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NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION (UPDATED)

CLASS - 8
Question Paper Code : 1O109

KEY

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

SOLUTIONS

MATHEMATICS

01. (B) $\sqrt{2401} = 49 \Rightarrow \sqrt{176 + 49} = \sqrt{225} = 15$

02. (C) $(2a + 3b - 4c)(2a + 3b - 4c)$

= $2a(2a + 3b - 4c) + 3b(2a + 3b - 4c) - 4c(2a + 3b - 4c)$

= $(2a + 3b - 4c)^2$

= $(2a)^2 + (3b)^2 + (4c)^2 - 2(2a)(4c) + 2(2a)(3b) - 2(3b)(4c)$

= $4a^2 + 6ab - 8ca + 6ab + 9b^2 - 12bc - 8ca - 12bc + 16c^2$

= $(4a^2 + 9b^2 + 16c^2 + 12ab - 24bc - 16ca)$

03. (B) Let the other number be x.

given $-5 + x = \dfrac{-4}{3}$

$x = \dfrac{-4}{3} + 5 = \dfrac{-4 + 15}{3} = \dfrac{11}{3}$.

04. (C) From the figure, the angles marked 'm' is given by

$360° - 180° - 45°$

= $360° - 225° = 135°$

(or) m = $180° - 45° = 135°$

05. **(D)** Here, P = Rs. 2000, R = 4% per annum,

n = 2 years

$$A = P\left(1 + \frac{R}{100}\right)^n = 2000\left(1 + \frac{4}{100}\right)^2$$

$$= 2000 \times \left(\frac{26}{25}\right)^2$$

= Rs. 2163.2

∴ C.I. = A − P = 2163.2 − 2000 = Rs. 163.2

06. **(A)** Angle of the sector representing the number of students interested in maths = 126°.

Total numbers of students = 2000

∴ No. of students who like maths

$$= \frac{126°}{360°} \times 2000 = 700$$

07. **(A)** We have, $2^x \times 3^y = 576$

$2^x \times 3^y = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3$

$2^x \times 3^y = 2^6 \times 3^2$

On comparing the powers, we get

$x = 6$ and $y = 2$

∴ $(x − y)^x = (6 − 2)^6 = 4^6 = (2^2)^6 = 2^{12}$

08. **(B)** Given expression

$$= \frac{\sqrt{0.0009}}{\sqrt{0.01}} = \frac{\sqrt{0.0009}}{\sqrt{0.0100}}$$

$$= \sqrt{\frac{9}{100}} = \frac{\sqrt{9}}{\sqrt{100}} = \frac{3}{10} = 0.3$$

09. **(A)** Let the marked price of the dress be Rs. x.

S.P. of the dress = Rs. 4800

Discount = 20%

S.P. = M.P. − Discount

$$= Rs.\left(x - \frac{x \times 20}{100}\right) = Rs.\left(x - \frac{x}{5}\right) = Rs.\frac{4x}{5}$$

According to the question,

$$\frac{4x}{5} = 4800 \Rightarrow 4x = 4800 \times 5$$

$$x = \frac{4800 \times 5}{4} = Rs. 6000$$

Hence, M.P. of the dress is Rs. 6000.

10. **(C)** $\frac{-3}{4} = -0.75$

$\frac{-1}{2} = -0.5$

$\frac{-7}{8} = -0.875$

$\frac{-5}{6} = -0.833$

−0.875 is the smallest, i.e, $\frac{-7}{8}$ is the smallest.

11. **(B)** Area of square sheet = 28.09 cm²

∴ Side of square sheet = $\sqrt{28.09}$ cm

∴ Side of square sheet = 5.3 cm

12. **(D)** TSA of a cylinder = $2\pi rh + 2\pi r^2$

= 880 cm² + 2 × 3.14 × 10 × 10 cm²

= 880 cm² + 628 cm²

= 1508 cm²

13. **(A)** Perimeter of the rectangle = 60 cm

From the figure, length is (3k − 2) cm and breadth is (k + 4) cm

∴ 2[(3k − 2) + (k + 4)] = 60

⇒ 2[4k + 2] = 60

⇒ 4k + 2 = 30

⇒ 4k = 28

$k = \frac{28}{4} = 7$

14. **(B)** Let x men are needed to finish the construction of the house in 51 days.

Number of men	102	x
Number of days	84	51

More the number of men, less the number of days taken to build the house. So, it is a case of indirect proportion.

