4}$$

$$= \frac{1}{2} \times 12 : \frac{1}{3} \times 12 : \frac{1}{4} \times 12$$

$$= 6 : 4 : 3$$

$$\therefore \text{Parthu's share} = \frac{6}{13} \times \text{₹ } 4680$$

$$= \text{₹ } 2160$$

10. (C) Given  $x \left(1 + \frac{30}{100}\right)^2 = 3,38,000$

$$x \times \frac{13}{10} \times \frac{13}{10} = 3,38,000$$

$$x = 3,38,000 \times \frac{100}{169}$$

$$= 2,00,000$$

11. (C) Let SP of each apple be ₹  $x$

$$\therefore \text{SP of 20 apples} = 20x$$

$$\therefore 20x = \text{CP} + \text{Profit}$$

$$\therefore \text{CP of 20 apples} + \text{CP of 5 apples} = 20x$$

$$\text{CP of 25 apples} = 20x$$

$$\text{CP of each apple} = \frac{20x}{25} = \frac{4x}{5}$$

$$\text{Profit} = \text{SP} - \text{CP} = x - \frac{4x}{5} = \frac{5x - 4x}{5} = \frac{x}{5}$$

$$\text{Profit percentage} = \frac{\text{Profit}}{\text{CP}} \times 100$$

$$= \left(\frac{x}{5}\right) \times 100 = \frac{x}{4x} \times 100 = 25\%$$

12. (D) Let the amount borrowed for 11% be ₹  $x$

$$\text{Given } \frac{x \times 11 \times \frac{9}{2}}{100} + \frac{(35000 - x) \times 10 \times 4}{100}$$

$$= \text{₹ } 15,900$$

$$\frac{99x}{200} + \frac{80(35,000 - x)}{200} = \text{₹ } 15,900$$

$$99x + 28,00,000 - 80x = \text{₹ } 15,900 \times 200$$

$$19x = 31,80,000 - 28,00,000$$

$$x = \frac{3,80,000}{19} = \text{₹ } 20,000$$

13. (C)

$$\begin{array}{r} 2 \overline{) 43379} \quad 208 \\ \underline{4} \phantom{0000} \\ 40 \phantom{0000} \\ \underline{40} \phantom{0000} \\ 408 \phantom{000} \\ \underline{408} \phantom{000} \\ 115 \end{array}$$

$\therefore$  115 to be subtracted from 43,379 to make a perfect square.

14. (C)

$$88209 = 11^2 \times 9^3$$

$\therefore$  88209 is divided by 121 to make a perfect cube.

15. (B)

$$\text{Given } 5^{3x+2} = 5^2 \times 5^{4x-1}$$

$$\therefore 3x + 2 = 4x + 1$$

$$x = 1$$

16. (C)

$$5x^2 - 320 = 5(x^2 - 64)$$

$$= 5(x + 8)(x - 8)$$

17. (D)  $\sqrt{16} = 4$  which is a rational number

18. (C)  $5x - \frac{x}{3} - \frac{1}{3} = 6x + \frac{1}{5}$

$$-x - \frac{x}{3} = \frac{1}{5} + \frac{1}{3}$$

$$-\frac{4x}{3} = \frac{8}{15}$$

$$x = -\frac{2}{5}$$

19. (C) Given  $2^{\frac{x}{2}} = 2^8$

$$\frac{x}{2} = 8$$

$$x = 16$$

20. (B) Given  $4^x = 5^y = 20^z = k$

$$4 = k^{\frac{1}{x}}, 5 = k^{\frac{1}{y}}, 20 = k^{\frac{1}{z}}$$

$$\therefore 20 = k^{\frac{1}{z}}$$

$$4 \times 5 = k^{\frac{1}{z}}$$

$$k^{\frac{1}{x}} \times k^{\frac{1}{y}} = k^{\frac{1}{z}}$$

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$$

$$\frac{x+y}{xy} = \frac{1}{z}$$

$$z = \frac{xy}{x+y}$$

21. (A)  $(343)^3 = (7^3)^3 = 7^9$

$$(2401)^2 = (7^4)^2 = 7^8$$

$$(49)^5 = (7^2)^5 = 7^{10}$$

$\therefore$  Descending order is  $7^{10}$ ,  $7^9$ ,  $7^8$  ie  $49^5$ ,  $343^3$ ,  $2401^2$

22. (B)  $\frac{x-y}{\sqrt{x}-\sqrt{y}} = \frac{(\sqrt{x})^2 - (\sqrt{y})^2}{\sqrt{x}-\sqrt{y}}$

$$= \frac{(\sqrt{x} + \sqrt{y})(\sqrt{x} - \sqrt{y})}{(\sqrt{x} - \sqrt{y})} = (\sqrt{x} + \sqrt{y})$$

23. (A) Principal for bank

$$= 3,00,000 \times \left(\frac{100-3}{100}\right) = ₹ 2,91,000$$

$\therefore$  Amount after second year

$$= ₹ 2,91,000 \left(\frac{104}{100}\right)$$

$$= ₹ 3,02,640$$

$\therefore$  Amount after third year

$$= ₹ 3,02,640 \times \frac{105}{100}$$

$$= ₹ 3,17,772$$

24. (B) Area of remaining park

$$= (40 \text{ m})^2 - \frac{4 \times 1}{4} \times \pi \times 14^2$$

$$= 1600 \text{ m}^2 - 616 \text{ m}^2$$

$$= 984 \text{ m}^2$$

25. (D) Capacity of box

= Outer volume – Inner volume

$$= 62 \times 30 \times 18 - (62 - 4)(30 - 4)(18 - 4)$$

$$= 33,480 - 21,112$$

$$= 12,368 \text{ cm}^3$$

### PHYSICS

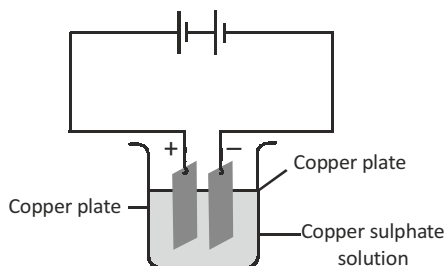
26. (D) The density of an object is not a force as density is equal to mass/volume.

