



NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION

CLASS - 8
Question Paper Code : 1P204

KEY

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

SOLUTIONS

MATHEMATICS

01. (B) Given $x^4 + \frac{1}{x^4} = 727$

Adding '2' on both sides

$$(x^2)^2 + \frac{1}{(x^2)^2} + 2 = 727 + 2$$

$$\left(x^2 + \frac{1}{x^2}\right)^2 = 729$$

$$x^2 + \frac{1}{x^2} = \sqrt{729} = 27$$

Subtracting '2' on both sides

$$x^2 + \frac{1}{x^2} - 2 = 27 - 2$$

$$\left(x - \frac{1}{x}\right)^2 = 25$$

$$\left(x - \frac{1}{x}\right) = \sqrt{25}$$

02. (C) Given $2024^2 - 2030 = 2024^2 - 2024 - 6$

Let $x = 2024 = x^2 - x - 6$

$$= (x^2 - 3x + 2x - 6)$$

$$= x(x - 3) + 2(x - 3)$$

$$= (x - 3)(x + 2) = (2024 - 3)(2024 + 2)$$

$$= 2021 \times 2026$$

03. (C) $\angle A + \angle C + \angle E + \angle G = 360^\circ$ & $\angle B + \angle D + \angle F + \angle H = 180^\circ$
 $\therefore \angle A + \angle B + \angle C + \angle D + \angle E + \angle F + \angle G + \angle H = 360^\circ + 360^\circ = 720^\circ$

04. (D) Given $6a^2 = 216 \text{ cm}^2$

$$a^2 = \frac{216 \text{ cm}^2}{6}$$

$$a^2 = 36 \text{ cm}^2$$

$$a = \sqrt{36 \text{ cm}^2}$$

$$a = 6$$

$$\text{Volume of the cube} = a^3$$

$$= (6 \text{ cm})^3$$

$$= 6 \text{ cm} \times 6 \text{ cm} \times 6 \text{ cm}$$

$$= 216 \text{ cm}^3$$

05. (A,D) $(a + 2b + 3c)(a - 2b - 3c) = \{a + (2b + 3c)\}[a - (2b + 3c)]$

06. (C) $\frac{(21x^2 + \sqrt{5}x - 10)}{3x + \sqrt{5}} = \frac{21x^2 + 7\sqrt{5}x - 6\sqrt{5}x - 10}{3x + \sqrt{5}}$

$$= \frac{7x(3x + \sqrt{5}) - 2\sqrt{5}(3x + \sqrt{5})}{(3x + \sqrt{5})}$$

$$= \frac{\cancel{(3x + \sqrt{5})}(7x - 2\sqrt{5})}{\cancel{(3x + \sqrt{5})}}$$

$$= (7x - 2\sqrt{5})$$

07. (A) Total cost for painting

$$= [2h(l + b)] \times \text{Rs. } 4$$

$$= 12 \times 15 \times 4$$

$$= \text{Rs. } 720$$

08. (D) Exterior angle of a triangle = sum of the interior opposite angles.

$$\therefore x + 69^\circ = 2x - 13^\circ + 3x + 30^\circ$$

$$69^\circ + 13^\circ - 30^\circ = 2x + 3x - x$$

$$4x = 52^\circ$$

$$x = \frac{52^\circ}{4} = 13^\circ$$

$$\therefore x + 69^\circ = 13^\circ + 69^\circ = 82^\circ$$

$$\text{But } \angle ACB + \angle ACD = 180^\circ$$

$$\angle ACB + 82^\circ = 180^\circ$$

$$\angle ACB = 180^\circ - 82^\circ = 98^\circ$$

09. (B) $\frac{2^{n+4} - 2 \times 2^{n+1}}{2^{n-3}} = \frac{2^{n+4} - 2^{n+1+1}}{2^{n-3}}$

$$= \frac{2^{n+4} - 2^{n+2}}{2^{n-3}}$$

$$= \frac{2^{n+2}(2^2 - 1)}{2^{n-3}}$$

$$= 2^{\cancel{n}+2} + 2^2 - \cancel{n} + 3 \times (4 - 1)$$

$$= 2^5 \times 3$$

$$= 32 \times 3 = 96$$

10. (D) Given each face area = 1 cm^2 & volume = $1 \text{ cm}^3 \Rightarrow$ each side = 1 cm

$$\therefore \text{Total surface area} = (8 + 8 + 6 + 4 + 4 + 6) \times 1 \text{ cm}^2 = 36 \text{ cm}^2$$

