MANAV RACHNA
vidyanatariksha

Manav Rachna University

Career Development Centre

Handbook for Quantitative Aptitude Semester V

Subject Name: PCE-III
Subject Code: CD0-301
Semester: JULY'19 to DEC'19
Branch: All

Student Name: ……

Roll Number: …….

Section: ……..

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CHAPTER 1

TIME & WORK

Time and Work

Work from days: If A can do a piece of work in n days, then A's one day work =1/n

Ratio: If A is thrice as good a workman as B, then:
Ratio of work done by A and B = 3 : 1.
Ratio of times taken by A and B to finish a work = 1 : 3

Example: If A can do a piece of work in 4 days, then A's 1 day's work = 1/4. If A's 1 day's work = 1/5, then A can finish the work in 5 days
If A is thrice as good workman as B, then: Ratio of work done by A and B = 3:1. Ratio of time taken by A and B to finish a work = 1:3

Definition of Variation:

The change in two different variables follow some definite rule. It said that the two variables vary directly or inversely. Its notation is X/Y = k, where k is called constant. This variation is called direct variation. XY = k. This variation is called inverse variation.

Some Pairs of Variables:

- Number of workers and their wages. If the number of workers increases, their total wages increase. If the number of days reduced, there will be less work. If the number of days is increased, there will be more work. Therefore, here we have direct proportion or direct variation.

- Number workers and days required to do a certain work is an example of inverse variation. If more men are employed, they will require fewer days and if there are less number of workers, more days are required.

- There is an inverse proportion between the daily hours of a work and the days required. If the number of hours is increased, less number of days are required and if the number of hours is reduced, more days are required.

Important Alert!

- More Men - Less Days and Conversely More Day - Less Men.

- More Men - More Work and Conversely More Work - More Men.

- More Days - More Work and Conversely More Work - More Days.

Number of days required to complete the given work = Total work/One day's work.

Since the total work is assumed to be one(unit), the number of days required to complete the given work would be the reciprocal of one day's work. Sometimes, the problems on time and work can be solved using the proportional rule ((man*days*hours)/work) in another situation.

If men are fixed, work is proportional to time. If work is fixed, then time is inversely proportional to men therefore,

(M1*T1/W1) = (M2*T2/W2)

Pipes and Cisterns

Inlet: A pipe connected with a tank or a cistern etc, that fills it, is known as an inlet.

Outlet: A pipe connected with a tank or cistern etc, emptying it, is known as an outlet.

If a pipe can fill a tank in x hours, then part of the tank filled in 1 hr =1/x
If a pipe can empty a tank in y hours, then part of the tank filled in 1 hr =1/y

If a pipe can fill a tank in x hours and another pipe can empty the full tank in y hours (where y > x), then on opening both the pipes, then

The net part filled in 1 hour = $\frac{1}{x} - \frac{1}{y}$

If a pipe can fill a tank in x hours and another pipe can empty the full tank in y hours (where y > x), then on opening both the pipes, then

The net part emptied in 1 hour = $\frac{1}{y} - \frac{1}{x}$

General Problems

Q1. A, B and C can complete a piece of work in 24, 6 and 12 days respectively. Working together, they will complete the same work in?
(a) 1/24 day (b) 7/24 day (c) 3 3/7 days (d) 4 days

Q2. Ram and Ghanshyam together can finish a job in 8 days. Ram can do the same job on his own in 12 days. How long will Ghanshyam take to do the job by himself?
(a) 16 days (b) 20 days (c) 24 days (d) 30 days

When Workers Leave in Between

Q3. A and B can do a piece of work in 30 days, while B and C can do the same work in 24 days and C and A in 20 days. They all work together for 10 days when B and C leave. How many days more will A take to finish the work?
(a) 18 days (b) 24 days (c) 30 days (d) 36 days

Q4. A and B together can complete a piece of work in 8 days while B and C together can do it in 12 days. All the three together can complete the work in 6 days. In how much time will A and C together complete the work?
(a) 8 days (b) 10 days (c) 12 days (d) 20 days

Q5. A and B can complete a work in 15 days and 10 days respectively. They started doing the work together but after 2 days B had to leave and A alone completed the remaining work. The whole work was completed in?
(a) 8 days (b) 10 days (c) 12 days (d) 15 days

Q6. A can finish a work in 24 days, B in 9 days and C in 12 days. B and C start the work but are forced to leave after 3 days. The remaining work was done by A in:
(a) 5 days (b) 6 days (c) 10 days (d) 10 ½ days

Q7. A machine P can print one lakh books in 8 hours, machine Q can print the same number of books in 10 hours while machine R can print them in 12 hours. All the machines are started at 9 A.M. while machine P is closed at 11 A.M. and the remaining two machines complete work. Approximately at what time will the work (to print one lakh books) be finished?
(a) 11:30 AM (b) 12 Noon (c) 12.30 PM (d) 1:00 PM

Q8. A can do a piece of work in 60 days while B alone can do it in 90 days. They begin together but 15 days before the completion of the work, B leaves off. Find the total number of days for the work to be completed?
(a) 42 days (b) 32 days (c) 35 days (d) 39 days

Working on Alternate Days

Q9. A and B can complete a piece of work in 12 days and 18 days respectively. A begins to do the work and they work alternately one at a time for one day each. The whole work will be completed in how many days?
(a) 14 1/3 (b) 7 1/3 (c) 15 (d) 7 1/2

Q10. A, B and C can do a piece of work in 18, 24 and 36 days, respectively. They work alternative, first day C, Second day B and third day A, fourth day C and so on. How many days will be needed to complete the work like this way?

