

ANSWER SET - 03

01. (2)02.(3) 03. (2)04.(1) 05. (4)
 06. (3)07.(3) 08. (1)09.(4) 10. (4)
 11. (3)12.(4) 13. (1) 14.(2) 15. (1)
 16. (3)17.(4) 18. (3) 19.(4) 20. (1)
 21. (2)22.(3) 23. (2) 24.(3) 25. (2)
 26. (1)27.(4) 28. (2)29.(4) 30. (3)
 31. (2)32.(3) 33. (4) 34.(1) 35. (3)
 36. (4)37.(2) 38. (2) 39.(3) 40. (3)
 41. (1)42.(4) 43. (3) 44.(2) 45. (3)
 46. (1)47.(4) 48. (1) 49.(2) 50. (3)
 51. (2)52.(1) 53. (3) 54.(2) 55. (3)
 56. (1)57.(1) 58. (1) 59.(3) 60. (3)
 61. (3)62.(3) 63. (3) 64.(3) 65. (3)
 66. (2)67.(1) 68. (4) 69.(4) 70. (4)
 71. (3)72.(3) 73. (4) 74.(4) 75. (1)
 76. (4)77.(2) 78. (2) 79.(3) 80. (4)
 81. (3)82.(1) 83. (4) 84.(4) 85. (4)
 86. (3)87.(4) 88. (1) 89.(4) 90. (2)
 91. (2)92.(2) 93. (3) 94.(2) 95. (4)
 96. (1)97.(4) 98. (4) 99.(1)

EXPLANATION - 03

01. Snake eats frog, frog eats **Insects**.
 02. Position of B is 2 $\Rightarrow 2^4 = 16$ then
 03.
 04. $4 + 5 + 8 = 4 + 8 - 5 = 7$ then
 $6 + 4 + 5 = 6 + 5 - 4 = 7$
 05. Except point, all are geometrical figure.
 06. **Minar of Pisa** is in Italy whereas others are in India.
 07. Except **246** rest are square of natural numbers. $729 = 27^2$, $225 = 15^2$, $625 = 25^2$

08. $Y \xrightarrow{-8} Q \xrightarrow{-8} I$
 $V \xrightarrow{-8} N \xrightarrow{-8} F$
 $S \xrightarrow{-8} K \xrightarrow{-8} C$
 $\therefore ? = \mathbf{IVK}$

09. $4^2 + \frac{6^2}{2} = 16 + 18 = 34$

$9^2 + \frac{8^2}{2} = 81 + 32 = 113$

$1^2 + \frac{3^2}{2} = 1 + 4.5 = 5.5$

10. Golden anniversary is celebrated in 50 years
 Number of leap years in 50 years = 12
 Number of odd days = $12 \times 2 = 24$
 Normal years = 38
 Number of days = 38
 Total number of odd days = $38 + 24 = 62$

$\therefore \frac{62}{7} = 7 \times 8 + 6 = 6$ is remainder

So, the day on which he was born = Friday - 6 = Saturday

- 11.

12. Two conditions are possible here.

1st condition

from one end \rightarrow Ravi \leftarrow 19 \rightarrow

Seema \leftarrow from other end
 (26th) (22nd)

Total number of students
 = $26 + 19 + 22 = 67 > 50$

It means this condition is not acceptable.

2nd condition

from one end \rightarrow Ravi \leftarrow 19 \rightarrow

Seema \leftarrow from other end
 (26th) (22nd)

From one end, number of students before Seema
 = $26 - 20 = 6$

From other end number of students after Ravi = $22 - 20 = 2$

\therefore **Total number of students = 6 + 2 + 19 = 27**

13. $2(1 + 2 + 3 + \dots + 11 + 12)$

$= 2 \times \left(\frac{12 \times 13}{2} \right) = \text{The clock rings}$

156 times.

