



# UNIFIED COUNCIL

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## NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION (UPDATED)

CLASS - 7

Question Paper Code : UN444

### KEY

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

### SOLUTIONS

#### MATHEMATICS

- (B) Distance walked =  $\frac{20}{3} \times \frac{12}{5}$  km = 16 km
- (B) Given  $3x - 8^\circ + 2x - 12^\circ = 180^\circ$   
 $5x - 20^\circ = 180^\circ$   
 $5x = 200^\circ$   
 $x = 40^\circ$
- (D) Let number of days absent be  $x$   
 $\therefore$  number of days present =  $(20 - x)$   
Given ₹ 60  $(20 - x) - ₹ 5x = ₹ 745$   
 $1200 - 60x - 5x = 745$

$$1200 - 745 = 65x$$

$$455 = 65x$$

$$x = \frac{455}{65} = 7$$

- (A) CP of Riksha

$$= ₹ 2640 \times \frac{100}{(100 - 12)} = ₹ 2640 \times \frac{100}{88}$$

$$= ₹ 3,000$$

$$\text{New SP of Riksha} = ₹ 3,000 \times \frac{100 + 2}{100}$$

$$= ₹ 3,360$$

5. (C)  $\frac{2}{3} = 0.66, \frac{4}{5} = 0.8, \frac{6}{7} = 0.857$

$$\therefore \frac{6}{7} > \frac{4}{5} > \frac{2}{3}$$

6. (C) Interest for 4 years

$$= ₹ 1200 - ₹ 1,100 = ₹ 100$$

$\therefore$  Principal = sum of 4 years – Interest for 4 years

$$= ₹ 1,100 - ₹ 100 = ₹ 1,000$$

7. (C) Sum of four angles of a quadrilateral =  $360^\circ$

8. (A)  $LHS = \left(\frac{3}{2}x^3 - \frac{5}{4}x^3\right) + \left(-\frac{1}{4}x^2 + \frac{3}{5}x^2 - x^2\right)$

$$+ \left(-x + \frac{3}{8}x\right) + \left(\frac{5}{3} + \frac{1}{5} - \frac{8}{15}\right)$$

$$= \frac{x^3}{4} - \frac{13x^2}{20} - \frac{5x}{8} + \frac{4}{3}$$

9. (D)  $LHS = (5x^2 + 20x - 3x - 12) - (6x^2 - 8x + 15x - 20)$

$$= (5x^2 + 17x - 12) - (6x^2 + 7x - 20)$$

$$= 5x^2 + 17x - 12 - 6x^2 - 7x + 20$$

$$= -x^2 + 10x + 8$$

10. (C) SAS Congruency

11. (D)  $\frac{5(2x-1) - 3(6x-2)}{15} = \frac{1}{3}$

$$10x - 5 - 18x + 6 = 5$$

$$-8x + 1 = 5$$

$$-8x = 4$$

$$x = -\frac{4}{8} = -\frac{1}{2}$$

12. (C)  $(2n - 4) \times 90^\circ$

13. (B) Let father and son's ages be  $x$  &  $y$  respectively

$$\text{Given } x - 5 = 7(y - 5)$$

$$x - 5 = 7y - 35$$

$$x - 7y = -30 \quad \rightarrow (1)$$

$$\text{Given } x + 5 = 3(y + 5)$$

$$x - 3y = 10 \quad \rightarrow (2)$$

$$\text{Solving (1) \& (2) } -4y = -40$$

$$y = 10$$

Present age of son =  $(y) = 10$  years

14. (A)  $x + 125^\circ = 180^\circ$

$$x = 55^\circ$$

$$\therefore \angle B = x = 55^\circ$$

But  $x + y = 180^\circ$  [Q AB//CD]

$$55^\circ + y = 180^\circ$$

$$y = 125^\circ$$

15. (D) Given A : B = 5 : 6 = 10 : 12

$$\text{Given B : C = 4 : 7 = 12 : 21}$$

$$\therefore A : B : C = 10 : 12 : 21$$

16. (D)  $LHS = ac - ab + \cancel{bc} - ab + ac - \cancel{bc}$

$$= 2ac - 2ab$$

$$= 2a(c - b)$$

17. (C) LHS

$$= 3ab - [ab - 2bc - \{4ab - (5bc + 6ab) - (ac - 3bc)\}]$$

$$= 3ab - [ab - 2bc - \{4ab - 5bc - 6ab - ac + 3bc\}]$$

$$= 3ab - [ab - 2bc - \{-2ab - 2bc - ca\}]$$

$$= 3ab - [ab - 2bc + 2ab + 2bc + ca]$$

$$= 3ab - [3ab + ca]$$

$$= 3ab - 3ab - ca$$

$$= -ca$$

18. (C) Let  $3^{-3}$  to be multiplied by  $x$

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

$$\frac{1}{27} \times x = \frac{1}{4}$$

$$x = \frac{27}{4}$$

19. (B)  $\frac{\left(-\frac{2}{5}\right)^7}{\left(\frac{2}{5}\right)^5} = \frac{(-1)^7 \left(\frac{2}{5}\right)^7}{\left(\frac{2}{5}\right)^5} = -\left(\frac{2}{5}\right)^{7-5}$

$$= -\left(\frac{2}{5}\right)^2 = -\frac{4}{25}$$

20. (C) If the diagonals of a quadrilateral intersect at right angles, it is not necessarily a rhombus

