SI CI AND PARTNERSHIP

Concept and Formulae

1. **Principal :** The money borrowed or lent out for a certain period is called the ***principal*** or the ***sum.***
2. **Interest :** Extra money paid for using other's money is called **interest.**
3. **Simple Interest (S.I) :** If the interest on a sum borrowed for a certain period is reckoned uniformlyLet principal = P, Rate = R % per annum (p.a) and Time = T years. Then,

(i) $S.I = \frac{P \times R \times T}{100}$.

(ii) $P = \frac{100 \times S.I}{R \times T}$; $R = \frac{100 \times S.I}{P \times T}$; $T = \frac{100 \times S.I}{P \times R}$.

Example 1:

A student purchases a phone by obtaining a simple interest loan. The phone costs 1500 and the interest rate on the loan is 12%. If the loan is to be paid back in weekly instalments over 2 years, calculate:

1. The amount of interest paid over two years
2. The total amount to be paid back
3. The weekly payment amount

Solution:

Principal : 1500, interest: 'R' 12 % = 0.12, repayment time 'N' = 2 years

Interest: 'I' = PNR

= 1500 x 0.12 x 2 = 360

Total repayments = principal + interest

1500 + 360 = 1860

Total repayments weekly payment amount

= 1860/2 x 52 = 17.88per week

Compound Interest

Sometimes it so happens that the borrower and the lender agree to fix up a certain unit of time, say *yearly* or *half-yearly* or *quarterly* to settle the previous account.

In such cases, the amount after first unit of time becomes the principal for the second unit, the amount after second unit becomes the principal for the third unit and so on.

After a specified period, the *difference between the amount and the money borrowed is called the* ***Compound Interest*** *(abbreviated as* ***C.I****) for that period.*

Concept and Formulae

If a sum (Principal) P is invested for n years at r% (i in decimal form) per annum, the simple interest S, the compound interest C and the amount A are given by

$S = Pnr/100 = Pni$ **and** $A = P\{1 + (nr/100)\} = P(1 + ni)$

$C = P[\{1 + (r/100)\}^n - 1] = P\{(1 + i)^n - 1\}$ **and**

$A = P\{1 + (r/100)\}^n = P\{(1 + i)^n\}$

Example 2 :

A invests a sum of Rs. 4000 in a bank which gives simple interest of 10% p.a. B invests Rs. 3000 in a private financial company which gives him a compound interest of 12% p.a, compounded annually. If both keep the sum in the bank and with the company respectively for 3 years, who gets a higher interest?

Solution:

For A, interest : 4000x0.1= 1200

For B, interest : 3000 $(1.2^3 - 1)$= 1214.784

Therefore, B gets a higher interest.

Example 3:

If A invested Rs. 3000 at 12% interest p.a simple interest, what is the excess interest B gets over A in the first year?

Solution:

Interest for A = 3000x 1 x 0.12= 360

Interest for B = 3000 x $(1.2^1 - 1)$ = 360

Therefore, B does not get any excess interest over A.

Example 4:

What will Rs.1500 amount to in three years if it is invested in 20% p.a. compound interest, interest being compounded annually?

a. 2400 b. 2592 c. 2678 d. 2540

Solution:

The usual way to find the compound interest is given by the formula $A = P(1+)^n$

In this formula, A is the amount at the end of the period of investment

P is the principal that is invested

r is the rate of interest in % p.a

And n is the number of years for which the principal has been invested.

In this case, it would turn out to be $A = 1500(1+)^3$

Hence answer is (b)

Example 5:
How long will it take for a sum of money to grow from Rs.1250 to Rs.10,000, if it is invested at 12.5% p.a simple interest?
a. 8 years b. 64 years c. 72 years d. 56 years
Solution:
Simple interest is given by the formula SI = (pnr/100), where p is the principal, n is the number of years for which it is invested, r is the rate of interest per annum
In this case, Rs. 1250 has become Rs.10,000.
Therefore, the interest earned = 10,000 – 1250 = 8750.
8750 = [(1250*n*12.5)/100]
=> n = 700 / 12.5 = 56 years.
Hence ans is (d).

Example 6:
Rs. 5887 is divided between Shyam and Ram, such that Shyam's share at the end of 9 years is equal to Ram's share at the end of 11 years, compounded annually at the rate of 5%. Find the share of Shyam.
Solution:
Shyam's share * (1+0.05)9 = Ram's share * (1 + 0.05)11
Shyam's share / Ram's share
= (1 + 0.05)11 / (1+ 0.05)9 = (1+ 0.05)2 = 441/400
Therefore Shyam's share = (441/841) * 5887 = 3087.