∴ 102 : x = 51 : 84

$$\Rightarrow \frac{102}{x} = \frac{51}{84} \Rightarrow x = \frac{102 \times 84}{51} = 168$$

15. Delete

16. (C) ΔBEF is isosceles

$\Rightarrow \angle BFE = \angle BEF$

ΔFDE is isosceles

$\Rightarrow \angle DFE = 45°$

$\angle BFE = 180° - (70° + 45°)$

$= 180° - 115° = 65°$

$\therefore \angle FBE = 180° - (2 \times 65°)$

$= 180° - 130° = 50°$

17. (B) Curved surface area of cylinder = 264 cm²

$\Rightarrow 2\pi rh = 264 \Rightarrow \pi rh = 132$

Volume of cylinder = 462 cm³

$\Rightarrow \pi r^2 h = 462 \Rightarrow \pi rh \times r = 462$

$\Rightarrow 132 \times r = 462$ (Using (i))

$\Rightarrow r = \dfrac{462}{132} = 3.5 cm$

$\therefore$ Diameter of cylinder

$= 2 \times r = 2 \times 3.5 = 7$ cm

18. (A) Length of each side of the field

$= \sqrt{80\dfrac{244}{729}} = \sqrt{\dfrac{58564}{729}}$

$= \dfrac{242}{27} = 8.96 m$

19. (B) Option (A): $(5^{-1} \times 2^{-1}) + 6^{-1} =$

$\left(\dfrac{1}{5} \times \dfrac{1}{2}\right) + \dfrac{1}{6} = \dfrac{1}{5} \times \dfrac{1}{2} + 6 = \dfrac{61}{10} = 6.1$

Option (B):

$\left(\dfrac{1}{2}\right)^{-3} \times \left(\dfrac{1}{2}\right)^{-2} = \left(\dfrac{1}{2}\right)^{-3+(-2)} = \left(\dfrac{1}{2}\right)^{-5}$

$= 2^5 = 32$

Option (C):

$\left(\dfrac{2}{3}\right)^{-2} \div \left(\dfrac{4}{3}\right)^{-2} = \left(\dfrac{3}{2}\right)^{2} \div \left(\dfrac{3}{4}\right)^{2} = \left(\dfrac{3}{2}\right)^{2} \times \left(\dfrac{4}{3}\right)^{2}$

$= \left(\dfrac{3}{2} \times \dfrac{4}{3}\right)^{2} = 2^2 = 4$

Option (D):

$\left(\dfrac{2}{3}\right)^{4} \div \left(\dfrac{1}{3}\right)^{4} = \left(\dfrac{2}{3} \div \dfrac{1}{3}\right)^{4} = \left(\dfrac{2}{3} \times 3\right)^{4} = 2^4 = 16$

20. (C) Since, square of an even number is always even and square of an odd number is always odd.

$\therefore$ Square of given three odd numbers i.e., 213, 777, and 155 are odd.

21. (D) Volume of the material used = volume of the cube = 4913 cm³.

$\therefore$ The length of its edge

$= \sqrt[3]{4913} = 17$ cm

22. (D) Let CP of each mango be Rs. x.

$\therefore$ CP of 100 mango = Rs. $100x$

$\therefore$ SP of 90 mangos = Rs. $100x$

SP of each mango

$= Rs. \dfrac{100x}{90} = Rs. \dfrac{10x}{9}.$

Profit percentage

$= \dfrac{\dfrac{10x}{9} - x}{x} \times 100 = 11\dfrac{1}{9}\%$

23. (D) Area = side × side

$= \dfrac{9}{16} x^2 + \dfrac{25}{36} y^2 - \dfrac{5}{4} xy$ sq. units

$= \left(\dfrac{3}{4} x\right)^2 + \left(\dfrac{5}{6} y\right)^2 - 2 \times \dfrac{3}{4} x \times \dfrac{5}{6} y$

$= \left(\dfrac{3}{4} x - \dfrac{5}{6} y\right)^2$ sq. units

$= \left(\dfrac{3}{4} x - \dfrac{5}{6} y\right)\left(\dfrac{3}{4} x - \dfrac{5}{6} y\right)$ sq. units

$\therefore$ Side $= \left(\dfrac{3}{4} x - \dfrac{5}{6} y\right)$ units

24. (B) Radius of the base of the cylinder = 5 cm

Height = 20 cm

Volume of cylindrical container $\pi r^2 h$

$= 3.14 \times 5 \times 5 \times 20 = 1570$ cm³

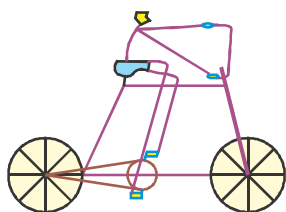1000 cm³ = 1l

$\Rightarrow 1570$ cm³ = 1.57 l

25. (C) $\left(8^{-25} - 8^{-26}\right) = \dfrac{1}{8^{25}} - \dfrac{1}{8^{26}}$

$= \dfrac{(8-1)}{8^{26}} = 7 \times 8^{-26}$

PHYSICS

26. (A) Musical sound in figure (i) is produced by regular vibrations of sound. Noise in figure (ii) is produced by irregular vibrations of sound.

27. (D) As the bicycle is not being pedalled, friction acts in the backward direction on both the wheels.

28. (B) When two or more forces act on an object in two different directions the effect on the object is due to the magnitude and direction of the net force acting on it. A piece of cloth is cut with the help of a scissor from bottom to the top and the cut pieces have regular and desired shape.

Tearing a piece of paper with hand mostly occurs from top to the bottom and the torn pieces of paper do not have a regular and desired shape.