21. (D) Reciprocal of

$$a - \frac{1}{a} = \frac{1}{\left(a - \frac{1}{a}\right)} = \frac{1}{\left(\frac{a^2 - 1}{a}\right)} = \frac{a}{a^2 - 1}$$

22. (D) Given  $a^x = b^y = c^z = k$

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

Given  $a^3 = b^2 c$

$$\left(k^{\frac{1}{x}}\right)^3 = \left(k^{\frac{1}{y}}\right)^2 \left(k^{\frac{1}{z}}\right)$$

$$k^{\frac{3}{x}} = k^{\frac{2}{y} + \frac{1}{z}}$$

$$\frac{3}{x} = \frac{2}{y} + \frac{1}{z} \quad \frac{3}{x} - \frac{2}{y} = \frac{1}{z}$$

23. (C) Profit = SP - CP

$$= \frac{11}{6} \text{ CP} - \text{CP} = \frac{5\text{CP}}{6}$$

Profit percentage

$$= \frac{\text{Profit}}{\text{CP}} \times 100 = \frac{\left(\frac{5\text{CP}}{6}\right)}{\text{CP}} \times 100$$

$$= \frac{250}{3} \% = 83\frac{1}{3} \%$$

24. (A)

$$\text{LHS} = \frac{\left(\frac{pq+1}{q}\right)^{p-q} \left(\frac{pq-1}{q}\right)^{p+q}}{\left(\frac{pq+1}{p}\right)^{p-q} \left(\frac{pq-1}{p}\right)^{p+q}}$$

$$= \frac{(pq+1)^{p-q}}{q^{p-q}} \times \frac{p^{p-q}}{(pq+1)^{p-q}} \times \frac{(pq-1)^{p+q}}{q^{p+q}}$$

$$\times \frac{p^{p+q}}{(pq-1)^{p+q}}$$

$$= \frac{p^{p-q} \times p^{p+q}}{q^{p-q} \times q^{p+q}}$$

$$= \frac{p^{2p}}{q^{2p}} = \left(\frac{p}{q}\right)^{2p}$$

25. (A) Given  $11^x = 3^y = 99^z = k$

$$11^x = k \Rightarrow 11 = k^{\frac{1}{x}}$$

$$3^y = k \Rightarrow 3 = k^{\frac{1}{y}}$$

$$99^z = k \Rightarrow 99 = k^{\frac{1}{z}}$$

$$99 = k^{\frac{1}{z}}$$

$$11 \times 3^2 = k^{\frac{1}{z}}$$

$$k^{\frac{1}{x}} \times k^{\frac{2}{y}} = k^{\frac{1}{z}}$$

$$\frac{1}{x} + \frac{2}{y} = \frac{1}{z}$$

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

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

$$\therefore \frac{1}{x} + \frac{1}{y} + \frac{1}{z} = \frac{1}{z} + \frac{1}{z} - \frac{1}{z} = \frac{2}{z} - \frac{1}{y}$$

### PHYSICS

26. (D) 180 divisions are there between the melting point of ice and boiling point of water on Fahrenheit scale. In the Fahrenheit scale, LFP is  $32^\circ\text{F}$  and UFP is  $212^\circ\text{F}$ .

27. (B) Statements (A) and (C) are true. The brightness of the bulb in each circuit is dependent on the amount of electric current flowing through it. A bulb glows brightly if more electric current flows through it. A bulb in circuit R glows more brightly followed by Q and P. It means the bulbs in the circuits do not have the same but have different brightness.

28. (B) As the temperatures of iron ball and water are equal, there will be no flow of heat from iron ball to water or from water to iron ball.