(a) 18 (b) 20 (c) 24 (d) 30

Work and Wages

Q11. A, B and C can do a piece of work in 12, 16 and 24 days, respectively. Doing that work together, they get an amount of Rs. 2700. What is the share of B in that amount?

(a) 1200 (b) 900 (c) 600 (d) 450

Q12. 4 men and 6 women get Rs. 1600 by doing a piece of work in 5 days. 3 men and 7 women get Rs. 1740 by doing the same work in 6 days. In how many days, 7 men and 6 women can complete the same work getting Rs. 3760?

(a) 6 days (b) 8 days (c) 10 days (d) 12 days

Equations and Work

Q13. 8 men can do a piece of work in 12 days. 4 women can do it in 48 days and 10 children can do it in 24 days. In how many days can 10 men, 4 women and 10 children together complete the piece of work?

(a) 5 days (b) 15 days (c) 28 days (d) 6 days

Q14. 9 men working 7 hours a day can complete a piece of work in 15 days. In how many days can 6 men working for 9 hours a day, complete the same piece of work?

(a) 8 days (b) 16 days (c) 12 days (d) None of these

Q15. It is given that 16 men working 18 h a day can build a wall 36 m long, 4 m broad and 24 m high in 20 days. How many men will be required to build a wall 64 m long, 6 m broad and 18 m high working 12 h a day in 16 days?

(a) 60 (b) 20 (c) 30 (d) 35

Q16. 50 men or 80 women can finish a job in 50 days. A contractor deploys 40 men and 48 women for this work, but after every duration of 10 days, 5 men and 8 women are removed till the work is completed. The work is completed in?

(a) 45 days (b) 50 days (c) 54 days (d) 62 days

Q17. If one man or two women or three boys can finish a work in 88 days, then how many days will one man, one woman and one boy together take to finish the same work?

(a) 46 days (b) 54 days (c) 48 days (d) 44 days

Q18. 10 women can complete a piece of work in 8 days and 10 children take 12 days to complete it. How many days will 6 women and 3 children together take to complete the work?

(a) 9 days (b) 12 days (c) 7 days (d) None of these

Addition/Subtraction of Manpower

Q19. 20 men complete one-third of a piece of work in 20 days. How many more men should be employed to finish the rest of the work in 25 more days?
(a) 10 (b) 12 (c) 15 (d) 20

Q20. In a garrison, there was food for 1000 soldiers for one month. After 10 days, 1000 more soldiers joined the garrison. How long would the soldiers be able to carry on with the remaining food?
(a) 25 days (b) 20 days (c) 15 days (d) 10 days

Pipes & Cisterns

Inlet& Outlet Pipes

Q21. A and B can fill a tank in 20 and 30 min respectively. If both the pipes are working together, how long will it take to fill the tanks?
(a) 12 min (b) 15 min (c) 25 min (d) 50 min

Q22. Pipes A and B can fill a tank in 5 and 6 hours respectively. Pipe C can empty it in 12 hours. If all the three pipes are opened together, then the tank will be filled in?
(a) 1 13/7 hours (b) 2 8/11 hours (c) 3 9/17 (d) 4 ½ hours

Q23. A cistern has two pipes. One can fill it with water in 8 hr and the other can empty it in 5 hr. In how many hours will the cistern be emptied if both the pipes are opened together when of the cistern is already half full of water?
(a) 7 hr (b) 6 hr (c) 6 hr & 40 minutes (d) None of these

Q24. A cistern has three pipes A, B and C. Pipes A and B can fill it in 3 and 4 hours, respectively, while pipe C can empty the completely filled cistern in 1 hour. If the pipes are opened in order at 3 pm, 4 pm and 5 pm, respectively, at what time will the cistern be empty?
(a) 6:15 pm (b) 7:12 pm (c) 8:12 pm (d) 8:35 pm

Q25. A tank can be filled by a tap in 20 minutes and by another tap in 60 minutes. Both the taps are kept open for 10 minutes and then the first tap is shut off. After this, the tank will be completely filled in?
(a) 10 minutes (b) 12 minutes (c) 15 minutes (d) 20 minutes

Pipes with Different Efficiency

Q26. Two pipes A and B can fill a tank in 15 minutes and 20 minutes respectively. Both the pipes are opened together but after 4 minutes, pipe A is turned off. What is the total time required to fill the tank?
(a) 10 min 20 sec (b) 11 min. 45 sec (c) 12 min 30 sec (d) 14 min 40 sec

Q27. One pipe can fill a tank three times as fast as another pipe. If together the two pipes can fill the tank in 36 minutes, then the slower pipe alone will be able to fill the tank in?
(a) 81 min (b) 108 min (c) 144 min (d) 192 min

Q28. Three pipes A, B and C can fill a tank from empty to full in 30 minutes, 20 minutes, and 10 minutes respectively. When the tank is empty, all the three pipes are opened. A, B and C discharge chemical solutions P,Q and R respectively. What is the proportion of the solution R in the liquid in the tank after 3 minutes?

