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NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION

Paper Code: UN415

Solutions for Class : 6

Mathematics

1. **(C)** Side of square = $\frac{a}{2}$ cm

Perimeter = 4 × side

$= 4 \times \frac{a}{2}$ cm $= 2a$ cm

2. **(B)** All fractions have the same numerator.

So, the fraction having the smallest denominator is the largest.

$\therefore \frac{29}{23}$ is the required largest fraction.

3. **(A)** A triangle with a right angle is called a right angled triangle.

4. **(C)** Numbers having 0 in numbers from 1 to 100 are 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100.

So, 0 appears 11 times.

5. **(A)**

$$\begin{array}{r} 3.50 \\ +4.05 \\ \hline 7.55 \end{array} \qquad \begin{array}{r} 7.550 \\ -6.005 \\ \hline 1.545 \end{array}$$

6. **(D)** The product of all odd factors is odd.

7. **(C)** side × side = 4 × side

$\therefore$ side = 4

8. **(C)** The smallest 4-digit number formed is 1035.

In this 3 is in the tens place.

9. **(B)** Apply BODMAS rule.

$9-[8+\{7-(6-\overline{5-4})\}]-1$

$=9-[8+\{7-(6-1)\}]-1$

$= 9 - [8 + \{7 - 5\}] - 1$

$= 9 - [8 + 2] - 1$

$= 9 - 10 - 1$

$= 9 - 11 = -2$

10. **(D)** Count the unit squares (= 16)

2 × 2 squares = 9

3 × 3 squares = 4

4 × 4 squares = 1

$\therefore$ Total number of squares in the figure

$= 16 + 9 + 4 + 1 = 30$

11. **(C)** From the given number line, p is -9 and q is 6. So, $p + q = -9 + 6 = -3$.

12. **(C)** 1 sq. m = 10,000 sq. cm

13. **(A)** $36\frac{1}{3}-\left[12\frac{2}{5}+13\frac{1}{2}+5\frac{4}{15}\right]$

$\Rightarrow \frac{109}{3}-\left[\frac{62}{5}+\frac{27}{2}+\frac{79}{15}\right]$

$\Rightarrow \frac{109}{3}-\left[\frac{62\times2+27\times15+79\times2}{30}\right]$

$\Rightarrow \frac{109}{3}-\left[\frac{372+405+158}{30}\right]$

$\Rightarrow \frac{109}{3}-\frac{935}{30} \Rightarrow \frac{1090-935}{30}=\frac{155}{30}$

$=\frac{31}{6} = 5\frac{1}{6}$

$\therefore$ Length of rope left $= 5\frac{1}{6}$ m

14. **(D)** Tolling together for next time means tolling after the least possible seconds which is the L.C.M of 9, 12 and 15.

$3 \mid 9, 12, 15$

$3, 4, 5$

L.C.M = 3 × 3 × 4 × 5 = 180 minutes

$= \frac{180}{60}$ hours = 3 hours

15. **(C)** From the figure,

$x^\circ + 3x^\circ = 180^\circ$ (straight angle)

$\Rightarrow 4x^\circ = 180^\circ$

$\Rightarrow x^\circ = 45^\circ$

$\therefore 3x^\circ = 3 \times 45^\circ = 135^\circ$

16. **(C)** The place value of a digit increases by 10 times as it moves from right to left in a place value chart.

17. **(C)** Addition and multiplication of whole numbers satisfy closure property.

18. **(C)** The largest negative integer has the least value.

19. **(C)** $\overrightarrow{AB} \neq \overrightarrow{BA}$ as their initial points are different and their directions are different.

20. **(A)** H.C.F. of two coprime numbers is 1.

21. **(A)** $\frac{5}{9}+\frac{5}{9}=\frac{5+5}{9}=\frac{10}{9}$

22. **(C)** The two parts are : a rectangle and a triangle.

23. **(A)** Each ☺ represents 600.

So, 2400 can be represented by ☺☺☺☺.

24. **(C)** Diameter of the circle = side of the square

So length of side of square = 2×4 cm = 8 cm

$\therefore$ Perimeter of the square = 4 × 8 = 32 cm

25. **(D)** Commutativity under subtraction of whole numbers.
$\Rightarrow P - Q = Q - P$

Physics

26. **(B)** Copper has high electrical conductivity and hence it is used to make electrical wires.

