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## NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION (UPDATED)

### CLASS - 6
### Question Paper Code : *1P104*

### KEY

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

### SOLUTIONS

#### MATHEMATICS

01. (B)  Greatest five digit number = 99999

$$876 \overline{)99999} (114$$
$$\underline{876}$$
$$1239$$
$$\underline{876}$$
$$3639$$
$$\underline{3504}$$
$$135$$

∴  Required number = 99999 − remainder

= 99999 − 135

= 99864

02. (A)  Given $\dfrac{1}{2} : 5 = x : \dfrac{25}{7}$ are in proportion.

∴  $5x = \dfrac{1}{2} \times \dfrac{25}{7}$

$x = \dfrac{25}{14} \times \dfrac{1}{5}$

$x = \dfrac{5}{14}$

03. (D)  $\left( \dfrac{321 \times 321 - 2 \times 321 \times 121 + 121 \times 121}{432 \times 432 - 2 \times 332 \times 432 + 332 \times 332} \right)$

$$= \frac{10304 - 77682 + 14641}{186624 - 286848 + 110224}$$

$$= \frac{40000}{10000}$$

$$= 4$$

04. (A) $\left(2 - \frac{3}{5}\right) \times \left(2 - \frac{5}{7}\right) \times \left(2 - \frac{7}{9}\right) \times \ldots \times \left(2 - \frac{2023}{2025}\right)$

$$= \left(\frac{10-3}{5}\right)\left(\frac{14-5}{7}\right)\left(\frac{18-7}{9}\right) \ldots \left(\frac{4046-2021}{2023}\right)\left(\frac{4050-2023}{2025}\right)$$

$$= \frac{7}{5} \times \frac{9}{7} \times \frac{11}{9} \times \ldots \times \frac{2025}{2025} \times \frac{2027}{2025}$$

$$= \frac{2027}{5}$$

05. (D) Option 'A' : $\frac{29}{30}$ = 0.966,

Option 'B' : $\frac{30}{31}$ = 0.967

Option 'C' : $\frac{31}{32}$ = 0.968,

Option 'D' : $\frac{32}{33}$ = 0.9696

$\therefore$ $\frac{32}{33}$ is the greatest option

06. (C) Sum of the digits = 7 + 8 + 6 + 5 + 4 + 3 + 2 + 1 + 4 + 6 + 7

= 53 = 45 + 8

$\therefore$ 78654321467 − 8 = 78654321459 is divisible by 9

[$\because$ sum of the digits is divisible by 9)

$\therefore$ The remainder if 78654321467 is divided by 9 is 8.

07. (B) Option A : 3.12 + 7.5 − 11.625 = −1.005

Option B : 1.32 + 5.7 − 8.12 = −1.1

Option C : 3.21 − 7.89 + 4.234 = −0.446

Option D : 1.23 − 5.67 + 3.39 = −1.05

08. (B) $\left(3\frac{1}{12} - 1\frac{3}{4} - 2\frac{1}{2} + 1\frac{1}{2} - \frac{1}{3}\right)$

$$= \frac{37}{12} - \frac{7}{4} - \frac{5}{2} + \frac{3}{2} - \frac{2}{3}$$

$$= \frac{37 - 21 - 30 + 18 - 4}{12} = \frac{0}{12} = 0$$

09. (D) The required decimal = 2 − 0.765 = 1.235

10. (B) 144 − 1024 ÷ 32 × 78 + 132

$$= 144 - \frac{1024}{32} \times 78 + 132$$

= 144 − 32 × 78 + 132

= − 2220

11. (D) Given the marbles ratio of Ram, Rahim and Robert

= 2 : 5 : 7 = 2a : 5a : 7a

Given 2a + 5a + 7a = 168

= 2 : 5 : 3 = 2a : 5a : 7a

14a = 168

a = $\frac{168}{14}$

a = 12

$\therefore$ Number of marbles having Rahim

= 12 × 5 = 60

12. (D) Option 'A' 203 = 7 × 29 is not a prime

Option 'B' 143 = 11 × 13 is not a prime

Option 'C' 377 = 13 × 29 is not a prime

Option 'D' is 1 × 101 is a prime

13. (A) 100 : 2 = 50 : 1

14. (C) Perimeter of the square ABCD = 200 mts = 4 s

Side of the square ABCD (s)

$$= \frac{200 \text{ mts}}{4} = 50 \text{ mts}$$

Area of the square ABCD = s × s = 50 m × 50 m = 2500 m$^2$

Given perimeter of the square PQRS

= 176 m = 4 s

Side of the square PQRS (s)