11. (D) Let 'D' lies on BC such that $AC + CD = AB + BD$

$$\text{Let } CD = x \text{ cm}$$

$$\therefore 3 + x = 4 + 5 - x$$

$$2x = 6$$

$$x = 3$$

$$\therefore CD = 3 \text{ cm} \Rightarrow BD = 5 - x = 2 \text{ cm}$$

$$\text{Area of } \triangle ABC = \frac{1}{2} \times AB \times AC = 6 \text{ cm}^2$$

$$= \frac{1}{2} \times AE \times BC = \frac{1}{2} \times 5 \times AE$$

$$AE = \frac{12}{5} \text{ cm}^2$$

$$\text{Area of } \triangle ABD = \frac{1}{2} \times BD \times AE = \frac{1}{2} \times 2$$

$$\times \frac{12}{5} \text{ cm}^2$$

12. (B) Given $\frac{1}{2}d_1d_2 = 24 \text{ cm}^2$

$$8 \text{ cm} \times d_2 = 2 \times 24 \text{ cm}^2$$

$$d_2 = 6 \text{ cm}$$

$$\text{In } \triangle AOB, \angle AOB = 90^\circ$$

$$\therefore AB^2 = AO^2 + OB^2$$

$$AB = 5 \text{ cm}$$

13. (B) In $\triangle BCD$, $\angle C = 90^\circ$
 $\Rightarrow BD^2 = BC^2 + CD^2 = (3 \text{ cm})^2 + (4 \text{ cm})^2$
 $= 25 \text{ cm}^2$

$\therefore BD = 5 \text{ cm}$

5 cm, 12 cm & 13 cm are the sides of a right angled triangle

\therefore Area of the quadrilateral ABCD
 $= \text{Area of } \triangle ABD - \text{area of } \triangle BCD$
 $= \frac{1}{2} \times 5 \text{ cm} \times 12 \text{ cm} - \frac{1}{2} \times 3 \times 4 \text{ cm}^2$
 $= 30 \text{ cm}^2 - 6 \text{ cm}^2$
 $= 24 \text{ cm}^2$

14. (A) Given $2\pi rh = 660 \text{ cm}^2$
 $2 \times \frac{22}{7} \times r \times 15 \text{ cm} = 660 \text{ cm}^2$
 $r = 7 \text{ cm}$
 $\text{TSA} = 2\pi r(h + r)$
 $= 2 \times \frac{22}{7} \times 7 \text{ cm} (15 \text{ cm} + 7 \text{ cm})$
 $= 968 \text{ cm}^2$

15. (B) In the quadrilateral
 $\angle A + \angle B + \angle C + \angle D = 360^\circ$
 $\angle A + \angle B + 3\angle A + 2\angle A = 360^\circ$
 $6\angle A + \angle B = 360^\circ$
 $6 \times 38^\circ + \angle B = 360^\circ$
 $228^\circ + \angle B = 360^\circ$
 $\angle B = 132^\circ$

16. (A) $\frac{xy \times yz}{xz} = \frac{8.4 \times 14.1}{11.04}$
 $y^2 = 12.25$
 $y = \sqrt{12.25} = 3.5$
 $xyz = (xz)y = 11.04 \times 3.5 = 38.64$

17. (C) Given the ratio of length, breadth and height = 1 : 3 : 4
 $= x : 3x : 4x$
 \therefore Volume = $x \times 3x \times 4x = 12x^3$
 Volume should be in form of $12x^3$
 \therefore Volume = 96 cm^3 [$\because 12 \times 8 \text{ cm}^3$]

18. (C) $13^4 - 11^4 = (13^2)^2 - (11^2)^2 = (13^2 + 11^2)(13^2 - 11^2)$
 $= (169 + 121)(13 + 11)(13 - 11)$
 $= 290 \times 24 \times 2$
 $= 2 \times 145 \times 3 \times 8 \times 2$
 $= 32 \times 145 \times 3$

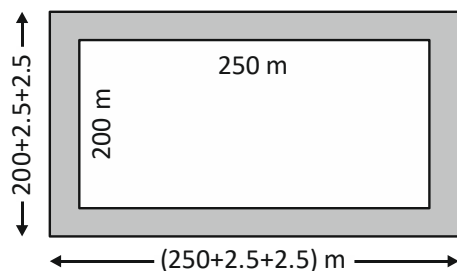
\therefore largest power of 2 = 5

19. (D) $\frac{611}{\sqrt{1225} + \sqrt[3]{1728}} = \frac{611}{35 + 12}$
 $= \frac{611}{47}$
 $= 13$

