NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION (UPDATED)

CLASS - 8

Question Paper Code : UN460

KEY

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

SOLUTIONS

MATHEMATICS

1: (D) Given $3x - 9 : 5x - 9 = 12 : 23$

$23(3x - 9) = 12(5x - 9)$

$69x - 207 = 60x - 108$

$69x - 60x = 207 - 108$

$9x = 99$

$x = 11$

$\therefore 5x = 5 \times 11 = 55$

2: (D) Given $17^2 - 13^2 = (17 + 13)(17 - 13)$

$= 30 \times 4$

$= 120$

$\therefore$ 121 is the nearest perfect square

$\therefore$ 1 to be added to 120 to get 121

3: (A) $\dfrac{-5}{7} \times \dfrac{14}{15} - \left(\dfrac{-5}{6}\right) = \dfrac{-2}{3} + \dfrac{5}{6} = \dfrac{-4+5}{6} = \dfrac{1}{6}$

4: (B) Let the number of days be x

Given $30 \times 7 = (30 + 5)x$

$\Rightarrow \dfrac{30 \times 7}{35} = x$

$x = 6$

5: **(D)** Given $\sqrt{l^2 + b^2} = 2b$

Squaring on both sides

$l^2 + b^2 = 4b^2$

$l^2 = 4b^2 - b^2$

$l^2 = 3b^2$

$l = \sqrt{3b^2} = \sqrt{3}b$

$\therefore \dfrac{l}{b} = \sqrt{3}$

$\therefore l : b = \sqrt{3} : 1$

6: **(D)** $\sqrt[3]{\dfrac{-729}{1331}} = \sqrt{\dfrac{(-9)^3}{11^3}} = \dfrac{-9}{11}$

7: **(B)** $\dfrac{(x+y)^2(x-y)^2}{(x^3y + xy^3)} = \dfrac{x^2 + 2xy + y^2 + x^2 - 2xy + y^2}{xy(x^2 + y^2)}$

$= \dfrac{2x^2 + 2y^2}{xy(x^2 + y^2)}$

$= \dfrac{2(x^2 + y^2)}{xy(x^3 + yx^2)}$

$= \dfrac{2}{xy}$

8: **(C)** Let the edge of cube be 'a' units

$\therefore$ Surface area $= 6a^2$.

Given $A = a + 40\% \ a = a\dfrac{(140)}{100} = \dfrac{7a}{5}$

New surface area =

$6A^2 = 6 \times \left(\dfrac{7a}{5}\right)^2 = 6 \times \dfrac{49a^2}{25}$

$\therefore$ Increased area $= 6a^2\left(\dfrac{49}{25}\right) - 6a^2$

$= 6a^2\left[\dfrac{49}{25} - 1\right]$

$= 6a^2\left[\dfrac{49 - 25}{25}\right]$

$= 6a^2\dfrac{(24)}{25}$

Percentage of increased area

$= \dfrac{6a^2\left(\dfrac{24}{25}\right)}{6a^2} \times 100$

$= 96\%$

9: **(A)** Rate of interest per annum = 10%

Rate of interest per half year

$= \dfrac{10\%}{2} = 5\%$

₹$800\left(1 + \dfrac{5}{100}\right)^n = $ ₹926.10

$\left(1 + \dfrac{1}{20}\right)^n = \dfrac{₹926.10}{₹800} \times \dfrac{100}{100}$

$\left(\dfrac{21}{20}\right)^n = \dfrac{92610}{80000} = \left(\dfrac{21}{20}\right)^3$

$\therefore$ Time = 3 half years $= 1\dfrac{1}{2}$ years

10: **(B)** Distance covered with 22 liters

$= \dfrac{432}{36} \times 22$

= 264 km

11: **(A)** Given a = C = 1

Given ab, ba, cd & dc are primes.

$\therefore$ ab = 13 & ba = 31

cd = 17 & dc = 71

$\therefore \dfrac{ab + ba}{cd + dc} = \dfrac{13 + 31}{17 + 71} = \dfrac{44}{88} = \dfrac{1}{2}$

12: **(B)** $(4a^2 + 4ab + b^2) - (9c^2 - 12cd + 4d^2) = (2a + b)^2 - (3c - 2d)^2$

$= [(2a + b) + (3c - 2d)] \ [(2a + b) - (3c - 2d)]$

$= (2a + b + 3c - 2d) \ (2a + b - 3c + 2d)$

2

13: (C) $(-1)^1 + (-1)^2 + (-1)^3 + ... + (-1)^{2020} + (-1)^{2021}$

$= (\cancel{-1}) + (\cancel{1}) + (\cancel{-1}) + (\cancel{1}) + ... + (\cancel{-1}) + (\cancel{1}) + (-1)$

$= -1$

14: (A)   Difference of x & y = $(y - x)$ $[x < y]$

$\therefore$ Percentage of x less than

$$y = \frac{(y - x)}{y} \times 100$$

15: (A)   In a parallelogram ABCD, $\angle A = \angle C$ & $\angle B = \angle D$

$\therefore$ $\angle B - \angle D = 0°$

16: (B)   Front value of the given solid is

17: (D)   Let the number of deer in the herd be 'x'