27. **(C)** We cannot see an object when there is no light.

28. **(C)** 1 metre = 100 cm

10 metres = 100×10 = 1,000 cm

29. **(A)** Like poles (north-north or south-south) repel each other, whereas unlike poles (north-south or south-north) attract each other.

30. **(C)** By adding a pinch of salt to pure water, it can conduct electricity. Here, salt is an electrolyte when it forms solution with water. A solution of salt in water is a conductor of electricity.

31. **(D)** All the statements are correct about air.

32. **(C)** The block executes curvilinear motion as it moves on a curved path.

33. **(B)** Bulbs I, III, IV and V are properly connected to the two terminals i.e., metal casing of the bulb and metal tip at the base of the bulb. Hence, four bulbs will light up. Bulb II does not light up as both the terminals are connected to the metal casing of the bulb.

34. **(D)** Magnetic poles or the poles of a magnet are the two free ends of a horse-shoe magnet. The pull force of a horse-shoe magnet is maximum in between the two poles. Magnetic force is minimum at the centre of a magnet.

35. **(A)** A car taking a turn on a curved road is in curvilinear motion. Motion of a swing, motion of needle end of a sewing machine and motion of an engine piston are in periodic motion.

36. **(D)** in an electric torch, electric energy is converted into both light and heat energy.

37. **(B)** When a magnet is cut into two pieces, each piece will be a magnet on its own. The magnet would not become stronger, lose its magnetism totally or have a piece stronger than the other.

38. **(B)** Shadows are formed when the path of light is obstructed by an opaque object. As the opaque objects are real, the shadows formed by them are also real.

39. **(A)** 125 mm in length is equal to 0.125 metres as a millimetre indicates one thousandth of a metre.

40 **(C)** A magnetic compass is a simple device which has a magnetic needle. Iron, cobalt and nickel are magnetic metals. The needle of a compass can be made with any one of these metals.

41. **(C)** When light is focussed with a torch on the glass, it does not form a shadow as glass is a transparent object.

42. **(A)** Iron, salt water and mercury are classified as conductors, though mercury is just a fair conductor. Cotton is a good insulator though. On the other hand, pure water is not a good conductor. But when it contains the slightest amount of salt or mineral solids then it becomes a good electrical conductor.

If material X is replaced by a conductor, it will allow the current to flow, thus the bulb will light up. Conversely, if it is replaced by an insulator, it will resist the current to flow, thus the bulb will not light up.

43. **(C)** The magnetic strength of a magnet is concentrated at two points near the ends of the magnet i.e., at the poles.

44. **(B)** Figure II represents the translucent medium as the translucent object allows light rays to pass through it partially.

45. **(A)** Both, the hands of a clock and the spokes of a wheel exhibit rotatory motion.

46. **(A)** The filament in an electric bulb is made up of tungsten metal. Metals being good conductors allow flow of current through them. When current flows through the filament, it gets heated up to a high temperature and starts glowing to give out light and heat.

47. **(D)** The poles of the magnet would have stronger magnetic pull than the other parts of the magnet.

48. **(B)** The path along which light travels in a homogeneous medium is called the ray of light.

49. **(D)** In an ideal circuit, the length of the wire will not affect the current flowing in the circuit.

The number and the arrangement of batteries will certainly affect the current flowing in the circuit. The more batteries connected in series, the greater the current and hence the brighter the bulbs.

The number and the arrangement of bulbs will also affect the resistance in the circuit. The more bulbs connected in series, the greater the resistance, the dimmer the bulbs. Bulbs connected in parallel will not affect the brightness.

50. **(D)** When we push and rotate the screw with the help of a screw driver, the screw goes into the wood in linear direction. The screw being screwed into the wood is in rotatory as well as in linear motion.

Chemistry

51. **(D)** Ice is in solid state, it absorbs heat from the surroundings and changes to liquid water. Solid $\rightarrow$ liquid. Water is in liquid state. On heating, it changes to water vapour. Evaporation also occurs naturally. Liquid $\rightarrow$ Gas. There is a change of state in both melting and evaporation.

52. **(C)** A mixture of tea leaves and iron filings can be separated by a magnet. Iron filings get attracted to magnet leaving tea leaves behind.