(a) 5/11 (b) 6/11 (c) 7/11 (d) 8/11

Problems on Volume

Q29. Two pipes can fill a tank in 20 and 24 minutes respectively and a waste pipe can empty 3 gallons per minute. All the three pipes working together can fill the tank in 15 minutes. The capacity of the tank is?

(a) 60 gallons (b) 100 gallons (c) 120 gallons (d) 180 gallons

Q30. Two pipes can fill a tank in 20 and 24 min., respectively and a waste pipe can empty 6 gallon per min. All the three pipes working together can fill the tank in 15 minutes. Find the capacity of the tank (in gallons)?

(a) 210 (b) 50 (c) 150 (d) 240

Q31. Water is filled in a container in such a manner that its volume doubles after every five minutes. If it takes 30 minutes for the container to be full, in how much time will it be one fourth full?

(a) 7.5 min. (b) 10 min. (c) 20 min. (d) 25 min.

Q32. A tap having diameter'd' can empty a tank in 40 minutes. How long another tap having diameter '2d' take to empty the same tank?

(a) 5 min. (b) 20 min. (c) 10 min. (d) 40 min.

Time Taken to Fill the Tank

Q33. Two pipes A and B can fill a cistern in 37.5 minutes and 45 minutes respectively. Both pipes are opened. The cistern will be filled in just half an hour, if the B is turned off after?

(a) 5 min. (b) 9 min. (c) 10 min (d) 15 min

Q34. A tank is filled by three pipes with uniform flow. The first two pipes operating simultaneously fill the tank in the same time during which the tank is filled by the third pipe alone. The second pipe fills the tank 5 hours faster than the first pipe and 4 hours slower than the third pipe. The time required by the first pipe is?

(a) 6 hours (b) 10 hours (c) 15 hours (d) 30 hours

Q35. A tank is filled in 5 hours by three pipes A, B and C. The pipe C is twice as fast as B and B is twice as fast
as A. How much time will pipe A alone take to fill the tank?

(a) 20 hours (b) 25 hours (c) 35 hours (d) Cannot be determined

Q36. A large tanker can be filled by two pipes A and B in 60 minutes and 40 minutes respectively. How many minutes will it take to fill the tanker from empty state if B is used for half the time and A and B fill it together for the other half?

(a) 15 min (b) 20 min (c) 27.5 min (d) 30 min

Q37. A tap can fill a tank in 6 hours. After half the tank is filled, three more similar taps are opened. What is the total time taken to fill the tank completely?
(a) 3 hrs 15 min (b) 3 hrs 45 min (c) 4 hrs (d) 4 hrs 15 min

FAQs @ Placements

Q38. Foreign language broadcast records last 30 minutes on each of two sides. If it takes 3 hours to translate one hour of broadcast, how long will it take to translate 15 full records?
(a) 5 hours (b) 15 hours (c) 75 hours (d) 22.5 hours.

Q39. A product is supported each week by the same three customer service Representation (CSRs). Last month the test CSR took 400 calls, the second took 330 calls and the third took 260 calls. This month the job will consist of 1200 calls. If three CSRs each increase these work proportionality how many more calls and the first CSR take this month than Last month?
(a) 85 (b)105 (c) 308 (d) 92

Q40. A printer begins printing forms at 10:23 AM, at the rate 76 forms per minute. Another printer begins printing at 10:32 AM, printing 88 forms per minute. At what time will the two printers have printed the same number of forms?
(a) 11:29 am (b) 11:38 am (c) 11:20 am (d) 11:59 am

Q41. Helpers are needed to prepare for the fete. Each helper can make either 2 large cakes or 35 small cakes per hour. The kitchen is available for 3 hours and 20 large cakes and 700 small cakes are needed. How many helpers are required?
(a) 10 (b)15 (c) 20 (d) 25

Q42. 10 men can complete a piece of work in 15 days and 15 women can complete the same work in 12 days. If all the 10 men and 15 women work together, in how many days will the work get completed?
(a) 6 (b) 6 1/3 (c) 6 2/3 (d) 7 2/3

Q43. A and B together complete a task in 14 days and B and C can complete the same work in 8 days while A and C can complete in 7 days. Find the number of days taken by the least efficient person to complete the work?
(a) 112 (b) 112/3 (c) 112/5 (d) 112/7

Q44. Two identical taps fill 2/5 of a tank in 20 minutes. When one of the taps goes dry in how many minutes will the remaining one tap fill the rest of the tank?
(a) 5 mins (b) 10 mins (c) 15 mins (d) 20 mins

Q45. A can do a piece of work in 10 days, B in 15 days. They work together for 5 days, the rest of the work is finished by C in two more days. If they get Rs. 3000 as wages for the whole work, what is the daily wage of A?
(a) 200 (b) 300 (c) 400 (d) 250

Q46. A is twice as good a workman as B and is therefore able to finish a piece of work in 30 days less than B. In how many days they can complete the whole work, working together?
(a) 10 (b) 12 (c) 20 (d) 28

Q47. A Contractor employed a certain number of workers to finish constructing a road in a certain scheduled time. Sometime later, when a part of work had been completed, he realized that the work would get delayed by three-fourth of the scheduled time, so he at once doubled the no of workers and thus he managed to finish the road on the scheduled time. How much work he had been completed, before increasing the number of workers?
(a) 10 % (b) 14 2/7 % (c) 20 % (d) 16 2/3 %

