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NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION (UPDATED)

CLASS - 8

Question Paper Code : 1O119

KEY

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

SOLUTIONS

MATHEMATICS

01. (C) $\dfrac{(67.542)^2 - (32.458)^2}{100}$

$= \dfrac{100 \times 35.084}{100} = 35.084$

02. (D) $\dfrac{p\left(1 + p + p^2 + \dots p^6\right)}{p^{-9}\left(1 + p + p^2 + \dots p^6\right)} = p^{10}$

03. (A) Let a = 20252025, b = 20242025 then

LHS = ab − (b − 1) (a + 1)

= ab − (ab + b − a − 1)

= ab − ab − b + a + 1

= a − b + 1

= 20252025 − 20242025 + 1

= 10000 + 1

= 10001

04. (C) SP after 12% discount = MP $\dfrac{(100 - 12)}{100}$

$= MP \times \dfrac{88}{100}$

SP after 20%

on above = MP $\frac{88}{100} \times \frac{(100-20)}{100}$

= MP $\times \frac{88}{100} \times \frac{80}{100}$ = MP $\times \frac{88}{125}$

Discount

percentage = $\dfrac{MP - MP\left(\dfrac{88}{125}\right)}{MP} \times 100$

= $\dfrac{(125-88)}{125 \times MP} \times 100$

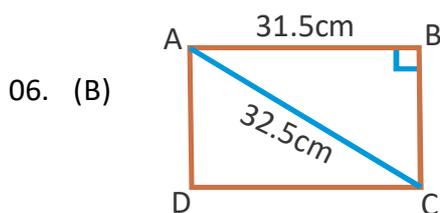= $\dfrac{37}{5} \times 4$ = $\dfrac{148}{5}$ = $29\dfrac{3}{5}$ %

(or)

$100 - \dfrac{(100-d_1)(100-d_2)}{100^{n-1}}$

= $100 - \dfrac{88 \times 80}{100} = \dfrac{500 - 352}{5} = \dfrac{148}{5}$

(or) $a + b - \dfrac{ab}{100}$

05. (C)   LHS = $4^2 + 5^2 + ... + 11^2 + 12^2$

= 16 + 25 + 36 + 49 + 64 + 81 + 100 + 121 + 144 = 636

06. (B)

In $\triangle ABC$, $\angle ABC = 90^o$

$\therefore$ $AC^2 = AB^2 + BC^2$

1056.25 = 992.25 + BC^2

BC^2 = 1056.25 − 992.25 = 64 = 8^2

$\therefore$ BC = 8 cm

Area of the rectangle = AB × BC

= 31.5 × 8 cm² = 252 cm²

07. (D) $\dfrac{1}{(x^2 - 3x - 28)} - \dfrac{1}{(2x^2 - 17x + 21)}$

= $\dfrac{1}{(x-7)(x+4)} - \dfrac{1}{(x-7)(2x-3)}$

= $\dfrac{(2x-3) - (x+4)}{(x-7)(x+4)(2x-3)}$

= $\dfrac{2x - 3 - x - 4}{(x-7)(x+4)(2x-3)}$

= $\dfrac{(x-7)}{(x-7)(x+4)(2x-3)}$

= $\dfrac{1}{(2x^2 + 5x - 12)}$

08. (B) $\left(\sqrt{x} + \sqrt{y}\right)\left(\sqrt{x} - \sqrt{y}\right)$

= $\left(\sqrt{x}\right)^2 - \left(\sqrt{y}\right)^2$

= $x - y$

09. (D)   Given $\dfrac{P \times \cancel{2} \times r}{\cancel{100}_{50}} = ₹400$

$\therefore$ Pr = 50 × ₹400 = ₹ 20000

Given

$P\left(1 + \dfrac{r}{100}\right)^2 - P - \dfrac{P \times r \times 2}{100} = ₹410 - ₹400$

$\Rightarrow P\left(1 + \dfrac{2r}{100} + \dfrac{r^2}{10000}\right) - P - \dfrac{2Pr}{100} = ₹10$

