



**NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION (UPDATED)**

**CLASS - 8**  
**Question Paper Code : UN489**

**KEY**

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

**SOLUTIONS**

**MATHEMATICS**

01. (B)

$$\begin{array}{r}
 1 \quad 1841234 \quad | \quad 1356 \\
 \quad \quad \quad 1 \\
 \hline
 23 \quad \quad \quad 84 \\
 \quad \quad \quad 69 \\
 \hline
 265 \quad \quad 1512 \\
 \quad \quad \quad 1325 \\
 \hline
 2706 \quad \quad 18734 \\
 \quad \quad \quad 16236 \\
 \hline
 \quad \quad \quad 2498 \\
 \hline
 \end{array}$$

$$\begin{aligned}
 \therefore 1357^2 &= 1841449 \\
 \therefore 1841449 - 1841234 &= 215 \\
 \therefore 215 \text{ to be added } 1841234 &\text{ to make it a perfect square.} \\
 02. (B) \quad 32^3 + 79^3 - 111^3 + (32)(79)(333) \\
 &= 32,768 + 4,93,039 - 13,67,631 + 8,41,824 \\
 &= -8,41,824 + 8,41,824 \\
 &= 0
 \end{aligned}$$

$$\begin{aligned}
03. (A) \quad & \sqrt[3]{\frac{0.2 \times 0.2 \times 0.2 + 0.04 \times 0.04 \times 0.04}{0.4 \times 0.4 \times 0.4 + 0.08 \times 0.08 \times 0.08}} = \\
& \sqrt[3]{\frac{0.2 \times 0.2 \times 0.2 + 0.04 \times 0.04 \times 0.04}{0.2 \times 2 \times 0.2 \times 2 \times 0.2 \times 2 + 0.04 \times 2 \times 0.04 \times 2 \times 0.04 \times 2}} \\
& = \sqrt[3]{\frac{(0.2 \times 0.2 \times 0.2 + 0.04 \times 0.04 \times 0.04)}{8(0.2 \times 0.2 \times 0.2 + 0.04 \times 0.04 \times 0.04)}} \\
& = \sqrt[3]{\left(\frac{1}{2^3}\right)} \\
& = \frac{1}{2} \\
& = 0.5
\end{aligned}$$

$$\begin{aligned}
04. (D) \quad & \text{Given } x^4 + \frac{1}{x^4} = 119 \Rightarrow (x^2)^2 + 2x^2 \times \frac{1}{x^2} \\
& + \left(\frac{1}{x^2}\right)^2 = 119 + 2 \\
& \Rightarrow \left(x^2 + \frac{1}{x^2}\right)^2 = 121 \\
& x^2 + \frac{1}{x^2} = \sqrt{121} = 11 \\
& x^2 - 2 + \frac{1}{x^2} = 11 - 2 \\
& \left(x - \frac{1}{x}\right)^2 = 9 \\
& x - \frac{1}{x} = \sqrt{9} = 3
\end{aligned}$$

$$\begin{aligned}
05. (B) \quad & \frac{a + 2\sqrt{ab} + b}{a - b} = \frac{(\sqrt{a})^2 + 2\sqrt{a}\sqrt{b} + (\sqrt{b})^2}{(\sqrt{a})^2 - (\sqrt{b})^2} \\
& = \frac{(\sqrt{a} + \sqrt{b})^2}{(\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b})}
\end{aligned}$$

$$\begin{aligned}
06. (A) \quad & 3x^2 + 5\sqrt{5}x - 10 = 3x^2 + 6\sqrt{5}x - \sqrt{5}x - 10 \\
& = 3x(x + 2\sqrt{5}) - \sqrt{5}(x + 2\sqrt{5}) \\
& = (x + 2\sqrt{5})(3x - \sqrt{5})
\end{aligned}$$

$$\begin{aligned}
07. (D) \quad & \text{Let the number be } (5k + 3) \\
& \therefore (5k + 3)^2 = 25k^2 + 30k + 9 \\
& = 5k^2 + 30k + 5 + 4 \\
& = 5(5k^2 + 6k + 1) + 4 \\
& \text{The } (5k + 3)^2 \text{ is divided by 5 leaves a remainder 4.}
\end{aligned}$$

$$\begin{aligned}
08. (D) \quad & \angle CBA = 180^\circ - 60^\circ = 120^\circ \text{ \& } \angle ADC \\
& = 180^\circ - 70^\circ = 110^\circ
\end{aligned}$$