20. (A) $3^{2x} \times 3^2 + 3 = 28 \times 3^x$
 $\Rightarrow (3^x)^2 \times 9 + 3 = 28 \times 3^x$
 let $3x = a \Rightarrow 9a^2 + 3 = 28a$
 $9a^2 - 28a + 3 = 0$
 $9a^2 - 27a - a + 3 = 0$
 $9a(a - 3) - 1(a - 3) = 0$
 $(a - 3)(9a - 1) = 0$
 $a - 3 = 0$ (or) $9a - 1 = 0$
 $a = 3$ $9a = 1$
 $3^x = 3^1$ $a = \frac{1}{9}$
 $x = 1$ $3x = \frac{1}{3^2}$
 $3x = 3^{-2}$

21. (D) $\left(\frac{x+4}{x}\right)$
 $\text{LHS} = \left(\frac{x+1}{x}\right)\left(\frac{x+1+1}{x+1}\right)\left(\frac{x+2+1}{x+2}\right)\left(\frac{x+3+1}{x+3}\right)$
 $= \frac{\cancel{(x+1)}}{x} \frac{\cancel{(x+2)}}{\cancel{(x+1)}} \frac{\cancel{(x+3)}}{\cancel{(x+2)}} \frac{\cancel{(x+4)}}{\cancel{(x+3)}}$
 $= \frac{(x+4)}{x}$

22. (C) Area of the trench = total area – inner area



$$= (255 \times 205) \text{ m}^2 - 250 \times 200 \text{ m}^2$$

$$= 52,275 \text{ m}^2 - 50,000 \text{ m}^2$$

$$= 2,275 \text{ m}^2$$

Volume of the earth = Area of the trench
 \times depth = $2,275 \text{ m}^2 \times 2 \text{ m}$
 $= 4550 \text{ m}^3$

Rise in level = $\frac{\text{volume of the earth}}{\text{spread area}}$

$$= \frac{4550 \text{ m}^3}{250 \times 200 \text{ m}^2}$$

$$= \frac{91 \text{ m}^3}{1000 \text{ m}^2}$$

$$= \frac{91 \text{ m}}{1000}$$

$$= \frac{91 \times 100 \text{ cm}}{1000} = 9.1 \text{ cm}$$

23. (B) No. of black balls = 8
 Total balls = $8 + 7 + 5 = 20$

$$\therefore p(B) = \frac{8}{20} = \frac{2}{5}$$

24. (C) Number of soaps =

$$\frac{\text{Volume of box}}{\text{Volume of each soap}}$$

$$= \frac{20 \times 10 \times 10 \text{ cm}^3}{10 \times 5 \times 2.5 \text{ cm}^3} = 16$$

25. (A) Given $\frac{3x - 2(x - 1)}{4} = \frac{(x - 2)}{12}$

$$= (3x - 2x + 2) \frac{12}{4} = (x - 2)$$

$$3x + 6 = x - 2$$

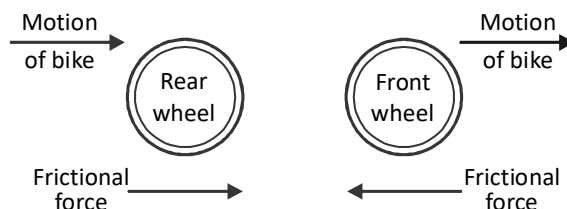
$$3x - x = -2 - 6$$

$$2x = -8$$

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

PHYSICS

26. (C) Sound travels faster in solids (table) as compared to gas (air). Thus, boy X hears louder and clear sound.
27. (A) We move faster on roller-skates than on shoes as the roller-skates have rollers which roll and reduce friction.
28. (A) When a bike is in motion, the frictional force acts in the backward direction on the front wheel and in the forward direction on the rear wheel as shown below.



29. (D) When electric current passes through a conducting solution, all the given changes are caused due to chemical reactions.
30. (D) In lateral inversion, when you raise your right hand in front of a mirror, the mirror reflection will show your raised right hand on the left side of the image. This means that the object's right side is observed or will be on the left side of the mirror image.
31. (A) When the balloon after it is inflated is taken to the top of a mountain, the air pressure decreases. As a result, the air inside the balloon expands causing the size of the balloon to increase.