29. (D) Statements (A), (B) and (C) are true. In a series connection, all the bulbs are not connected directly to a battery. Hence, they do not glow independently.
30. (D)  $\text{Speed} = \frac{\text{Distance}}{\text{Time}}$   
 $\therefore \text{Distance} = \text{Speed} \times \text{Time} = 55 \text{ km/h} \times 5 \text{ h} = 275 \text{ km}.$
31. (A) When the switch is closed, the electromagnet is magnetised and attracts the L-rod, causing the circuit to break. The bulb is turned off as a result. The L-rod goes back in position, closing the circuit. Once again, the electromagnet is magnetised and the process repeats itself. Hence, the bulb will turn on and off continuously until the switch is opened.
32. (A) A swinging pendulum of a wall clock exhibits both oscillatory and periodic motion.
33. (D) A clinical thermometer measures a temperature range from 35 °C to 42 °C but the normal room temperature is 25 °C. So, a clinical thermometer cannot be used to measure room temperature.
34. (A)  $\text{Bus 'X' speed} = \frac{\text{Distance}}{\text{Time}}$   
 $= \frac{360}{5 \text{ h}} \text{ km} = 72 \text{ km h}^{-1}$   
 $\text{Bus 'Y' speed} = \frac{\text{Distance}}{\text{Time}}$   
 $= \frac{476 \text{ km}}{7 \text{ h}} = 68 \text{ km h}^{-1}$   
 $\therefore \text{Bus X travelled faster than bus Y.}$
35. (C) Apart from one electric lamp, if one more identical lamp is connected in series with the first, the flow of current decreases as the current from the battery is shared between the two lamps.

## CHEMISTRY

36. (A) Copper sulphate solution reacts with iron and a new substance iron sulphate is formed as given below.  
 $\text{Fe(s)} + \text{CuSO}_4(\text{aq}) \rightarrow \text{FeSO}_4(\text{aq}) + \text{Cu(s)}$   
 Hence, it is a chemical change.
37. (A) A fruit salt is a mixture of dry organic acid (tartaric or citric acid) and dry baking soda (sodium bicarbonate).
38. (B) Hurricane is a huge rotating storm that begins over tropical oceans. It is usually associated with huge flooding.
39. (B) The candle melted on heating the vessel but no new substance is formed. So, it is a physical change.
40. (A) Formic acid is a weak organic acid. Sulphuric, nitric and hydrochloric acids are strong inorganic acids.
41. (A) Water has a pH of 7, i.e. it is neutral. It can be placed in the middle of the pH scale.
42. (C) Statements (A) and (B) are not true. Warm air expands, has less weight. It is lighter and rises up to a greater height than the cold air which is denser and does not rise up.
43. (D) Heat energy is given off from exhaled air due to the oxidation of food in our body during respiration. This heat keeps our body warm.  
 Burning of fuel gives out heat. The surroundings gain heat. It is an exothermic reaction.  
 When concentrated acid is poured into water, much heat is given off. It is also an exothermic reaction.
44. (A) As the bee sting is acidic in nature, its effect can be neutralised by a weak alkali such as bicarbonate of soda,  $\text{NaHCO}_3$  made in the form of paste.
45. (D) Decantation is the process of pouring out upper supernatant liquid from the sediment solid into another container. It is not a chemical change.

**BIOLOGY**

- 46. (C) A group of tissues working together to perform certain specific activities constitute organ.
- 47. (B) The process of respiration in cells is carried out by mitochondria.
- 48. (B) Stomata are present in leaves.
- 49. (B) The tissue which transports the prepared food in plants is phloem.
- 50. (C) Plants use chlorophyll to trap solar energy.
- 51. (D) Paramecium moves with the help of cilia.
- 52. (A) During photosynthesis the plants release oxygen.
- 53. (C) The organisms which depend on other organisms for food are termed as heterotrophs.
- 54. (B) Poor eye sight is due to the lack of vitamin A.
- 55. (C) Anaemia is caused due to the lack of iron.

**CRITICAL THINKING**

- 56. (B) There are 31 days in July.  
 $31 \div 7 = 4 \text{ R } 3$   
 This means three days of the week appeared 5 times in that month. Hence, Sundays, Mondays and Tuesdays appeared 5 times in that month.  
 Method 1 : Make a List  
 Sundays: 1st, 8th, 15th, 22nd, 29th  
 28th July fell on a Saturday.  
 Method 2: Make a table

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

28th July fell on a **Saturday**.

- 57. (A) In fig. (X), one of the dots is placed in the region common to the circle and the triangle only and another dot is placed in the region common to the square and the triangle only. In each of the three alternatives (2), (3) and (4), there is no region common to the square and the triangle only. Only fig. (1) consists of both the types of regions.

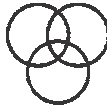
- 58. (B)
 

•	•	•	•	•
Bindu	Seema	Rani	Reeta	Mary

 Rani is in the middle of the photograph

- 59. (C)
 

● ● ● ● ● ● ● ● ● ●	Amritha (10 <sup>th</sup> )
● ● ● ● ● ● ● ● ● ●	Mamtha (18 <sup>th</sup> )
● ● ● ● ● ● ● ● ● ●	Mukul (25 <sup>th</sup> )
● ● ● ● ● ● ● ● ● ●	
● ● ● ● ● ● ● ● ● ●	

- 60. (A) 

**THE END**