ABCD is a quadrilateral

$$\Rightarrow \angle A + 120^\circ + \angle C + 110^\circ = 360^\circ$$

$$\therefore \angle A + \angle C = 360^\circ - 230^\circ = 130^\circ$$

$$\begin{aligned}
09. (B) \quad & \text{Given } a^x = b \\
& \Rightarrow (a^x)^y = b^y = c \quad [\because b^y = c] \\
& \Rightarrow a^{xy} = c \\
& \Rightarrow (a^{xy})^z = c^z \\
& \Rightarrow a^{xyz} = a \quad [\because c^z = a] \\
& \therefore xyz = 1
\end{aligned}$$

$$\begin{aligned}
10. (D) \quad & \frac{1}{x-2} - \frac{2}{x(x-1)(x-2)} \\
& = \frac{x(x-1) - 2}{x(x-1)(x-2)} \\
& = \frac{x^2 - x - 2}{x(x-1)(x-2)} \\
& = \frac{(x^2 - 2x + x - 2)}{x(x-1)(x-2)} \\
& = \frac{(x+1)\cancel{(x-2)}}{x(x-1)\cancel{(x-2)}}
\end{aligned}$$

11. (C) LHS =

$$\begin{aligned} & \frac{3}{(1 \times 2)^2} + \frac{5}{(2 \times 3)^2} + \frac{7}{(3 \times 4)^2} + \dots \\ & \quad + \frac{17}{(8 \times 9)^2} + \frac{19}{(9 \times 10)^2} \\ & = \left(1 - \frac{1}{2^2}\right) + \left(\frac{1}{2^2} - \frac{1}{3^2}\right) + \left(\frac{1}{3^2} - \frac{1}{4^2}\right) + \dots \\ & \quad + \left(\frac{1}{8^2} - \frac{1}{9^2}\right) + \left(\frac{1}{9^2} - \frac{1}{10^2}\right) \\ & = 1 - \frac{1}{2^2} + \frac{1}{2^2} - \frac{1}{3^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots \\ & \quad + \frac{1}{8^2} - \frac{1}{9^2} + \frac{1}{9^2} - \frac{1}{10^2} \\ & = 1 - \frac{1}{100} \end{aligned}$$

$$= \frac{99}{100}$$

$$= 0.99$$

12. (A) It is in direct variation.

$$\therefore \frac{x_1}{y_1} = \frac{x_2}{y_2}$$

$$\Rightarrow \frac{2635}{24 \text{ km}} = \frac{x_2}{214 \text{ km}}$$

$$\therefore x_2 = \frac{2635 \times 214}{24} = ₹4590$$

13. (B) Given equation is  $\frac{p-3}{p+4} = \frac{p+1}{p-2}$

On cross multiplication, we get

$$(p-3)(p-2) = (p+1)(p+4)$$

$$\Rightarrow p^2 - 5p + 6 = p^2 + 5p + 4$$

$$\Rightarrow p^2 - 5p + 6 - p^2 - 5p - 4 = 0$$

$$\Rightarrow -10p + 2 = 0$$

$$\Rightarrow p = \frac{-2}{-10} = \frac{1}{5}$$

So, Qadir's answer was correct

14. (B) Additive inverse of  $\frac{5}{6}$  is  $-\frac{5}{6}$

$$\frac{-5}{7} \times \frac{14}{15} = \frac{-2}{3}$$

$\Rightarrow$  multiplicative inverse of  $\frac{-2}{3} = \frac{-3}{2}$

$$\text{Required resultant} = \frac{-3}{2} - \left(\frac{-5}{6}\right)$$

$$= \frac{-9+5}{6} = \frac{-4}{6} = \frac{-2}{3}$$

15. (A) No. of T.V sets sold in May = 50

Total number of T.V. sets sold

$$= 40 + 20 + 60 + 30 + 50 = 200$$

$\therefore$  The required percentage

$$= \frac{50}{200} \times 100\% = 25\%$$

16. (C) Given  $\pi R^2 = \pi r_1^2 + \pi r_2^2$

$$\pi R^2 = \pi \left[ \left(\frac{120\text{cm}}{2}\right)^2 + \left(\frac{182\text{cm}}{2}\right)^2 \right]$$

$$R^2 = \frac{\pi}{\pi} [60^2 + 91^2]$$

$$= 3600 + 8281$$

$$R = \sqrt{11,881}$$

$$= 109 \text{ cm}$$

$$\therefore D = 2R = 2 \times 109 \text{ cm} = 218 \text{ cm}$$

$$\begin{array}{r} 1 \quad 1 \ 18 \ 81 \quad 109 \\ \quad 1 \\ \hline 20 \quad 18 \\ \quad 0 \\ \hline 209 \quad 1881 \\ \quad 1881 \\ \hline \quad 0 \end{array}$$

