NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION (UPDATED)

CLASS - 8
Question Paper Code : UN464

KEY

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

EXPLANATIONS

MATHEMATICS

01. (B) Given first whole number be 'n'

∴ Next whole number = n + 1

∴ n + n + 1 = 13 [∴ Given]

02. (B) Given $\sqrt{1 + \dfrac{56}{169}} = 1 + \dfrac{x}{13}$

$\Rightarrow \sqrt{\dfrac{169 + 56}{169}} = \dfrac{13 + x}{13}$

$\Rightarrow \sqrt{\dfrac{225}{169}} = \dfrac{13 + x}{13}$

$\Rightarrow \dfrac{15}{13} = \dfrac{13 + x}{13}$

∴ 13 + x = 15

x = 15 − 13 = 2

03. (D) $\dfrac{-5}{6} = \dfrac{-5}{6} \times \dfrac{5}{5} = \dfrac{-25}{30}$

04. (C) Cone has only one flat surface

05. (A) Given $1^3 + 2^3 + 3^3 + ... + 9^3 = 2025$

$(0.11)^3 + (0.22)^3 + (0.33)^3 + ... + (0.99)^3$
$= (0.11 \times 1)^3 + (0.11 \times 2)^3 + (0.11 \times 3)^3 +$
$..... + (0.11 \times 9)^3$

= $(0.11)^3 (1^3 + 2^3 + 3^3 + ... + 9^3)$

= 0.001331×2025

= 2.695

06. (A)   Cost of each metre $= \dfrac{₹d}{x}$

∴   Cost of 'y' metre $= \dfrac{₹dy}{x}$

07. (C)   Third side = Perimeter - (sum of remaing two sides)

= $(6a^2 + 4a + a) - (a^2 - 2a + 1 + 3a^2 - 5a + 3)$

= $6a^2 + 4a + 9 - a^2 + 2a - 1 - 3a^2 + 5a - 3$

= $6a^2 - a^2 - 3a^2 + 4a + 2a + 5a + 9 - 1 - 3$

= $(2a^2 + 11a + 5)$

08. (C)   Let the given number be 10 a + b

Given $(10a + b) - (10b + a) = 45$

$\Rightarrow 10a + b - 10b - a = 45$

$9a - 9b = 45$

$9(a - b) = 45$

$(a - b) = \dfrac{45}{9} = 5$

09. (D)   Let CP be ₹ x

∴ $SP = \dfrac{₹5x}{4}$

∴ $Profit = SP - CP = \dfrac{₹5x}{4} - ₹x = \dfrac{₹5x - ₹4x}{4}$

$= \dfrac{₹x}{4}$

∴   Profit percentage $= \dfrac{Profit}{CP} \times 100$

$= \dfrac{\left(\dfrac{₹x}{4}\right)}{₹x} \times 100$

= 25%

10. (A)   (0, −5), (0, 5), (4, 1), (3, −1),(3, 7), (4, 7) are the six possibilities to satisfy $(x - y)^2 + x^2 = 25$

where $x \in Z^+ \cup \{0\}$ and Y ∈ Z

11. (B) $9a^4 - 36b^4 c^4 = 3^2 (a^4 - 4b^4c^4)$

= $9 [(a^2)^2 - (2b^2c^2)^2]$

= $9 (a^2 - 2b^2c^2)(a^2 + 2b^2c^2)$

12. (C)   Direct proportion is in the form of

$\dfrac{x_1}{y_1} = \dfrac{x_2}{y_2} = \dfrac{x_3}{y_3}....$

Only Option 'c' is in this form ie $\dfrac{x}{y} = \dfrac{23}{11}$.

13. (C)   Given 4b = 50 m

$\Rightarrow b = \dfrac{50m}{4} = 12.5m$

∴   Area of rhombus = b × h = 12.5m × 5m

= $62.5m^2$

14. (D)   Given $27^{x+1} = 9^{x+3} = 3^{2y}$

∴ $27^{x+1} = 9^{x+3}$ & $9^{x+3} = 3^{2y}$

$(3^3)^{x+1} = (3^2)^{x+3}$ $(3^2)^{x+3} = 3^{2y}$

$\Rightarrow$ $3^{3x+3} = 3^{2x+6}$

∴ $3^{2x+6} = 3^{2y}$

$3x+3 = 2x + 6$

∴ $2x + 6 = 2y$

$3x - 2x = 6 - 3$

$2(3) + 6 = 2y$

$x = 3$

$\dfrac{6 + 6}{2} = y$

$y = \dfrac{12}{2} = 6.$

15. (D)   No. of women $= 120 \times \dfrac{3}{5} = 72$

∴   No.of men = 120 − 72 = 48

No. of married people $= \dfrac{2}{3} \times 120 = 80$

Given maximum women's are unmarried

$\Rightarrow$ maximum men are married

∴   Assume all men (48) are married

∴   Number women are married = 80 − 48 = 32

∴   Number women are unmarried = 72 − 32 = 40

16. (C) Given

$$P = \left(1 + \frac{r}{100}\right)^n - P - \frac{PTR}{100} = ₹11,106$$

$$\Rightarrow P\left(1 + \frac{\cancel{15}^3}{\cancel{100}_{20}}\right)^2 - P - \frac{P \times 2 \times \cancel{15}^3}{\cancel{100}_{20}} = ₹11,106$$