14. After changing the sign, we have,

$8 \div 6 - 4 \times 7 + 3$

$= \frac{8}{6} - 28 + 3 = \frac{26}{6} - 28 = \frac{13}{3} - 28$

$= \frac{13 - 84}{3} = \frac{-71}{3}$

16. $1 \rightarrow 4 \rightarrow 2 \rightarrow 3 \rightarrow 5$

- 17.

then

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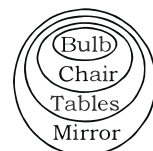
18. $AT = A \times T = 1 \times 20 = 20$

$BAT = B \times A \times T = 2 \times 1 \times 20 = 40$

then,

$CAT = C \times A \times T = 3 \times 1 \times 20 = 60$

19.

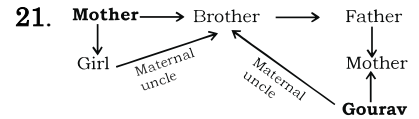


- 1 ✓
 2 ✓
 3 ✓

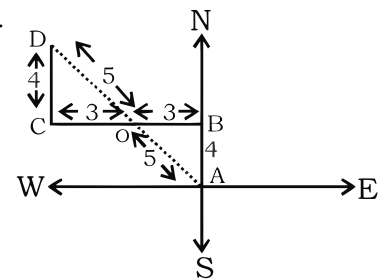
All conclusions are true.

20. Information is given about reading.

Only literate person can read the information. So only conclusion I follows.



22.



$AD = AO + OD$

$AD = AO + DO$

$\Rightarrow \sqrt{AB^2 + BO^2} + \sqrt{OC^2 + CD^2}$

$\Rightarrow \sqrt{3^2 + 4^2} + \sqrt{3^2 + 4^2}$

$\Rightarrow 5 + 5 = 10$ miles

25. **abc|cb|bca|ac|cab|ba**

26. $999\frac{1}{7} + 999\frac{2}{7} + 999\frac{3}{7} + 999\frac{4}{7}$

$+ 999\frac{5}{7} + 999\frac{6}{7}$

$\Rightarrow 999 \times 6 + \left(\frac{1+2+3+4+5+6}{7} \right)$

$\Rightarrow 5994 + \frac{21}{7} = 5997$

27.

	₹ 1	50-P	25-P
Number	5	6	8
Value	5	3	2 = 10
			↓ × 24
			240

Number of 25 - P coins

= $8 \times 24 = 192$

28. Let, total capital is ₹60

So,

He invests half (₹30) \rightarrow 10%

= $30 \times \frac{10}{100} = 3$

One-third (₹20) at \rightarrow 9%

= $20 \times \frac{9}{100} = 1.8$

Remaining (₹10) at \rightarrow 12%

= $10 \times \frac{12}{100} = 1.2$

\therefore Average rate = $\frac{3+1.8+1.2}{60}$

= 100

= 10%

29. Let the cost of low priced chair is ₹x

Then, the cost of high priced chair = $900 - x$

$$\therefore \frac{4x}{5} + \frac{5}{4}(900 - x) = 900 + 90$$

$$\therefore 9x = 22500 - 19800$$

$$= 2700$$

$$x = 300$$

30. Maximum retail price = ₹60

Selling price of article

$$= 60 \times \frac{85}{100} = ₹51$$

\therefore Actual selling price after giving gift = $51 \cdot 3 = ₹48$

$$\therefore \text{Cost price} = 48 \times \frac{100}{120} = ₹40$$

31. Required Time =

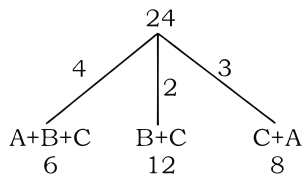
Distance between them

Relative speeds

$$= \frac{5}{90 - 75} = \frac{5}{15} = \frac{1}{3} \text{ hr}$$

= 20 minutes

32.