$$\begin{aligned}
 17. \quad (B) \quad & 1 - 2^2 + 3^2 - 4^2 + 5^2 - 6^2 + \dots + 13^2 - \\
 & 14^2 + 15^2 = (1 - 2)(1 + 2) + (3 + 4)(3 - \\
 & 4) + (5 - 6)(5 + 6) + \dots + (13 - 14)(13 \\
 & + 14) + 15^2 \\
 & = (-1)(1 + 2)(-1)(3 + 4) + (-1)(5 + 6) + \dots \\
 & (-1)(13 + 14) + 15^2 \\
 & = -1(1 + 2 + 3 + \dots + 14) + 225 \\
 & = -1 \times 105 + 225 = -105 + 225 = 120
 \end{aligned}$$

$$\begin{aligned}
 18. \quad (B) \quad & \left[ (x^4 \cdot y)^{1/3} \cdot \frac{1}{(x^2 \cdot y^8)^{1/4}} \right]^{-6} \\
 & \text{(Since } \sqrt[n]{a} = a^{1/n} \text{)} \\
 & = \left[ x^{4/3} \cdot y^{1/3} \times \frac{1}{(x^{2/4} \cdot y^{8/4})} \right]^{-6} \\
 & = \left[ x^{\frac{4}{3} - \frac{1}{2}} \times y^{\frac{1}{3} - 2} \right]^{-6} = \left[ x^{\frac{8-3}{6}} \cdot y^{\frac{1-6}{3}} \right]^{-6} \\
 & = (x^{5/6} \cdot y^{-5/3})^{-6} = x^{\frac{5}{6} \times -6} \cdot y^{\frac{-5}{3} \times -6} \\
 & = x^{-5} \times y^{+10} = \frac{y^{10}}{x^5}
 \end{aligned}$$

$$\begin{aligned}
 19. \quad (A) \quad & \text{LSA} = 2h(l + b) = 2(hl + bh) \\
 & = 2(72 \text{ cm}^2 + 60 \text{ cm}^2) \\
 & = 2 \times 132 \text{ cm}^2 \\
 & = 264 \text{ cm}^2
 \end{aligned}$$

OR

$$\text{Given } lb = 120 \text{ cm}^2 \text{ \& } bh = 72 \text{ cm}^2 \text{ \& } hl = 60 \text{ cm}^2$$

$$lb \times bh \times hl = (120 \times 72 \times 60) \text{ cm}^6$$

$$(lbh)^3 = (720 \text{ cm}^3)^3$$

$$lbh = 720 \text{ cm}^3$$

$$l = \frac{lbh}{bh} = \frac{720 \text{ cm}^3}{72 \text{ cm}^2} = 10 \text{ cm}$$

$$b = \frac{lbh}{lh} = \frac{720 \text{ cm}^3}{60 \text{ cm}^2} = 12 \text{ cm}$$

$$h = \frac{lbh}{bh} = \frac{720 \text{ cm}^3}{120 \text{ cm}^2} = 6 \text{ cm}$$

But given  $l > b > h$

$$\Rightarrow l = 12 \text{ cm}, b = 10 \text{ cm} \text{ \& } h = 6$$

$$\text{LSA} = 2h(l + b)$$

$$= 2 \times 6 \text{ cm} (10 + 12) \text{ cm} = 264 \text{ cm}^2$$

$$\begin{aligned}
 20. \quad (B) \quad & (3x + 4)(5x - 6) + 7 \\
 & = 15x^2 - 18x + 20x - 24 + 7 \\
 & = 15x^2 + 2x - 17 \\
 & = 15x^2 + 17x - 15x - 17 \\
 & = x(15x + 17) - 1(15x + 17) \\
 & = (15x + 17)(x - 1)
 \end{aligned}$$

$$\begin{aligned}
 21. \quad (A) \quad & \text{Let the cost price be } ₹ x \\
 & \text{Given profit percentage} = 20\%
 \end{aligned}$$