$\Rightarrow \cancel{P} + \cancel{\dfrac{2Pr}{100}} + \dfrac{Pr^2}{10000} - \cancel{P} - \cancel{\dfrac{2Pr}{100}} = ₹10$

$\therefore$ $\dfrac{Pr \times r}{10000} = ₹10$

$\dfrac{\cancel{20,000}^{\,2} \times r}{\cancel{10,000}} = 10$

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

10. (D) Let the two numbers be x & $(x - 10)$

Given $x(x - 10) = 144$

$x^2 - 10x - 144 = 0$

$x^2 - 18x + 8x - 144 = 0$

$x(x - 18) + 8(x - 18) = 0$

$(x - 18)(x + 8) = 0$

$x = 18$ (or) $x = -8$

If $x = 18$ then $x - 10 = 8$ (or) If $x = -8$ then $x - 10 = -18$ sum of two numbers

Sum of two numbers = -26

11. (B) Given profit = $\dfrac{1}{6}$ of SP

$CP - SP - P = SP - \dfrac{1}{6} SP = \dfrac{6SP - SP}{6}$

$= \dfrac{5SP}{6}$

Profit % $= \dfrac{\text{Profit}}{CP} \times 100$

$= \dfrac{\dfrac{5 \times \cancel{SP}}{\cancel{6}}}{\dfrac{5}{\cancel{6}} \cancel{SP}} \times 100 = 20\%$

12. (B) Area of rectangle

$= lb = (3p - 5q)(5p + 7q)$

$= 15p^2 + 21pq - 25pq - 35q^2$

$= 15p^2 - 4pq - 35q^2$

13. (D) $\dfrac{\sqrt{72} \times \sqrt{363} \times \sqrt{175}}{\sqrt{32} \times \sqrt{147} \times \sqrt{252}}$

$= \dfrac{\sqrt{6 \times 6 \times 2} \times \sqrt{11 \times 11 \times 3} \times \sqrt{5 \times 5 \times 7}}{\sqrt{4 \times 4 \times 2} \times \sqrt{7 \times 7 \times 3} \times \sqrt{6 \times 6 \times 7}}$

$= \dfrac{6\sqrt{2} \times 11\sqrt{3} \times 5\sqrt{7}}{4\sqrt{2} \times 7\sqrt{3} \times 6\sqrt{7}}$

$= \dfrac{55}{28}$

14. (C) $2^{4\left(x^2 + 3x - 1\right)} = 2^{3\left(x^2 + 3x + 2\right)}$

$4x^2 + 12x - 4 = 3x^2 + 9x + 6$

$\Rightarrow x^2 + 3x - 10 = 0$

or $(x + 5)(x - 2) = 0$

$\therefore x = -5, 2$

Sum of all values of "x" = $-5 + 2 = -3$

15. (A) Total cost for painting

$= [2h \, (l + b)] \times ₹4$

$= 12 \times 15 \times 4$

$= ₹720$

16. (B)

3	4563
3	1521
3	507
13	169
	13

$4563 = 3^3 \times 13^2$

$\therefore$ 4563 to be multipled by 13 to make it a perfect cube.

17. (D) $\sqrt{3} \, x^2 - 2x - 8\sqrt{3}$

$= \sqrt{3} \, x^2 - 6x + 4x - 8\sqrt{3}$

$= \sqrt{3} \, x \, (x - 2\sqrt{3}) + 4(x - 2\sqrt{3})$

$= (x - 2\sqrt{3})(\sqrt{3} \, x + 4)$

18. (B) Given $x + y = 17$

Squaring on both sides

$x^2 + 2xy + y^2 = 289$

$x^2 + y^2 + 2xy = 289$

$157 + 2xy = 289$

$2xy = 289 - 157$

$xy = \dfrac{132}{2} = 66$

19. (A)

$$
\begin{array}{r|r|r}
4 & \overline{2,08,}\overline{3}\overline{93} & 456 \\
  & 16 & \\
\hline
85 & 483 & \\
  & 425 & \\
\hline
906 & 5893 & \\
  & 5436 & \\
\hline
  & 457 & \\
\end{array}
$$

∴ 457 to be subtracted from 2,08,393 to make it a perfect square.

