



NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION (UPDATED)

CLASS - 7
Question Paper Code : UN470

KEY

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

SOLUTIONS

MATHEMATICS

01. (C) Given the digits in units place is 'x' and tens place is (2x + 3)

$$\begin{aligned} \text{Required number} &= 10(2x + 3) + 1(x) \\ &= 20x + 30 + x \\ &= 21x + 30 \end{aligned}$$

02. (A) Let the salary of A be ₹ x

$$\begin{aligned} \text{Increased salary} &= ₹ x \frac{(100 + 30)}{100} = ₹ x \times \frac{130}{100} \\ &= ₹ \frac{13}{10} \end{aligned}$$

$$\text{Decreased salary} = ₹ \frac{13x(100 - 20)}{10 \times 100}$$

$$= ₹ \frac{13x}{10} \times \frac{80}{100}$$

$$\text{Difference} = \frac{₹ 104x}{100} - ₹ x = \frac{₹ 4x}{100}$$

Increased percentage

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

03. (B) Given $30^\circ + t + 110^\circ = 180^\circ$
 [\therefore straight angle]
 $t = 180^\circ - 140^\circ = 40^\circ$
 But $30^\circ + 40^\circ + r = 180^\circ$
 $r = 180^\circ - 70^\circ = 110^\circ$
 $r - t = 110^\circ - 40^\circ = 70^\circ$
04. (D) Given $x = -174$, $y = 0$ & $z = 261$
 $x - y - z = -174 - 0 - 261 = -435$
05. (B) Given $\frac{1}{4}$ of $5\% = \frac{1}{4} \times \frac{5}{100} = 0.0125$
06. (B)
$$\frac{0.001 - 0.008}{0.01 + 0.02 + 0.04} = \frac{-0.007}{0.07}$$

$$= \frac{-0.007}{0.07} \times \frac{100}{100}$$

$$= \frac{-0.7}{7} = -0.1$$
07. (C) Let number of runs scored by Sehwag be x
 \therefore Let number of runs scored by Sachin = $2x$
 Given $2x + x = 300 - 3 = 297$
 $3x = 297$
 $x = 99$
 \therefore Runs made by Sachin = $2x = 2 \times 99 = 198$
08. (A) $x + x + 30^\circ = 180^\circ$
 $2x = 180^\circ - 30^\circ = 150^\circ$
 $x = \frac{150^\circ}{2} = 75^\circ$
 Given $x + x + 3y = 180^\circ$
 $150^\circ + 3y = 180^\circ$
 $3y = 180^\circ - 150^\circ = 30^\circ$
 $y = \frac{30^\circ}{3} = 10^\circ$
 $\therefore x + y = 75^\circ + 10^\circ = 85^\circ$
09. (C) Complementary angle less than 45° is greater than 45°

10. (A) $\triangle ABC$ is an equilateral triangle
 $BC = CD = DB$
 In $\triangle ABD$, $85^\circ + 40^\circ + \angle A = 180^\circ$
 $\angle A = 180^\circ - 125^\circ = 55^\circ$
 In $\triangle ABD$, $\angle ADB$ is biggest
 $\Rightarrow AB$ is biggest in $\triangle ABD$
 $\therefore AB > DB$
11. (D) Given $\angle CAB = \angle CAD$ and $\angle B = \angle D$
 $\therefore \angle ACB = \angle ACD$
 [\therefore Angle sum property of a triangle]
 $\therefore \triangle ACB \cong \triangle ACD$
 [\therefore A S A congruency]
12. (C) Correct answer percentage = $\frac{19}{25} \times 100 = 76\%$
 \therefore Wrong answer percentage = $100\% - 76\% = 24\%$
 Difference = $76\% - 24\% = 52\%$
13. (C) $\frac{4}{5} = 0.8$, $81\% = \frac{81}{100} = 0.81$
 $\therefore 0.8 < 0.801 < 0.81$
 $\Rightarrow \frac{4}{5} < 0.801 < 81\%$
14. (B) Statement 'P' is true and statement Q is false
15. (D) Let cost price of each pencil be ₹ x
 \therefore Cost price of 13 pencils = ₹ $13x$
 Given selling price of 10 pencils = ₹ $13x$
 \therefore Selling price of each pencil = $\frac{₹13x}{10}$
 \therefore Profit = $\frac{₹13x}{10} - ₹x = \frac{₹13x - ₹10x}{10} = \frac{₹3x}{10}$
 Profit percentage = $\frac{\text{Profit}}{\text{CP}} \times 100 = \left(\frac{₹3x}{10} \right) \times 100 = 30\%$

