



UNIFIED COUNCIL

An ISO 9001:2008 Certified Organisation

nstse

Test • Assess • Achieve

NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION

Paper Code: UN415

Solutions for Class : 7

Mathematics

1. (A) Let the number be x . Then,
 $x - 4 = 80\%$ of x
 $\Rightarrow x - 4 = \frac{80}{100}x$
 $\Rightarrow \frac{x}{5} = 4 \Rightarrow x = 20$
2. (A) $AB + BC = 10$ cm
 $BC + CA = 12$ cm
(+) $CA + AB = 16$ cm

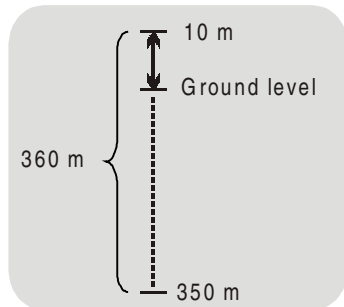
 $2(AB + BC + CA) = 38$ cm

 $\Rightarrow AB + BC + CA = 19$ cm
3. (A) Let the present ages of A and B be $2x$ years and x years.
After 30 years, their ages will be
 $A = (2x + 30)$ years
 $B = (x + 30)$ years
So, $2x + 30 = 1\frac{1}{2}(x + 30)$
 $\Rightarrow 4x + 60 = 3x + 90$
 $\Rightarrow x = 30$
 \therefore Present age of B = 30 years
 \Rightarrow Present age of A = 2×30
 $= 60$ years
4. (C) Multiplication distributes over addition and subtraction.
 $2(3 + 4) = 2 \times 3 + 2 \times 4$ and $3(6 - 4) = 3 \times 6 - 3 \times 4$.
5. (C) $a^3 - 2a^2 + 4a - 5$
(-) $-a^3 + 2a^2 - 8a + 5$
(+) (-) (+) (-)

 $2a^3 - 4a^2 + 12a - 10$
6. (A) Total length of the rope = 30 m
Length of each piece = $3\frac{3}{4}$ m
Number of pieces
 $= \frac{30}{3\frac{3}{4}} = \frac{30}{\frac{15}{4}}$
 $= 30 \times \frac{4}{15} = 8$
7. (B) Profit on one watch = 10%
Loss on the other = 10%
 \therefore Loss on the whole =
 $\frac{10 \times 10}{100} = 1\%$ loss
8. (C) BC is the hypotenuse of the given triangles, whose measure must be known.
9. (C) According to the problem.
 $87 = 2x + 7$ where x is the lowest marks.
 $87 = 2x + 7$
 $\Rightarrow 80 = 2x$
 $\Rightarrow x = 40$
10. (B) $\frac{11}{4} = 2\frac{3}{4}$
So, $\frac{11}{4}$ lies between 2 and 3.
11. (D) The angle representing students who like other juices is
 $360^\circ - (90^\circ + 75^\circ + 135^\circ)$
 $= 360^\circ - 300^\circ = 60^\circ$
Total number of students = 360
 \therefore Required number of students
 $= \frac{60^\circ}{360^\circ} \times 360 = 60$

12. (C) The lift has to descend 360 m so as to reach -350 m, as it is 10 m above the ground level.

Given that the lift descends at the rate of 6 m/minute.



$$6 \text{ m} \rightarrow 1 \text{ minute}$$

$$360 \text{ m} \rightarrow \frac{360}{6} \times 1 = 60 \text{ minutes}$$

$$= 1 \text{ hour}$$

13. (B) Total number of pages in the book = 216

No. of pages read by Suresh

$$= \left(\frac{3}{4} \text{ of } 216 \right) = \left(216 \times \frac{3}{4} \right)$$

$$= \frac{216}{1} \times \frac{3}{4} = \frac{216 \times 3}{1 \times 4} = 162$$

Hence, Suresh read 162 pages during last week.