20. (B) $2^{20} = 2^{5×4} - (2^5)^4 = 32^4$

$3^{16} = 3^{4×4} = (3^4)^4 = 81^4$

$4^{12} = 4^{3×4} = (4^3)^4 = 64^4$

$5^8 = 5^{2×4} = (5^2)^4 = 25^4$

21. (C)   In a a rhombus diagonals bisect each other perpendicularly

22. (C)   Given AB∥DC

$\Rightarrow \angle DAB + \angle ADC = 180°$ →(1)

But AD∥BC

$\Rightarrow \angle DAB + \angle ABC = 180°$ →(2)

from (1) & (2) $\angle DAB + \angle ADC$

$= \angle DAB + \angle ABC$

$\angle ADC = \angle ABC$

$\therefore \dfrac{4x}{3} - \dfrac{x}{2} + \dfrac{67°}{2} = \dfrac{x}{2} + \dfrac{5x}{3} - \dfrac{53°}{2}$

$\dfrac{67°}{2} + \dfrac{53°}{2} = \dfrac{x}{2} + \dfrac{5x}{3} - \dfrac{4x}{3} + \dfrac{x}{2}$

$= \dfrac{3x + 10x - 8x + 3x}{6}$

$\dfrac{120°}{2} = \dfrac{8x}{6}$

$x = 60° × \dfrac{3}{4} = 45°$

$\therefore \angle ABC = \dfrac{x}{2} + \dfrac{5x}{3} - \dfrac{53°}{2} = \dfrac{45°}{2} + \dfrac{5×45°}{3} - \dfrac{53°}{2}$

$= 75° + \dfrac{45° - 53°}{2}$

$= 75° - \dfrac{8°}{2} = 75° - 4° = 71°$

23. (A) $\sqrt[3]{\dfrac{512}{125}} = \sqrt[3]{\left(\dfrac{8^3}{5^3}\right)} = \dfrac{8}{5} = 1\dfrac{3}{5}$

24. (C)   In ΔABC

$80° + 30° + 30° + 2x = 180°$

$2x = 180° - 140° = 40°$

$x = 20°$

In Δ BCD $30° + 20° + y = 180°$

$y = 130°$

25. (D) $15.55 (30 + k) = 462 + 16k$

$466.5 + 15.55 k = 462 + 16 k$

$466.5 - 462 = 16k - 15.55 k$

$4.5 = 45 k$

$\dfrac{4.5}{0.45} = 5$

$k = 10$

PHYSICS

26. (B)   Constructive interference and uniform wave propagation → sound becomes distorted or lost.

27. (B)   Copper is the anode, so it loses electrons and dissolves as copper ions into the electrolyte. This is part of electrolysis or electroplating in reverse.

28. (B)   By sitting, the mechanic increases his own normal force, thereby increasing friction under feet, allowing effective reaction force.

29. (B)   Frogs are sensitive to low-frequency ground vibrations, not high-pitched ultrasound.

30. (D)   For an aqueous solution to conduct electricity, it must contain free-moving ions.

- Solutions X and Z contain substances that dissociate into ions, allowing electric current to flow and the bulb to glow.

- Solution Y does not contain enough free ions to conduct a detectable current, which is why the bulb does not glow.

- Option (A) is incorrect as taste (sourness) is not a measure of conductivity.

- Option (B) is incorrect because non-conductive solutions do not simply conduct slowly; they lack the necessary charge carriers (ions).

- Option (C) is incorrect because all matter is made of atoms with electrons; the key is the presence of mobile ions in the solution, not the absence of electrons in the material itself.

31. (C) Image inversion indicates real image, formed only by convex lenses

32. (B) It helps locate the epicentre.

- P waves travel faster than S waves, so they arrive at a seismograph first.

- The time gap between the arrival of the P wave and the S wave tells seismologists how far the station is from the earthquake's epicentre; using data from at least three stations, they can triangulate the epicentre's location.

33. (B) Complex waveforms are combinations of sinusoidal harmonics.

Our ears receive them as composite longitudinal waves, interpreted as tone + timbre.

34. (C) In plane mirrors (rear silvered), light reflects twice (glass + silver). Front-silvered mirrors give clear, single reflection.