16. (C) Hypotenuse² = sum of the squares of the perpendicular
 $= (40^2 + 9^2) \text{ cm}^2$
 $= (1600 + 81) \text{ cm}^2$
 $= 1681 \text{ cm}^2 = 412 \text{ cm}^2$

\therefore Hypotenuse = 41 cm

17. (D) Distance covered in 6 hours = $\frac{1}{2}$ of circumference

$$= \frac{1}{2} \times 2 \times \frac{22}{7} \times 4.5 \text{ cm}$$

$$= 14.14 \text{ cm}$$

18. (B) Given $(2x + 8) \text{ cm} = (3x - 2) \text{ cm}$

$$\therefore 2x - 3x = -2 - 8$$

$$-x = -10$$

$$\therefore x = 10 \text{ cm}$$

\therefore Side of square

$$= 2x + 8 = 2 \times 10 + 8 = 28 \text{ cm}$$

$$\therefore \text{Perimeter} = 4s = 4 \times 28 \text{ cm}$$

$$= 112 \text{ cm}$$

19. (C) Let the first number be x

\therefore Second number = $2490 - x$

Given 6.5% of x = 8.5% of $(2490 - x)$

$$\frac{6.5}{100} \times x = \frac{8.5}{100} \times (2490 - x)$$

$$\frac{100}{100} x = \frac{8.5}{6.5} (2490 - x)$$

$$x = \frac{17}{13} \frac{85}{65} (2490 - x)$$

$$13x = 42330 - 17x$$

$$13x + 17x = 42330$$

$$30x = 42330$$

$$x = \frac{1411}{30}$$

other number = $2490 - x$

$$= 2490 - 1411 = 1079$$

\therefore Difference of those numbers

$$= 1411 - 1079 = 332$$

20. (A) Given $\frac{\left(\frac{64^{2x}}{16^x}\right)}{128^x \times 4^{2x}} = \frac{\left(\frac{2^6}{2^4}\right)^{2x}}{\left(2^7\right)^x \times \left(2^2\right)^{2x}}$

$$= \frac{\left(\frac{2^{12x}}{2^{4x}}\right)}{2^{7x} \times 2^{4x}}$$

$$= 2^{8x - 7x - 4x}$$

$$= 2^{-3x}$$

21. (C) Option 'C' has four lines of symmetry.

22. (A) LHS

$$= \left(5x^2 + \frac{x^2}{2} - 2x^2\right) + \left(\frac{x}{3} + \frac{x}{2} + \frac{x}{5}\right)$$

$$+ \left(\frac{5}{2} - \frac{1}{3} - \frac{1}{6}\right)$$

$$= \left(3x^2 + \frac{x^2}{2}\right) + \left(\frac{10x + 15x + 6x}{30}\right)$$

$$+ \left(\frac{15 - 2 - 1}{6}\right)$$

$$= \left(\frac{7x^2}{2} + \frac{31x}{30} + \frac{16}{6}\right) = \left(\frac{7x^2}{2} + \frac{31x}{30} + 2\right)$$

23. (A) Let the number to be divided by be 'x'

Given $\frac{\left(\frac{-3}{2}\right)^{-2}}{x} = \left(\frac{4}{9}\right)^{-3}$

$$\Rightarrow \left(\frac{-2}{3}\right)^2 \times \frac{1}{x} = \left(\frac{9}{4}\right)^3$$

$$\frac{4}{9} \times \frac{1}{x} = \frac{729}{64}$$

$$\therefore x = \frac{4 \times 64}{9 \times 729} = \frac{256}{9 \times 9^3} = \frac{(2^8)}{9^{1+3}} = \frac{2^8}{(3^2)^4} = \frac{2^8}{3^8}$$

$$= \left(\frac{2}{3}\right)^8$$

$$24. (A) \quad \frac{110.331}{72.611} \times \frac{3.157}{3.198}$$

$$= \frac{\overset{34.5}{1,10,331}}{\underset{23}{72,611}} \times \frac{\overset{34.5}{3157}}{\underset{23}{3198}} = 1.5$$

