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**NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION**

**Paper Code: UN421**

**Solutions for Class : 6**

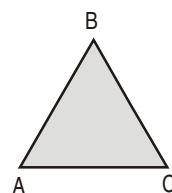
**Mathematics**

1. (C) Let  = 4,  = 2
- $\Rightarrow$   +  +  + 
- $= 2 + 2 + 2 + 2 = 8$
-   $\times$    $= 4 \times 2 = 8$
- $\therefore$   +  +  + 
- $=$    $\times$  
-  +  +  + 
- $= 4 + 4 + 4 + 4 = 16$
-   $\times$    $\times$    $= 2 \times 2 \times 4 = 16$
- $\therefore$   +  +  + 
- $=$    $\times$    $\times$  
- Hence,  = 4 and  = 2
2. (C) The greatest negative integer is - 1.
3. (D)  $M = \frac{5}{6} + \frac{2}{3} - \frac{4}{9} = \frac{15+12-8}{18}$
- $= \frac{19}{18} = 1\frac{1}{18}$
4. (B) Successor of the least 5-digit number = 10001
- Predecessor of the greatest 3-digit number = 998

Required difference  $10001 - 998$

$$= \overline{9003}$$

5. (C) A perfect number has the sum of all its factors equal to twice itself.
6. (C) The largest decimal that can be formed using 1, 3, 4 and 6 is **643.1**.
7. (C) Through three non-collinear points, **3 line segments** can be drawn.



8. (C) The angle formed between the two hands of a clock at 5: 20 is an **acute angle**.
9. (B) **8** is not a prime number.
10. (B)  $l = 2l$
- $b = 2b$
- $p = 2(l + b)$
- $p = 2(2l + 2b)$
- $p = 4(l + b)$
- $= 2 \times 2(l + b)$
11. (D)  $43 + 1 = 44$
- $47 - 3 = 44$
12. (C) Two different diameters of the same circle can't be parallel as they both have to pass through the center of the circle.
13. (B) A line has no end points. It can be extended indefinitely on both the sides.
14. (B)  $-12 - (-28) = (-12) + (+28) = + 16$

15. (D) 0 is one of the even numbers that are both greater than  $-10$  and less than  $+10$ .  
The product of any number and zero is always zero.

$\therefore$  The required product is **zero**.

16. (C)  $\frac{3}{4} = 0.75$

17. (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.

18. (C) Among the given options an **obtuse angled isosceles triangle** is the only possible triangle.

19. (B) 

The points P, Q, R, S, T ... lying on line  $l$  are said to be collinear.

NOTE: Infinite number of points lying on same line are considered as collinear.

20. (A) Between 0 and 100 there are **99** whole numbers.
21. (C) Total no. of pupils in all the 4 classes  
=  $20 \times 5 = 100$  pupils.
22. (A) The missing number is 2. Since **121** is a multiple of 11.

23. (B)  $\frac{1}{3} + \frac{1}{6} = \frac{9}{18} \times \frac{1}{2} = \frac{1}{4}$

$\frac{1}{4}$  is the reciprocal of 4.

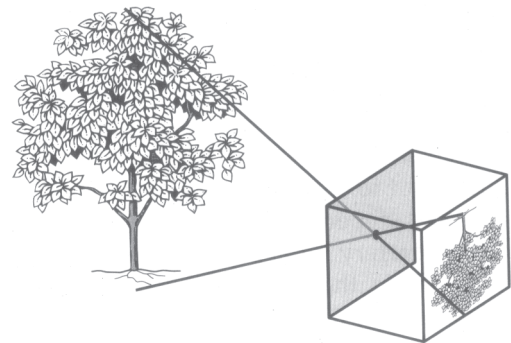
$\therefore$  The average of reciprocals of 3 and 6 equals to reciprocal of 4.

24. (A) **Zero**, as the product of 0 and its place value is always **0**.
25. (A)  $n + 8 = 20 \Rightarrow n = 12$

By trial and error method, substitute values from each set and find the solution.