35. (A) Spikes penetrate the track, providing mechanical anchoring, which overcomes reduced static friction due to wetness.

CHEMISTRY

36. (D) All the given statements are correct about coal and LPG.

37. (B) The incorrect substances are glass is non-combustible but match stick is combustible. Wood, charcoal and kerosene are combustible substances Iron nails made up of metal is a non-combustible.

38. (B) Paraffin wax is used in making ointments and vaseline.

39. (C) Candle, camphor, magnesium ribbon and petrol form flame while coal and charcoal do not form flame.

40. (A) Exhaustible natural resources means that they are limited in quantity not plenty. They are exhausted by human activities and are dependent on nature.

41. (D) All the given advantages of gaseous fuels are safe for cooking at home.

42. (C) The correct option is (C) residue.

In petroleum refining, residue (also known as the residual fraction) is the heaviest part of crude oil that remains at the bottom of the fractionating column after lighter fractions have vaporized and been collected. This residue is then further distilled—often under vacuum—to produce high-boiling products such as:

Lubricating oil (used to reduce friction in machinery).

Paraffin wax (used in candles, ointments, and Vaseline).

Asphalt/Bitumen (used for road surfacing and roofing).

Why other options are incorrect

A) Gasoline : This is a much lighter fraction with a low boiling point, collected near the top of the fractionating column and used primarily as fuel for cars.

B) Heavy oil : While heavy oil is a term sometimes used for fractions like diesel or fuel oil, it is a specific distilled fraction rather than the base residue that is processed into wax and asphalt.

D) Naphtha : Naphtha is a light, highly volatile liquid used as a feedstock for gasoline or the petrochemical industry; it does not yield heavy products like asphalt or lubricating oils.

43. (B) The correct matching is

P-(ii), Q-(i), R-(iv), S-(iii)

Rusting of iron **–** Slow combustion

Exposure of sodium to open air **–** Spontaneous combustion

Burning of paper dipped in kerosene **–** Rapid combustion

Burning of crackers **–** Explosion

44. (D) Coal tar is used as a starting material for the synthesis of various items like synthetic drugs, explosives, perfumes, plastics, naphthalene balls etc.

45. (A) All the given products are obtained from coaltar.

BIOLOGY

46. (B) (1) True: Y eats X → Y is a consumer of X.

(2) True: If Z decreases, Y has fewer predators → Y increases → Y eats more X → X decreases.

(3) False: In a drought, producers (X) die first; Z cannot survive alone.

47. (B) Reproduction without the fusion of gametes is known as asexual reproduction reproduction. The offspring are genertically identical

48. (B) Typhoid spreads through contaminated food and water.

49. (C) The solution smells like alcohol with bubbles due to fermentation.

50. (D) The larva of the frog is tadpole.

51. (B) Deforestation destroys habitats, reducing biodiversity. It also causes soil erosion, lowers oxygen levels, and disrupts climate regulation. Therefore, option B is correct.

52. (C) Chlamydomonas is a unicellular green alga found in ponds. It contains chlorophyll, so it performs photosynthesis like plants. It also has a flagellum that helps it move in water.

53. (B) Food web is formed by the interlinking of several food chain.

54. (C) Statement 1 is false — the egg is the largest, and the sperm is the smallest human cell.

Statements 2 and 3 are true — the egg doesn't move much and is female; the sperm moves actively and is male and egg is the female reproductive cell where sperm is the male reproductive cell.

55. (D) Plasma membrane is a delicate, thin, elestic and living membrabe ane of the cell. It Is selectivily permeable and has similar functions in both plant and animal cells.

CRITICAL THINKING

56. (A) Each day, one child gets 7 fish.

To get 49 fish, that child needs

49 ÷ 7 = 7days.

The other child gets 5 fish per day, so in 7 days receives 7 × 5 = 35 fish.

57. Delete

58. (D)

- Statements: Some profits are losses, some losses are shares, some shares are prices.

- Conclusion I & II & IV: No direct connection → Do not follow.

- Conclusion III: "Some shares are prices" → Some prices are shares

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

m1R11TmlmT

60. (C)