25. (D) LCM of 2, 6 & 3 is 6

$$\therefore 2^{\frac{1}{2}} = 2^{\frac{1 \times 3}{2}} = 2^{\frac{3}{2}} = 2^{3 \times \frac{1}{6}} = (2^3)^{\frac{1}{6}} = 8^{\frac{1}{6}}$$

$$3^{\frac{1}{3}} = 3^{\frac{1 \times 2}{3}} = 3^{\frac{2}{3}} = (3^2)^{\frac{1}{6}} = 9^{\frac{1}{6}}$$

$$1^{\frac{1}{6}} < 6^{\frac{1}{6}} < 8^{\frac{1}{6}} < 9^{\frac{1}{6}} \Rightarrow 1 < 6^{\frac{1}{6}} < 2^{\frac{1}{2}} < 3^{\frac{1}{3}}$$

PHYSICS

26. (B) The brightness of the lamps increases when there are more batteries or there are fewer lamps used in a circuit. Lamp R, which has 2 batteries, is the brightest.

Lamp P will have $\frac{1}{2}$ the brightness of R.

Lamp Q will have $\frac{2}{3}$ the brightness of P.

Lamp S will have $\frac{1}{2}$ the brightness of P.

The correct arrangement of the lamps P, Q, R and S from the brightest to the dimmest is R, P, Q and S.

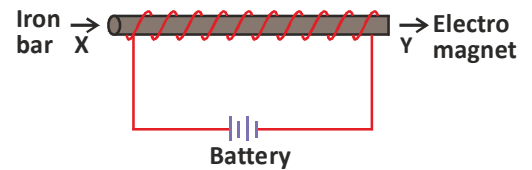
$$27. (C) \quad \text{Distance left} = \frac{1000}{2} \text{ m} = 500 \text{ m}$$

$$\text{Time left} = \left[\left(1 - \frac{3}{5} \right) \times 60 \right] = 0.4 \times 60 = 24 \text{ s}$$

$$\text{Speed required} = \frac{500 \text{ m}}{24 \text{ s}} = 20.83 \text{ m/s}$$

28. (A) Land (solid) warms up more quickly than the sea (liquid). During the day, the land becomes warmer more quickly and as the warmer air rises up, the cooler air from the sea rushes onshore to take its place. At night, the land cools more quickly, and the sea is warmer. As the warm air rises above the sea, the cool land air rushes offshore to take its place.

29. (A) Electromagnets are more powerful than ordinary bar magnets. Soft iron is easy to magnetize and demagnetize. The poles of an electromagnet depend upon the direction of current flowing through a circuit.



30. (C) Time taken by Revanth to cover 100 m race

$$= \frac{\text{Distance}}{\text{Speed}} = \frac{100}{8.4} = 11.9 \text{ s}$$

Time taken by Rohan to cover 100 m race

$$\frac{\text{Distance}}{\text{Speed}} = \frac{100}{12.2} = 8.2 \text{ s}$$

As, the school record for 100 metre race is 12 s and time taken by Revanth and Rohan is 11.9 s and 8.2 s respectively, it means, both of them broke the record.

31. (B) Heat will flow from a region of higher temperature to a region of lower temperature until equilibrium of temperature is reached. When the heated metal ball loses heat to the surroundings and reaches room temperature of 25°C, then it will stop radiating the heat.

32. (C) The base of an electric iron needs to be hot during ironing of clothes. So, the material used must be able to conduct heat well.

33. (B) When a body moves with constant speed, the change in position of the body remains the same for a particular interval of time. If you break the time axis into small parts and see, the distance travelled in each of these parts is the same. Graph in option (B) is correct.

34. (C) Black and dull surfaces are good absorbers of heat. Hence, cooking will be faster with minimum loss of heat.

35. (D) In order to connect X and Y, the switch arm needs to be connected to Position X. As a result, electricity will be able to flow through the circuit to light up the bulb.