Example 7:
A man invests Rs.5000 for 3 years at 5% p.a. compound interest reckoned yearly. Income tax at the rate of 20% on the interest earned is deducted at the end of each year. Find the amount at the end of the third year.
Solution:
5% is the rate of interest. 20% of the interest amount is paid as tax. That is 80% of the interest amount stays back. Therefore, if we compute the rate of interest as 80% of 5% = 4% p.a., we will get the same value.
Interest accrued for 3 yrs in compound interest = 3*simple interest on principal + 3*interest on simple interest + 1*interest on interest on interest
= 3*(200) + 3*(8) + 1*0.32 = 600 + 24 + 0.32 = 624.32
The amount at the end of 3 years = 5000 + 624.32 = 5624.32

Example 8:
Shawn invested one half of his savings in a bond that paid simple interest for 2 years and received Rs.550 as interest. He invested the remaining in a bond that paid compound interest, interest being compounded annually, for the same 2 years at the same rate of interest and received Rs.605 as interest. What was the value of his total savings before investing in these two bonds?
Solution:
Shawn received an extra amount of (Rs.605 – Rs.550) Rs.55 on his compound interest paying bond as the interest that he received in the first year also earned interest in the second year.
The extra interest earned on the compound interest bond = Rs.55
The interest for the first year = $\frac{550}{2}$ = Rs.275
Therefore, the rate of interest = = 20% p.a.
20% interest means that Shawn received 20% of the amount he invested in the bonds as interest.
If 20% of his investment in one of the bonds = Rs.275, then his total investment in each of the bonds
= (275/20)100 = 1375.
As he invested equal sums in both the bonds, his total savings before investing = 2*1375 = Rs.2750.

Questionnaire for Practice

1. Divide Rs. 3,650 into two parts such that, the SI on the first part at 6% for two years, is equal to the SI on the second part at 4% in 3 years.
   a. Rs.1,900; Rs.1,750 c. **Rs.1,825; Rs.1,825**
   c. Rs.2,000; Rs.1,650 d. Rs.1,800; Rs.1,850

2. How many years will it take for some amount to double itself if the rate of interest is 8% per annum?
   a. 10 years **b. 12.5 years**
   c. 20 years d. 15 years

3. Two equal sums of money were lent out at 7% and 5% per annum. The total interest earned for four years amounts to Rs. 960. What is the total amount lent?
   a. Rs. 3200 b. Rs. 4750
   c. Rs. 1980 **d. Rs. 4000**

4. A and B enter into a partnership. A puts in Rs. 3000/ and at the end of 4 months withdraws Rs. 1500 whereas B brought in additional capital of Rs. 1000 after 3 months. Out of the total profit of Rs. 390 at the end of the year, if A's share is Rs. 240. Find the initial capital of B.
   a. Rs. 1000 **b. Rs. 500**
   c. Rs. 2000 d. None of these

5. Three friends A, B, C started a joint venture by investing money in the ratio of 2:3:4 respectively. A withdrew half of his money after some months. A few months before the end of the year, C too withdrew one-fourth of his money. If they distributed profits in the ratio 2:4:5 respectively, then after how many months did C withdraw one-fourth of his money?
   a. 6 **b. 9**
   c. 4 d. Cannot be determined

6. A certain sum of money borrowed in SI triples itself in 10 years. What is the rate of interest?
   a. 30% b. 25%
   c.20% d. None

7. Find the compound interest on a sum of Rs.20,000 at the rate of 20% per annum for 2 years, interest being calculated after every 6 months?
   a. Rs.9282 b. Rs.21472
   c. Rs.41472 d. None

DIRECTION SENSE

Dev, Kumar, Nilesh, Ankur and Pintu are standing facing to the North in a playground

- Kumar is standing 40 m to the right of Ankur.
- Dev is 60 m to the south of Kumar.
- Nilesh is at a distance of 25 m to the west of Ankur.
- Pintu is at a distance of 90 m to the north of Dev.

1. Who is to the North-East of the person who is to the left of Kumar?
   a.Dev b.Nilesh c.Ankur **d.Pintu**

2. If a boy starting from Nilesh, walked up to Ankur and then to Kumar and after this he went to Dev and then to Pintu and walked in a straight line from boy to boy, then how much total distance did he cover?
   a.215m b. 155m c.245m d.185m

3. One morning, A and B were talking to each other face to face. If A's shadow was exactly to the left of B, which direction was B facing?
   a.North b.South c.East d.West

4. If South-East becomes North, North-East becomes West and so on. What will West become?
   a.North-East b. North-West
   c.South-East d. South-West

5. Some boys are sitting in three rows all facing North such that A is in the middle row. P is just to the right of A but in the same row. Q is just behind of P while R is in the North of A. In which direction of R is Q?
   a. South b. South-West
   c. North-East **d. South-East**

6. If A x B means A is to the south of B; A + B means A is to the north of B; A % B means A is to the east of B; A - B means A is to the west of B; then in P % Q + R - S, S is in which direction with respect to Q?
   a. South-East b. South-West
   c. North-East d. North-West

