



UNIFIED COUNCIL

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NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION - 2011

SOLUTIONS FOR CLASS : 8

Mathematics

1. (D) This is an identity, so it is true for every value of x except zero.
2. (C) $\sqrt{3} + \sqrt{3} = 2\sqrt{3} \rightarrow$ irrational
 $\sqrt{3} - \sqrt{3} = 0 \rightarrow$ rational
 $\sqrt{3} \times \sqrt{3} = 3 \rightarrow$ rational
 $\sqrt{3} \div \sqrt{3} = 1 \rightarrow$ rational
3. (B) $(0.11)^3 + (0.22)^3 + \dots + (0.99)^3$
 $= \left(\frac{11}{100}\right)^3 (1^3 + 2^3 + \dots + 9^3) = 2.695$
4. (B) $CD = 22 - 16 = 6$ cm ; $AD = 6 + 2 = 8$ cm
 $AC = \sqrt{6^2 + 8^2} = 10$ cm
 \Rightarrow The line joining the mid points of AB and BC is parallel to AC and half of AC.
 \Rightarrow The required length = $\frac{1}{2} \times 10 = 5$ cm
5. (A) $3^x = \frac{\sqrt{3}}{9} = 3^{\frac{1}{2}-2} = 3^{-\frac{3}{2}}$
 $\Rightarrow x = \frac{-3}{2}$
6. (D) $a + b + c = 0 \Rightarrow a + b = -c$
 $b + c = -a$
 $a + a = -b$
 $(a + b - c)^3 + (b + c - a)^3 + (c + a - b)^3$
 $= (-2c)^3 + (-2a)^3 + (-2b)^3$
 $= -8(a^3 + b^3 + c^3)$
 $= -8(3abc)$
 $= -24abc$
7. (C) $\sqrt{1681} = 41$
8. (B)
9. (B) $\sqrt{15876} = 126$
 \therefore units digit = 6
10. (C) $P = \frac{-27}{64}$ $Q = \frac{4}{25}$ $R = \frac{9}{100}$ $S = \frac{144}{100}$
 $P = \frac{-2700}{6400}$ $Q = \frac{1024}{6400}$ $R = \frac{576}{6400}$ $S = \frac{9216}{6400}$
 $\therefore S > Q > R > P$
11. (A) $\frac{50}{100}(x - y) = \frac{30}{100}(x + y)$
 $\Rightarrow 20x = 80y$
 $\Rightarrow \frac{y}{x} \times 100 = \frac{20}{80} \times 100 = 25\%$
12. (B)
13. (B) 2 times \rightarrow 4 years
8 times = 2^3 times $\rightarrow 3 \times 4 = 12$ years
(or) $2^{\frac{1}{4}} = 8^{\frac{1}{t}}$
 $2^{\frac{1}{4}} = 2^{\frac{3}{t}}$
 $\frac{1}{4} = \frac{3}{t}$
 $t = 12$ years.
14. (A) $x - y = 1$
 $x^2 + y^2 - 2xy = 1$
 $\Rightarrow 2xy = 40 \Rightarrow xy = 20$
 $(x + y)^2 = x^2 + y^2 + 2xy = 41 + 40 = 81$
 $x + y = \pm 9$
15. (B) Area of rhombus = side \times height
 $= 10 \times 5$
 $= 50$ sq.m
16. (A) $C = CP, S = SP, M = MP, L =$ List price
 $P =$ profit
Given, $C = L - \frac{1}{4}L = \frac{3}{4}L$
 $S = M - \frac{1}{5}M = \frac{4}{5}M$
 $S = C + P$

$$\frac{4}{5}M = \frac{3}{4}L + \frac{1}{4} \cdot \frac{4}{5}M$$

$$\Rightarrow M = \frac{5}{3} \times \frac{3}{4}L = \frac{5}{4}L$$

$$\therefore \text{percentage required} = \frac{5}{4} \times 100 = 125\%$$

17. (C) $(x+y)^{-1} \cdot (x^{-1}+y^{-1})$

$$= \left(\frac{1}{x+y} \right) \left(\frac{1}{x} + \frac{1}{y} \right)$$

$$= \frac{1}{x+y} \times \frac{x+y}{xy}$$

$$= \frac{1}{xy} = x^{-1}y^{-1}$$

18. (C) Since doubling the radius of a given circle quadruples the area.

19. (D) $v = \pi r^2 h = \pi (2r)^2 (2h)$

$$= 8(\pi r^2 h)$$

$$\therefore 8 \text{ times}$$

20. (C) $\frac{S_1}{100+x_1} = \frac{S_2}{100+x_2}$

$$\Rightarrow \frac{880}{100-20} = \frac{S_2}{100+10}$$

$$\Rightarrow S_2 = \frac{880}{80} \times 110 = ₹1210$$

21. (B) The one's digit, when divided by 5, must leave a remainder of 3. So the one's digit must be either 3 or 8.

22. (C) $(a+b)^2 = a^2 + 2ab + b^2 \quad \forall a, b \in \mathbb{R}$
i.e. set of real numbers.