Q48. (x-2) men can do a piece of work in x days and (x+7) men can do 75% of the same work in (x-10) days. Then in how many days can (x+10) men finish the work?
(a) 27 days (b) 12 days (c) 25 days (d) 18 days

Q49. Pipe A can fill the tank in 4 hours, while pipe B can fill it in 6 hours working separately. Pipe C can empty whole the tank in 4 hours. He opened the pipe A and B simultaneously to fill the empty tank. He wanted to adjust his alarm so that he could open the pipe C when it was half-filled, but he mistakenly adjusted his alarm at a time when his tank would be 3/4th filled. What is the time difference between both the cases, to fill the tank fully?
(a) 48 min (b) 54 min (c) 30 min (d) 36 min

Q50. A group of workers was put on a job. From the second day onwards, one worker was withdrawn each day. The job was finished when the last worker was withdrawn. Had no worker been withdrawn at any stage, the group would have finished the job in 55% of the time. How many workers were there in the group?
(a) 50 (b) 40 (c) 45 (d) 10

Q51. There are three boats B1, B2 and B3 working together they carry 60 people in each trip. One day an early morning B1 carried 50 people in few trips alone. When it stopped carrying the passengers B2 and B3 started carrying the people together. It took a total of 10 trips to carry 300 people by B1, B2 and B3. It is known that each day on an average 300 people cross the river using only one of the 3 boats B1, B2 and B3. How many trips it would take to B1, to carry 150 passengers alone?
(a) 15 (b) 30 (c) 25 (d) 10

Q52. A single reservoir supplies the petrol to the whole city, while the reservoir is fed by a single pipeline filling the reservoir with the stream of uniform volume. When the reservoir is full and if 40,000 liters of petrol is used daily, the supply fails in 90 days. If 32,000 liters of petrol is used daily, it fails in 60 days. How much petrol can be used daily without the supply ever failing?
(a) 64000 liters (b) 56000 liters (c) 78000 liters (d) 60000 liters

Q53. In Nuts And Bolts factory, one machine produces only nuts at the rate of 100 nuts per minute and needs to be cleaned for 5 minutes after production of every 1000 nuts. Another machine produces only bolts at the rate of 75 bolts per minute and needs to cleaned for10 minutes after production of every 1500 bolts. If both the machines start production at the same time, what is the minimum duration required for producing 9000 pairs of nuts and bolts?

(a) 130 min (b) 135 min (c) 170 min (d) 180 min

Q54. If a quarter kg of potato costs 60 paisa, how many paisa will 200 gm cost?

(a) 40 paisa (b) 48 paisa (c) 1200 paisa (d) 2400 paisa

Q55. 50 men took a dip in a water tank 40 m long and 20 m broad on a religious day. If the average displacement of water by a man is 4 m3, then the rise in the water level in the tank will be?

(a) 30 (b) 15 (c) 25 (d) 32

Q56. Two copiers are being used to produce 1800 copies of 1-page document one copier runs at 125% of speed of the speed of the other. How many copies should be made on the faster copier so that both copier will finish at the same time?

(a) 720 (b) 800 (c) 1000 (d) 1080

CHAPTER 2

NUMBER SYSTEM

DIVISIBILITY OF A NUMBER

Divisibility Tests	*Example*
A number is divisible by 2, if the last digit is 0, 2, 4, 6 or 8.	168 is divisible by 2 since the last digit is 8.
A number is divisible by 3, if the sum of the digits is divisible by 3.	168 is divisible by 3 since the sum of the digits is 15 (1+6+8=15), and 15 is divisible by 3.
A number is divisible by 4, if the number formed by the last two digits is divisible by 4.	316 is divisible by 4 since 16 is divisible by 4.
A number is divisible by 5, if the last digit is either 0 or 5.	195 is divisible by 5 since the last digit is 5.
A number is divisible by 6, if it is divisible by 2 **AND** it is divisible by 3.	168 is divisible by 6 since it is divisible by 2 **AND** it is divisible by 3.
A number is divisible by 8, if the number formed by the last three digits is divisible by 8.	7,120 is divisible by 8 since 120 is divisible by 8.
A number is divisible by 9, if the sum of the digits is divisible by 9.	549 is divisible by 9 since the sum of the digits is 18 (5+4+9=18), and 18 is divisible by 9.
A number is divisible by 10, if the last digit is 0.	1,470 is divisible by 10 since the last digit is 0.

Divisibility Rule for 7

Subtract 2 times the last digit from remaining truncated number. Repeat the step as necessary. If the result is divisible by 7, the original number is also divisible by 7.
For example: **945**
94-(2*5)=84. Since 84 is divisible by 7, the original no. 945 is also divisible

Divisibility Rule for 11

For a test of divisibility by 11 start from the right and add every second digit. Now subtract from that total the sum of the remaining digits. The resulting number is divisibly by 11 if and only if the number you started with is divisible by 11.
For example consider **678234.**
(4 + 2 + 7) - (3 + 8 + 6) = 13 - 17 = -4
Which is not divisible by 11 so **678234 is not divisible by 11.**
Now, try **908193**
(3 + 1 + 0) - (9 + 8 + 9) = -22 which is divisible by 11. So, **908193 is divisible by 11.**

Divisibility Rule for 13

Add 4 times the last digit to the remaining truncated number. Repeat the step as necessary. If the result is divisible by 13, the original number is also divisible by 13.
For example: **3146**
314+ (4*6) = 338 :: 33+(4*8*) = 65. Since 65 is divisible by 13, the original no. 3146 is also divisible.