14. (A) Given, the angles $(2a - 10)^\circ$ and $(a - 11)^\circ$ are complementary angles.

$$\therefore (2a - 10)^\circ + (a - 11)^\circ = 90^\circ$$

$$\Rightarrow 2a^\circ - 10^\circ + a^\circ - 11^\circ = 90^\circ$$

$$\Rightarrow 3a^\circ - 21^\circ = 90^\circ$$

$$\Rightarrow 3a^\circ = 90^\circ + 21^\circ = 111^\circ$$

$$\Rightarrow a = \frac{111^\circ}{3} = 37^\circ \quad \therefore a = 37^\circ$$

15. (B) The exterior angle of a triangle is equal to the sum of interior opposite angles.

16. (C) $\frac{3}{4} = 0.75$; $\frac{1}{2} = 0.5$; $\frac{69}{88} = 0.78$

$$\frac{9}{11} = 0.82$$
; $\frac{13}{11} = 1.18$; $\frac{1}{4} = 0.25$

Of the given rational numbers as 0.78 lies between 0.75 and 0.82, $\frac{69}{88}$ lies between

$$\frac{3}{4} \text{ and } \frac{9}{11}.$$

17. (D) According to the properties of a triangle, all the given statements are true.

18. (A) Given that $\triangle ABC \cong \triangle XYZ$ and $BC = YZ$

$$\therefore \angle A = \angle X$$

Similarly, $\angle y = \angle B = 60^\circ$.

19. (D) Circumference = Area (Given)

$$\Rightarrow 2\pi r = \pi r^2 \Rightarrow r = 2$$

$$\text{Diameter} = 2r = 2 \times 2 = 4$$

20. (D) $\frac{m}{5} + 8 = 4 - 3m$

$$\Rightarrow \frac{m}{5} + 3m = 4 - 8 = \frac{16m}{5} = -4$$

$$\Rightarrow m = -4 \times \frac{5}{16} = \frac{-20}{16}$$

$$\Rightarrow m = \frac{-5}{4}$$

21. (C) Here we equate the areas,

$$\text{i.e., } AB \times DL = BC \times DM$$

$$\Rightarrow 18 \times DL = 12 \times 10$$

$$\Rightarrow DL = \frac{12 \times 10}{18} = \frac{20}{3} = 6\frac{2}{3} \text{ cm}$$

22. (D) $a + b + c = 180^\circ$
(Sum of angles in a triangle)

$$\text{Also, } x + a + y = 180^\circ$$

(Angle on a straight line)

$$\therefore a + b + c = x + a + y$$

23. (B) One way to deal with fractions is to convert them all to decimals.

In this case all you would need to do is to see which is greater than 0.5.

Otherwise to see which is greater than $\frac{1}{2}$, double the numerator and see if the result is greater than the denominator. In B, the correct answer, doubling the numerator gives us 8, which is bigger than 7.

24. (D) Indian stamps are common to both ratios. Multiply both ratios by factors such that the Indian stamps are represented by the same number.

$$\text{US : Indian} = 5 : 2, \text{ and}$$

$$\text{Indian : British} = 5 : 1.$$

Multiply the first by 5, and the second by 2.

Now US : Indian = 25 : 10, and
Indian : British = 10 : 2

Hence the two ratios can be combined
and US : British = 25 : 2

25. (B) Radius of a wheel = $\frac{70}{2} = 35$ cm

In one revolution, the wheel covers a distance equal to its circumference

$$\therefore 2\pi r = 2 \times \frac{22}{7} \times 35$$
$$= 220 \text{ cm}$$

In 24 complete revolutions, distance covered

$$= 24 \times 220 = 5280 \text{ cm}$$

Physics

26. (C) The image formed in a plane mirror is at the same distance behind the mirror as the object is in front of the mirror.

27. (C) Time = 30 min = $\frac{1}{2}$ h Speed = 60 km/h

$$\therefore \text{Distance} = \left(60 \times \frac{1}{2} \right) \text{ km} = 30 \text{ km}$$

28. (D) As a shiny surface is a good reflector of heat, it slows down the rate of heat radiation. Oil storage tanks are painted with aluminium paints to keep the oil cool for a longer time.

As a black surface is the best absorber of heat, pipes on solar water heaters are painted black to absorb radiations from the Sun quickly.

As a black surface is also the best radiator of heat, pipes at the back of refrigerators are painted black to allow heat lost to the surroundings quickly.

29. (D) When wires are wound around an iron bar and electricity is passed through the wire, the iron bar becomes a magnet.