7. Radha moves towards South-East a distance of 7 km, then she moves towards West and travels a distance of 14 km. From here she moves towards North-West a distance of 7 km and finally she moves a distance of 4 km towards east. How far is she now from the starting point?
   a. 3 km b.4km **c.10km** d.11km

Each of the following questions is based on the following information:
A # B means B is at 1 metre to the right of A.
A $ B means B is at 1 metre to the North of A.
A * B means B is at 1 metre to the left of A
A @ B means B is at 1 metre to the south of A
In each question first person from the left is facing North

8. According to X @ B * P, P is in which direction with respect to X?
a.North b.South
c.North-East **d. South-West**

9. According to M # N $ T, T is in which direction with respect to M?
a.North-West b. South-East
c.North-East d. South-West

10. According to P # R $ A * U, in which direction is U with respect to P?
a.East b.South
c.West **d.North**

11. Ramesh starting from a fixed point goes 15 km towards North and then after turning to his right he goes 15 km. Then he goes 10, 15 and 15 metres after turning to his left each time. How far is he from his starting point?
a. 1.5m **b.10m** c.20m d.15m

12. Sonalika goes 12 km towards North from a fixed point and then she goes 8 km towards South from there. In the end she goes 3 km towards east. How far and in what direction is she from her starting point?
a.7km East b. 5 km West
c.7 km West **d. 5 km North-East**

13. A man starts on his bike towards west from a certain point. After driving 5 km he turns towards north and drives another 4 km. From the point he turns towards east drives 8 km and stops at a coffee shop. How far is he from the starting point and in which direction from it?
a. 5 km Northeast b. 4 km Northeast
c. 5 km Southeast d. 4km Southwest

14. I am facing south. I turn right and walk 20 m. Then I turn right again and walk 10 m. Then I turn left and walk 10 m and then turning right walk 20 m. Then I turn right again and walk 60 m. In which direction am I from the starting point?
a. North b. Northwest
c. East **d. Northeast**

15. A child is looking for his father. He went 90 meters in the east before turning to his right. He went 20 meters before turning to his right again to look for his father at his uncle's place 30 meters from this point. His father was not there. From here he went 100 meters to the north before meeting his father in a street. How far did the son met his father from the starting point?
a. 80 meters **b. 100 meters**
c. 140 meters d. 260 meters

CODING AND DECODING

1. If EFGHIJK is coded as VUTSRQP, then LIMIT is coded as
1. KNRNC **2. ORNRG**
3. JKOKG 4. RSTSG

2. If in a certain code, 'bir le nac' means 'green and tasty'; 'pic nac hor' means 'tomato is green' and 'coc bir hor' means 'food is tasty'. Which of the following means 'tomato is tasty' in that code?
1. bir le hor 2. pic hor nac
3. hor bir pic 4. None

3. If in a certain language , CALCUTTA is coded as GEPGYXXE, which word would be coded as FSQFCE?
1. BOMBYA 2.BOMBAY
3. BOMYAB 4.BOBAYM

4. In a certain code , RIPPLE is written as 613382 and LIFE is written as 8192. How is PILLER written in that code?
1. 318826 2. 776655
3. 786543 4. 156724

5. If JUNK is written as B5C7B7A11, which one among the following words can be written as B4C3B7B2?
1. BIND 2. BEND 3. HANG 4. **HIND**

6. GO AT ONCE is a coded message received as 'JB SM BQZY' and you are required to relay the answer in a code saying GO TO GATE. Select the code you will use.
1. HP BU PMDF 2. JB MK JSMY
3. IM CS QMDF **4. JB MB JSMY**

7. If OVER is coded as QYIW and UP as WS, then STAR is coded as
1. UWEV 2. UWDV 3. UVBS 4. **UWEW**

8. In a certain code, COMPUTER is written as RFUVQNPC. How is MEDICINE written in the same code?
1. EOJDJEFM 2.EOJDEJF
3. MFEJDJOE 4. MFEDJJOE

In a certain code,'il be pee' means 'roses are blue', 'sik hee' means 'red flowers' and 'pee mit hee' means 'flowers are vegetables'

9. How is 'red' written in that code?
1. hee **2. sik** 3. be 4.None

10. How is 'roses' written in that code?
1. il 2. pee 3. be **4. Cannot be determined**

11. How is 'vegetables are red flowers' written in this code?
1. pee sik mit hee 2. sik pee hee be
3. il sik mit hee 4. None

12. If GO = 32, SHE = 49, then SOME will be equal to:
1. 56 2. 58 3. 62 4. 64

13. If ROSE is coded as 6821, CHAIR is coded as 73456 and PREACH is coded as 961473, what will be the code for SEARCH?
1. 246173 **2. 214673** 3. 214763 4. 216473

If in a certain language, ENTRY is coded as 12345 and STEADY is coded as 931785, then state the correct code for each of the given words.