Divisibility Rule for 17

Subtract 5 times the last digit from remaining truncated number. Repeat the step as necessary. If the result is divisible by 17, the original number is also divisible by 17

For example : **2278**

227-(5*8)=187. Since 187 is divisible by 17, the original number 2278 is also divisible.

Divisibility Rule for 19

Add 2 times the last digit to the remaining truncated number. Repeat the step as necessary. If the result is divisible by 19, the original number is also divisible by 19

For example : **11343**

1134+(2*3)= 1140. (Ignore the 0):: 11+(2*4) = 19. Since 19 is divisible by 19, original no. 11343 is also divisible

LCM and HCF

Important Terms:

1) **Factors:** Factor is a number which exactly divides other number.

2) **Multiple:** A number is said to be multiple of another number, when it is exactly divisible by other number.

3) **Common multiple:** A common multiple of two or more numbers is a number which is exactly divisible by each of them.

4) **Highest Common Factor (HCF) or Greatest Common Factor (GCF)** : HCF of two or more numbers is the greatest number which divides each number exactly.

5) **Lowest Common Multiple (LCM)**: The least number exactly divisible by each one of the given numbers is called least common multiple.

Tips and Tricks:

1) H.C.F. and L.C.M. of Fractions

a) $\text{H.C.F.} = \dfrac{\text{H.C.F. of Numerator}}{\text{L.C.M. of Denominator}}$

b) $\text{L.C.M.} = \dfrac{\text{L.C.M. of Numerator}}{\text{H.C.F. of Denominator}}$

2) **Product of two numbers = Product of their H.C.F. and L.C.M.**

This condition is only true for two given numbers. If H.C.F. and L.C.M. of three or more numbers are given, then this rule is not applicable.

Method to Find H.C.F. of Given Numbers

Prime Factorization Method

Steps to follow :

1) Express the given numbers as product of their prime factors.
2) Check for common prime factors and find least index of each common prime factor
3) The product of all common prime factors with the respective least indices is H.C.F of given numbers.

Example : H.C.F. of 12, 36, 48

Prime Factors of 12, 36, 48

$12 = 2 \times 3 \times 2 = 3 \times 2^2$

$36 = 2 \times 2 \times 3 \times 3 = 2^2 \times 3^2$

$48 = 2 \times 2 \times 2 \times 2 \times 3 = 2^4 \times 3$

2 & 3 are common factors. 2^2 & 3 have least indices.

H.C.F. of 12, 36,48 = Product of common prime factors with least indices.

H.C.F. of 12, 36,48 = $2^2 \times 3 = 12$

H.C.F. of 12, 36,48 = 12

Division Method

Steps to follow:

1) Draw a table as shown and arrange the given numbers horizontally.
2) Divide the numbers with their common factors.
3) Divide till the given numbers have no common factors.
4) Finally multiply the common factors on left hand side of the table to find the H.C.F.

Example: H.C.F. of 12, 36, 48

2	12	36	48
2	6	18	24
3	3	9	12
	1	3	4

H.C.F or G.C.F = 2 x 2 x 3 = 12

H.C.F of 12, 36, 48 = 12

FACTORS OF A NUMBER

Given an integer N, there is a simple way to find the total number of its factors. The main tool for the feat is the ***prime number decomposition theorem.***

These are certain basic formulas pertaining to factors of a number N, such that,

$N = p^a \times q^b \times r^c$

Where, p, q and r are the prime factors of the number N. a, b and c are non-negative powers/ exponents.

1. Number of factors of N = (a+1)(b+1)(c+1)

2. Number of odd factors of N = product of only odd numbers power increased by 1.

3. Number of even factors of N = Total factors – odd factors

4. Number of prime factors of N = addition of powers=a+b+c.

5. Product of factors of $N = N^{\text{No. of factors}/2}$

6. Sum of factors of N = $(p^0+p^1+...+p^a)\ (q^0+ q^1+....+q^b)\ (r^0+r^1+...+r^c)$

Example- Consider the number 120. Find the following for n:

1. Sum of factors. 2. Number of factors. 3. Product of factors.
4. Odd factors. 5. Even factors. 6. Prime factors.

Solution- The prime factorization of 120 is $2^3 \times 3^1 \times 5^1$. By applying the formulae,

1. **Sum of factors** = [(20+21+22+23)(30+31)(50+51)]= 1560

2. **Number of factors** = (3+1)(1+1)(1+1) = 16

3. **Product of factors** = 120(16/2) = 1208

4. **Odd factors** = (1+1)*(1+1) = 4

5. **Even factors** =16-4 = 12

6. **Prime Factors** = 3+1+1 = 5

FACTORIALS

The factorial function (symbol " ! ") means to multiply a series of descending natural numbers.

An older notation for the factorial is $\lfloor n$

N!=N(N-1)(N-2)……1.
4!=4*3*2*1=24
Note- 0!=1 and 1!=1.

Trailing zeros or ending zeros in N!