23. (C) $\frac{-7}{8} - \frac{5}{12} = x$

$$\frac{-21-10}{24} = x$$

$$\frac{-31}{24} = x$$

24. (C) $\left[2 - 3(1)^{-1} \right]^{-1} = \left(2 - \frac{3}{-1} \right)^{-1} = 5^{-1} = \frac{1}{5}$

25. (B) $x = \frac{ky}{z^2}$

$$10 = \frac{k(4)}{14^2} \Rightarrow k = \frac{10 \cdot 14^2}{4}$$

$$\therefore x = \frac{\frac{10 \cdot 14^2}{4} \times 16}{7^2} = 160$$

Physics

26. (B) Vinegar is a good conductor of electricity. Hence, X is vinegar.

27. (B) Frictional force is a relative force between two surfaces in contact. Thus, frictional force acts in a direction opposite to the direction of motion. Secondly, motion of a body will be in the direction of pushing force.

28. (C) Object distance after shifting the object 0.5 m = 4 m + 0.5 m = 4.5 m

For a plane mirror;

$$\text{Object distance} = \text{Image distance} = 4.5 \text{ m}$$

$$\text{Distance between the object and its image} = 4.5 + 4.5 = 9 \text{ m}$$

29. (A) The constellation is Orion.

30. (A) Car bumpers are coated with chromium. As chromium prevents rusting, corrosion due to moisture. The coating also gives a better look but it is not a main reason for consideration.

31. (B) Focus is the point of initial rock movement along a fault during an earthquake.

32. (C) $\text{Pressure} = \frac{\text{Thrust (weight)}}{\text{Area}}$

For same mass, weight acted upon by all the objects is same. Hence, pressure depends inversely on base area. For the greatest pressure, the base area must be the least. In given options (C) has the least base area, the greatest pressure.

33. (C) The letters that are not changed when the word is seen by reflection are : X, A, M, I, A, T, L, O i.e. 8 letters.

34. (C) During lightning the path followed by discharge of accumulated electric charges appear as streaks of bright light.

35. (D) When a stationary bowling ball is slid by the exertion of force, there will be a change in the position of a stationary object.

36. (A) As both blocks have same mass, the friction depending on the weight of the blocks is not affected. Secondly, friction depends on nature of the surfaces and sand paper is more rough than ice block. Ice block offers least friction than sand paper block. Hence, ice block reaches the bottom of the tray first.

37. (A) If you are inside a building when an earthquake occurs then it is best to leave the building at once. So, that any destruction is likely to cause to a building then, can easily save our life.

38. (D) 'X' is eardrum it converts sound vibrations from middle ear to the inner ear.

39. (C) The angle between the incident ray and reflected ray = $\angle i + \angle r$

From the figure, $\angle i = 90 - 25$

$$\angle i = 65^\circ = \angle r \text{ and (laws of reflection)}$$

$$\begin{aligned}\angle i + \angle r &= 65^\circ + 65^\circ \\ &= 130^\circ\end{aligned}$$

40. (B) An LED has two wires. One LED is slightly longer than the other. The longer lead is always connected to a positive terminal of the battery while shorter lead is always connected to a negative terminal of a battery. In the circuit switch is also present. A switch only in its ON position can glow the LED.
41. (A) Friction is the relative between two surfaces in contact, which causes the decrease in the movement of a body or sometimes may even prevent the motion.
42. (D) On undergoing stress of a rock, the rock responding to stress depends on:
(a) its temperature
(b) how slowly or quickly the stress is applied
(c) the confining pressure on the rock.
43. (C) Dispersion of sunlight is splitting of white light into seven coloured rays. Just after rain there are a large number of water drops in the air which act like small prisms. As the white sunlight enters and leaves these water drops, the various coloured constituents of white light are refracted by different amounts, and a band of seven colours called rainbow is produced.
44. (A) For throwing a stone at a bird, we need to apply a pushing force.
45. (B) A mosquito vibrates its wings very rapidly hence for this reason it produces a sound of high frequency. Higher the frequency of sound greater is the pitch of that sound wave.
46. (C) An LED can glow even when a weak electric current flows through it.
47. (A) $\text{Pressure} = \frac{\text{Thrust}}{\text{unit area}}$. If area of cross section is high, then low pressure is exerted due to thrust. In case of wide tyres of a heavy vehicle the pressure exerted by the tyres is less on the road.
48. (D) Pitch is the characteristic of sound that depends on the frequency of sound. Higher the pitch, greater is the frequency of the sound. Hence, high pitch, high frequency.
49. (B) Aircraft, rocket and fish have stream lined shapes to reduce friction.
50. (D) Sound can travel through solids, liquids as well as gases. Glass of water (liquid), balloon full of air (gas), iron bar (solid). Through all of these materials sound can

travel through as they are material mediums.