$$P\left(\frac{23}{20}\right)^2 - P - \frac{6P}{20} = ₹11,106$$

$$\Rightarrow \frac{529P}{400} - P - \frac{6P}{20} = ₹11,106$$

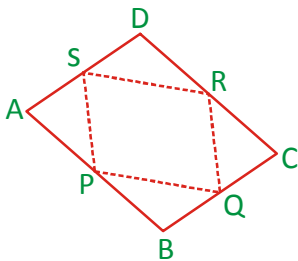$$\Rightarrow \frac{529P - 400P - 120P}{400} = ₹11,106$$

$$\Rightarrow 9P = ₹11,106 \times 400$$

$$P = \frac{₹\cancel{11,106}^{1234} \times 400}{\cancel{9}_1}$$

$$= ₹4,93,600$$

17. (B) Midpoint of the sides of a quadrilateral joined in an order gives a parallelogram

18. (B) Present ages ratio of A & B = 5 : 7 = $5x : 7x$.

Given $5x + 4 : 7x + 4 = 3 : 4$

$3(7x + 4) = 4(5x + 4)$

$21x + 12 = 20x + 16$

$21x - 20x = 16 - 12 = 4$

$x = 4$

∴ Present age of A = $5x = 5 \times 4 = 20$ years

19. (A) $6x^2 - 5\sqrt{2}x - 12 = 6x^2 - 9\sqrt{2}x + 4\sqrt{2}x - 12$

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

∴ $6x^2 + 5\sqrt{2}x - 12 = (\sqrt{2}x - 3)(3\sqrt{2}x + 4)$

20. (C)

$$
\begin{array}{r}
2x + 3 \\
(3x - 2)\overline{)6x^2 + 5x + 11} \\
\underline{6x^2 - 4x} \\
(-)\ (+) \\
\hline
9x + 11 \\
\underline{9x - 6} \\
(-)\ (+) \\
\hline
17
\end{array}
$$

21. (B) Let the other number be 'x'

Given $\frac{5}{4}x = \frac{-25}{16}$

$x = \frac{-25}{16} \times \frac{4}{5} = \frac{-5}{4}$

22. (D) Number of bottles filled in one hour

$= \frac{510}{3} = 170$

Number of bottles filled in 5 hours = 170 × 5 = 850

23. (C) Given $\pi r^2 h = 0.0154$ m³

$$\Rightarrow \frac{22}{7} \times r^2 \times 1m = 0.0154 \text{ m}^3$$

$$r^2 = 0.0154 \times \frac{7}{22} m^2$$

$= 0.0049$ m²

$r^2 = (0.07 \text{ m})^2$

∴ r = 0.07 m = 0.07 × 100 cm

r = 7 cm

∴ Diameter = 2r = 14 cm.

24. (A) $\sqrt{1^3 + 2^3 + 3^3 + 4^3 - 8^2} = \sqrt{1 + 8 + 27 + 64 - 64}$

$= \sqrt{36}$

$= 6$

25. (C) Area of rectangle = $l \times b$

$= (3x + 4) \times (3x - 2)$ cm²

$= [3x(3x - 2) + 4(3x - 2)]$ cm²

$= (9x^2 - 6x + 12x - 8)$ cm²

$= (9x^2 + 6x - 8)$ cm²

PHYSICS	CHEMISTRY

PHYSICS

26. (C) Sound travels faster in dense materials. Thus, it travels the fastest in solids, followed by medium in liquids and the slowest through gases.

27. (D) The pulling force of gravity is greater than the frictional force of the air.

28. (B) When two bodies are rubbed against each other they acquire equal and opposite charges.

29. (D) Round and smooth spherical objects like rollers or ball bearings reduce friction, They are placed around axles in many machines to allow the axles to turn easily.

30. (B) Vinegar is a good conductor of electricity. Hence, X is vinegar.

31. (B) For the eye to capture the image, the object must be real. All real images produced by a converging lens are inverted and diminished

32. (D) Pressure (P) = $\dfrac{\text{Force (F)}}{\text{Area (A)}}$

Therefore, F = P × A and A = $\dfrac{F}{P}$

33. (D) LED's replace bulbs because they consume less electricity, have longer life and have more power.

34. (D) Frictional force can produce sound and heat. It also reduces the speed of a moving object.

35. (D) All the given statements relate to care of our eyes.