27. (A) Speed of sound is more in denser medium (steel) than in air (gas). The assistant at the other end N of a long hollow steel pipe hears the first sound through steel followed by second sound through air.

28. (A) When a force is applied on an object, there is no change in its mass but there is a change in the shape, position and direction of movement of an object.

29. (D) Both a basketball player doing a jumpshot and a mountaineer climbing Mount Everest are involved in the opposite direction of gravity.

30. (A) When copper sulphate, an electrolyte is dissolved in water, it forms positively – charged copper ions and negatively-charged sulphate ions. When an electric current is passed through the solution:



- The copper ions (cations) move towards the cathode, pick up electrons from there (supplied by the electric current), and get deposited on it as copper atoms.
- At the anode, the copper atoms in the copper plate lose electrons to form copper ions. The ions go into solution. Thus, the copper lost to the cathode is restored by the anode.

Therefore, the anode slowly dissolves into the solution, while a layer of copper gets deposited on the cathode. The sulphate ions do not take part in the chemical reaction.

The overall result is the transfer of Cu from anode to cathode and there is no change in the concentration of the solution.

31. (C) Initial object distance = 2 m.  
Final object distance  $2 + 0.5 = 2.5$  m  
In a plane mirror, image distance = object distance. Therefore, final image distance = 2.5 m and the distance between object and its image is  $2.5 + 2.5 = 5$  m.
32. (A) When the string of a guitar is plucked, its vibrations travel through the neighbouring air molecules causing them to vibrate with the same frequency as that of vibrating guitar. So, they have the same frequency. The number of vibrations produced per second by a source of sound is called Frequency Wavelength of a sound wave is the distance covered by a compression and an adjacent rarefaction. (It is out of syllabus)

33. (C) Crust, mantle, outer core and inner core is the correct sequence of layers of the earth.
34. (B) Electrolytic cell converts electrical energy to chemical energy.
35. (D) All the given statements relate to care of our eyes.

### CHEMISTRY

36. (D) Statements (A), (B) and (C) are correct. Coal causes air pollution when burnt in the form of smoke.
37. (D) Metals are used to make wire. Diamond is used in glass cutting. Chlorine gas is passed through drinking water to kill germs. Sulphur is used in the vulcanisation of rubber to make it hard.
38. (A) Kerosene oil has a low ignition temperature. Hence, it burns to produce large amount of heat energy. To reach the ignition temperature of wood or coal, kerosene oil is used to start fire in wood or coal.
39. (A) Styrofoam cup is used for serving hot tea or coffee as it is a poor conductor of heat.
40. (C) Combustion is a reaction in which a substance reacts with oxygen.
41. (C) Coal tar is a thick and black liquid with unpleasant smell.
42. (B) Metals combine with oxygen to form basic oxides. When added to water they form bases.
43. (D) Statements (A), (B) and (C) are true as plastics are bad conductors of heat and electricity.
44. (A) Sulphur and nitrogen oxides released by industries as pollutants react with water vapour in air to form acid rain. It is very harmful for crops, buildings and soils.
45. (A) Nitrogen occurs in free state. In atmospheric air, it has a major volume of 78%.

### BIOLOGY

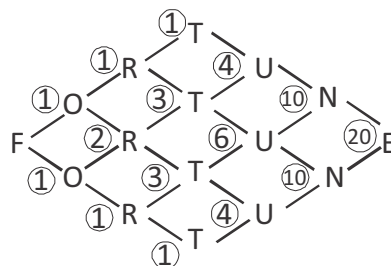
46. (B) The branch of agriculture that deals with the rearing of bees is called apiculture.
47. (C) In plant cells, the cell wall is made of cellulose.
48. (D) The colourless plastids are leucoplasts.
49. (B) Yeast is an example of fungus.
50. (A,B,C) Symbiotic bacteria in legume root nodules fixes atmospheric nitrogen in the form of ammonia.  
Freeliving nitrosomonas oxidizes ammonia into nitrite.  
Freeliving nitrobacter oxidises nitrite into nitrate.
51. (C) Lactobacillus converts milk into curd.
52. (D) The virus which infects bacteria is termed as bacteriophage.
53. (C) Ascariasis is a disease caused by worms.
54. (D) Cutting of ripened crop is called harvesting.
55. (A) Amoeba reproduces through binary fission.

### CRITICAL THINKING

56. (B)

Name	Name	Lives on
Suma	Singer	5th floor
Pavitra	Doctor	4th floor
Meghana	Engineer	3rd floor
Nikita	Artist	2nd floor

57. (B)



There are 20 different ways to form the word "FORTUNE".

58. Del

59. (D) Words are necessary part of language. Slang is not necessary to language (choice b). Not all languages are written (choice c). Not all languages are spoken (choice a).

60. (B)

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**THE END**

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