CHEMISTRY

36. (B) The position of a drop of ink did not change in four glass same sized tubes eventhough the four glass tubes were placed in four different directions to prove that air pressure acts in all directions.
37. (B) Organic matter releases acids which neutralises the basic nature of soil.
38. (A) An iron ball that can pass through a ring easily may not do so when heated as the iron ball has expanded in size. Changes given in options (B), (C) and (D) are chemical changes.
39. (B) Neutralisation is the reaction between an acid P and an alkali R to form salt and water. A neutral solution has a pH value of 7.
40. (D) Corrosion is a chemical change, and it is irreversible.
41. (B) Lower the pH of a solution, the more acidic is the solution. Solution of pH 2 is more acidic as the strong acids have pH range between 0 to 3.
42. (C) Pulses germinate by undergoing several changes. During the chemical change, physical changes also takes place. The change is irreversible. Hence, it is a chemical change.
43. (A) Antacids are used for indigestion by human beings for neutralising the excess acid produced in the stomach.
44. (C) When we add sugar to water, it becomes sweet. It is a physical change because the original substance sugar can be recovered by physical methods.
45. (D) The equator receives more heat than the poles. The warm air near the equator rises while the cool air from the poles blows towards the equator. This wind currents are caused across the globe due to uneven heating between the equator and the poles.

BIOLOGY

46. (D) The breakdown of proteins
1. Occurs in the stomach due to the action of pepsin. It is a form of chemical digestion.
 2. The churning action of the stomach helps to break the food into smaller pieces. This is a form of physical digestion.
 3. The hydrochloric acid produced helps to kill any micro-organisms that may have been ingested.
 4. It also provides a suitable pH for the action of pepsin and rennin.
47. (C) He can use the Benedict's test to test for the presence of reducing sugars, and the iodine test to test for the presence of starch. The Biuret test is used to indicate the presence of proteins while the ethanol-emulsion test is used to indicate the presence of fats.
48. (C) The first time the red blood cells returns to the heart is when the renal vein joins the vena cava and blood flows into the right side of the heart. The blood then leaves the heart via the pulmonary artery to the lungs and returns the second time via the pulmonary vein. The blood flows through the left side of the heart and leaves via the aorta.
49. (A) Phagocytes are white blood cells which carry out phagocytosis to engulf and digest foreign particles. The lymphocytes, a type of white blood cell, is responsible for producing antibodies. Antigens (found on the cell surface membranes) are not formed by white blood cells but are expressed by the cells themselves. The clotting of blood is a result of the release of thrombokinase by platelets and a cascade of reactions involving plasma proteins. Hence, clotting is not considered a major function of the white blood cell.

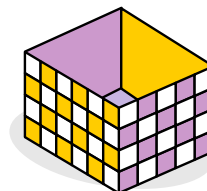
50. (C) The guard cells regulate the size of the stomata in the leaf, through which water loss (transpiration) and gaseous exchange occur. Light is able to penetrate the leaf to reach its inner mesophyll layers easily, the guard cells and stomata play no part in enhancing this (2).
51. (D) Respiration takes place all the time while photosynthesis only when light is available.
52. (B) In aerobic respiration, glucose is broken down in the presence of oxygen to produce carbon dioxide and water. A large amount of energy is released in the process.
53. (D) Fish are only able to take in dissolved oxygen in water because their gills will collapse in air (C). The high level of decomposition in the lake means that the levels of dissolved oxygen would be lower than normal since decomposers respire (A). The fish have to be closer to the surface because oxygen from the air dissolves in the water and its concentration would be the highest near the surface. The concentration of carbon dioxide will not directly affect the ability of fish to respire and hence the lower concentration of carbon dioxide at the surface is not a compelling reason for fish to be there (B).
54. (A) P - Artery; Q - Vein; S - Ureter
55. (D) The pollen tube grows from the pollen grain, secreting enzymes that digest through the tissue of the stigma, followed by the tissue of the style, and finally the ovary wall to reach the ovule(s).

CRITICAL THINKING

56. (C)



57. (D)

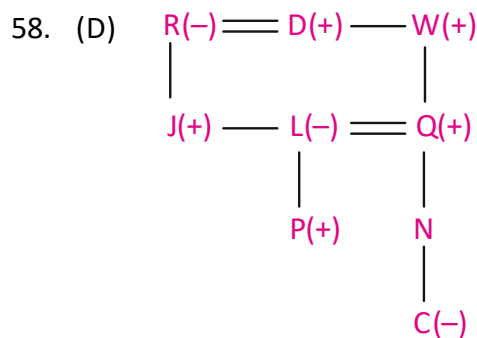


(A) $5 \times 4 \times 4 = 80$

(B) $3 \times 3 \times 7 = 63$

(C) $4 \times 3 \times 5 = 60$

(D) $6 \times 5 \times 4 = 120$



==	Wife and Husband
—	Brother or Sister
	Son or Daughter

59. (B)



Can not be produced by rotating the given object.

60. (C) It is faith neutral and age inclusive.