$$\therefore \frac{\text{Profit}}{\text{CP}} \times 100 = 20$$

$$\frac{\text{Profit}}{x} \times 100 = 20$$

$$\therefore \text{Profit} = \frac{20x}{100} = \frac{x}{5}$$

$$\text{Given profit} = ₹ 240 = \frac{x}{5}$$

$$\therefore x = ₹ 240 \times 5 = ₹ 1200$$

$$\therefore \text{SP} = \text{CP} + \text{Profit} = ₹ 1200 + 240 = ₹ 1440.$$

$$\begin{aligned}
 22. \quad (C) \quad & \text{Area of small circle} = \pi r^2 = \pi \times (2 \text{ cm})^2 \\
 & = 4\pi \text{ cm}^2 \longrightarrow \textcircled{1}
 \end{aligned}$$

$$\text{Area of semicircle} = \frac{1}{2} \pi R^2$$

$$= \frac{1}{2} \pi (4 \text{ cm})^2$$

$$= \frac{1}{2} \times \pi \times 16 \text{ cm}^2 = 8\pi \text{ cm}^2$$

$$\text{Area of the shaded region} = (8\pi - 4\pi) \text{ cm}^2$$

Fraction of shaded area =

$$\frac{\text{shaded area of semicircle}}{\text{Area of semicircle}} = \frac{4\pi \text{ cm}^2}{8\pi \text{ cm}^2} = \frac{1}{2}$$

**PHYSICS**

23. (A)  $LHS = a^x - b^x + b^x - c^x + c^x - a^x = 0$ .

24. (B) Let the height of the building be  $x$  metres. Less the length of shadow, less is the height.

$\therefore 40.25 : 28.75 :: 17.5 : x$

$\Rightarrow 40.25 \times x = 28.75 \times 17.5$

$\Rightarrow x = \frac{28.75 \times 17.5}{40.25} \Rightarrow x = 12.5 \text{ m}$

25. (C)  $\frac{\left(a^n - \frac{1}{a^n}\right)}{\left(a^n + \frac{1}{a^n}\right)} = x$

$\Rightarrow \frac{\left(\frac{(a^n)^2 - 1}{a^n}\right)}{\left(\frac{(a^n)^2 + 1}{a^n}\right)} = x$

$\Rightarrow \frac{a^{2n} - 1}{a^{2n} + 1} = x$

$\Rightarrow a^{2n} - 1 = (a^{2n} + 1)x$

$a^{2n} - 1 = x \times a^{2n} + x$

$a^{2n} - a^{2n} \times x = x + 1$

$a^{2n} (1 - x) = x + 1$

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

26. (B) Sound has the ability to do work as it is a form of energy.

Option (A): Sound cannot travel in space as it needs a medium to travel through.

Option (C): High-pitched sounds have higher frequencies than low-pitched sounds.

Option (D): Loud sounds have higher amplitudes than quieter sounds.

27. (C) The force will remain unchanged but the pressure will decrease. When you walk on mud, the force you put on the mud is equal to your weight. The pressure is quite large as the area of our feet is small. Putting a light board down to walk on will increase the area of contact of with the mud and would lessen the pressure as the pressure is inversely proportional to the area. Your weight, however, remains the same, so the force is unchanged.

28. (A) During a thunderstorm, the air currents being lighter move upwards while the water droplets being heavy move downwards. This vigorous movements cause separation of charges. The positive charges collect near the upper edges of the clouds and the negative charges accumulate near the lower edges of the clouds.

29. (B) Liquid X. Liquid X allowed the block to travel the furthest across the surface. This shows that it was the most effective in reducing the friction between the block and the surface.

30. (C) Statements (ii) and (iii) are correct. The object to be electroplated is taken as cathode. Electric current when passed through an object also produces magnetic effect. Ex: Compass, electric bell etc.

31. (B) For a plane mirror, object and image are at equal distance from the mirror.

So, let  $x$  be the initial distance between the object and the mirror. So,  $x + x = 20$  m or  $x = 10$  m.

For  $2x = 10 \Rightarrow x = 5$  m.

So, the student should move  $10 - 5 = 5$  m towards the mirror.

32. (A) Force on the table by the block = Force on the block by the table.

Pressure on the table by the block.

$$= \frac{\text{Weight}}{\text{Contact area}} = \frac{Q}{X}$$

Hence, pressure on the block by the table

$$\text{is also } \frac{Q}{X}.$$

33. (A) Copper ions being positive move to the cathode i.e., negative electrode.

34. (A) Boy Y. Both the boys have to apply a force to overcome the friction between the box and the surface. However, as boy Y is pushing the box upwards, he has to apply a greater force to overcome the force of gravity.

35. (C) The correct matching is

P-2, Q-4, R-1, S-3.