Given $\dfrac{2x}{3} + \dfrac{1}{2}\left(x - \dfrac{2x}{3}\right) + 15 = x$

$\Rightarrow \dfrac{2x}{3} + \dfrac{1}{2}\left(\dfrac{3x - 2x}{3}\right) - x = -15$

$\Rightarrow \dfrac{2x}{3} + \dfrac{x}{6} - x = -15$

$\Rightarrow \dfrac{4x + x - 6x}{6} = -15$

$-x = -15 \times 6$

$x = 90$

18: (B) $\sqrt{6}x^2 + x - \sqrt{6} = \sqrt{6}x^2 + 3x - 2x - \sqrt{6}$

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

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

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

19: (C)
$$x - \frac{1}{x} \begin{array}{|l} x^2 + \dfrac{1}{x^2} \\ x^2 - 1 \\ \underline{(-)\ (+)} \\ 1 + \dfrac{1}{x^2} \end{array} x$$

20: (D)   Area $= l \times b = 10\dfrac{7}{11}\text{m} \times 4\dfrac{8}{9}\text{m}$

$= \dfrac{\cancel{117}^{13}}{\cancel{11}_1} \times \dfrac{\cancel{44}^4}{\cancel{9}}\text{m}^2$

$= 52\ \text{m}^2$

21: (C)   Maximum length of pencil = diagonal of a cubord

$= \sqrt{l^2 + b^2 + h^2}$

$= \sqrt{(12)^2 + (9)^2 + 8^2}$ cm

$= \sqrt{144 + 81 + 64}$ cm

$= \sqrt{289}$ cm

$= 17$ cm

22: (D) $\sqrt{32.5^2 + 18.5^2 - 17.5^2 - 31.5^2}$

$= \sqrt{(32.5)^2 - (31.5)^2 + (18.5)^2 - (17.5)^2}$

$= \sqrt{(32.5 + 31.5)(32.5 - 31.5) + (18.5 + 17.5)(18.5 - 17.5)}$

$= \sqrt{64(1) + 36(1)}$

$= \sqrt{100}$

$= 10$

23: (B) $\dfrac{a + 2\sqrt{ab} + b}{\sqrt{a} + \sqrt{b}} = \dfrac{(\sqrt{a})^2 + 2\sqrt{a} \times \sqrt{b} + (\sqrt{b})^2}{(\sqrt{a} + \sqrt{b})}$

$= \dfrac{(\sqrt{a} + \sqrt{b})^2}{(\sqrt{a} + \sqrt{b})}$

$= (\sqrt{a} + \sqrt{b})$

24: (D)   Let the number be 'x'

Given $x - \dfrac{2}{3}x = 15$

$x = 3 \times 15 = 45$

25: (B)   Let the cost price of each candel be ₹x

$\therefore$ cost price of 15 candles = ₹$15x$

selling price of 12 candle = ₹$15x$

selling price of each candle =

$$\frac{\cancel{₹15}^{5}\,x}{\cancel{12}_{4}} = \frac{₹5x}{4}$$

$\therefore$ Profit $= \dfrac{₹5x}{4} - ₹x = \dfrac{₹5x - ₹4x}{4} = \dfrac{₹x}{4}$

Profit percentage

$$= \frac{\text{Profit}}{\text{CP}} \times 100 = \frac{\left(\dfrac{₹x}{4}\right)}{₹x} \times 100 = 25\%$$

(OR)

Let CP of each candle be ₹12 &

SP of each candle be ₹15

$\therefore$ Profit $= ₹15 - ₹12 = ₹3$

Profit percentage

$$= \frac{\text{Profit}}{\text{CP}} \times 100 = \frac{₹3}{₹12} \times 100 = 25\%$$

PHYSICS

26. **(D)** The speed of sound is 330 m/s but the speed of light is 300,000,000 m/s. This is around a million times slower.

27. **(D)** The force due to the electrical charges on objects is called electrostatic force. A plastic ruler acquires negative charge and attracts tiny pieces of paper after rubbing with a woollen cloth, that acquires positive charge.

28. **(A)** The weak zones around the boundaries of plates underneath the earth, which are prone to slide and cause earthquake are commonly known as fault zones. (Refer page no. 193, 2nd para on the right side of VIII NCERT text book).

29. **(D)** On the rear wheel, the force of friction F_2 acts in forward direction. It is so because pedalling rotates the rear wheel. It makes the rear wheel slide in backward direction while rotating. So, sliding frictional force is created in forward direction. On the front wheel, no pedalling is done. So, it simply rolls. It does not slide. So, simple rolling friction acts on front wheel i.e., F_1 and makes it move in backward direction.

30. **(A)** Cans used for storing soft drinks or food items are usually electroplated with tin because tin is less reactive than the base metal with which the can is made of. Tin does not contaminate the food or soft drink. It also does not get corroded.