For example, 5!=120. So, it has only one zero in end.
Rule for finding trailing zeros- Divide the given number by the powers of 5 till it divisible by powers of 5.It means numerator is greater or equal to denominator.
N/5 + N/5^2 + N/5^3……N>= 5^n
Here we take only quotient of it.
Example- Find the trailing zeros in 102!
102/5 + 102/25 = 20+4=24(Here 100/125 is not possible, so divide by 5's powers till it is less or equal to number)So, 102! Have 24 zeros.

Highest power of a number in a factorial or in a product

Highest power of p (prime number) in N! is [N/p] +[N/p^2] +[N/p^3]+……..[N/p^n] till N>=p^n.
Take only quotient of these divisions.
Example 1- Highest power of 2 in 50!?50/2 +50/4 +50/8+50/16 +50/32=25+12+6+3+1=47
Example 2- Highest power of 6 in 20!?
6 is a composite number. To find the highest power of composite number write it into prime factorization, i.e., 6=2x3.Now, find the highest power of 2 and 3 in 20!.
Highest power of 2 is= 20/2+20/4+20/8+20/16=10+5+2+1=18
Highest power of 3 is=20/3+20/9=6+2=8
Highest power of 6 is the least value which of individual highest powers. Here values are 18 and 8. So, the highest power of 6 is 8.

Highest power of p^a in N! is [N/p +N/p^2+N/p^3+……N/p^n] / a

(**a – natural Number & p – prime**)
Example - **Highest power of 72 in 50!**

72=8x9=2^3 x 3^2
Highest power of 2^3 =[50/2+50/4+50/8+50/16+50/32]/3=[25+12+6+3+1]/3=15
Highest power of 3^2=[50/3+50/9+50/27]/2=[16+5+1]/2=11
So, the highest power of 72 is 11.

REMAINDER

Remainder Theorem:- Dividend =Divisor x Quotient + Remainder
When dividend is of the form $a^n + b^n$ or $a^n - b^n$:

Theorem1: $a^n + b^n$ is divisible by a + b when n is **ODD**.
Theorem 2: $a^n - b^n$ is divisible by a + b when n is **EVEN**.
Theorem 3: $a^n - b^n$ is ALWAYS divisible by a − b.

When $f(x) = a + bx + cx^2 + dx^3 + \ldots$ is divided by x – a

The remainder when $f(x) = a + bx + cx^2 + dx^3 + \ldots$ is divided by $x - a$ is $f(a)$.
So, If $f(a) = 0$, $(x - a)$ is a factor of $f(x)$.

Example:- What is the remainder when the product 1998 × 1999 × 2000 is divided by 7?
Find the individual remainders of 1998, 1999, and 2000 are divided by 7 are 3, 4, and 5 respectively.
Hence, the final remainder is the remainder when the product 3 × 4 × 5 = 60 is divided by 7.So, the final remainder is 4.

Fermat's theorem-

This theorem is stated in the following form: if p is a prime and a is an integer co-prime to p, then a^(p−1) − 1 will be evenly divisible by p. In other words, [a^(p-1)]/p gives remainder 1.
Example:- Find the remainder when 72^40 divide by 41?
Answer: So here we see that 41 is a prime number, so we will target Fermat's little theorem instead of Euler's theorem.
Again 72 and 41 are co-prime. so we can apply our little theorem in this problem easily.
–> remainder [72^40/41] = 1.

Wilson's Theorem-

This theorem state that for a prime number p , (p-1)! Divide by p , then the remainder is p-1.
Example:- Find the remainder when 16! is divided by 17.
16! = (16! + 1) -1 = (16! + 1) + 16 - 17
Every term except 16 is divisible by 17 in the above expression. Hence the remainder = the remainder obtained when 16 is divided by 17 = Rem (16).

UNIT DIGIT

Unit digit of product- Multiply last digits of each number.
Example:- 121x76x528x172= 1x6x8x2=96= 6 is unit digit here.
Unit digit of powers- *Either use cyclicity of number or use simple method.*

2	3	4	5	6	7	8	9
$2^1=2$	$3^1=3$	$4^1=4$	$5^1=5$	$6^1=6$	$7^1=7$	$8^1=8$	$9^1=9$

$2^2=4$	$3^2=9$	**$4^2=6$**	$5^2=5$	$6^2=6$	$7^2=9$	$8^2=4$	**$9^2=1$**
$2^3=8$	$3^3=7$	$4^3=4$	$5^3=5$	$6^3=6$	$7^3=3$	$8^3=2$	$9^3=9$
$2^4=6$	$3^4=1$	$4^4=6$	$5^4=5$	$6^4=6$	$7^4=1$	$8^4=6$	$9^4=1$
$2^5=2$	**$3^5=3$**	$4^5=4$	$5^5=5$	$6^5=6$	**$7^5=7$**	**$8^5=8$**	$9^5=9$
$2^6=4$	$3^6=9$	$4^6=6$	$5^6=5$	$6^6=6$	$7^6=9$	$8^6=4$	$9^6=1$
$2^7=8$	$3^7=7$	$4^7=4$	$5^7=5$	$6^7=6$	$7^7=3$	$8^7=8$	$9^7=9$

Example:- Find the unit digit in 2^{49}?
We know in case of 2, it repeats itself after a cycle of 4 . We will divide 49 by 4
49/4 remainder is 1
We write it as 2^49= 2^1= 2. That means the unit digit in the 2^49 is 2.