Cataract - Cloudy eye lens

Cornea - Front part of human eye

Blind spot - No vision

Persistence of vision - 1/16th of a second

## CHEMISTRY

36. (B) Statements I, II and III are correct. The petroleum or crude oil is subjected to fractional distillation to obtain products of various uses. It cannot be used directly without refining.

37. (D) Group I: Sodium, magnesium and calcium are metals while carbon is a non-metal.

Group II: Germanium, silicon and antimony are metalloids while iodine is a non-metal.

Group III: Bromine, sulphur and phosphorus are non-metals while mercury is a liquid metal.

38. (C) Increased concentration of carbon dioxide into the environment due to the combustion of fuels results in increased temperature of the Earth which is the cause for global warming.

39. (C) All the plastics do not have the same arrangement of monomers. In some plastics, monomers are arranged linearly but in some plastics, they are cross-linked.

Melamine is a better plastic which resists fire and bears heat.

Because of their specific properties, plastics are used widely almost in all areas but their applications are not limited.

40. (B) Metal X is sodium. It has low density and floats on water. It reacts vigorously with cold water to form sodium hydroxide along with release of hydrogen gas that puts out a lighted splinter with a pop sound. Metal Y is zinc. It has high density and sinks in water. It is unreactive with cold water.

41. (C) Statements I, III and IV are correct.

Water should not be used to extinguish fire caused by cooking oil.

42. (A)

(i) Melamine - This polymer cannot be deformed and is fire resistant,

- (ii) Bakelite - This polymer cannot be deformed and is not fire resistant,
- (iii) PVC - A thermoplastic, linear polymer that can be deformed.
43. (A) P is Magnesium - Metal,  
Q is Chlorine - Non-metal,  
R is - Metalloid
- R has characteristics of both metals and non-metals. Like metals, it is shiny and brittle like non-metals. It has chemical properties that are more similar to metals than non-metals.

44. (D) 1-ignition, 2-petrol (220 °C), 3-coal (300 °C), 4-inflammable, 5-calorific value

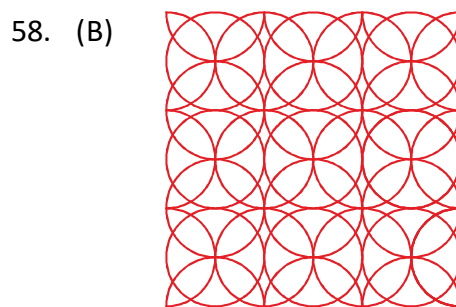
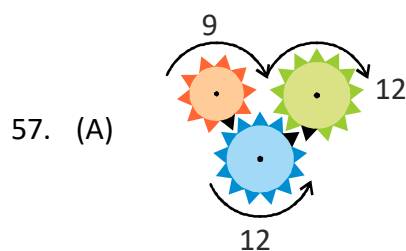
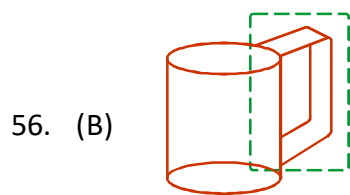
45. (D) Natural gas (W) is a fossil fuel. It is formed from the remains of tiny sea animals and plants that lived millions of years ago. Methane X is the major component of natural gas. Natural gas is also used as a source of hydrogen (Y). Natural gas in the form of compressed natural gas (CNG) (Z) is used as a fuel in motor vehicles.

### BIOLOGY

46. (D) Bulk organic matter improves soil structure, which increases water-retaining capacity in sandy soil, helps in drainage and water clogging in clayey soil. It makes soil porous and aerated.
47. (D) Yeast is a type of fungal microorganism.
48. (A) Red data book contains list of endangered plants and animals.
49. (A) Plastids is found in plants.
50. (D) Brinjal, chilli, tomato all are transplanted to fields from nurseries.
51. (D) Microorganisms help in keeping our environment clean by decomposing organic waste such as dead plants and animals, animal excreta, etc. These are used in wastewater treatment to decompose the organic matter present in it, remove pollutants and are anerobic digestors.

52. (D) Ingesting or engulfing other cells or particles is called phagocytosis.
53. (D) The correct sequence of reproduction is Fertilization → Zygote → Foetus → Well development baby
54. (D) Hormone that initiates the metamorphosis in frog is thyroxin.
55. (D) The process of transformation of larva into an adult through drastic changes is called metamorphosis.

### CRITICAL THINKING



59. (C) I and II are effects of independent causes.
60. (C)