32. (C) Like charges repel and unlike charges attract each other.
33. (D) Increasing friction on fast moving objects enables them to slow down. Increased friction on objects also helps to have a better grip on surfaces and allows us to hold things firmly.
34. (D) An electrolyte forms positive and negative ions.
35. (C) Statements (A), (B) and (D) are not true. Statement (C) is true as per second law of reflection of light.

CHEMISTRY

36. (C) Petrol is a fuel with low ignition temperature than coal. Hence, catches fire easily and may cause damage. So, more care is needed to preserve petrol than coal.
37. (C) Inflammable substances have low ignition temperature and can catch fire easily.
38. (D) Natural gas is a very important fossil fuel because it is easy to transport through pipes. It can be stored under high pressure as CNG. It is also used as a starting material for the manufacture of a number of chemicals and fertilisers. So, 'X' is natural gas.
39. (D) During the combustion of a candle flame, oxidation of fuel takes place, which releases water vapour and carbon dioxide along with liberation of heat and light energy.
40. (B) As CNG is less polluting and cleaner fuel it is used as a fuel for transport vehicles.
41. (A) Some red phosphorus is converted into white phosphorus which burns the matchstick.
42. (D) Coal tar is a black, thick liquid with unpleasant smell. It is one of the products obtained on processing of coal. Naphthalene balls to repel moths are also obtained from coal tar.
43. (C) During the combustion of kerosene, water vapour, carbon dioxide and heat energy are formed. Carbon is not formed during the combustion of kerosene.

44. (C) Statements (A), (B) and (D) are false. Natural gas is stored under high pressure as compressed natural gas which is a good fuel for vehicles.
45. (C) The salt solution of Sodium bicarbonate is used in soda acid type extinguisher

BIOLOGY

46. (D) When an animal is dead and gone forever then it is said to be extinct.
47. (A) Wild life include natural habitats of all non domesticated and non cultivated plants and animals.
48. (B) Sickle is used for harvesting.
49. (B) In the given figure, X is Paramecium and Y is Euglena. Both of them are protozoans and unicellular. Euglena shows mixotrophic nutrition.
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) Yeast is a type of fungus, specially unicellular fungus.
52. (C) The given organism is Chlamydomonas.
53. (D) P – Hoe: It is a simple tool which is used for removing weeds and for loosening the soil. It consists of long rod made up of wood or iron. A strong, broad and bent plate of iron is fixed to one of its ends which works like a blade.
Q – Cultivator: It is attached to a tractor. Such tractor-driven cultivators save labour and time.
54. (B) Deforestation increases soil erosion.
55. (A) It was a movement started from hills of Tehri Garhwal Himalayas under leadership of Sundar Lal Bahuguna to conserve conifer trees. The movement was based on indiscriminate and illegal exploitation of forest sources.

CRITICAL THINKING

56. (A) The action taken by the school authorities (Statement II) is a direct response to the issue of cheating (Statement I). Therefore, Statement II is an effect of the cause mentioned in Statement I.

57. (B) This brain teaser requires you to observe the number and find-out the logic. Look carefully the number in the center circle of each line is half the sum of numbers towards its left and right. So, for the last line, the answer will be: $9 + 3 = 12 (\div 2) = 6$.

58. (D) $1 \text{ Dove} = 2 \text{ football} + 1 \text{ apple}$
 $2 \text{ Doves} = 4 \text{ football} + 2 \text{ apples} = 3 \text{ apples}$
Therefore $4 \text{ footballs} = 1 \text{ apple}$
Given that $\text{doll} = 1 \text{ foot ball} + 1 \text{ apple} = 5 \text{ footballs}$

59. (C) From the previous deduction, we know that School C wears green uniforms.
Let's analyze the given information step-by-step to deduce which school wears which color uniforms:

1. School A does not wear green uniforms.
2. School B wears blue uniforms.
3. No students from School C wear blue uniforms.
4. One of the schools wears green uniforms.

From point 2, we know that:

- School B wears blue uniforms.

From point 3, we know that:

- School C does not wear blue uniforms.

Since School B wears blue uniforms, and School C does not wear blue uniforms, the only color left for School C is green (as one school must wear green according to point 4).

Now, we know:

- School B wears blue uniforms.

School C wears green uniforms.

60. (A)



The End