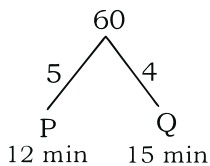
Efficiency of A = $4 \cdot 2 = 2$

Efficiency of B = $4 \cdot 3 = 1$

$$\therefore (A + B) \text{ will do} = \frac{24}{2+1}$$

= 8 days

33.



$$\therefore \text{Part filled in 3 min} = (5 + 4) \times 3$$

$$= 27$$

Remaining part = $60 - 27 = 33$

$$\therefore Q \text{ will take} = \frac{33}{4} = 8\frac{1}{4} \text{ min.}$$

34. Speed of second train = $\frac{360}{4}$

= 90 km/hr

Ratio of speeds of 1st and 2nd train

$$= \begin{array}{cc} 8 & : & 9 \\ \downarrow \times 10 & : & \downarrow \times 10 \\ 80 \text{ km/hr} & & 90 \text{ km/hr} \end{array}$$

\therefore Distance travelled in 3 hr by 1st train = $80 \times 3 = 240 \text{ km/hr}$

35. $l = b \times 3 \Rightarrow b = \frac{l}{3}$

$$l = h \times 5 \Rightarrow h = \frac{l}{5}$$

$$\therefore V = lbh$$

$$14400 = l \times \frac{l}{3} \times \frac{l}{5}$$

$$l^3 = 144 \times 1500$$

$$l = \sqrt[3]{216000} \Rightarrow l = 60$$

$$b = \frac{60}{3} = 20, h = \frac{60}{5} = 12$$

\therefore Total surface area = $2(lb + bh + lh)$

$$= 2(60 \times 20 + 20 \times 12 + 12 \times 60)$$

$$= 2(1200 + 240 + 720)$$

$$= 4320 \text{ cm}^2$$

36. $\frac{x}{2} - \frac{1}{2} = x \times \frac{1}{\sqrt{3}} \times \frac{1}{\sqrt{3}} = \frac{x}{3}$

$$\frac{x}{2} - \frac{x}{3} = \frac{1}{2} \Rightarrow \frac{x}{6} = \frac{1}{2}$$

37. $x^y = y^x \quad \therefore x = 3$

$$\therefore y = x$$

$$\therefore \left(\frac{x}{y}\right)^{\frac{x}{y}} = \left(\frac{x}{\frac{y}{x^x}}\right)^{\frac{x}{y}} = x^{\frac{x}{y} \cdot \frac{x}{y} \cdot \frac{y}{x}} = x^{\frac{x}{y} - 1}$$

38. $\frac{1}{\cos \theta} = \frac{4a^2 + 1}{4a}$

$$\therefore \sin \theta = 1 - \sqrt{1 - \left(\frac{4a}{4a^2 + 1}\right)^2}$$

$$= \sqrt{\frac{16a^4 + 1 + 8a^2 - 16a^2}{(4a^2 + 1)^2}}$$

$$= \sqrt{\frac{16a^2 - 8a^2 + 1}{(4a^2 + 1)^2}}$$

$$= \frac{4a^2 - 1}{4a^2 + 1}$$

$$\therefore \tan \theta + \frac{1}{\cos \theta} = \frac{\sin \theta + 1}{\cos \theta}$$

$$= \frac{4a^2 - 1^2}{4a^2 + 1} + 1 = \frac{8a^2}{4a} = 2a$$

39. Let $x = 3, y = 4$

$$\text{So, } x + y = 3 + 4 = 7$$

$$\text{and } x^2 + y^2 = 3^2 + 4^2 = 25$$

$$\therefore \frac{1}{x} + \frac{1}{y} = \frac{1}{3} + \frac{1}{4} = \frac{7}{12}$$

40. $\sqrt{mn} = 10, mn = 100$

If $m = 100$ then $n = 1$

$$\therefore m + n = 101$$

If $m = 50$, then $n = 2$

$$\therefore m + n = 52$$

If $m = 25$, then $n = 4$

$$\therefore m + n = 29$$

$$\therefore m + n \neq 50$$

41. Length of hypotenuse

$$= \sqrt{24^2 + 7^2} = 25$$

$$\therefore \frac{1}{2} \times 25 \times h = \frac{1}{2} \times 7 \times 24$$

$$h = \frac{7 \times 24}{25} = 6.72 \text{ cm}$$

42. $\sin \theta + \cos \theta = \sqrt{3} \cos \theta$

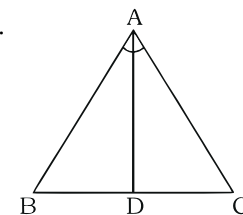
$$\sin \theta = (\sqrt{3} - 1) \cos \theta$$