### Physics

26. (B) Switches **K**, **M** and **N** must be closed for only Bulb **A** to light up.
27. (C) A glow worm is a luminescent insect and the stars are natural sources of light, while electric bulb is an artificial source of light.
28. (D) A measuring tape is the most suitable tool for measuring the length of a badminton court.
29. (A) An object is said to be in motion, if it changes its position with time.
30. (B) A pinhole camera is a simple camera without a lens and with a single small aperture - effectively a light-proof box with a small hole on one side. Light from a tree passes through this single point and projects an inverted image on the opposite side of the box. This device uses a property of light that light moves in straight lines.



31. (A) An object moving as a whole along a straight line shows linear or translatory motion. It means that a car moves as a unit and all its parts move simultaneously through the same distance. A translatory motion is of two types, a straight line motion called rectilinear motion and a curved line motion called curvilinear motion.
32. (D) The brightness of the bulbs in ascending order is G, F and E.
- (i) Circuit G has only one battery of 1.5 V. This voltage has to be shared between the two bulbs. Hence, the two bulbs glow less brightly.
- (ii) Circuit F has two batteries of 1.5 V each. As the batteries are arranged in parallel, the resultant voltage will be  $\frac{3V}{2} = 1.5V$ . As this circuit has only one bulb, it glows more

- brightly than the two bulbs in circuit G.
- (iii) Circuit E has two batteries of 1.5 V each arranged in series. The resultant voltage of this circuit will be  $1.5\text{ V} + 1.5\text{ V} = 3\text{ V}$ . As this circuit has only one bulb, it glows more brightly than the bulb in circuit F.
33. (D) The energy source for the satellite is the sun. Satellites with solar panels collect solar energy from the sun and convert it into electrical energy. This energy is used either directly or it is stored in an accumulator for future use.
34. (D) A compass works at all the places within the earth's magnetic field.
35. (A) Kilometre is the unit that is used to measure the distance between cities.
36. (A) Two batteries of 1.5 V each are connected in series resulting in higher voltage of 3 V i.e.,  $1.5 \times 2$ . So, bulb P glows the brightest.
- Bulbs Q, R and S are separately connected in parallel. The voltage of 3 V is shared by the three bulbs i.e.,  $\frac{3\text{V}}{3\text{ bulbs}} = 1\text{V}$ . So, each bulb receives only 1 Volt, so bulbs Q, R and S glow less brightly than bulb P.
37. (D) Like poles repel and unlike poles attract. The set in option (D) has both magnets placed with opposite poles facing each other. Hence, they attract each other.
38. (D) An artificial source of light is an electric bulb.
39. (B) A unit that always has the same measure for every person is called a standard unit.
40. (B) In order to induce magnetism to a nail by stroking, the stroking must be done in one direction from the end of the nail to the other end. The same pole of the magnet must be used throughout the whole process. If the south-pole of the magnet is used for stroking the end of the nail, that end will become the north-pole of the magnetic nail. If the north-pole of the magnet is used for stroking the end of the nail, that end will become the south-pole of the magnetic nail.
41. (A) The length of the shadow of a tree will keep changing with respect to the changing position of the sun from morning to evening.
42. (C) Statements (A), (B) and (D) are true. The rubber gloves act as an insulator and prevent the flow of current but it does not control the flow of electric current.
43. (A) A magnetic pole will induce an opposite pole on the magnetic material to attract it. The process by which a magnetic material, such as iron or steel, becomes magnetised by a magnetic field is known as magnetic induction.
44. (B) The moon is a non-luminous object but it reflects the light falling on it from the sun.
45. (B) Rotatory motion is not always oscillatory, as it may not be periodic.
46. (B) A single dry cell is used to light a small torch. Most of the torch lights have two or more dry cells arranged in series to form a battery for obtaining bright light.
47. (A) The force of attraction is maximum at the poles of any magnet.
48. (C) Light rays incident on a mirror can be reflected.
49. (C) Materials that conduct electricity are called conductors. Most metals are conductors of electricity. Carbon (graphite) is an example of a non-metal that is a conductor of electricity. Water and human body are also good conductors. Silver is the best conductor of electricity, though it is too expensive for common use. Copper is the second best conductor, and it is used for electrical wiring in our homes.
50. (C) When a magnet is able to turn freely, North pole of the magnet will point to the North pole of the Earth and the South pole of the magnet will point to the South pole of the Earth regardless of the direction we are facing. This is because the Earth's South magnetic pole is located at the North pole and the Earth's North magnetic pole is located at the South pole.

