

## Section : I - Aptitude and Logical Reasoning

- Find the missing number in the series?  
4, 18, ?, 100, 180, 294, 448  
(a) 48 (b) 50 (c) 58 (d) 60
- How many 4's are there preceded immediately by 7 but not followed by 3?  
5 9 3 2 1 7 4 2 6 9 7 4 6 1 3 2 8 7 4 1 3 8 3 2 5 6 7 4 3 9 5 8 2 0 1 8 7 4 6 3  
(a) Four (b) Three (c) Six (d) Five
- What is the next number of the following sequence ?  
21, 77, 165, 285, .....  
(a) 404 (b) 415 (c) 426 (d) 437
- I. A, B, C, D, E and F are six members of a family.  
II. One couple has parents and their children in the family.  
III. A is the son of C and E is the daughter of A.  
IV. D is the daughter of F who is the mother of E.  
How many female members are there in the family ?  
(a) 2 (b) 3 (c) 4 (d) 5
- Next number in the number sequence is  
22, 11, 33, 16.5, 49.5, ?  
(a) 24.75 (b) 41 (c) 33.5 (d) 26.75

## Section : II - Mathematics

- If  $a^b = 2$  and  $b^a = 3$ , then find the value of  $a^{b^{(a+1)}} + b^{a^{(b+1)}}$ .  
(a)  $2^3$  (b) 17 (c) 25 (d) 13
- Express  $0.\overline{987} - 0.\overline{756}$  in the form  $\frac{p}{q}$ , where p and q are integers and  $q \neq 0$ .  
(a)  $\frac{88}{165}$  (b)  $\frac{229}{990}$   
(c)  $\frac{164}{495}$  (d) More than one of the above

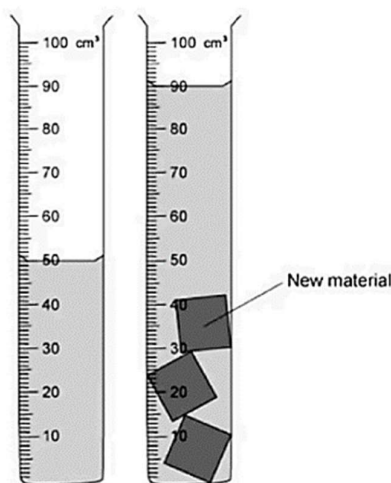
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8. What is the value of  $(2 + \sqrt{2}) + \left(\frac{1}{2 + \sqrt{2}}\right) + \left(\frac{1}{2 - \sqrt{2}}\right) + (2 - \sqrt{2})$ ?  
 (a) 2 (b) 4 (c) 8 (d) 6
9. What comes in the place of x?  
 $(216)^{1.3} \times (36)^{1.8} \div (6)^{0.5} = 6^x$   
 (a) 5 (b) 4 (c) 7 (d) 3
10. What is the value of  $\sqrt{13 - 4\sqrt{10}} + \sqrt{8 - 2\sqrt{15}}$ ?  
 (a)  $2\sqrt{2} - \sqrt{3}$  (b)  $\sqrt{8} + \sqrt{3}$  (c)  $\sqrt{6} - \sqrt{3}$  (d)  $\sqrt{8} - \sqrt{5}$
11. Among the  $2^{1/3}, 3^{1/4}, 5^{1/6}, 6^{1/12}$  which one is greater?  
 (a)  $2^{1/3}$  (b)  $3^{1/4}$  (c)  $5^{1/6}$  (d)  $6^{1/12}$
12.  $a = \sqrt[8]{6} - \sqrt[8]{5}, b = \sqrt[8]{6} + \sqrt[8]{5}, c = \sqrt[6]{6} + \sqrt[6]{5}, d = \sqrt[4]{6} + \sqrt[4]{5}$ , and  $e = \sqrt{6} + \sqrt{5}$ , then which of the following is a rational number?  
 (a) abcde (b) abde (c) ab (d) cd
13. If  $2^t = t^{32}$ , which of the following is an integer value of t that satisfies the equation?  
 (a) 256 (b) 8 (c) 56 (d) 128
14. Simplify :  $\frac{5 \times (125)^{(n+1)} + 25 \times 5^{3n-1}}{8 \times 5^{3n} - 5 \times (125)^n}$   
 (a) 120 (b) 210 (c) 270 (d) None of these
15. Among  $\sqrt{11} - \sqrt{9}, \sqrt{7} - \sqrt{5}, \sqrt{13} - \sqrt{11}, \sqrt{10} - \sqrt{8}$  which is the greatest?  
 (a)  $\sqrt{13} - \sqrt{11}$  (b)  $\sqrt{10} - \sqrt{8}$  (c)  $\sqrt{11} - \sqrt{9}$  (d)  $\sqrt{7} - \sqrt{5}$