$$\therefore \cos \theta - \sin \theta = \cos \theta - (\sqrt{3} - 1) \cos \theta$$

$$= \cos \theta [1 - \sqrt{3} + 1]$$

$$= (2 - \sqrt{3}) \cos \theta$$

43.



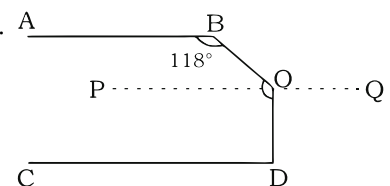
If AD is the angle bisector, then

$$\frac{AB}{AC} = \frac{BD}{DC} \quad \therefore \frac{BD}{DC} = \frac{3}{4}$$

44. $\frac{1 - \sin \theta + 1 + \sin \theta}{\sqrt{1 + \sin \theta} \times \sqrt{1 - \sin \theta}} = \frac{2}{\cos \theta}$

$$= 2 \sec \theta$$

45.



Draw a line PQ through O, parallel to AB and CD.

$$\angle BOP = 180^\circ - 118^\circ = 62^\circ$$

$$\therefore \angle POD = 152^\circ - 62^\circ = 90^\circ$$

PQ || CD

$$\therefore \angle POD + \angle ODC = 180^\circ$$

$$\angle ODC = 180^\circ - 90^\circ$$

$$= 90^\circ$$

46. We know that

$$\frac{PA}{PQ} = \frac{AB}{QR} = \frac{PB}{PR}$$

$$\frac{PB}{6} = \frac{3}{9} \Rightarrow PB = 2 \text{ cm}$$

47. $h = 10.5 \text{ m}, r = \frac{13}{2} = 6.5$

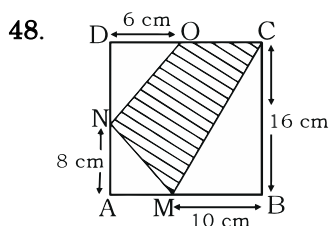
$$\therefore V = \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times \frac{13}{2} \times \frac{13}{2} \times \frac{21}{2}$$

$$= 464.75$$

\therefore Each person required

$$= \frac{464.75}{8}$$

$$= 58.09375 = 58 \frac{3}{32} \text{ m}^3$$



$$\text{Area of square ABCD} = 16 \times 16 = 256 \text{ cm}^2$$

$$\text{Area of } \triangle MBC = \frac{1}{2} \times 10 \times 16 = 80 \text{ cm}^2$$

$$\text{Area of } \triangle NAM = \frac{1}{2} \times 8 \times 6 = 24 \text{ cm}^2$$

$$\text{Area of } \triangle NDO = \frac{1}{2} \times 6 \times 8 = 24 \text{ cm}^2$$

$$\therefore \text{Required area} = 256 - 80 - 24 - 24 = 128 \text{ cm}^2$$

49. Unit digit of $327^{123} = 3$

Unit digit of $413^{96} = 1$

Unit digit of $118^{119} = 2$

Unit digit of $226^{67} = 6$

Sum of unit digits = 12

↓

Unit digit

50. Middle digit of the number N

$$= 6$$

Sum of 1st and the last digit

$$= 3 + 3 = 6$$

51. $x^2 - 4x + 3 = x^2 - 3x - x + 3$

$$= x(x - 3) - 1(x - 3)$$

$$= (x - 3)(x - 1)$$

Again,

$$x^2 - 5x + 6 = x^2 - 3x - 2x + 6$$

$$= x(x - 3) - 2(x - 3)$$

$$= (x - 3)(x - 2)$$

So, L.C.M. of $x^2 - 4x + 3$ and $x^2 - 5x + 6$

$$= (x - 1)(x - 2)(x - 3)$$

52. Distance between A and B

$$= 120 \text{ km} = 120 \times 1000 \text{ m}$$

$$\text{Time} = 10 \text{ a.m.} - 6 \text{ a.m.} = 4 \text{ hr} = 4 \times 60 \times 60 \text{ sec}$$