Rule for numbers ending in digits 0 or 1 or 5 or 6 :-
Unit digits of that numbers are same as there last digits ending in 0 or 1 or 5 or 6 whatever the power is.
Eg.- (235)^27= unit digit 5
(126)^344= unit digit 6

Rule for numbers ending in digits 2,3,4,7,8 and 9 :-
Divide the power by 4 find the remainder. Make that remainder to the power of last digit of the number will give us the unit digit.
Note- if remainder is 0 (power completely divisible by 4) take remainder as 4 not 0.

Example.1- (327)^22
22/4 =Rem(2)
Last digit is 7. Make remainder 2 to power of 7=7^2=49
So , 9 is a unit digit.

Example.2- (28)^36
36/4=Rem(0). Here take remainder as 4.
Last digit is 8. Then, 8^4= 64x64=4x4=16.
So, unit digit is 6.

ARITHMETIC & GEOMETRIC PROGRESSION

An Arithmetic Progression (A.P.) is a sequence in which the difference between any two consecutive terms is constant. Let a = first term, d = common difference
Then, ***nth term $a_n = a + (n-1)d$***

The sum of n terms of an A.P. whose first term is a and common difference is d, is given by

$$S_n = \frac{n}{2}\left[2a + (n-1)d\right]$$

The sum of n terms of an A.P. whose first term is a and last term is l is given by the formula:

$$S_n = \frac{n}{2}[a + l]$$

AM (Arithmetic mean): If a, b, c are in AP then the arithmetic mean is given by **b = (a+c)/2**
Inserting AM:
To insert k means between a and b the formula for common difference is given by **d=(b-a)/k+1**
For Example: Insert 4 AM's between 4 and 34
d= (34-4)/4+1= 30/5= 6
∴ The 4 AM are 4+6=10, 10+6=16, 16+6=22 ,22+6=28

Geometric Progression: Geometric sequences are powers r^k of a fixed number *r*, such as 2^k and 3^k. The general form of a geometric sequence is

The *n*-th term of a geometric sequence with initial value *a* and common ratio *r* is given by

$$a_n = a r^{n-1}.$$

Such a geometric sequence also follows the recursive relation

$$a_n = r\, a_{n-1} \text{ for every integer } n \geq 1.$$

Sum of G.P.= a(1-r^n)/(1-r)

GM (Geometric mean): If a, b, c are in GP Then the GM is given by $b = \sqrt{ac}$
Note: *1. AM>GM>HM 2. GM^2=AMxHM*
Inserting GM: To insert k means between a and b the formula for common ratio is given by
r = (b/a)^(1/(k+1))
For example: Insert 4 GM's between 2 and 486
r = (486/2)^(1/(4+1))= (243)^(1/5)= 3
∴ The 4 GM are 2x3 = 6, 6x3 = 18, 18x3 = 54 ,54x3 = 162.

LOGARITHM

1. **Logarithm:**
   If *a* is a positive real number, other than 1 and $a^m = x$, then we write:
   m* = log$_a$*x and we say that the value of log *x* to the base *a* is *m*.
   Examples:
   (i). 10^3 1000 $\Rightarrow$ $\log_{10}$ 1000 = 3.

   (ii). $3^4 = 81 \Rightarrow \log_3 81 = 4$.

   (iii). $2^{-3} = \frac{1}{8} \Rightarrow \log_2 \frac{1}{8} = -3$.

   (iv). $(.1)^2 = .01 \Rightarrow \log_{(.1)} .01 = 2$.

2. **Properties of Logarithms:**
   1. $\log_a (xy) = \log_a x + \log_a y$

   2. $\log_a \left(\frac{x}{y}\right) = \log_a x - \log_a y$

   3. $\log_x x = 1$

   4. $\log_a 1 = 0$

5. $\log_a (x^n) = n(\log_a x)$

6. $\log_a x = \dfrac{1}{\log_x a}$

7. $\log_a x = \dfrac{\log_b x}{\log_b a} = \dfrac{\log x}{\log a}$.

3. **Common Logarithms:**

   Logarithms to the base 10 are known as common logarithms.

4. The logarithm of a number contains two parts, namely 'characteristic' and 'mantissa'.
   Characteristic: The internal part of the logarithm of a number is called its **characteristic.**

   Case I: When the number is greater than 1.

   In this case, the characteristic is one less than the number of digits in the left of the decimal point in the given number.

   Case II: When the number is less than 1.

   In this case, the characteristic is one more than the number of zeros between the decimal point and the first significant digit of the number and it is negative.
   Instead of -1, -2 etc. we write 1 (one bar), 2 (two bar), etc.

   Examples:-

Number	Characteristic	Number	Characteristic
654.24	2	0.6453	1
26.649	1	0.06134	2
8.3547	0	0.00123	3

   Mantissa:
   The decimal part of the logarithm of a number is known is its **mantissa.** For mantissa, we look through log table.