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### Section : III - Science

16. Which of the following shows the prefixes in **ascending** order correctly?  
 (a) micro, milli, centi, deci (b) deci, centi, milli, micro  
 (c) centi, micro, deci, milli (d) milli, micro, deci, centi
17. Which of the following is NOT one of the seven fundamental SI base units?  
 (a) Kelvin (K) (b) Mole (mol) (c) Candela (cd) (d) Tesla (T)
18. If the units of Mass, Length and Time are changed to be three times their original values (i.e.,  $M' = 3M, L' = 3L, T' = 3T$ ), how will the unit of Power change?  
 (a) It will become 3 times the original unit. (b) It will remain the same as the original unit.  
 (c) It will become 9 times the original unit. (d) It will become  $\frac{1}{3}$  times the original unit.
19. A scientist is trying to determine the volume of three identical pieces of new material. She places them in a measuring cylinder, as shown in the diagram. What is the volume of each piece of the new material?

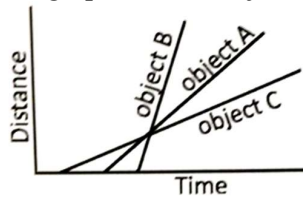


- (a)  $13.3 \text{ cm}^3$  (b)  $30.0 \text{ cm}^3$  (c)  $16.7 \text{ cm}^3$  (d)  $40.0 \text{ cm}^3$
20. A stone is dropped from the top of a tower and reaches ground in 4 seconds. Find the height of the tower.  
 (a) 26 m (b) 19.6 m (c) 78.4 m (d) 93.6 m

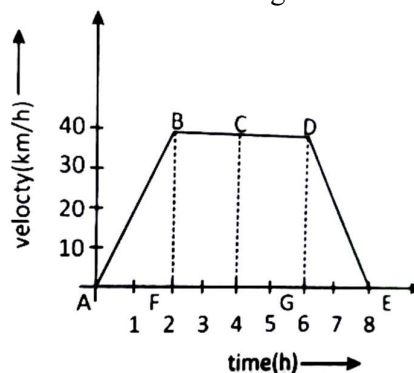
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21. How much momentum will a dumb-bell of mass 10 kg transfer to a floor if it falls from a height of 80 cm? Take its downward acceleration to be  $10 \text{ m/s}^2$ .  
 (a) 30 kg m/s (b) 40 kg m/s (c) 20 kg m/s (d) 25 kg m/s

22. Look at the following time-distance graph. Which object is moving with maximum speed?



- (a) Object A (b) Object B  
 (c) Object C (d) All are moving with equal speed
23. The velocity-time graph for a car is shown in the figure below.



Using this graph, calculate the average speed of the car.

- (a) 40 km/h (b) 30 km/h (c) 64 km/h (d) 80 km/h
24. A passenger travels along a straight line with velocity  $v_1$  for first half time and with velocity  $v_2$  for next half time, then the mean velocity  $v$  is given by  
 (a)  $v = \frac{v_1 + v_2}{2}$  (b)  $v = \sqrt{v_1 v_2}$  (c)  $v = \sqrt{\frac{v_2}{v_1}}$  (d)  $\frac{2}{v} = \frac{1}{v_1} + \frac{1}{v_2}$
25. A particle moves with constant acceleration for 6 seconds after starting from rest. The distance travelled during the consecutive 2 seconds interval are in the ratio  
 (a) 1 : 1 : 1 (b) 1 : 2 : 3 (c) 1 : 3 : 5 (d) 1 : 5 : 9

