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NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION

CLASS - 7

Question Paper Code : 1O119

KEY

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

SOLUTIONS

MATHEMATICS

01. (B) Smallest whole number is zero and n^{th} whole number value is $(n - 1)$

$\therefore$ Range $= (n - 1)$

02. (C) In ΔABC, $27° + 99° + \angle BAC = 180°$

$126° + \angle BAC = 180°$

$\angle BAC = 180° - 126° = 54°$

But, $y + 23° + x + \angle BAC = 180°$

$x + y + 23° + 54° = 180°$

$x + y = 180° - 77° = 103°$

03. (C) $$\frac{8^{10} + 4^{10}}{64^2 + 4^{11}} = \frac{\left(2^3\right)^{10} + \left(2^2\right)^{10}}{\left(2^6\right)^2 + \left(2^2\right)^{11}}$$

$$= \frac{2^{30} + 2^{20}}{2^{12} + 2^{22}} = \frac{2^{12}\left(2^{18} + 2^8\right)}{2^{12}\left(1 + 2^{10}\right)}$$

$$= \frac{2^8\left(2^{10} + 1\right)}{\left(2^{10} + 1\right)} = 256$$

04. (A) Given $\frac{3x}{4} + x + \frac{x}{2} = 180°$

$\frac{3x + 4x + 2x}{4} = 180°$

$9x = 180° \times 4$

$x = 80°$

05. (A) $\frac{3}{4}$ × S.P = 90% of C.P

(Since loss = 10%)

$\Rightarrow$ S.P = 120% of C.P

$\Rightarrow$ S.P = 1.2 of C.P

$\therefore$ Profit % = $\frac{1.2\text{C.P} - \text{C.P}}{\text{C.P}} \times 100\%$

= 0.2 × 100 = 20%

06. (A) $(1^3 + 2^3 + 3^3 + \ldots + 7^3)^{\frac{3}{2}}$ = (1 + 8 + 27 + 64 + 125 + 216 + 343) $^{-3/2}$

= $(784)^{\frac{3}{2}} = 28^{2\times\frac{3}{2}}$

= 28^3 = 21952

07. (A) Here jumping downwards is taken as positive and jumping upwards is taken as negative

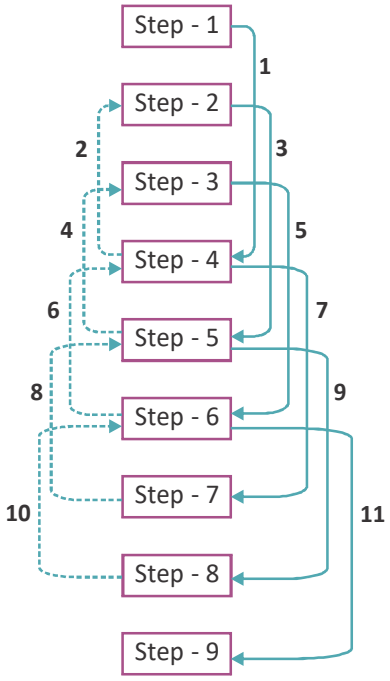
Also given that the monkey is sitting on the first step

1 + (+3) + (–2) + (+3) + (–2) + (+3) + (–2) + (+3) + (–2) + (+3)+(–2) + (+3)

= 1+3–2+3–2+3–2+3–2+3–2+3

is 11 steps

(or)



08. (D) LHS $= 1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{\left(\frac{3}{2}\right)}}}$

$= 1 + \cfrac{1}{1 + \cfrac{1}{1 + \frac{2}{3}}} = 1 + \cfrac{1}{1 + \cfrac{1}{\left(\frac{5}{3}\right)}}$

$= 1 + \cfrac{1}{1 + \frac{3}{5}} = 1 + \cfrac{1}{\left(\frac{8}{5}\right)} = 1 + \frac{5}{8}$

$= \frac{8+5}{8} = \frac{13}{8}$

09. (C) Let the first prize be Rs. x

$\therefore$ Second prize = Rs. $\frac{3}{4}x$

Third prize = Rs. $\frac{1}{2} \times \frac{3x}{4}$ = Rs. $\frac{3x}{8}$

$\therefore$ Rs. $\left(x + \frac{3x}{4} + \frac{3x}{8}\right)$ = Rs. 2250

Rs. $\frac{17x}{8}$ = Rs. 2550

x = Rs. 1200

10. (C) LHS = $\frac{a^2}{2}-\frac{b^3}{3}+\frac{c^3}{4}+\frac{2a^2}{3}-\frac{3b^3}{4}+\frac{4c^3}{5}$