$$\text{Speed (m/sec)} = \frac{120 \times 1000}{4 \times 60 \times 60}$$

$$= \frac{25}{3} = 8 \frac{1}{3} \text{ m/sec}$$

53. Distance between B and A

$$= 120 \text{ km}$$

$$= 120 \times 1000 \text{ m}$$

$$\text{Time} = 9 \text{ a.m.} - 7 \text{ a.m.}$$

$$= 2 \text{ hr} = 2 \times 60 \text{ min}$$

$$\text{Speed} = \frac{120 \times 1000}{2 \times 60}$$

$$= 1000 \text{ m/min}$$

54. Right time is 8 : 30 a.m.

55. (3) $\frac{3}{7}P = \frac{4}{11}Q$

$$\Rightarrow \frac{P}{Q} = \frac{4}{11} \times \frac{7}{3}$$

$$\Rightarrow \frac{P}{Q} = \frac{28}{33}$$

$$P : Q = 28 : 33$$

56. An ecosystem includes all the living things (plants, animals and organisms) in a given area, interacting with each other and also with their non-living environments (weather, earth, sun, soil, climate atmosphere).

58. Angora wool is also known as Angora hair or Angora fiber. It refers to the downy coat produced by the Angora rabbit. Angora is known for its softness, thin fibres fluffiness, silky texture. It is much warmer and lighter than wool due to hollow core of the Angora fibre.

60. Commercial Nitric acid has a brown colour due to dissolved nitrogen dioxide. The procedure of bubbling dry air through warm commercial Nitric Acid, is to drive away the dissolved nitrogen dioxide, so that the acid becomes colourless.

61. Ultraviolet (UV) light has shorter wavelengths than visible light. Although UV waves are invisible to the human eye, some insects can see them. The Sun is a source of the full spectrum of ultraviolet radiation, which is subdivided into UV-A, UV-B and UV-C. UV-C rays are most harmful and almost completely absorbed by our atmosphere. UV-B rays are harmful rays that cause sunburn.

Exposure to UVB rays increases the risk of DNA and other cellular damage in living organisms. Fortunately, about 95% UV-B rays are absorbed by ozone in the Earth's atmosphere.

62. Hamburger effect is also known as chloride shift. It is a process which occurs in a cardiovascular system and refers to the exchange of bicarbonate (HCO_3^-) and chloride (Cl^-) across the membrane of red blood cells (RBCs).

63. X-rays is a form of electromagnetic radiation ranging from wavelength 0.01 to 10 nanometres. X-ray wavelengths

are shorter than UV rays and longer than gamma rays. Due to its penetrating ability, they are widely used to image the inside objects especially in medical radiography and airport security. But direct X-ray are not able to capture clear images of intestine. For this a powder named Barium is mixed with water to make Barium liquid. This liquid is given to the patient before X-ray and then the X-ray is done.

64. MIRV stands for Multiple independently reentry vehicle. It is a ballistic missile payload containing several warheads, each capable of being aimed to hit one of a group of targets. Britain, China, France, Russia and US are known to possess MIRV missiles.

66. Boron increases the absorption of water and calcium in the plants. It also helps in the metabolic activities in plants. Boron is necessary for sugar to move through protoplasmic membranes.

67. Yellow fever is an acute viral disease. Its symptoms include fever, chills, loss of appetite, nausea, muscle pains particularly in the back and headache. This disease is caused by yellow fever virus and spread by the bite of female mosquito Aedes Aegypti.

68. The rate of respiration is dependent on temperature. The warmer it is, the more a plant will respire. Drought, extreme winter or frost and heat creates a situation where moisture is not adequate to maintain the proper

water level in plant tissues. The air is also very dry as well.