### Chemistry

51. (C) The crystallisation of sugar is a physical change.
52. (C) Statements (A) and (B) are not true of mixture. A mixture has elements or compounds which do not combine chemically. The constituents of a mixture can be separated easily by physical methods. A mixture contains substances in variable composition.
53. (A) Wood is opaque whereas glass is transparent.
54. (D) Evaporation is the way by which water from reservoirs, oceans, ponds, etc., is converted to water vapour, while transpiration is the way by which plants release excess water to their surroundings.
55. (C) During sublimation, when a solid substance is heated, it changes directly to gaseous state. Example: Camphor.  
Naphthalene balls placed in between the clothes undergo change of state from solid to gaseous. Sublimation is a physical change.
56. (D) A flexible material like rubber when bent, stretched or compressed will return to its original shape and size.
57. (B) Statements (A), (C) and (D) are the true properties of air. Though air cannot be seen by us, it is a gaseous state of matter.
58. (B) The relative humidity of a place is the amount of water vapour present in the air. It is not fixed as it changes from time to time and from place to place and depends on the temperature.
59. (C) Opaque objects do not allow any light to pass through them.
60. (A) Sieving is used only when the components of the mixture are of different sizes.
61. (D) Copper and silver are conductors, wood and air are insulators, water and mercury are liquids.
62. (B) Heat is released when you burn petrol. So, it is an exothermic reaction.
63. (A) Filtration is used to separate insoluble solids from liquids. The insoluble solids have bigger particle size compared to the pore size of the filter paper; therefore the solids can be trapped by the filter paper.

64. (B) Water on the earth evaporates from all water bodies all the time and at all the places. Water vapour rises up with the warm air, cools and condenses to form tiny droplets of water that remain floating in air to form clouds. These tiny droplets come together to form large drops of water, become heavy and fall as rain.
65. (C) Plywood X can support weights upto 250 kg and plywood Y can support weights upto 190 kg only. It means that plywood X is stronger than plywood Y.
66. (A) Nitrogen is nearly 78 % in the atmospheric air. It is a non-reactive gas that makes up a major part in the air.
67. (A) In all the given processes, there is only change of state. Hence, all are usually physical changes.

Process	Change of state
(i) Boiling	From liquid to gas
(ii) Condensation	From gas to liquid
(iii) Freezing	From liquid to solid
(iv) Melting	From solid to liquid
(v) Evaporation	From liquid to gas.

68. (C) Statements (A), (B) and (D) are not true of elements. An element is a substance made up of only one kind of atoms.
69. (A) Hydrometer is an instrument used to measure the density of liquids.
70. (D) Condensation involves the conversion of gaseous water (water vapour) into liquid water. All the three options involve condensation process.

### Biology

71. (C) Plastic bags are non-biodegradable substances.
72. (D) Cabbage is the leaf part of the plant.
73. (A) Kneejoint is also called hinge joint.
74. (D) Scurvy disease is also called bleeding of gums.
75. (D) Jute fibre is obtained from the stems of jute plant.
76. (D) The animals given in the picture are omnivores.
77. (B) In the given figure P-stigma, Q-style, R-ovary, S-ovule
78. (D) Recycling of paper, vermicomposting, and by insisting on the use of paper and clothbags can minimise garbage.

79. **(D)** Brain is the controlling system of human body.
80. **(B)** Rayon is an artificial fibre.
81. **(C)** Cauliflower and broccoli are flower parts of a plant that we eat.
82. **(B)** The arrows in the given diagram indicate the exchange of gases with surroundings.
83. **(B)** Ginger is an edible stem.
84. **(B)** Vitamin D helps our body to use calcium for bones and teeth. it is found in sunlight, eggs, butter and milk.
85. **(C)** Whole grains is a source of roughage.
86. **(D)** Water and mineral salts are carried by xylem in plants.
87. **(B)** Z represents an animal that can live both on land and in water. Hence frog, which is an amphibian can be placed in Z.
88. **(B)** An X-ray gives report to find out the extent of an injury.
89. **(C)** Humus is formed from organic wastes.
90. **(B)** X is the humerus.

