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# NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION

***CLASS - 6***

***Question Paper Code : UN497***

## KEY

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

## SOLUTIONS

### MATHEMATICS

01. (C) Option 'C' is longest rectangle because

$$\frac{100\ \text{cm}^2}{8\ \text{cm}} = 12.5\ \text{cm}$$

02. (B) Given $x : y = 3 : 5$ & $y = z = 5 : 7$

$\therefore$ $x : y : z = 3 : 5 : 7$ (or)

$\therefore$ $x : y : z = 3 \times 5 : 5 \times 5 : 7 \times 5$

$= 15 : 25 : 35 = 3 : 5 : 7$

$= 3a : 5a : 7a$

$\therefore$ $y - x : x + z = 5a - 3a : 3a + 7a$

$= 2a : 10a = 1 : 5$

03. (B) $$\frac{1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9}{1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9}$$

$$= \frac{1 \times 2 \times 3 \times 4 \times \cancel{5} \times 6 \times 7 \times 8 \times \cancel{9}}{\cancel{45}}$$

$= 8064$

04. (B)

4059)4182(1
4059

123)4059(33
369

369
369
(0)

123)4223(34
369

533
492

41)123(3
123

(0)

HCF = 41

05. (C) The eggs sold in week 2 is twice as many eggs sold in week 4.

06. (D) LHS = 1 + 3 + 5 + ..... + 2021 + 2023 – 2 – 4 – 6 – ..... – 2020 – 2022

= 1 – 2 + 3 – 4 + 5 – 6 + ..... + 2019 – 2020 + 2021 – 2022 + 2023

= (–1) + (–1) + (–1) +..... + (–1) + (–1) + 2023

= – 1011 + 2023 = 1012

07. (C) Area of square B = 4 × 64 $cm^2$ = 256 $cm^2$

= $(16\ cm)^2$

Side of square B = 16 cm

Perimeter of square B = 4 s = 4 × 16 cm = 64 cm

08. (A) LHS = –145 + 79 – 265 – 41 + 2

+ 1056 – 798 – 38 + 44 – 1

= –145 – 265 – 41 – 798 – 38 + 79

+ 2 + 1056 + 44 – 1

= – 106 – 1 = –107

09. (D) $\left(\frac{24}{7}\times\frac{14}{8}-\frac{9}{8}\times\frac{16}{3}\right)=\left(\frac{24}{7}\times\frac{14}{8}-\frac{9}{8}\times\frac{16}{3}\right)$

= (6 – 6) = 0

$\therefore \quad \left(\frac{2}{3}\times\frac{4}{5}-\frac{5}{6}\times\frac{7}{8}-\frac{9}{10}\times\frac{11}{12}+\frac{13}{14}\times\frac{15}{16}\right)\times 0=0$

10. (A) Vertex is common end point of two rays of an angle.

11. (C) Triangular pyramid

12. (B) –6 – 4 = –10, Hence $x$ = –6

13. (C) $\frac{123\times123-2\times123\times32+32\times32}{231\times231-2\times231\times218+218\times218}$

$=\frac{15{,}129-7872+1024}{53{,}361-1{,}00{,}716+47{,}524}$

$=\frac{8281}{169}=49$

14. (B) Number of cubes in the given solid = 11

It forms a 5 × 3 × 2 cuboid which has 30 cubes.

$\therefore$ Least number of cubes needed to make it a cuboid = 30 – 11 = 19

15. (D) Perimeter of plot = 2(4$x$ – 8) + 2 ($x$ + 10) = 10$x$ + 4

Cost of fencing the plot for $x$ = 5

= [10(5) + 4] × 14 = ₹756

16. (B) The number of prime numbers between 50 and 60 are two. (i.e., 53 and 57).

Hence, if $x$ is the number of primes less than 50, then $x$ + 2 is the number of primes less than 60.

17. (A) A scalane triangle has zero line symmetires

18. (A)

$$\text{LHS}=\left(2-\frac{1}{3}\right)\left(2-\frac{3}{5}\right)\left(2-\frac{5}{7}\right)\ .....\ \left(2-\frac{2021}{2023}\right)$$

$$=\left(\frac{6-1}{3}\right)\left(\frac{10-3}{5}\right)\left(\frac{14-5}{7}\right)\ .....\times\left(\frac{4046-2021}{2023}\right)$$

$$=\frac{\cancel{5}}{3}\times\frac{\cancel{7}}{\cancel{5}}\times\frac{9}{\cancel{7}}\times.....\frac{2025}{\cancel{2023}}$$

$$=\frac{2025}{3}$$

19. (D) $\left(999\times6\right)+\left(\frac{1}{7}+\frac{2}{7}+\frac{3}{7}+\frac{4}{7}+\frac{5}{7}+\frac{6}{7}\right)$

= 5994 + $\frac{21}{7}$

= 5994 + 3

= 5997

20. (D) M is prime & M + 1 is also prime

$\Rightarrow$ M = 2

$\therefore$ M (M–1) + 2 = 2(2–1) + 2

= 2 + 2 = 4

Which is least composite number

21. (A) Let the number of pencils bought by Shilpa be 'p'. Then the number of pencils Devi bought = 4p

$\therefore$ Total pencils bought = p + 4p = 5p

The number of pencils remaining in the shop = 30.

$\therefore$ Required answer = 5p + 30.