30. (B) 7.55 is the lateral inversion of 4.05, which is the correct time.

31. (C) If a body covers equal distances in equal intervals of time, it is said to be in uniform motion.

32. (A) Radiation is the way by which heat energy can be transferred within a distance without direct contact. i.e. solids and liquids. Therefore, in the outer space, the heat energy transmitted by the Sun can reach the Earth through a vacuum (without the presence of gases).

33. (B) An ammeter is a device that can be used to measure electric current in a circuit.

34. (D) Light cannot penetrate through solids as they are opaque.

35. (B) To use a certain liquid in a thermometer, it must stay at the same state (liquid) within a range of required temperatures. To have a thermometer that is able to measure temperature between -50°C and 50°C we use the one that has freezing point below -50°C and boiling point above 50°C . i.e. alcohol. Otherwise, the liquid would have frozen before it reaches -50°C and it would have vaporised before it reaches 50°C .

36. (A) A car parked in a parking lot is an example of a body at rest as there is no change in its position at that particular time.

37. (D) When current flows through the filament of a bulb in a circuit, electrical energy is converted into light and heat energy.

38. (D) Thermal equilibrium is achieved when two systems are in thermal contact with each other until there is no more heat-flow. It follows that if two systems are in thermal equilibrium, then their temperatures are the same.

Ice and water can be found in thermal equilibrium if and only if their temperature is at 0°C .

39. (B) The image formed by a plane mirror is always virtual, erect and of same size as that of the object but not smaller than the object.

40. (A) When the switch of an electric bell is pressed on, current flows in the electromagnet. It then attracts the iron rod towards itself, causing the hammer to strike the gong. At the same time, the armature loses contact with the screw and the current is switched off.

This causes the electromagnet to lose its magnetism and the armature springs back to its original position to close the circuit once again. Current flows again and the cycle repeats itself till the current is switched off.

41. (B) Only mercury thermometer uses expansion and contraction of liquid as temperature changes.

42. (C) A convex lens can form real and inverted images of objects.

43. (A)
$$\text{Speed} = \frac{\text{Distance covered}}{\text{Time}} = \frac{2\pi r}{60} \text{ cm/s}$$

$$= \frac{2 \times \frac{22}{7} \times 5}{60} = 0.52 \text{ cm/s}$$

44. (C) The sole of an electric iron needs to be hot during ironing. The material used must be able to conduct heat well.

45. (A) Railway tracks need gaps between them as they will expand during hot days. Otherwise, the railway tracks may buckle.

46. (C)
$$112 \times \frac{5}{18} = 31.1 \text{ m/s}$$

47. (D) The amount of heat produced in a wire depends on its length, thickness and material. The tungsten filament in an electric bulb is very thin and coiled. In electrical appliances like iron, geyser, room heater etc., heating elements made of nichrome are thick. For various requirements, the wires of different materials, lengths and thicknesses are used depending on the amount of heat to be produced.

48. (C) A spherical mirror with its reflecting surface on the outside is a convex mirror.

49. (C) 50 km/h means the bicycle travels 50 km in 1 hour.

For the first 2 hours, the distance travelled is $50 \times 2 = 100 \text{ km}$.

For the remaining journey, the time taken is $\frac{30}{60} = 0.5 \text{ hour}$.

The total distance travelled is $100 + 30 = 130 \text{ km}$, and the total time taken is $2 + 0.5 = 2.5 \text{ hours}$.

The average speed of the bicycle is $\frac{130}{2.5} = 52 \text{ km/h}$.

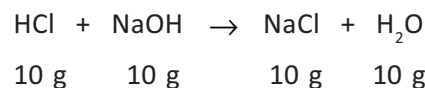
50. (C) Taking a shower bath does not produce heat.

Chemistry

51. (C) A natural disaster that is characterized both by thunder and lightning is a thunderstorm. Huge sparks are produced due to attraction between the oppositely charged clouds or between a cloud and the ground resulting in lightning. This lightning heats up the air in its path so quickly and produces a loud booming sound called thunder. This is the thunder we hear along with the lightning.

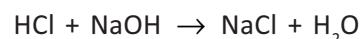
52. (B) Law of conservation of matter states that matter cannot be created nor destroyed. The total mass stays constant.