Chemistry

51. (A) Coal, petroleum and natural gas are fossil fuels. Fossil fuels are formed from the dead remains of living organisms by anaerobic degradation for millions of years. Hence, this preparation of fossils fuels in laboratory is not possible.
52. (C) Metals generally have high density, hence metal spoon, thumbtack sink in water. Marble being a stone also sinks in water, but cork being lighter floats on water. (Since cork is made of cellulose a non metal compound which is very light in weight).
53. (B) A flame is always pointed upwards because the gases produced in the flame are hot and hot gases are lighter and rise up.
54. (B) By using the biodegradable plastic bags the pollution due to used plastic bags can be avoided.
55. (B) Gold being less reactive than hydrogen, and is placed below hydrogen in reactivity series, cannot produce hydrogen gas on reaction with acids.
56. (C) Petrol is a fuel with low ignition temperature than coal. Hence, catches fire easily and may cause damage. So, more care is needed to preserve petrol than coal.
57. (A) A nylon thread is stronger than a steel wire. So it is used in making parachutes, stockings and ropes for rock climbing etc.
58. (D) Coal tar is a black, thick liquid with unpleasant smell. It is one of the product obtained on processing of coal. Napthalene balls to repel moths are also obtained from coal tar.
59. (B) As CNG is less polluting and cleaner fuel it is used as a fuel for transport vehicles.
60. (D) When heat is supplied to the paper cup containing water, the supplied heat is transferred to water by conduction. So, in the presence of water, the ignition temperature of paper is not reached. Hence, it does not burn.
- Observation :** Paper cup with water does not burn.
- Conclusion :** Paper cup loses heat to the water and temperature of water increases.
61. (A) The reactivity of the metals given in the options is as follows:
 $K > Mg > Cu > Ag$. Magnesium reacts vigorously with steam but slowly with water. Hence, X is magnesium.
62. (B) Natural polymers are polymers produced by living organisms. They include natural rubber and natural food stuff. Polyester is a synthetic fibre (not a natural polymer).

63. (D) Lubricating oil is not used as a fuel in electric generators.
64. (C) As copper is used as electrical wire, it can be drawn into wires (ductile) and is a good conductor of electricity.
Secondly, it is used to make cooking vessels i.e., it is malleable and is a good conductor of heat. Low melting point is not a property of copper.
65. (B) Polywool is a mixture of polyester and wool.
66. (C) Carbon dioxide is the best extinguisher for inflammable materials like petrol, because it is heavier than oxygen, covers the fire like a blanket. Since the contact between the fuel and oxygen is cut off, the fire is controlled. Secondly, it does not harm the electrical equipment.
67. (B) Kerosene is mainly used as a fuel in jet engines.
68. (B) The outermost zone (non luminous) of the flame is blue. It is the hottest part in the flame because of complete combustion of fuel. Due to more temperature, it can melt metals of high melting point like gold easily.
69. (D) Synthetic fibres cannot absorb sweat easily so, David's mother advised him not to wear them in hot and humid weather.
70. (A) Iron being more reactive than copper displaces it from the oxide forming iron (II) oxide and copper.
77. (C) The fusion of ovum and sperm is called fertilization.
78. (D) Our efforts in conserving and preserving living organisms are greatly helped by modern science and technology.
79. (D) Uterus is a sac well supplied with blood vessels along its walls. The wall develops a spongy cushion (endometrium) which disintegrates every month except when a baby is developing in it.
80. (A) In human's other than gametes have diploid set of chromosomes, human egg cell is called a gamete, are formed after undergoing (meiosis) Meiotic cell division. In meiosis the number of chromosomes are reduced to half. Hence the egg cell has half the number of chromosomes of skin cell.
81. (B) Release of nitrogen into the air by the action of bacteria on decaying matter is called denitrification.
82. (D) Deforestation leads to reduced rainfall, soil erosion, destruction of habitat and climatic changes.
83. (C) This is because the eggs and sperms get exposed to water movement, wind and rainfall. Also there are other animals in the pond which may feed on eggs. Thus production of large number of eggs and sperms is necessary to ensure fertilisation of atleast few of them.
84. (C) Vegetables are grown during summer at many places.
85. (D) Cytoplasm is a colourless liquid-like jelly, cell wall maintains the shape of the cell and nucleus contains genetic information.
86. (C) Fungi, Bacteria and algae contain cell wall as a common character. Cell wall is either made up of cellulose or chitin.
87. (C) Fishes feed on larvae of mosquito.
88. (C) MEF stands for Ministry of Environment and Forests. It initiated a "Project Tiger" funded by WWF to save tiger population from exploitation by Man but for its multiplication in its "Natural Habitat".
89. (D) Pathogens spread through air, water, by body contact and through vectors.
90. (A) Only one egg is released by one of the ovaries every month.

Biology

71. (C) In the given figures R is Penicillin.
72. (B) Soyabean is a leguminous plant and is a rich source of protein
73. (C) Some bacteria and blue green algae like NOSTOC are able to fix nitrogen from the atmosphere to enrich soil with nitrogen and increase the soil fertility.
74. (B) The hormone thyroxine controls metamorphosis in frog. Tadpoles get iodine dissolved in water to produce thyroxine hormone.
75. (C) The given diagram represents binary fission in amoeba.
76. (B) A male (sperm) has one X chromosome and one Y chromosome when a sperm containing X chromosomes fertilises the egg develop into zygote would have two X chromosomes i.e., female. If the sperm contributes a Y chromosome to the egg at fertilisation the zygote would develop into a male child.