53. **(B)** The correct order of increasing hardness is wood (softest), glass, steel and lastly tungsten carbide (hardest).

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

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

Each member used 7000 l in 2 weeks.

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

= 3500 l/week

55. **(B)** Wood burns to form ash and CO_2 gas is released. It is a chemical change.

56. **(D)** An object (ball) sinks in oil as its density is more than the density of oil. Otherwise, the object will float.

57. **(B)** The given experiment shows that air expands when it absorb heat or when is heated. The balloon will expand as air inside the bottle expands. If we leave the bottle long enough or exchange the boiled water with cold water the balloon will contract back to its original form. This is because air inside the bottle releases heat to the outside environment, thus it will contract.

58. **(D)** Hail consists of masses of ice in layers one above the other. They join together to grow in size and fall on the earth as hail or snow.

59. **(B)** Keys are made solid and hard to fit exactly into the lock. They cannot easily change shape, hence they can last long.

60. **(C)** Sieving is one of the physical separating techniques. It is used to separate two solids of different sizes by putting it through sieves with pores big enough only for certain solids that are small enough to pass through.

61. **(C)** Glass is a non-conductor of electricity, transparent and non-malleable.

62. **(C)** Curdling of milk is a slow chemical change.

63. **(D)** Both filtration and sedimentation are the two techniques that allow separation of insoluble solids from their solvent. In filtration, the suspended solid will be held back by the filter. Sedimentation, on the other hand, allows the solid particles to settle down, leaving clear water above.

64. **(C)** Water is a compound because it contains two different elements joined by chemical bonds.

65. **(D)** Plastic is a material that is not found in nature. It is man-made.

66. **(D)** In the process of photosynthesis, green plants absorb carbon dioxide from the air and make food by combining it with water and energy from the sunlight with the help of chlorophyll. In this process, oxygen is released into the air which is renewed by plants continuously to keep the balance of oxygen almost constant in the atmosphere.

67. **(B)** Photosynthesis is an endothermic (heat absorbing) process. The heat from the sun is absorbed by green plants to carry out chemical processes to make food and release oxygen into the air.

68. **(A)** Stones and other undesirable substances are separated from food grains by hand picking.

69. **(B)** Metals are good conductors of heat and electricity. A frying pan except the handle is usually made of stainless steel, iron or aluminium to conduct heat easily and quickly to the food to cook faster.

70. **(D)** Water exists in liquid state in all water bodies like rivers, lakes, ponds, reservoirs, seas, oceans etc.

Biology

71. **(B)** 'P' represents solar energy, 'Q' oxygen gas, 'R' CO_2 gas and 'S' represents the movement of water from the roots to all parts of the plant body.

72. **(B)** Tendrils helps the plant to climb up a support.

73. **(D)** Living things take birth, grow old and die. Before death they reproduce to give birth to youngones. This is true for all the organisms. This cycle of life goes on and on. This is called life cycle.

74. **(B)** Hip and shoulder joints are called ball and socket joint.

75. **(B)** Culturing of earthworms and redworms is called vermicomposting.

76. **(D)** The above classification is grouped on the basis of their sources. Cotton, jute and flax are obtained from plant sources and fur, leather and silk are obtained from animal sources.

77. **(B)** The given food items are rich in proteins.

78. **(D)** A plastic glass is a non-biodegradable substance.

79. **(B)** Animals which provide meat and eggs are called poultry birds.

80. **(A)** Deficiency of vitamin D leads to rickets

81. **(D)** Turnip is a modified root while others are fruits.

82. **(B)** Biodegradable wastes or organic wastes cannot be recycled.

83. **(B)** The figure represents the interdependence between plants and animals. Animals depend on plants for food and oxygen. Plants depend on animals for carbon dioxide.

84. **(C)** The bones in elbow and knee have hinge joint that allows only back and forth movement.

85. **(B)** Water from the roots of a plant reaches the leaves through the stem of a plant. The stem conducts water to all parts of the plant.

86. **(C)** Wool is obtained from the fleece of sheep. Hence on burning, woollen fibre smell like the burning hair.

87. **(A)** Fibres contain roughage. It prevent constipation.

88. **(C)** In the given food chain X is a herbivore.

89. **(A)** The given information is about paper.

90. **(D)** Aquatic plants are called hydrophytes. Hydrophytes have nuerous air spaces that make them light and spongy.