This law is true in both chemical reactions and physical changes.



53. (B) The browning of the apple flesh when exposed to air is due to oxidation. Salt water, therefore helps prevent the oxidation process in apples.

54. (D) A neutralisation reaction occurs between an acid and a base. Salt and water are produced as shown below.



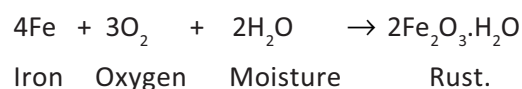
55. (A) Air exerts its pressure in all directions.

56. (B) A piece of toast when placed in a toaster for 10 minutes, hardens and turns black. It is a chemical change as a new substance, black mass of toast is formed.

57. (B) Dilute acid is a corrosive substance. Acids and alkalis are corrosive chemicals.

58. (D) The power generated from water is called hydroelectric power.

59. (B) Statements (A) (C) and (D) are incorrect. Rust is hydrated iron oxide



60. (C) Andhra Pradesh has a very long coastline extending to several kilometres which is most likely to be hit by cyclones frequently.

61. (B) The compound that produces hydroxyl ions in water are called bases. A base when dissolved in water is called an alkali. Most of the metallic oxides like alkali and alkaline earth metals when dissolved in water yield hydroxide ions. All bases are not alkalis and all alkalis are not bases. There are some metallic oxides like copper, lead etc., when dissolved in water do not yield hydroxide ions. A base is a more appropriate option for the specified question and grade.
62. (D) A volcanic eruption is not associated with cyclone.
63. (C) If an iron article is coated with oil, grease or paint, it may rust again once the coat is lost due to cracks. The best method to prevent rusting of iron article is to coat it with a non-rusting metal like zinc. This process is called galvanisation.
64. (B) Egg-shells are made up of calcium carbonate. When it reacts with HCl, CO₂ gas is evolved that turns lime water milky as given below.
- $$\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2 \uparrow$$
65. (C) When an iron nail is placed in a container of tap water for several days, it forms a new substance called rust. It is a chemical change.
66. (B) When the speed of wind increases the pressure decreases. This principle was given by Bernoulli.
67. (D) A solution that turns red litmus blue is a base and its pH should be >7.
68. (C) Cutting down vegetation to reduce water lost by transpiration is not a method to conserve water. Retaining vegetation helps to absorb fresh, rain water on the surface of land by preventing its flow into water bodies and thus recharges groundwater.
69. (B) The 'eye' of a cyclone is the least pressure area with very high speed winds revolving around it.
70. (C) In a combination reaction, two or more substances combine to form a single substance.
- Biology**
71. (A) The gas that is diffusing out of the body cells is carbon dioxide.
72. (B) In the given equation X is carbon dioxide and Y is oxygen.
73. (B) The given figure is of mucor. It is the example of fungi.
74. (C) 'P' is Heart, 'Q' is stomach and 'R' is lungs.
75. (C) In the given correlation silk-cocoon. wool-fleece of sheep.
76. (B) The digestive system digest the substances by the action of enzymes and are made to be absorbed for the bodys growth and repair.
77. (D) X-WBC produces antibodies and Y-platelets help in blood clotting.
78. (D) In human beings exchange of gases takes place in alveoli.
79. (B) Transpiration takes place through stomata.
80. (C) Polar region animals have thick fur, that helps to keep their body warm.
81. (A) In the given figure 'X' is cross pollination and 'Y' is self pollination.
82. (C) Double circulation is shown by
Heart → Lungs → Heart → Organs → Heart
83. (C) Yeast is a fungus. It respire anaerobically, used in making wine and reproduces by budding.
84. (D) Sponges are multicellular organisms.
85. (A) The given figure should hands of mammals. They all have opposable thumbs to hold things.
86. (B) Potato, ginger, onion and sugarcane vegetatively reproduces from their stem parts.
87. (A) A-Horizon that contains top layer of soil provides shelter for many living organisms.
88. (B) The complete digestion and absorption of digested food takes place in small intestine.
89. (C) Earthworm moves with the help of body segments, euglena with flagella, paramecium with cilia and Hydra with tentacles.
90. (D) The seed in figure S is dispersed by animals.