14. TENANT
1. 956169 2. 196247 3. 352123 4. **312723**

15. SEDATE
1. **918731** 2. 954185 3. 814195 4. 614781

16. If '245' means — 'Art and Talent' in a certain code language, '316' means — 'Callous to Generous', '147' means — 'Callous and Polite' then what is the code used for 'to' ?
1. Only 3 2. Only 1 **3. 3 or 6** 4. Only 6

NUMBER SERIES

Type I

1. 16, 33, 65, 131, 261, ?
1. 523 **2. 521** 3. 613 4. 721

2. 10, 5, 13, 10, 16, 20, 19, ?
1. 22 **2. 40** 3. 38 4. 23

3. 2, 4, 12, 48, 240, ?
1. 960 **2. 1440** 3.1080 4.1920

4. 8, 7, 11, 12, 14, 17, 17, 22, ?
1. 27 **2. 20** 3. 22 4. 24

5. 8, 24, 12, 36, 18, 54, ?
1. 27 2. 108 3. 68 4. 72

6. 4, -8, 16, -32, 64, ?
1. 128 **2. -128** 3. 192 4. -192

7. 7, 26, 63, 124, 215, 342, ?
1. 481 **2. 511** 3. 391 4. 421

8. 3, 7, 6, 5, 9, 3, 12, 1, 15, ?
1. 18 2. 13 **3. -1** 4. 3

Type II

9. 8, 27, 64, 100, 125, 216, 343
1. 27 **2. 100** 3. 125 4. 343

10. 396, 462, 572, 427, 671, 264
1. 396 **2. 427** 3. 671 4. 264

11. 2, 5, 10, 17, 26, 37, 50, 64
1. 50 2. 26 3. 37 **4. 64**

12. 8, 13, 21, 32, 47, 63, 83
1. 47 2. 63 3. 32 4. 83

13. 36, 54, 18, 27, 9, 18.5, 4.5
1. 18.5 2. 4.5 3. 18 4. 54

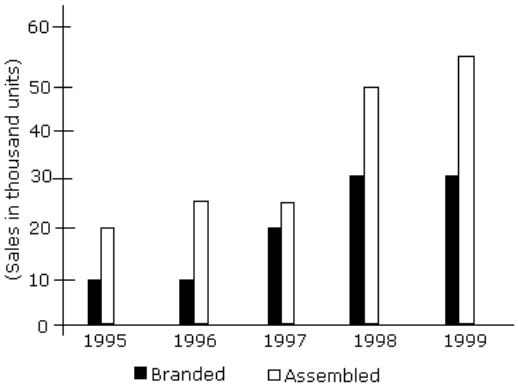
14. 56, 72, 90, 110, 132, 150
1. 72 2. 110 3. 132 **4. 150**

15. 7, 8, 18, 57, 228, 1165, 6996
1. 7 2. 6996 **3. 228** 4. 57

16. 445, 221, 109, 46, 25, 11, 4
1. 221 2. 109 **3. 46** 4. 25

DATA INTERPRETATION

Direction for questions 1 - 5:
Study the following graph carefully and answer the questions given below it



1. What is the approximate average percentage growth of sales of Assembled PCs for the given years?
a. 30 b.20 c.40 **d. 34**

2. If the Branded PCs sold in 1996 were 1,00,000 how many Branded PCs were sold in 1999?
a. 2,02,800 **b. 3,00,000**
c. 2,34,000 d. None of these

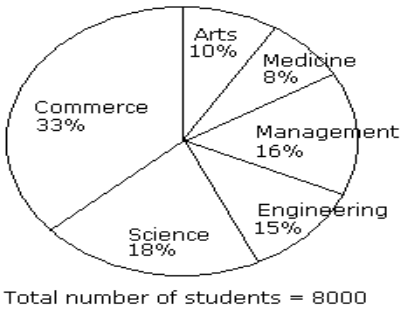
3. What is the difference between total Branded the total Assembled PCs sold for the given years?
a. 75,000 b.7,50,000
c.1,75,000 d. None of these

4. In which year is the difference in the growth between Branded and Assembled the lowest?
a. 1995 b. 1998 c. 1999 **d. None => (**1997**)**

5. For Assembled PC sale, which year the per cent growth is the highest compared to previous year?
a.1999 b.1996 **c.1998** d. None

Directions for questions 6 - 10:
Refer the following and answer the questions

Stream	Male : Female
Arts	2:3
Medicine	1:1
Engineering	7:5
Science	4:5
Management	9:7
Commerce	3:5



6. Total number of female students studying Engineering and Medicine is
a. 1280 b. 5000 **c. 820** d. 480

7. Number of Female students studying Management is what percentage of the total number of students in the University?
a. 27 b. 12 c. 9 **d. None**

8. How many male students are there in the Arts stream?
a. 320 b. 480 c. 800 d. 720

9. What is the total number of male students studying Commerce?
a. 1280 b. 1440 c. 1650 **d. None**

10. The approximate central angle for male students studying science?
a. 36^0 **b. 28^0** c. 50^0 d. None

Direction for questions 11 - 15:

Refer the following and answer the questions

In a class of 120 students, each student studies at least one of the subjects from History, English & Maths. 59 study History, 67 study English and 73 Maths. 34 study Maths and History, 26 English & Maths and 33 History and English.

