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## STATE LEVEL SCIENCE TALENT SEARCH EXAMINATION – 2013

SOLUTIONS FOR CLASS : 6

Mathematics

1. (B) There can't be two factors of 3; but 333 has $3 \times 3 = 9$ as a factor.

2. (C) $\dfrac{3}{8} \to 42$

   $\dfrac{1}{8} \to 42 \div 3 = 14$

   $\dfrac{8}{8} \to 8 \times 14 = 112$

3. (D) $10 - 3\,(3) = 10 - 9 = 1$

4. (C) Area of square $= 16 \times 4 = 64$ sq. units.

   Side of square = 8 units

   Perimeter $= 4 \times 8 = 32$ units

5. (C) Let the least number to be subtracted be x.

   Then $\dfrac{14 - x}{17 - x} = \dfrac{34 - x}{42 - x}$

   $\Rightarrow 588 - 56x = 578 - 51x$

   $\Rightarrow 5x = 10$

   or $x = 2$

6. (C) Total number of students = 1400

   The number of boys $= \dfrac{3}{5} \times 1400 = 840$

   $\therefore$ Total number of girls $= 1400 - 840 = 560$

7. (B) Let the shares of A, B and C be $3x$, x and $5x$ respectively.

   Given $5x - x = $ ₹ 3600 $\Rightarrow x = $ ₹ 900

   A's share + B's share $= 3 \times$ ₹ 900 + ₹ 900

   $= $ ₹ 3600

8. (B) Fishing is the second most popular hobby. Number of people who like fishing

   $= 7 \times 3 = 21$

   Number of people who like swimming $= 21 + 9 = 30$

Number of ⚲ symbols that should be recorded for swimming

$= 30 \div 3 = 10$

9. (C)
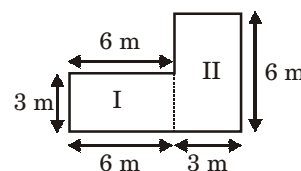
Area of I $= 6\,\text{m} \times 3\,\text{m} = 18\ \text{m}^2$

Area of II $= 6\,\text{m} \times 3\,\text{m} = 18\ \text{m}^2$

Total area $= 36\ \text{m}^2$

10. (A)
$$\begin{array}{r} 1\ldots.895\ \text{x}\ 9\ldots..312 \\ \hline \ldots\ldots\ldots 1790 \\ \ldots\ldots\ldots 895\text{x} \\ \ldots\ldots\ldots 85\text{xx} \\ \hline \boxed{2}\,4\,0 \end{array}$$

11. (C) $\dfrac{1}{2} \times \dfrac{2}{5} = \dfrac{1}{5}$

   $\dfrac{1}{5}$ of the children wore spectacles.

12. (D) $24 = 4 \times 3 \times 2 \times 1$

13. (C) As we move to the left on a number line the value of the number decreases and as we move to the right the value of the number increases.

14. (C) The angles are 16°, 64°, 100°, since $16° + 64° + 100° = 180°$.

15. (C) If a > b, then –a < –b

   If a < b, then –a > –b

   Since 56803 < 64122,

   $-56803 > -64122$.

16. (D) If the sum of the digits is 200, the number may not have less than $\dfrac{200}{9} \approx 22$ digits.

17. (B) $B = \dfrac{48}{3} = 16$ m

$\Rightarrow$ Side of square $= \dfrac{2(L + B)}{4} = \dfrac{128}{4} = 32$ m

Area of square $= 32 \times 32$ m^2 = 1024 m^2

18. (C) Number of rows $\times$ Number of flowers in each row = Number of flowers.

i.e., $3 \times x = 15 \Rightarrow 3x = 15$

19. (D) $5\% \rightarrow 2$ students

$100\% \rightarrow \dfrac{2}{5} \times 100$

$= 40$ students

20. (A) A straight angle measures 180°.

$35° + 145° = 180°$

21. (D) $\dfrac{3}{5} = 0.6$

$93.651 = 93 + 0.6 + \boxed{0.05} + 0.001$

$0.05 = \dfrac{0.1}{2}$

22. (C) A quadrilateral in a plane divides it into three parts - points inside the quadrilateral points on the quadrilateral and points outside the quadrilateral.

23. (C) $16 - 10 = 6$

24. (A) $13 \times 7 = 7 \times 13$ satisfies commutative property.

25. (B) $\dfrac{0.216 + 0.064}{0.36 + 0.16 - 0.24} = \dfrac{0.28}{0.28} = 1$

26. (A) APB is a straight line. Given that $\angle APD = 170°$

$\angle DPB = 180° - 170° = 10°$

27. (D) The largest number is 75321000 and the smallest number is 10002357.

$\therefore$ The difference in the place values of $2 = 20000 - 2000 = 18000$

28. (D) It has five sides.

29. (B) No other line except DH is perpendicular to AB.