$$= \frac{176 \text{ m}}{4} = 44 \text{ m}$$

Area of the square PQRS

$= s \times s = 44 \text{ m} \times 44 \text{ m}$

$= 2500 \text{ m}^2 - 1936 \text{ m}^2 = 564 \text{ m}^2$

15. (B)  Greatest 5 digit number using 9, 8, 0, 1
= 99810

Smallest 5 digit number using 9, 8, 0, 1
= 10089

Their difference = 99810 – 10089 = 89721

16. (B)  1 + 2 + 3 – 4 – 5 – 6 = 6 – 15 = –9

7 + 8 + 9 – 10 – 11 – 12 = 24 – 33 = –9

13 + 14 + 15 – 16 – 17 – 18 = –9

(1 + 2 + 3 – 4 – 5 – 6) + (7 + 8 + 9 – 10 – 11 – 12) + (13 + 14 + 15 – 16 – 17 – 18) + (19 + 20 + 21) + 19 = (–9) + (–9) + (–9) + 60

= –27 + 60

= 33

17. (A)  Given expression is 40 – 6a

18. (B)  From options $4 - \frac{5}{2} = \frac{8-5}{2} = \frac{3}{2} = 1\frac{1}{2}$

∴ $x = 4$

19. (A)  Base has 4 edges and 4 slant edges

Total edges = 4 + 4 = 8

20. (A)  c = 6 Þ b + c = 8

∴ b = 2

3a + 2(2) + 6 = 22

3a = 22 – 4 – 6

$a = \frac{12}{3} = 4$

a + b + c = 4 + 2 + 6 = 12

21. (C)  W score = 10 + 6 = 16

22. (B)  –18 < 16

23. (B)  Second number = Sum – First number

= 2025 – 2059

= –34

24. (A)  Given A : B = 0.01 : 0.11 = 0.01 × 100 = 0.11 × 100 = 1 : 11

Given A : C = 0.2 : 1 = 0.2 × 10 : 1 × 10

= 2 : 10

A : B = 1 : 11 = 1 × 2 : 11 × 2 = 2 : 22

B : C = 22 : 10

= 2.2 : 1

25. (B)  Factor of 48 are 1, 2, 3, 4, 6, 8, 12, 16, 24, 48
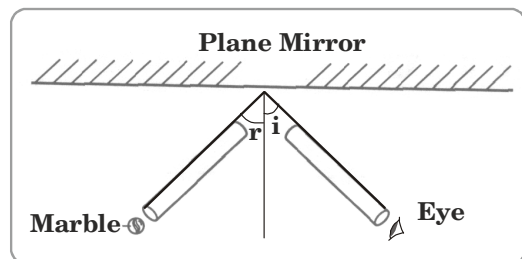
∴  48 has 10 factors

## PHYSICS

26. (D)  The bulb glows in 1st case implies that current passed through P and Q as both are conductors of electricity.

The bulb does not glow in the 2nd case implies that one of the P and Q is a conductor and the other is an insulator.

27. (C)  A plane mirror works on the principle of reflection of light. According to the diagram, the position of marble and position of eye at tube R can make the student to see the marble.



28. (C)  Reading at one end of scale = 1.2 cm

Reading at the other end of scale = 7.0 cm

Actual length of the box = 7.0 cm – 1.2 cm = 5.8 cm

29. (D)  The arrangement of batteries as shown in option (D) are not properly connected. Hence, the bulb in this circuit glows most dimly when compared with the bulbs in other circuits.

30. (C)  An object's image when placed in front of a hole in a pinhole camera forms an image that is always real and inverted.

An object's image when placed in front of a plane mirror forms an image that is always virtual and erect.

31. (A) The distance between Radha's home and her school is 3250 m.

$$3250 \text{ m in kilometres} = \frac{3250}{1000} = 3.25 \text{ km}$$

32. (A) As per the given figure of an electric bulb,

Part P is a filament.

Part Q is a metal tip.

Part R is a metal casing.

33. (C) Comparison between sand paper and a plane mirror are true in options (A), (B) and (D). A mirror can produce images when objects are placed in front of it. A sand paper is opaque. When light falls on a piece of sand paper, it is reflected and scattered at different angles. It absorbs light and does not form images when objects are placed in front of it.

34. (B) Length of each foot step = 30 cm

Length of classroom = 30 × 20 = 600 cm

Breadth of classroom = 30 × 15 = 450 cm

35. (Delete)

## CHEMISTRY

36. (B) As per the given pie-chart, component X is oxygen gas of 21% and Y is nitrogen gas of 78%. Nitrogen and oxygen gases make up most of the air.

37. (D) Sugar being soluble in water will form a sugar solution. During filtration, the sand will be separated by the filter paper as residue while sugar solution will pass through. During distillation pure water can be collected leaving the sugar crystals separate.