$+ a^2 - b^3 - c^3$

$=\left(\frac{a^2}{2}+\frac{2a^2}{3}+a^2\right)+\left(-\frac{b^3}{3}-\frac{3b^3}{4}-b^3\right)$

$+\left(\frac{c^3}{4}+\frac{4c^3}{5}-c^3\right)$

$=\left(\frac{3a^2+4a^2+6a^2}{6}\right)+\left(\frac{-4b^3-9b^3-12b^3}{12}\right)$

$+\left(\frac{5c^3+16c^3-20c^3}{20}\right)$

$=\frac{13a^2}{6}-\frac{25b^3}{12}+\frac{c^3}{20}$

11. (B) Cost of one litre milk

$=\frac{\left(₹\frac{5157}{20}\right)}{\frac{27}{5}}=\frac{₹5157}{20}\times\frac{5}{27}$

$\therefore$ Cost of $3\frac{3}{4}$ litres

$=\frac{₹\cancel{5157}^{191}}{4}\times\frac{1}{\cancel{27}}\times\frac{15}{4}=\frac{₹2865}{16}=₹179\frac{1}{16}$

12. (C) $[(43)^3 + 3 \times (43)^2 \times 57 + 3 \times 43 \times (57)^2 + (57)^3]$

$= 79507 + 171 \times 1849 + 129 \times 3249 + 185193$

$= 79507 + 316179 + 419121 + 185193$

$= 10,00,000$

13. (B) Given $a + b + c + d + e = 215$

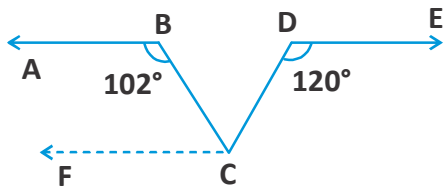
$a + 76 + 107 = 215$

$a = 215 - 76 - 107 = 32$

$32 + b = 67$

$b = 67 - 32 = 35$

14. (D) Const:- Draw FC || AB



FC || AB $\Rightarrow \angle ABC + \angle FCB = 180°$

[$\because$ alternative angles]

$102° + \angle FCB = 180°$

$\angle FCB = 180° - 102° = 78°$

But DE || FC $\Rightarrow \angle FCD = \angle D$

[$\because$ alternative angles]

$78° + \angle BCD = 120°$

$\angle BCD = 120° - 78° = 42°$

$\angle BCD = 42°$

15. (B) $4\frac{4}{5}\times1\frac{2}{3}\times7\frac{3}{4}\times2\frac{8}{31}\times1\frac{5}{23}\times3\frac{2}{7}$

$=\frac{\cancel{24}^{8}}{\cancel{5}_{1}}\times\frac{\cancel{5}^{1}}{\cancel{3}}\times\frac{\cancel{31}}{\cancel{4}_{1}}\times\frac{\cancel{70}^{10}}{\cancel{31}}\times\frac{\cancel{28}^{7}}{\cancel{23}}\times\frac{\cancel{23}}{\cancel{7}}=560$

16. (B) Given $S_1 + S_2 + S_3 = 3322$ units .....(i)

Given $S_1 - S_2 + S_3 = 2026$ units .....(ii)

Eq (i) – eq (ii)

$\Rightarrow (S_1 + S_2 + S_3) - (S_1 - S_2 + S_3)$

= (3322 – 2024) units

$S_1 + S_2 + S_3 - S_1 + S_2 - S_3 = 1296$ units

$2S_2 = 1296$ units

$S_2 = \frac{1296}{2}$ units

$S_2 = 648$ units

17. (C) $98765 \times 123 + 98765 \times 678 + 98765 \times 987 + 98765 \times 212$

$= 98765 (123 + 678 + 987 + 212)$

$= 98765 \times 2000$

$= 19,75,30,000$

18. (B) Let the pricipla be 'x'

Given Amount = ₹1,28,800

But $P\left(1+\frac{tr}{100}\right)=A$

$\Rightarrow P\left(1+\frac{2\frac{8}{12}\times 15}{100}\right)=₹1,28,800$

$\Rightarrow P\left(1+\frac{\frac{8}{3}\times 15}{100}\right)=₹1,28,800$

$P\left(\frac{20+8}{20}\right)=₹1,28,800$

$P=₹1,28,800\times\frac{20}{28}$

= ₹ 92,000

19. (A) In ΔABC, given AB = BC

$\Rightarrow \angle C = \angle A = 35°$

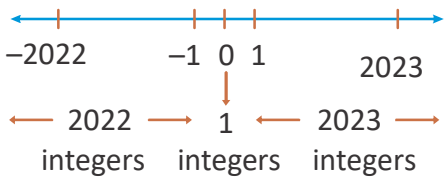
But $\angle ABD = \angle A + \angle C = 35° + 35° = 70°$