CHEMISTRY

36. (A) As X and Y are carbon rich materials, thus these could be coal or its derivatives. When coal is heated in the absence of air, coke is formed which is tough, porous and a black substance.

$$\underset{(X)}{\text{Coal}} \xrightarrow{\text{Absence of air}} \underset{(Y)}{\text{Coke}}$$
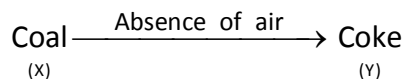
37. (B) Magnesium metal does not react with oxygen at room temperature. On heating, magnesium ribbon burns in air giving intense heat and a very bright, white light.

38. (D) The substances/fuels that undergo slow combustion when burnt are candle, wood and oil lamp.

39. (D) Synthetic fibres and plastics are made up of long chained molecules that are formed by repeated fusion of many small molecules called monomers. Synthetic fibres and plastics are produced by humans.

40. (D) Carbon, a non-metal is the main substance present in all the fuels. Copper, zinc and aluminium are metals.

41. (A) Both spirit and petroleum are volatile liquids and they turn into gas at room temperature.

42. (A) Synthetic polymers like plastics, fibres, etc., are generally strong, long lasting, light, cheap, can be easily moulded into various shapes and sizes as well as easily coloured. Hence, they are used widely in our daily life. However, the widespread use of synthetic polymers leads to an increase in environmental problems, as they are not biodegradable. If disposed anywhere or in open landfills without being processed, these substances will remain in the environment for a long, long time and will slowly pollute the environment.

43. (A) Gold is a highly malleable metal.

44. (B) Flame produced by a fuel depends on the amount of oxygen available at the time of burning. If sufficient oxygen is available, the fuel burns with a blue flame. If insufficient oxygen is available, then the fuel burns with a yellow flame.

45. (D) Statements (A), (B) and (C) are correct. Coal causes air pollution when burnt in the form of smoke.

BIOLOGY

46. (B) Part labelled 2 is chloroplast. Chloroplast contains a green pigment called chlorophyll, it traps light energy.

47. (A) Removing chaff from the grains is called winnowing. In this process, the mixture is dropped on the ground from a height. The heavier seeds fall almost vertically down, whereas the lighter chaff gets blown away by the wind and falls at the distance.

48. (D) Earthworms do not feed on the green leaves of crops. They speed up the decomposition of fallen leaves. When the leaves decompose in the soil, the soil becomes fertile. Their castings also make the soil fertile. They help to loosen and aerate the soil too.

49. (A) Intestinal bacteria of herbivores (ruminants) bring about digestion of cellulose.

50. (A) Some living things on Earth have become extinct. They became extinct because of over-hunting, the presence of diseases or the destruction of their habitats due to logging or deforestation.

Some living things are in danger of extinction because of over-hunting, poaching, diseases, excessive logging or deforestation.

51. (D) The fertilised egg moves to the uterus and implants on uterine lining.

52. (D) 1 - capsule, 2 - cell wall, 3 - mesosome, 4 - ribosome

53. (A) A National Park is protected land area preserved in natural conditions to provide natural habitat to wildlife. Activities like forestry, grazing, cultivation is prohibited national parks. Visitors can seek entry only through prior approval letters given by governing authorities.

54. (D) Ingesting or engulfing other cells or particles is called phagocytosis.

55. (C) The given figure represent a food web.
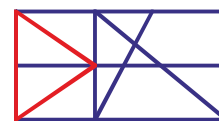
CRITICAL THINKING

56. (C) P and U share a wall is a flase statement.
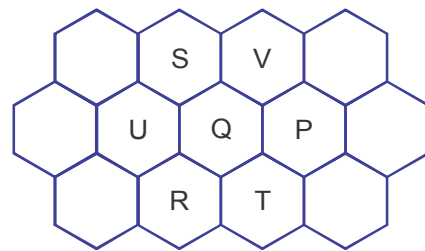
57. (D)
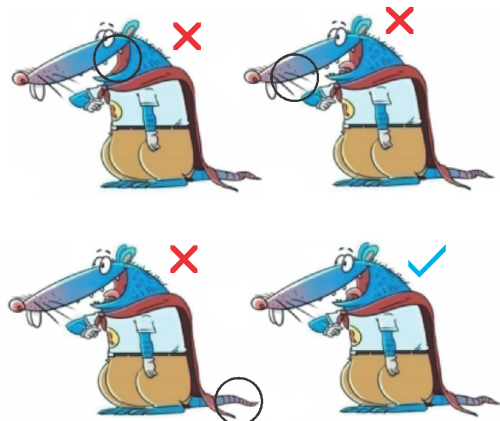
58. (A)

59. (B) The tiles in each of the vertical column have this pattern: 2, 3, 4, 5, …

Thus the nth figure will have $(n + 1) \times 2 + n = 3n + 2$ tiles

∴ Figure number with 6044 tiles = $(6044 - 2) \div 3 = 2014$

60. (A)