A filter paper is used for separating solid particles from a liquid. Distillation is used to obtain a pure form of liquid from a solution.

38. (C) As per the tabulated results both metal and plastic are waterproof. Metal is a conductor of heat whereas plastic is an insulator. Metal is hard but plastic is not hard.

39. (B) When few fishes were put in a sealed glass tank, following is the composition of various gases in the tank after half an hour

(i) As few fishes breathed in dissolved oxygen in water, its composition in water decreased after half an hour.

(ii) As few fishes breathed out carbon dioxide and released it into the water, its composition increased after half an hour.

(iii) As few fishes breathed out water vapour along with carbon dioxide, the composition of water vapour increased after half an hour.

40. (D) In the given mixture, iron filings being magnetic can be separated from non-magnetic substances by using a magnet.

41. (B) The material that is used to make the slide has a smooth surface that enables the children to slide down easily.

42. (C) As the five guinea pigs were placed in a concealed box, there will not be any change in nitrogen gas present in the box. When the guinea pigs respire, the limited oxygen available in the box will decrease. The guinea pigs exhale the air that contains more of carbon dioxide and water vapour.

43. (D) The residue (trapped on the filter paper) is the sand. The filtrate (which passes through the filter paper) is the clean sea water.

Options (A), (B) and (C): represent the wrong residue and filtrate.

44. (D) Leather handbag is not grouped correctly.

45. (B) By placing a green plant in it the rat survives because in the presence of sunlight, it undergoes photosynthesis. During this process, plant releases oxygen which is used by the rat for respiration.

## BIOLOGY

46. (D) The plant may not be able to survive in ice-cold water.

Increasing the distance from the lamp would reduce the light intensity falling on the plant.

Reducing the electricity flowing through the lamp would decrease the light intensity falling on the plant.

Photosynthesis requires carbon dioxide.

47. (C) The ribcage is made up of pairs of curved bones in our chest and is connected to the backbone (spine).

The ribcage protects the heart and the lungs.

The lungs are organs that allow gaseous exchange.

48. (B) 'X' in the given figure is a xerophyte.

49. (B) Process Z is photosynthesis.

Plants including carnivorous plants and non-flowering plants can carry out photosynthesis.

Plants carry out photosynthesis because they have chlorophyll, the green pigment that traps light energy from the Sun. The light energy is required to combine carbon dioxide and water into sugar and oxygen. [Animals and fungi do not carry out photosynthesis because they do not have chlorophyll.]

50. (B) Q is the plant. Plant is an autotroph.

51. (B) The bones are held together by ligaments and muscles are attached to bones by tendons.

52. (B) In the given figure I - pivot, II - ball and socket, III - hinge.

53. (C) Raji is suffering from scurvy which results due to the deficiency of vitamin C. Goosberry extract is a good source of vitamin C. So, Raji is taking capsules that contains Gooseberry extract.

54. (D) Edible part of ginger and potato is stem. Turnip and Radish are roots, lettuce and cabbage is leaf. Rice and almond are seed.

55. (C) Organic matter such as leftover food and bones can be decomposed by bacteria or fungi into Mineral nutrients that can be absorbed and used by plants for healthy growth.

## CRITICAL THINKING

56. (A) Lokesh is telling the truth

Lokesh's statement is true: "I didn't tear the book."

This means Eshwar and Ganesh are lying.

This scenario leads to a contradiction Eshwar is telling the truth

- Eshwar's statement is true: "I didn't tear the book."

- This means Lokesh and Ganesh are lying.

This scenario is consistent because it indicates that Lokesh tore the book and only Eshwar is telling the truth.
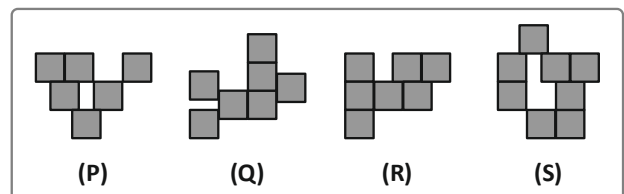
Ganesh is telling the truth

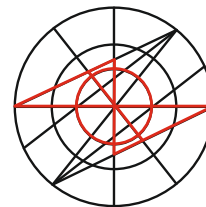Ganesh's statement is true: "Eshwar tore the book."

This means Lokesh and Eshwar are lying.

This scenario leads to a contradiction

57. (B) Q and R images are equal area.



(P)    (Q)    (R)    (S)

58. (D)



59. (B) 66/7 = 3 remainder

3 days from Saturday is Tuesday.

60. (B) Rotate the given image 180 degrees, we get option B image.