11. How many students study exactly two subjects?
a. 54 **b. 51** c. 48 d. 46

12. How many students study all the three subjects?
a. 12 b. 51 c. 13 **d. 14**

13. How many students study more than one subject?
a. 63 **b. 65** c. 62 d. 66

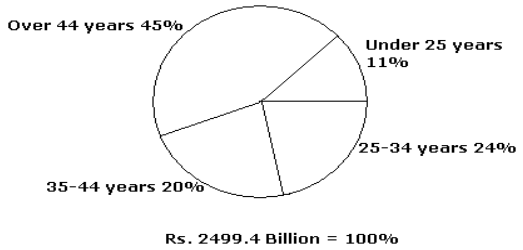
14. How many study English and Maths but not History?
a. 12 b. 13 c. 14 d. 11

15. How many study English and Maths & English and History?
a. 41 b. 43 c. 47 **d. 45**

Direction for questions 16 - 20:

Refer the following and answer the questions

Distribution of Personal Income of Citizens of a country in 2000



Rs. 2499.4 Billion = 100%

16. The personal income of the citizens in the age group 35-44 years is (in Rs. Billion) approximately
a. 500 b. 600 c. 1125 d. 1375

17. The ratio of the personal income of the citizens in the 25-34 years age group to that of 35-44 years age group is
a. 9 : 4 b. 5 : 6 c. 8 : 15 **d. 6 : 5**

18. If the total personal income in 2000 is 20% more than that of 1997, the total personal income of 1997 was (in Billion Rupees)
a. 2200 **b. 2100** c. 2000 d. 1900

19. The angle in the pie chart representing the income of citizens of the 35-44 years age group is
a. 20^0 b. 40^0 **c. 72^0** d. 86^0

20. If the total personal income in 2005 is one and a half times that in 2000, what is the average annual growth rate during the period 2000 – 2005?
a. 15% b. 12% **c. 10%** d. None

Direction for questions 21 - 24:

Prof. Singh has been tracking the number of visitors to his homepage? His service provider has provided him with the following data on the country of origin of the visitors and the university they belong to:

Number of visitors:

	DAY		
COUNTRY	1	2	3
Canada	2	0	0
Netherland	1	1	0
India	1	2	0
UK	2	0	2
USA	1	0	1

Number of visitors:

	DAY		
UNIVERSITY	1	2	3
University 1	1	0	0
University 2	2	0	0
University 3	0	1	0
University 4	0	0	2
University 5	1	0	0
University 6	1	0	1
University 7	2	0	0
University 8	0	2	0

21. To which country does University 5 belong?
a. **India or Netherlands not USA**
b. India or USA but not Netherlands
c. Netherlands or USA but not India
d. India or USA but not UK

22. University 1 can belong to
a. UK b. Canada
c. Netherlands d. USA

23. Visitors from how many universities from UK visited Prof. Singh's homepage?
a. 1 b. 2 **c. 3** d. 4

24. Which among the listed countries can possibly host three of the eight listed universities?
a. None b. Only UK
c. Only India **d. Both India and UK**

DATA SUFFICIENCY

Type I - Each question is followed by two statements, I and II. Mark the answer

a. If the question can be answered by using one of the statements alone, but cannot be answered using the other statement alone.
b. If the question can be answered by using either statement alone.
c. If the question can be answered by using both statements together, but cannot be answered using either statement alone.
d. If the question cannot be answered even by using both statements together.

1. What is the sum of 2 numbers?
I. The LCM of the numbers is 51
II. One of the numbers is 17

2. What are the distinct integers A and B?
I. The product of A and B is 4
II. A and B are both positive.

3. LCM of 2 numbers is 630. What is the absolute difference between them?
I. HCF is 9
II. The sum of the 2 numbers is 153

4. Is (a2 - b2) even?
I. (a + b) is odd II. (a - b) is odd

5. If a, b and c are integers, is 3(a + b) + c divisible by 3?
I. (a + b) is divisible by 3
II. c is divisible by 3.

6. If d = 0.2f6, then what is the value of d rounded off to one decimal place?
I. f < 5 II. d<¼

7. A log of wood is 8m long. It is cut into three smaller pieces. How long is the longest of the three pieces?
I. The smallest piece is 1.5m long
II. One of the pieces is 4.1m.