69. Lambert's law states that the radiant intensity or luminous intensity observed from an ideal diffusely reflecting surface or radiator is directly proportional to the cosine of the angle θ between the direction of the incident light and the surface normal. Such a surface has the same radiance when viewed from any angle.
70. Epidemic dropsy is a clinical state resulting from the use of an edible oil adulterated with Argemone Mexicana seed oil.
71. (3) Mass is a universal constant. The mass of a body remains unchanged in any part of universe. Mass of a body does not change with respect to gravity. It is the weight that changes with gravity.
72. (3) Ball bearings are used to reduce friction and friction is directly proportional to effective surface area. So if effective surface area is reduced then friction will also reduce.
73. (4) Because of density. The density of the clouds is less than that of the air. Same phenomena is there behind this, according to which is ship float in a sea.
74. (4) Initially at start of heating from 0°C to 4°C there will be a contraction as a result of which volume decreases. On further heating beyond 4°C to 10°C the molecules gain kinetic energy and start moving more randomly. Thus, intermolecular distance increases as a result of which its volume increases.
75. (1) An optical fibre is a thin, flexible, transparent fibre that acts as a waveguide or "light pipe" to transmit light between the two ends of the fibre. An optical fibre transmits light along its axis, by the process of total internal reflection. When light traveling in a dense medium hits a boundary at an angle larger than the "critical angle" for the boundary, the light will be completely reflected. This effect is used in optical fibres to confine light in the core.
76. (4) Air bubble in water would act as a diverging lens, because the

index of refraction of air is less than that of water.

77. (2) Resistance (R) of a length l , resistivity r and area of cross-section A is given by

$$R = \rho \frac{l}{A}$$

For the two wires,

$$\frac{R_1}{R_2} = \frac{\rho_1}{\rho_2} \times \frac{l_1}{l_2} \times \frac{A_2}{A_1} = \frac{1}{2} \times \frac{1}{2} \times \frac{4}{1} = 1$$

$$\therefore R_1 = R_2 = 10 \Omega$$

$$(\because r_1 : r_2 = l_1 : l_2 = 1 : 2 \text{ and } A_1 : A_2 = 1 : 4)$$

78. (2) **Frequency modulation** : It is a process in which the frequency of the carrier is varied in accordance with the instantaneous value of modulating voltage. In telecommunications and signal processing, frequency modulation (FM) conveys information over a carrier wave by varying its instantaneous frequency. FM is most commonly used for radio and television broadcasting.
81. (3) There are 13 essential nutrients required by plants for its healthy and proper growth. Now these nutrients are divided into two categories : Macronutrients (nitrogen, phosphorus, potassium, calcium, magnesium and sulphur). Micronutrients (iron, copper, manganese, zinc, boron, molybdenum and chlorine). Additional mineral nutrient elements which are beneficial but not necessary are sodium, cobalt, vanadium, nickel, selenium, aluminium and silicon. Thus boron, zinc and copper falls into category of essential micronutrients while sodium does not.
82. (1) Fluorine is the most reactive among all halogens. However the reactivity decreases from F_2 to I_2 (from top to bottom of group) may be attributed to
- (1) Low dissociation enthalpies
 - (2) High electron affinities
83. (4) Blue vitriol is blue, crystalline hydrous solution of copper sulphate, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, one of the most important industrial copper salts, used in insecticides, germicides, and hair dyes and in the processing of leather and textiles. Magnesium sulphate is a

chemical compound containing magnesium, sulphur and oxygen, with the formula MgSO_4 . It is often encountered as the heptahydrate epsomite ($\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$), commonly called "Epsom salt". Sodium bicarbonate or sodium hydrogen is the chemical compound with the formula NaHCO_3 . The salt has many related names such as baking soda, bread soda, cooking soda, bicarbonate of soda. Caustic soda or sodium hydroxide is an essential ingredient in an array of industrial applications. In addition, consumers use caustic soda when using cleaners, such as oven and drain cleaners.