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26. Elements P and Q react to form a compound  $P_xQ_y$ . A and B react to form  $A_sB_t$ . When A and P react, the compound formed is \_\_\_\_\_ and if A and Q react, the compound formed is \_\_\_\_\_.  
 (a)  $A_yP_t, A_xQ_s$  (b)  $A_xP_s, P_xQ_t$  (c)  $A_yP_t, A_xQ_t$  (d)  $A_xP_s, A_rQ_s$
27. Select the true one between the two options given in each of the following :  
 (a)  ${}_YA^X$  and  ${}_YA^Z$  are isotopes (b)  ${}_YA^X$  and  ${}_ZB^X$  are isotopes  
 (c)  ${}_YA^X$  and  ${}_ZA^X$  are isotopes (d) None of these
28. Strong reducing agent is  
 (a) K (b) Mg (c) Al (d) Ba
29. Difference between valency and oxidation number are following except  
 (a) Valency of an element is a fixed quantity whereas oxidation number varies from compound to compound  
 (b) Valency is a pure number whereas oxidation number has positive or negative value  
 (c) Oxidation number and valency are having fixed value  
 (d) Valency and oxidation number can be represented for an element or a radical
30. If  $(1/4)^{\text{th}}$  of mass of one oxygen – 16 isotope was used as reference unit mass then what will be the relative atomic mass of carbon –12  
 (a) 3 (b) 12 (c) 4 (d) 8
31. The electronic configuration of a neutral atom 'X' is 2, 8, 6. The electronic configuration of  $X^{-2}$  is  
 (a) 2, 8, 4 (b) 2, 8, 8 (c) 2, 6, 8 (d) 2, 8, 2
32. 2, 8, 8 can be the electronic configuration of  
 (a) Ar (b)  $K^+$  (c)  $Ca^{++}$  (d) All
33. Number of electrons in the outermost orbit of the element of atomic number 15 is  
 (a) 7 (b) 5 (c) 3 (d) 2
34. An element has atomic number 11 and mass number 24. What does the nucleus contain?  
 (a) 11 protons and 13 neutrons (b) 11 protons, 13 neutrons and 13 electrons  
 (c) 13 protons and 11 neutrons (d) 13 protons and 11 electrons
35. The number of electrons and neutrons of an element is 18 and 20 respectively. Its mass number is  
 (a) 2 (b) 17 (c) 37 (d) 38

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36. Plasmolysis occurs due to  
 (a) Absorption (b) Endosmosis (c) Osmosis (d) Exosmosis
37. Cell secretion is done by  
 (a) Plastids (b) ER (c) Golgi apparatus (d) Nucleolus
38. Match the column I and II, and choose the correct combination from the options given:

Column I		Column II	
a.	WBC	k.	Branched
b.	Mesophyll	l.	Round & biconcave
c.	Red blood cells	m.	Amoeboid
d.	Nerve cell	n.	Round and oval

- (a) a-m, b-l, c-k, d-n (b) a-m, b-l, c-n, d-k (c) a-l, b-k, c-m, d-n (d) a-m, b-n, c-l, d-k
39. \_\_\_\_\_ epithelium is found in the proximal convoluted tubule (PCT) of the nephron in the kidney.  
 (a) Squamish (b) Cuboidal (c) Columnar (d) Ciliated
40. Cardiac muscles are \_\_\_\_\_.  
 (a) Smooth and voluntary (b) Striated and involuntary  
 (c) Smooth and involuntary (d) None of the above
41. Cells of the tissue have dense cytoplasm, thin cellulose walls and prominent vacuoles. Identify the tissue.  
 (a) Collenchyma (b) Sclerenchyma (c) Meristem (d) Parenchyma
42. Bending of various parts of a plant like tendrils or stems is due to the presence of which tissue?  
 (a) Parenchyma (b) Collenchyma (c) Sclerenchyma (d) Chlorenchyma
43. Sclerid and fibres are type of  
 (a) Parenchyma (b) Arenchyma (c) Sclerenchyma (d) Collenchyma
44. Which of the following is not a function of adipose tissue?  
 (a) Shock absorption (b) Heat generation (c) Energy storage (d) Structural rigidity
45. Haversian canals are found in \_\_\_\_\_.  
 (a) Cartilage (b) Bone (c) Adipocyte tissue (d) Blood

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