30. (C) $\dfrac{1}{7} \times (1) = \dfrac{1}{7}$

So, y = 1 is the multiplicative identity of $\dfrac{1}{7}$.

31. (B) 3 right angles $= 90° \times 3 = 270°$

The angle in option (B) measures greater than 270°.

32. (C) $p - (-4) = 8$

$4 - (-4) = 4 + 4 = 8$

33. (D) Let the two numbers be $3x$ and $4x$

$\therefore$ H.C.F. of $3x$ and $4x = x$

Given $x = 4$

$\Rightarrow$ Numbers are $3 \times 4 = 12$ and $4 \times 4 = 16$

$\therefore$ L.C.M. of 12 and 16 = 48

34. (B) $x - 1 = 7$ is an equation.

35. (D) L.C.M. is always completely divisible by the H.C.F. So, 60 cannot be the L.C.M. of the two numbers.

36. (B) $a + 8 \geq 4 \Rightarrow a \geq -4$

37. (C) If $x = 3$, then $x + 2 = 3 + 2 = 5$

$\Rightarrow x(x + 2) + 1 = 3 \times 5 + 1 = 16$

If $x = 5$, then $x + 2 = 5 + 2 = 7$

$\Rightarrow x(x + 2) + 1 = 5 \times 7 + 1 = 36$

If $x = 11$, then $x + 2 = 11 + 2 = 13$

$\Rightarrow x(x + 2) + 1 = 11 \times 13 + 1 = 144$

All the resulting numbers are perfect squares.

38. (C) An equation need not always contain a variable.

39. (B) 34★68 will be divisible by 9, if the sum of its digits is divisible by 9.

i.e., $3 + 4 + ★ + 6 + 8 = 21 + ★$

$21 + ★$ should be equal to 27 to make it divisible by 9.

$\therefore$ ★ = 6.

40. (A) Twice a number $(x) = 2x$

8 less than twice the number $= 2x - 8$

41. (B) $187 \div 3 = 62$ R 1

42. (C) The angle w is a little more than 90°.

43. (B) $1 + \dfrac{2 - 3}{-1} \dfrac{-4 + 5}{+1} \dfrac{+6 - 7}{-1} \dfrac{-8 + 9}{+1} + ...$

$\dfrac{-2012 + 2013}{+1}$

$= 1 + (-1) + (+1) + ... + (-1) + (+1) = 1$

44. (A) $4 \times (x - 7)$

45. (B) Let the length of the smaller line segment be x cm.

Then, the length of the greater line segment $= (x + 2)$ cm

Given $(x + 2)^2 - x^2 = 32$

$\Rightarrow 4x = 32 - 4 \Rightarrow x = 7$ cm

$\therefore$ The length of the greater line segment $= 9$ cm

General Science

46. (B) Water exists in liquid state. It is measured in litres.

47. (D) Lode stones are called natural magnets.

48. (C) Rainbow formation occurs naturally in the sky.

49. (D) 1 litre = 1000 ml

    Volume of juice to be served for each guest = 200 ml

    Volume of juice required for 9 guests = 200 m$l \times 9 = 1800$ ml, 1.8 l or 1 l 800 ml

50. (A) Lactic acid bacteria are harmless which help in changing milk into curd.

51. (B) A star and streaks of bright light produced during lightning give out their own light.

52. (A) As per the given figures, option (A) is a transparent material, plastic or glass. It can be used for making lenses of spectacles. Glass/plastic being transparent makes everything clear for viewing.

53. (D) A magnetic compass always aligns in N–S direction. On right and left side of the compass the two bar magnets will form SN, SN poles.

54. (C) A solid substance (camphor) on burning directly changes into gaseous state. This process is called sublimation.

55. (D) A piece of electric wire, a battery/cell, a bulb and a switch are the essential components to make a simple electric circuit as shown below.
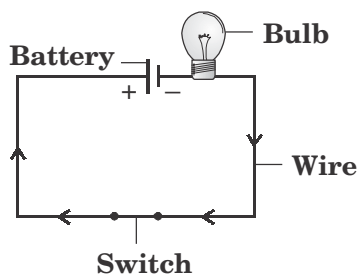
56. (B) Ice being lighter than orange juice floats above it.

57. (C) If a rod magnet is cut into two halves or several pieces, even in those pieces also, two poles will exist. Magnetic poles cannot be isolated.

58. (B) In extreme cold conditions, the big drops of water in the clouds solidify/freeze to form ice. This ice pieces fall as hailstones on the land.

59. (D) Among the given graphs, the graph in option (D) shows the correct lengths of shadows from 6 a.m. to 12 noon. Early morning and late evening shadows are long. As the time advances towards the noon, the sun is over our head or in the mid sky. Hence, the shadow is very short.

60. (D) Both liquids and gases need a container to store them. Liquids do not have a definite shape, they take the shape of the container in which they are stored. They have a definite volume. Gases have no definite shape and volume. They must be stored in containers with tight fitting lids, otherwise they will escape into the atmosphere.