20. (C) $a° = 1 \Rightarrow \frac{a}{b} = 0$

$\therefore a = 0 \times b$

$a = 0$

21. (C)



$\therefore$ Total integers from –2022 to 2023

= 2022 + 1 + 2023 = 4046

22. (D) LHS = [–101 × 13 – 101 × 14 – 101 × 15 – 101 × 16 – 101 × 17 – 101 × 18 – 101 × 19 – 101 × 20 – 101 × 21 – 101 × 22 – 101 × 23]

= 101[–13 – 14 – 15 –16 – 17 – 18 – 19 – 20 – 21 – 22 – 23]

= 101 × –198 = –19998

23. (C) Let the number of notes of each denomination be 'x'

Given

` $10x$ + ` $20x$ + ` $50x$ + ` $200x$ = `6440

$\bar{2}80x$ = ` 6440

$x=\frac{₹6440}{280}=23$

$\therefore$ Number of notes of each denomination = x = 23

$\therefore$ Total notes = 23 × 4 = 92

24. (A) $\frac{5.43\times 5.43-3.45\times 3.45}{8.88}$

$=\frac{29.4849-11.9025}{8.88}$

$=\frac{17.5824}{8.88}$

= 1.98

25. (B) Given loss = SP of 6 apples

SP = SP of 24 apples

$\therefore$ CP = SP + Loss = SP of (6 + 24) apples

= SP of 30 apples

$\text{Loss\%}=\frac{\text{Loss}}{\text{CP}}\times 100$

$=\frac{\text{SP of 6 apples}}{\text{Sp of 30 apples}}\times 100=20\%$

PHYSICS

26. (B) In figure (I), the voltmeter is connected in series (not parallel). Similarly, in figure (III). the ammeter is in parallel which should be in series. In figure (IV), the negative terminal of battery has been connected to the positive terminal of the ammeter, whereas it should be connected to the negative terminal.

27. (C) Less friction and better balance may allow smoother, faster rolling.

28. (C) Obstructed airflow breaks the convection loop, leading to uneven temperature zones.

29. (C) A relay symbol includes a coil and switching contacts. It acts as an electrically operated switch and is widely used in automation, machines, and industrial control to isolate or connect high-voltage parts using a low-voltage control signal.

30. (D) Iron conducts heat, but the conduction takes time to reach the entire length.

31. (C) When a body is thrown vertically upwards, its motion is influenced by gravity, which causes a constant downward acceleration. The equation that describes the body's position x(t)at any time tis

$$x(t) = ut + \frac{1}{2}at^2$$

Where, x(t)is the position at time t,

uis the initial velocity (the speed with which the body is thrown upwards),

ais the acceleration due to gravity (negative, as gravity pulls the object downward).

Graph Shape

The graph of x(t)is a parabola.

It starts at the origin, rises (upward motion), then curves downward (falling motion).

This parabolic shape reflects the constant acceleration due to gravity, which causes the body to slow down, stop, and then accelerate in the opposite direction.

Why Graph (C) is Correct

Graph (C) shows a parabola that starts at the origin (since the body starts at the ground).

It rises and then falls back down, exactly representing the motion of the body thrown vertically upwards.

The graph accurately captures the behavior of the body under constant gravity, where the position initially increases (upward motion), peaks (velocity becomes zero), and then decreases (falling motion).

32. (D) When the switch is turned ON, the circuit becomes complete and an electric field is established throughout the entire conducting loop almost instantly (at a speed close to the speed of light).

Although individual electrons drift slowly, the signal to start moving is transmitted very fast through the circuit. As a result:

Current begins everywhere in the circuit at nearly the same time.

Each bulb receives current simultaneously.

There is no time delay between bulbs A, B, and C lighting up that can be observed.

So, even though bulb A is closer to the switch and bulb C is farther away, all three bulbs glow at the same time.

33. (A) Axillary (armpit) temperature is usually 1°F lower than oral due to external exposure and lower core temperature at that site.

34. (B) $\text{Average speed} = \frac{\text{Total distance}}{\text{Total time}}$

$\text{Time for first 120 km} = \frac{120}{60} = 2\text{h}$

$\text{Time for next 120 km} = \frac{120}{40} = 3\text{h}$

Total distance = 120 + 120 = 240 km

Total time = 2 + 3 = 5 h

Average speed = $\frac{240}{5}$ = 48 km / h

35. (C) The contact breaker helps repeat the action $\rightarrow$ classic working of an electric bell.