22. (C) Each ◎ represents 15 beads. There are 510 beads in the box.

∴ Number of symbols

$= \frac{510}{15} = 34$

Number of symbols present on the graph

= 10 + 9 + 8 = 27

∴ Number of symbols to be drawn to represent yellow beads = 34 – 27 = 7

23. (B) If positive numerators are same then smallest denominator fraction becomes largest

24. (D) The required descending order is

10.101 > 9.009 > 1.11 > 0.99 > 0.909 > 0.09

25. (D) All options are divisible by 4 but only option (D) sum of digits = 78 which is divisible by 3

∴ Option (D) is divisible by 12

## PHYSICS

26. (B) Switches K, M and N must be closed for only Bulb A to light up.

27. (C) From the given figure, we can observe that stick Y lies between 7 cm and 10.4 cm. So, its length is (10.4 – 7) cm = 3.4 cm.

28. (C) Translucent objects are the one through which only partial light passes. Opaque objects do not allow any light to pass through them. Transparent objects allow all the light rays to pass through them.

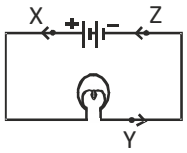
29. (D) Statements II and IV are true. A switch not fuse is used to complete or break an electric circuit. Current flows in a closed electric circuit.

30. (C) Statements II and III are incorrect. International System of Units is abbreviated as SI and it was established by French Scientists. Convenient unit for measuring distance between Delhi and Mumbai is kilometre.

31. (D) As the Sun appears to move across the sky, the shadows cast by an object will point in different directions at different times of the day.

Early in the morning, the Sun is low in the eastern horizon, so a long shadow pointing to the west is cast. At noon, the Sun is directly overhead, so a short shadow is cast. In the late afternoon, the Sun is low in the western horizon, so a long shadow pointing to the east is cast.

32. (D) Current flows from the positive to the negative terminal of a battery as shown below.




33. (C) A potter shaping a pot on its axis in the middle as the wheel is rotating. It is an example of rotatory motion.

34. (C) Tracing paper (2) allows some light to pass through. It is translucent. Sandpaper (0) blocks light completely. It is opaque.

35. (A) The part 'P' is wrongly labelled. It is zinc can/case which acts as negative electrode in a dry cell and carbon rod acts a positive electrode.

## CHEMISTRY

36. (B) Things in Group X are made from plant/ tree parts. Things in Group Y are made from materials found in the ground. Things in Group Z are made from animals. The balloon is made from rubber sap which is obtained from the rubber tree. A balloon can be placed in group X.

37. (C) Stretching of rubber band and dissolving of salt in water are reversible changes. The remaining changes are irreversible.

38. (B) 6 members in a family used 42,000 $l$ of water in 2 weeks.

$= \frac{42000}{6} = 7000\,l / 2$ weeks

Each member used 7000 $l$ in 2 weeks.

Quantity of water used by each member in 1 week $= \frac{7000}{2}$

= 3500 l/week

39. (A) Solids have a fixed shape, size and volume and are incompressible. Liquids do not have a fixed shape, but have a fixed volume and are not compressible too. Gases have neither fixed shape nor fixed volume but have fixed mass and are compressible.

40. (D) Mixture of peanuts and bean seeds are separated by hand-picking.

Seeds of wheat can be separated from a bundle of wheat stalks by threshing

41. (B) Butter changes its state when it gains or loses heat.

42. (B) Statements (A), (C) and (D) are not correct. We can see partially through frosted glass is a correct statement.

43. (D) As per the given figure, statements (A), (B) and (C) are true about water.

44. (D) The given phenomenon is known as

(a) Condensation.

(b) It proves that water vapour is present in air.

45. (D) Air is filled in balloons, tyres and footballs. Rubber being soft and flexible can easily withstand air pressure.

## BIOLOGY

46. (A) Nutrients.

47. (D) The stems of sugarcane have supporting roots coming out from the lower nodes of the stem.

48. (C) Roughage consists of fibres of plant origin. These fibres comprising mostly of cellulose, cannot be digested by humans. Roughage helps in proper bowel movement. Fruits and vegetables are rich sources of roughage.

49. (C) Fats as well as carbohydrates are energy giving foods. So, X is Fats and Y is Carbohydrates.

50. (C) Parasitic roots are also called as sucking roots as they protrude into the host plant for the absorption of nutrients.

51. (C) The farmer's friend is earthworm.

52. (D) The lack of iodine in the diet causes goitre, a disease in which thyroid glands swell up.

53. (A) Benedict's solution is used to test the presence of simple sugars; Millon's reagent is used to test the presence of proteins and iodine is to test the presence of starch.

54. (C) Carrot is a modified storage root.

55. (C) Joint between upper jaw and skull is an immovable joint.

## CRITICAL THINKING

56. (D) H ✻ M

57. (A) To achieve the same torque (the torque needed to keep the rectangle static), the farther the pole is from the pivot point, the less force it needs to apply.

Thus pole 2, the pole farther away from the point of contact with the floor, applies less force on the rectangle. This is essentially the Law of the Lever.

According to Newton's 3rd Law, the rectangle applies less force on Pole 2 as well. Therefore, the correct answer is 1.

58. (C) 626 → 627
↑
625

59. (D) Neither statement is sufficient

60. (A) Wheat and Paddy are different from each other but Wheat is the Rabi-Crop.