8. How many children does M have?
I. H is only daughter of X who is wife of M.
II. K and J are brothers of M.

9. If $x \neq y$, then what is the value of x?
I. $7y/(3x+67) = 5$ II. $(x + y)/(y-x) = 1$

10. What is the value of (c + d)?
I. $c^2 - d^2 = 5$ II. c-d = 1

11. Is g greater than h?
I. (g + 3) is greater than (h + 2)
II. The cube of g is greater than the cube of h.

12. What is the value of the ratio (a + c): c?
I. The ratio of a: b = 1: 5
II. The ratio of b:c = 3:2.

13. Ten children are sitting at a table. What is the average age of 10 children?
I. Average age of 6 youngest children is 12
II. Average age of 4 oldest children is 16

14. What is the sum of three real numbers?
I. Their product is 450 II. Their average is 40

15. What is the value of x?
I. q - x = x – p II. p + q = 20

16. Is Arun taller than Sachin?
I. Dinesh is of the same height as Arun and Sachin.
II. Sachin is not shorter than Dinesh.

17. In a certain code language, '13' means 'stop smoking' and '59' means 'injurious habit'. What is meaning of '9' and '5' in that code?
I. '157' means 'stop bad habit'
II. '839' means 'smoking is injurious'.

18. Five persons --- A, B, C, D and E are sitting in a row. Who is sitting in the middle?
I. B is in between E and C.
II. B is to the right of E.
III. D is in between A and E.
a. I and II together b. II and III together
c. I and III together d. I, II and III together
e. Data insufficient

19. Four Subjects --- Physics, Chemistry, Mathematics and Biology were taught in four consecutive periods of one hour each starting from 8.00 a.m. At what time was the Chemistry period scheduled?
I. Mathematics period ended at 10.00 am which was preceded by Biology.
II. Physics was scheduled in the last period.
III. Mathematics period was immediately followed by Chemistry.
a. Only I b. Only I and II
c. Only II d. II and III together

PROBLEMS ON AVERAGE

Concept and Formulae:

1. Average = $\left(\frac{\text{Sum of observations}}{\text{Number of observations}}\right)$
2. Suppose a man covers a certain distance at x kmph and an equal distance at y kmph. Then, the average speed during the whole journey is $\frac{2xy}{x+y}$ kmph.

Example 1:
Find the average of all prime numbers between 30 and 50.
Solution:
There are 5 prime number between 30 and 50.
They are 31, 37, 41, 43 and 47.
$\therefore$ Reqd avg = $\frac{31+37+41+43+47}{5} = \frac{199}{5} = 39.8$.

Example 2:
Find the average of first 40 natural numbers.
Solution:
Sum of first n natural numbers = $\frac{n(n+1)}{2}$
So, sum of first 40 natural numbers
$= \frac{40 \times 41}{2} = 820$.
$\therefore$ Required average = $\frac{820}{40} = 20.5$.

Example 3:
Find average of first 20 multiples of 7.
Solution:
Reqd avg = $\frac{7(1+2+3+\ldots+20)}{20}$
$= \frac{7 \times 20 \times 21}{20 \times 2} = \frac{147}{2} = 73.5$

Example 4:
Average of four consecutive even numbers is 27. Find the largest of these numbers.
Solution:
Let the numbers be x, x + 2, x + 4 and x +6.
Then, $\frac{x + (x+2) + (x+4) + (x+6)}{4} = 27$
$\frac{4x+12}{4} = 27 \Rightarrow x + 3 = 27 \Rightarrow x = 24$.
$\therefore$ Largest number = (x + 6) = 24 + 6 = 30.

Example 5:
There are two sections A and B of a class, consisting of 36 and 44 students respectively. If the average weight of section A is 40 kg and that of section B is 35 kg, find the average weight of the whole class.
Solution:
Total weight of (36 + 44) students
= (36 x 40 + 44 x 35) kg = 2980kg.
$\therefore$ Avg weight of the whole class
$= \frac{2980}{80}$ kg = 37.25 kg

Questionnaire for Practice

1. The average age of students in a class of 40 is 16 years. 12 more students of average age 19 years are admitted to the class. Find the average age of the class.
   a.12 years b.14 years
   c.15.6 years **d.16.7 years**

2. The average weight of patients on a particular day in a hospital is recorded as 50 kg. Of these there were 20 children of average weight 30 kg, 40 males of average weight 60 kgs and 50 female patients. Find the average weight of the female patients.
a. 45 kg **b.50kg** c. 60 kg d. None

3. The average runs scored by a batsman in 5 innings in 45. After his sixth innings the average falls to 43. How many runs did he score in the 6^{th} innings?
a.31 b.32 **c.33** d.34

4. 6 persons standing in queue with different age group, after two years their average age will be 43 and seventh person joined with them. Hence the current average age has become 45. Find the age of seventh person?
a. 45 b. 56 **c. 69** d. 57

5. In a shopping mall with a staff of 5 members the average age is 45 years. After 5 years a person joined them and the average age is again 45 years. What's the age of 6th person?
a.40 b. 30 **c. 20** d. 25