31. **(D)** Non-optical aids include visual aids, tactual aids (using the sense of touch), auditory aids (using the sense of hearing) and electronic aids. Visual aids can magnify words, can provide suitable intensity of light and material at proper distances. Tactual aids including Braille writer slate and stylus, help the visually challenged persons in taking notes, reading and writing. Auditory aids include cassettes, tape recorders, talking books and other such devices.

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

33. **(A)** When electric current flows through a conductor, some amount of electrical energy is converted into heat energy.

34. **(D)** Friction of road helps the cars to move forward, so statement (ii) is wrong. Ball bearings are designed to reduce friction between two surfaces. So, statement (v) is also wrong.

35. **(C)** A person suffering from myopia has elongation of the eye ball. As such he cannot see distant objects clearly. A suitable concave lens can rectify the above defect, so that the image falls on the retina.

CHEMISTRY

36. **(D)** Coal is made up of carbon along with small amounts of oxygen, sulphur, hydrogen and nitrogen. There are four varieties of coal like peat, lignite, bituminous and anthracite. Lignite is the softest coal with low carbon and high hydrogen and oxygen content. Among these, anthracite is the hardest and contains 90-95% of carbon.

37. **(D)** Sodium is a very reactive metal. It reacts vigorously with oxygen and water and the reaction is highly exothermic. Therefore, the metal is stored in kerosene.

38.	(C)	Diesel will give out maximum amount of heat by complete combustion when compared with wood, coal and biogas. Given below are calorific values of wood, coal, biogas and diesel:
		Wood – 17000 – 22000 KJ/Kg
		Coal – 25000 – 33000 KJ/Kg
		Biogas – 35000 – 40000 KJ/Kg
		Diesel – 45000 KJ/Kg
39.	(B)	PVC can be coated on cloth base to make it water proof as it is tougher than polythene to make rain coats and seat covers.
40.	(C)	Solution of the oxide of substance X is acidic in nature as it turns blue litmus red. Hence, element X is a non-metal.
		Sulphur (X) + Oxygen → Sulphur dioxide (Y)
		Sulphur dioxide + Water → Sulphurous acid (Z)
41.	(C)	Butane is an odourless gas, so it is mixed with ethyl mercaptan such that if the gas leaks in air, it can be easily detected due to its peculiar choking smell and prevents it from explosion.
42.	(D)	As plastics are not biodegradable, they may enter into water bodies by wind and can block the flow of water in drains. If they accumulate at a particular place, it becomes a breeding place for mosquitoes and also increases the risk of flash floods. They remain in the environment for a long time and slowly pollute the land and environment.
43.	(C)	Iodine – Lustrous non-metal
		Sodium – Metal having low melting and boiling point
		Sulphur – Solid non-metal
		Silver – Metal less reaction than copper
44.	(B)	Inexhaustible natural resources can be replenished continuously.
		When coal is heated in the presence of air, it produces mainly carbon dioxide gas.
45.	(D)	Natural gas in used for all the given purposes.

BIOLOGY

46.	(B)	Part labelled 2 is centrioles. Centrioles are absent in higher plant cells.
47.	(A)	Reproduction is the act or process that produces young living things. Living things reproduce to ensure the continuity of their own kind.
		The fusion of a sperm and an egg is calle fertilisation.
48.	(B)	Yeast is a fungus.
49.	(D)	A microscope magnifies and enables us to see tiny things such as bacteria and yeast cells clearly.
		Lenses used in a microscope are thin transparent glasses with curved surfaces that magnify small objects.
50.	(B)	Root hair cell absorbs water and mineral cells. Xylem helps in conduction of water and support to plant. RBC transport oxygen.
51.	(B)	Sickle is used for harvesting.
52.	(B)	S, U, Q, P, R, T. S - Fertilisation, U - Four weeks, Q - Ten weeks, P - 16 weeks, R - 20 weeks, T - Nine months.
53.	(A)	IUCN now known as WCU (World Conservation Union) has maintained Red data book or Red list which contains records of endangered plants and animals. Red list made in the year 2000 assesses 18,000 species of plants and animals as endangered.
54.	(D)	Part labelled 4 is ribosomes. Proteins are synthesised in ribosomes.
55.	(C)	The given organism is chlamydomonas.

56: (C)   drasso<u>glitive</u>   <u>wood</u>board

frassopoolts   body study

<u>glitive</u>drassy   food<u>wood</u>

dressowoolts   digitalscreen

wood = glitive

∴   screen = dresso

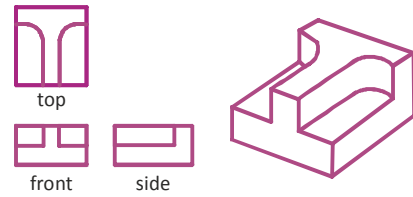only option 'C' satisfies the condition

57: (A)

58: (A)   Samesh cannot have Green, Red or Grey ball, as letter e will be same. So, Samesh will have Brown ball.

Vansh and Daman cannot have Green ball, as letter n will be common. So, only Akash can have green ball.

Daman cannot have red ball as letter d will be common. So, Daman will have Grey ball and Vansh will have Red ball.

59: (C)   Option (C) is the correct water image of the given combination.

60: (D)

top

front   side

THE END