CHEMISTRY

36. (C) The correct matching is

1-r, 2-t, 3-p, 4-s, 5-q

Used in electrical wiring is copper

Most malleable and ductile is Gold

Living organinsms cannot survive without it is oxygen.

Plants grow healthy when fertilizers containing nitrogen is added to the soil.

Used in water purification is chlorine.

37. (A) In the given reaction, NaOH + $HCl \rightarrow NaCl + H_2O$, the salt is $NaCl$.

38. (D) Eating away of iron metal or gradual deterioration of metal surfaces caused by water, oxygen (air) or other substances is called corrosion.

39. (C) Vinegar is acidic and would turn blue litmus paper back to red reversing the effect caused by the basic solution.

40. (D) When a substance 'X'that is a metal is hit with a hammer, it expands in size in the form of a sheet but does not break.

The substance 'X' is malleable.

41. (A) An ant (by biting) injects formic acid into our skin.

42. (A) Copper and silver get corroded in air by developing coloured layers on their surfaces. Copper forms a green coating on its surface whereas silver forms a black coating on its surface.

43. (C) Vinegar (acid) when treated with turmeric paper turns yellow.

Baking soda solution (basic) when treated with turmeric paper turns red.

Sugar solution (neutral) when treated with turmeric paper remains yellow.

44. (D) Rusting of iron articles or objects can be prevented by painting, greasing and galvanising.

45. (D) Oxalic acid is found in spinach. Hence, substance 'Y' is spinach.

BIOLOGY

46. (A) Option A is correct — red light is efficiently absorbed by chlorophyll, enhancing photosynthesis and growth.

47. (A) Iron is essential for hemoglobin formation, which carries oxygen to tissues. During adolescence, especially in girls, iron demand rises due to rapid growth and menstruation, supporting energy and overall development.

48. (C) The trachea or windpipe, is the tube that connects the throat to the lungs

49. (D) Regular exercise boosts metabolism, energy, and helps maintain a healthy weight (1 $\rightarrow$ S). Avoiding physical activity or sleeping excessively reduces energy and can lead to weight gain (2 $\rightarrow$ R), (3 $\rightarrow$ Q). Frequent consumption of energy drinks provides only temporary energy without improving overall fitness (4 $\rightarrow$ P) excessive sleep without exercise leads to weight gain and lethergy.

50. (C) Saliva contains amylase, starting starch digestion (A & B correct). Pain while chewing reduces mechanical digestion (D correct). Saliva does not influence bile secretion, so C is incorrect.

51. (B) RBC is an iron rich protein it helps to bind with oxygen

52. (B) The plant wilts despite water and light because xylem blockage prevents water and mineral transport to leaves.

53. (B) The protein part in haemoglobin is globulin.

54. (B) In females, the ovaries produce estrogen and progesterone. Estrogen stimulates the development of breasts and widening of the hips during puberty. Progesterone helps in implantation of the embryo. Therefore it is also called pregnancy hormone.

55. (A) Nose → Trachea → Bronchus → Bronchiole → Alveolus

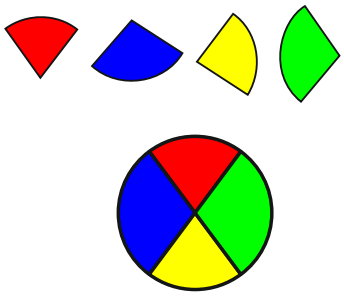
Inhalation is breathing in of air. During this mechanism air enter in through the nostrils passes into the lungs through the trachea.

CRITICAL THINKING

56. (B) The person 'T' travel to Jaipur by Bus.

	P	Q	R	S	T
Dehradun				Bike	
Mumbai		Train			
Jaipur					Bus
Bangalore			Truck		
Chandigarh	Cycle				

57. (D)



58. (A) 

AbCdEfGhIjKlMnOpQrStUvWxUz

hEℓp (h, ℓ, p are small letters so turn anti-clockwise 90 degrees)

E (capital alphabet turn clockwise 90 degrees)

59. (C) The first two statements give information about lilly and pansies. Information about any other kinds of flowers cannot be determined.

60. (A) 4th July – Tuesday (Given)

∴ 8th July = Saturday

∴ 29th July = Saturday

∴ 1st August = Tuesday

∴ 15th August = Tuesday

(As, on dates 1, 8, 15, 22, 29 of every month, day remains the same)