BLOOD RELATIONS

1. If A + B means A is the mother of B; A - B means A is the brother B; A % B means A is the father of B and A x B means A is the sister of B, which of the following shows that P is the maternal uncle of Q?
   a. Q - N + M x P b. P + S x N - Q **c. P - M + N x Q** d. Q - S % P

2. Pointing at a photograph Upendra says "He is the only son of the only son to the father of my father's wife". How is the person in the photograph related to the speaker?
   a. Brother b. Father c. Uncle **d. Cousin**

3. A is the son of C; C and Q are sisters; Z is the mother of Q and P is the son of Z. Which of the following statements is true?
   a. P and A are cousins **b. P is the maternal uncle of A**
   c. Q is the maternal grandfather of A d. C and P are sisters

4. Pointing at a photograph Ramaprasad says "I have no brothers or sisters but his father is my father's son". How is the person in the photograph related to the speaker?
   a. Himself b. Father **c. Son** d. Brother

5. B5D means B is the father of D. B9D means B is the sister of D. B4D means B is the brother of D. B3D means B is the wife of D. Which of the following means F is the mother of K?
   a. F3M5K b. F5M3K c. F9M4N3K d. F3M5N3K

In a family of seven, three generations are living together.

- The family consists of two married couples having two children each.
- Gopal is lucky to have two grandchildren.
- There are two housewives and both are beautiful.
- Gopal who is Manoj's father, is a lawyer and earns the most.
- Jyotsna is the sister of a lecturer and herself is a nurse.
- Anuradha is married to a lecturer who is Nidhi's son.
- Jyothika is the granddaughter of one of the housewives and is a classical dancer.

6. What is Manoj's profession?
   1. Student **2. Lecturer** 3. Lawyer 4. Cannot be determined
7. How many male members are there in the family?
   1.2 2.3 3. 4 **4. Cannot be determined**

Directions for questions 8 - 11: Read the following data and answer the questions.
Radha and Minnilal have two children, Simmi and Divya. Divya is married to Anuj who is the son of Madhu and Jabbar. Resham is the daughter of Anuj. Kiran, who is Anuj's sister is married to Subodh and has two sons Tarun and Aman. Tarun is the grandson of Madhu and Jabbar.

8. What is the relationship between Aman and Resham?
   A. Uncle-Niece B. Father-Daughter
   C. Husband-wife **D. Cousins**
9. How is Subodh related to Jabbar?
   A. Son-in-law B. Son C. Brother D. Father-in-law
10. How is Resham related to Kiran?
    A. Niece B. Daughter C. Mother D. Aunt
11. How is Kiran related to Divya?
    A. Aunt B. Grandmother **C. Sister-in-law** D. None of these

LOGICAL REASONING

Directions for questions 1 - 5: Read the following data and answer the questions
There are four girls – Kavitha, Meera, Meena and Teju. One of them lives at Chennai and her hobbies are clay modeling and reading. Meera lives at Mumbai. Kavitha also lives at Mumbai and her hobby is dancing. Both girls staying at Mumbai are fond of gardening. Teju lives at Delhi and her hobbies are painting and photography. One girl staying at Mumbai enjoys traveling. If all the girls have two hobbies each, answer the following questions:

1. Who enjoys traveling?
   1. Kavitha **2. Meera** 3. Meena 4. Teju
2. Who is the girl with the hobbies dancing and gardening?
   1. Kavitha 2. Teju 3. Meera 4. Meena
3. Who is staying at Chennai?
   1. Meena 2. Teju 3. Both 1 and 2 4. None of the above
4. Who among the following is fond of gardening?
   1. Meena **2. Meera** 3. Both 1 and 2 4. None of the above
5. What are Meena's hobbies?
   1. Reading and Dancing 2. Gardening and painting
   3. Travelling and dancing **4. Clay modeling and reading**

Directions for questions 6 - 11: Read the following data and answer the questions A genealogist has determined that M, N, P, Q, R, S and T are the father, the mother, the aunt, the brother, the sister, the wife and the daughter of X, but she has been unable to determine which person has which status. She does know :

1. P and Q are the same sex.
2. M and N are not of the same sex.
3. S was born before M.
4. Q is not the mother of X.

6. How many of seven people - M, N, P, Q, R, S and T - are female?
   1. 3 2. 4 **3. 5** 4.7

7. Which of the following must be true?
   1. M is a female. 2. N is a female. **3. P is a female**. 4. T is a female

8. If T is the daughter of X, which of the following must be true?
   1. M and P are of the same sex 2. M and Q are of the same sex
   3. P is not of the same sex as N **4. R is not of the same sex as S**

9. If M and Q are sisters, all of the following must be true EXCEPT
   1. N is a male 2. M is X's mother 3. Q is X's aunt **4. T is X's daughter**

10. If S is N's grandfather, then which of the following must be true?
    1. R is N's aunt 2. X is P's son **3. M is X's brother** 4. Q is S's husband