61. (C) The ground water in Nalgonda district is polluted with excess amount of fluoride. Consumption of such water leads to a disease called fluorosis.

62. (C) (i) In circuit (II), 3 cells are arranged in series. Only one bulb in it glows the brightest. Chemical energy produced by the three cells is more than the consumption of light energy by the bulb.

    (ii) In circuit (I), 2 cells are arranged in series. The bulb will glow less brighter than the bulb in circuit (II).

    (iii) In circuit (III), 2 cells are arranged in parallel. The bulb glows less brighter when compared to the bulb in circuit (II).

    (iv) In circuit (IV), 2 cells are arranged in parallel. The two bulbs will glow the least brightest than the bulbs in circuits (II), (I) and (III).

    The correct order of arrangement of bulbs glowing from the most brightest to the least brightest is II, I, III, IV.

63. (C) Sea water contains common salt. When sea water enters into lagoons, it undergoes evaporation by sunlight. After the water content evaporates, salt crystals are obtained.

64. (A) When some iron pins are brought near P, Q, R and S, they will be attracted at the ends P and Q only because poles have the maximum force of attraction for magnets and magnetic substances.

65. (A) When sunlight falls on water bodies, small droplets of water escape into the atmosphere as water vapour. A part of the water vapour remains in the atmosphere and the remaining reaches the clouds. Once the clouds are full, the water vapour condenses and falls as rain on the land.

66. (D) (i) A rainbow is formed when the sun shines while it is raining. When sunlight enters each rain drop, they act as prisms splitting the white sunlight into a spectrum of seven colours.

(ii) The sun rises in the east and sets in the west. It is a natural phenomenon.

(iii) Evaporation of water occurs when sunlight falls on all water bodies. It is an invisible natural cycle of water.

67. (D) Statements (A), (B) and (C) are true for a chemical change

    (i) When reactants undergo a chemical change, a change in colour of products is observed.

    (ii) A new substance as product is formed always during a chemical change.

    (iii) It is an irreversible change because we cannot get back the original reactants after the product(s) are formed.

68. (D) Sulphur dioxide, nitrogen dioxide and nitric oxide combine with the water vapour present in the atmosphere to form acid rain.

69. (B) A metre rod is a standard tool made up of a metal. It has 100 cm and a very thick line for every 10 cm is engraved on it. We can buy the cloth in centimetres/fraction of a metre(s) according to our requirement.

70. (C) Light rays travel in a straight line.

71. (B) 100 cm = 1m, 1000 m = 1 km. Centimetre and metre are too small to measure long distances. Hence, kilometre, a multiple of metre is used to measure the distance between Hyderabad and Delhi.

72. (B) A strainer has a mesh enclosed in a structure with a handle to hold it. Tea decoction is poured on to the strainer which separates tea leaves and decoction.

73. (B) From the given options, option (B) is correct. Copper wire 'X' acts as a conductor which is insulated with plastic material 'Y' to prevent it from shocks and short circuit.

74. (B) (i) Shadows are formed because light rays travel in a straight line.

    (ii) Light rays cannot pass through opaque objects.

75. (D) A magnet always aligns itself in North-South direction.

76. (B) Tomatoes are an excellent source of vitamic C and are very rich in carotenoid lycopene. Eating foods with carotenoids and lycopene can lower the risk of cancer.

77. (D) Sponges are the sedentary organisms in animal kingdom.

78. (C) An avocado has more than twice as much potassium as a banana.

79. (C) Animals like cow, buffalo, camel etc. chew their food very quickly, swallow and store it in a part of their stomach. After some time, they bring back the food material from the stomach to the mouth and chew it again. This process is called rumination.

80. (D) A rat can last longer without water than a camel can.

81. (B) The given figure shows the food chain in water. Worms, larvae eat small water plants. Eggs, worms and larvae are eaten by fish and frogs. Fish and frog are food for a crane.

82. (C) Ants do a lot of things. Their colony has large ant forces to work. Just as we keep cows for milk, ants keep a type of insect called aphids for honey dew. Like humans ants are good farmers. They grow fungus to eat.

83. (D) Eagles fly to a great height. Penguin, ostrich and emu are flightless birds.

84. (D) In pond water leech and mosquito larva are found in midwater region.

85. (C) Prawn - Aquatic
Rabbit - Burrowing
Crow - Tree
Cactus - Desert

i-q, ii-p, iii-s, iv-r

86. (B) Raddish - storage root
Turmeric - storage stem

87. (C) Through a system of tubes, the stem supplies food and water to the plants.

88. (D) Silk fabrics are slippery, smooth and shiny.

89. (B) Ball and socket joint is the joint found between the shoulder blades and the bones of arm.

90. (C) A snake is a vertebrate. It has a long backbone and several muscles. Usually the snake's body curves into many loops and helps it to move forward.