Forces which act on a body in two different directions can cause the object to break, cut or tear.

29. (B) Distilled water, glucose, alcohol and glycerine are non-electrolytes. Due to the absence of positive and negative ions, they do not conduct electricity. Solutions of acids, bases and salts conduct electricity. Solutions of common salt and caustic soda conduct electricity.

30. (C) The image formed in the plane mirror is as far as the object from the plane mirror. So, distance of football from the plane mirror after it is kicked 2 m away from plane mirror = 4 + 2 = 6 m

So, distance of image from the plane mirror = 6 m

Distance between the football and its image = distance of football from the plane mirror + distance of its image from plane mirror = 6 m + 6 m = 12 m

31. (D) The rise of water in the dropper is due to atmospheric pressure.

32. (B) Options (A), (C) and (D) are correct.

Option (B) is not correct as charge on X is positive and gets attracted to charge on Y being a negative charge. Charge on X is positive and charge on Z is also positive. So, both the positive charges get repelled.

33. (B) Frictions can be reduced by the use of rollers, lubricants (in the form of powder) and ball bearings.

34. (B) Electroplating is the process of depositing a layer of a desired metal on another material by passing electric current.

35. (C) Light rays travel in a straight line is correctly shown in cardboards 1 and 3.

CHEMISTRY

36. (D) Wildlife and minerals are exhaustible natural resources because these resources are present in a limited quantity in nature and can be exhausted by human activities.

37. (C) Soda acid type fire extinguishers can put out only ordinary fires. Foamite fire extinguishers can put out oil fires. Liquefied carbon dioxide extinguishers can put out ordinary fires, oil fires and also electrical fires. Water jets can put out only ordinary fires.

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

39. (D) The calorific value of a fuel is kilojoule per kilogram (kJ/kg)

40. (D) Natural gas (W) is a fossil fuel. It was 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.

41. (D) As it is clear from the given diagram that in (a) case, there is a gap between glass-chimney and wood, thus oxygen is available and candle keeps on burning but in cases (b) and (c) oxygen supply is stopped completely by covering the candle by glass chimney and wood respectively. Thus, in both these cases candle goes off. Thus, this experiment shows that oxygen is essential for combustion.

42. (B) The presence of air gaps in the coke causes the molecules to occupy a greater volume for a given mass. Hence, the density is less (being inversely proportional to volume) and thus, coke floats on water.

43. (A) The spirit and kerosene lamps are made in such a way that the free end of the wicks with flame remains totally cut off from the fuel since the fuel as vaporised at room temperature and is highly inflammable.

44. (C) Statements (A), (B) and (D) are false.

Natural gas is stored under high pressure as compressed natural gas.

45. (A) Blue flame is ideal for heating a substance. All other given statements are true.

BIOLOGY

46. (C) The given figure shows asexual reproduction budding in yeast.

47. (C) Contractile vacuole in amoeba take part in osmoregulation and excretion. It has a highly extensible and collapsible membrane. The vacuole periodically increases in volume to get filled with water and contracts to discharge its water content to the surrounding environment. Contractile vacuole is significant to prevent bursting of cell wall due to accumulation of too much water in it. This is known as osmoregulation. The water leaving and entering water may carry some excretory matter causing excretion as an additional role.

48. (A) The combination of sex chromosomes is present in a female is '44 + XX'.

49. (C) Fertilisation takes place in fallopian tubes of human reproductive system. Due to tubal ligations sperms cannot reach the ovum.

50. (D) Moulting is the process of periodic shedding or casting of outermost dead skin layer. In insects like silkworm, cockroach etc., moulting is essential for their growth. Moulting is also observed in snakes. In birds and mammals, seasonal loss of hair, fur and feathers is also known as moulting.

51. (B) A machine like a combine is used to harvest and thresh the crop. It makes the farmers work easier.

52. (A) Wild life include natural habitats of all non domesticated and non cultivated plants and animals.

53. (A) The change from larva to adult is called metamorphosis. In frog, metamorphosis from tadpole to adult frog is controlled by thyroxine hormone secreted by thyroid gland.

54. (D) Fermentation takes place by the release of CO_2 and alcohol.

55. (A) 1 - R; 2 - P; 3 - Q

CRITICAL THINKING

56. **(C)** The weight of a liquid is determined by its density, which is the mass of a substance per unit volume.

    Oil : The density of oil varies depending on the type of oil, but for this explanation, we'll consider an average density of 0.92 grams per mililiter (g/mL).

    Water : The density of water is approximately 1 gram per mililiter (g/mL)

    Mercury : The density of mercury is significantly higher than that of oil and water, at approximately 13.6 g/mL.

57. **(C)** This option balances your priorities, ensuring you help your friend while still preparing for your test.

58. **(D)** The blue circle is opposite blue stars so it must be B or D. The big square is clockwise of the blue circle so the answer must be D.

59. **(A)** The metal of the wires expands in summers due to heat and contracts in winters due to low temperature.

60. **(B)**