11. If M is X's wife, all of the following could be true EXCEPT
    1. S is X's daughter 2. P is X's sister 3. Q is X's sister 4. R is X's father

Directions for questions 12 – 16: Read the following data and answer the questions
All the roads of city Z are either perpendicular or parallel to one another. The roads are all straight Roads. A, B, C, D, E are parallel to one another Roads G, H, I, J, K, L, M are parallel to one another.
Road A is 1 mile east of Road B Road B is ½ mile West of C
Road D is 1 mile West of E Road I is 1 mile north of J
Road K is ½ mile north of L Road K is 1 mile South of M

12. If E is between B and C which is false
   1. D is less than 1 mile from B 2. C is less than $1\frac{1}{2}$ mile from D
   3. E is less than 1 mile from A **4. D is 2 miles West of A**

13. Which of the following possibilities would make 2 roads coincide?
   1. L is $\frac{1}{2}$ mile north of I 2. D is $\frac{1}{2}$ mile east of A
   3. I is $\frac{1}{2}$ mile north of K 4. C is 1 mile West of D

14. If X is parallel to I and X is $\frac{1}{2}$ mile South of J and 1 mile north of G, which two roads would be $2\frac{1}{2}$ miles apart?
   1. I and X 2. X and H 3. J and G **4. I and G**

15. If road E is between B and C then distance between A and D is
   1. $\frac{1}{2}$ mile 2. 1 mile 3. $1\frac{1}{2}$ miles **4. $1\frac{1}{2}$ - 2miles**

16. Which is necessarily true?
   1. I is 1 mile north of L 2. D is 2 miles West of B
   3. E and B intersect **4. M is $1\frac{1}{2}$ miles north of L**

Directions for questions 17 - 21: Read the following data and answer the questions

A group of six players P, Q, R, S, T and U are participating in a challenge tournament. All matches played are challenge matches and are governed by the following rules:

A player may challenge another player if and only if that player is ranked either one or two places above her.

If a player successfully challenges the player ranked immediately above her, the two players exchange ranks.

If a player successfully challenges the player two ranks above her, she moves up two ranks, and both the loser of the match and the player ranked below the loser move down one rank.

If a player is unsuccessful in her challenge, she and the player immediately below her exchange ranks, unless the unsuccessful challenger was already ranked last, in which case the rankings remain unchanged.

The initial rankings from the highest (first) to the lowest (sixth) are P, Q, R, S, T, U. Only one match is played at a time.

17. Which of the following is possible as the first match of the tournament?

1. P challenges Q 2. Q challenges R **3. R challenges P** 4. S challenges P

18. If S reaches first place after the first two matches of the tournament, which of the following must be ranked fourth at that point in play?

1. P 2. Q **3. R** 4. T

19. All of the following are possible rankings, from highest to lowest, after exactly two matches EXCEPT

1. P, R, Q, T, S, U 2. P, R, Q, S, U, T **3. R, P, Q, U, S, T** 4. Q, P, S, R, U, T

20. If exactly two matches have been played, what is the maximum number of players whose initial ranks could have been changed?

1. 2 2. 3 3. 4 **4. 6**

21. If after the initial two matches two players have improved their rankings and four players have each dropped in rank, which of the following could be the third match of the tournament?

1. R challenges P 2. R challenges Q 3. Q challenges U **4. U challenges**

Directions for questions 22 - 26: Read the following data and answer the questions

Three friends A. B and C have Rs. 155, Rs.180, Rs. 160. They started playing a game in which a person who has maximum money gives other two persons an amount equal to one-fifth of their own respective amount. The game stops when each of them has given money at least once.

22. What is the approximate amount left with A at the end of the game?

1. Rs. 155 **2. Rs. 169** 3. Rs.159 4. Rs. 162

23. What is the approximate amount left with B at the end of the game?

1. Rs. 175 2. Rs. 154 **3. Rs. 168** 4. Rs. 182

24. What is approximate amount left with C at the end of the game?

1. Rs. 158 2. Rs. 155 3. Rs. 151 4. Rs. 145

25. In how many steps does the game end?

1. 3 2. 4 3. 5 4. 6

26. After the first step who among them has highest amount?

1. A 2. B **3. C** 4. A and B

Directions for questions 27 - 31: Read the following data and answer the questions

At the end of the soccer season, every player had scored a prime number of goals and the average of the 11 players was also a prime number. No player's individual tally was the same as anyone else's or as the average. Nobody had scored more than 45 goals.

27. What was the average of their goals scored?

1. 27 **2. 23** 3. 29 4. 31

28. What was the maximum number of goals scored by a single player?

1. 43 2. 41 3. 37 4. 29

29. What was the minimum number of goals scored by a single player?

1. 5 2. 7 3. 11 4. 13

30. How many players had scored above 20 goals individually?

1. 6 **2. 5** 3. 7 4. None of these

31. What was the second minimum number of goals scored by a single player?

1. 2 2. 5 3. 3 **4. 7**