General Questions on Number System

Q1. For the product n*(n + 1)*(2n + 1), where n is a natural number. Which one of the following is not necessarily true?
(a) It is even. (b) Divisible by 3 (c) Divisible by 6 (d) Never divisible by 12

Q2. If two digit integers M and N are positive and have same digits, but in reverse order, which of the following cannot be the sum of M and N?
(a) 181 (b) 165 (c) 121 (d) 99

Q3. What is the value of (x-a)(x-b)(x-c) - - - - - (x-z)?
(a) 1 (b) 3 (c) 2 (d) 0

Q4. If you write first 252 natural numbers in a straight line, how many times do you write the digit 4?
(a) 55 (b) 53 (c) 50 (d) 48

Q5. There are three consecutive natural numbers such that the square of the second minus twelve times the first is three less than twice the third. What is the largest of the three numbers?
(a) 14 (b) 13 (c) 15 (d) 18

Q6. Which one of the following is the minimum value of the sum of two integers whose product is 36?
(a) 37 (b) 20 (c) 15 (d) 12

Q7. Four digits of the number 29138576 are omitted so that the result is as large as possible. The largest omitted digit is?
(a) 5 (b) 6 (c) 7 (d) 8

Q8. A boy writes all the numbers from 100 to 999. The number of zeroes that he uses is 'a', the number of 5's that he uses is 'b' and the number of 8's he uses is 'c'. What is the value of b +c−a?
(a) 280 (b) 380 (c) 180 (d) 80

Q9. The product of 4 consecutive even numbers is always divisible by?
(a) 600 (b) 768 (c) 864 (d) 364

Q10. A set has exactly five consecutive positive integers starting with 1.What is the percentage decrease in the average of the numbers when the greatest one of the numbers is removed from the set?
(a) 8.54 (b) 12.56 (c) 15.25 (d) 16.66

Q11. When writing numbers from 1 to 10,000, how many times is the digit 9 written?
(a) 3200 (b) 3600 (c) 4000 (d) 4200

Q12. How many keystrokes are needed to type numbers from 1 to 1000 on a standard keyboard?
(a) 3001 (b) 2893 (c) 2704 (d) 2890

Q13. In the equation given below A, B, C, D & E are the five consecutive positive integers, then what is the value of A + E in $A^2 + B^2 + C^2 = D^2 + E^2$?
(a) 24 (b) 15 (c) 17 (d) 19

Q14. Which of the following is largest?
(a) $(5^2)^3$ (b) 5^{2^3} (c) 5^5 (d) 5^{3^2}

Q15. You are selecting 10 numbers randomly out of the first 100 odd numbers. Sum of these 10 odd numbers is A. How many different values of A are possible?
(a) $^{100}C_{10}$ (b) 1801 (c) 1800 (d) 901

Q16. A is a three-digit natural number. If you strike out extreme left digit of A, remaining number is a perfect square. If you strike out extreme right digit of A, remaining number is still a perfect square. How many different values of A are possible?
(a) 2 (b) 3 (c) 4 (d) 5

Q17. If (a + b)=12 and a*b=11, then find (a - b)?
(a) 100 (b) 1 (c) 10 (d) None of these

Q18. If a rubber ball consistently bounces back 2/3 of the height from it is dropped, what fraction of its original height will the ball bounce after being dropped and bounced four times without being stopped?
(a) 16/17 (b) 4/81 (c) 37/81 (d) 16/81

Q19. What is the difference between the place value and face value of 2 in the numeral 7229?
(a) 20 (b) 200 (c) 180 (d) 18

Q20. What is the place value of 3 in the numeral 3259?
(a) 300 (b) 30 (c) 3 (d) 3000

Questions on Rules of Divisibility

Q21. What least value should be assigned to * so that the number 451*603 is exactly divisible by 9?
(a) 2 (b) 5 (c) 8 (d) 7

Q22. What least value should be assigned to * so that the number 63576*2 is divisible by 8?
(a) 2 (b) 1 (c) 4 (d) 3

Q23. If 256X561 is divisible by 11, then what can be the value of 'X'?
(a) 3 (b) 0 (c) 6 (d) 8

Q24. If ABC0 is a 4 digit number divisible by 4, then how many such 4 digit number exist?
(a) 360 (b) 400 (c) 450 (d) 500

Q25. If a number 968A96B is to be divisible by 72, the respective values of A and B can be?
(a) 7 and 8 (b) 7 and 0 (c) 5 and 8 (d) 0 and 8

Q26. The number ($6n^2 + 6n$) for any natural number n is always divisible by which maximum number?
(a) 6 (b) 24 (c) 12 (d) 18

Q27. It is given that $(2^{32}+1)$ is exactly divisible by a certain number. Which of the following is also definitely divisible by the same number?
(a) $(2^{16}+1)$ (b) $(2^{8}+1)$ (c) $(2^{16}-1)$ (d) $(2^{96}+1)$

Q28. What is the value of M and N respectively if M8458N is divisible by 88, where M and N are single digits?
(a) 5, 4 (b) 8, 6 (c) 6, 4 (d) 3, 2

Q29. A number when divided by a divisor leaves a remainder of 24. When twice the original number is divided by the same divisor, the remainder is 11. What is the value of the divisor?
(a) 73 (b) 37 (c) 64 (d) 53

Q30. The largest number amongst the following that will perfectly divide $101^{100}-1$ is?
(a) 100 (b) 10000 (c) 100^{100} (d) 10

Q31. How many numbers between 1 and 1200, both included, are not divisible by any of the numbers 2, 3 and 5?
(a) 312 (b) 320 (c) 203 (d) 302

Q32. How many numbers from 10 to 100 are exactly divisible by 9?
(a) 8 (b) 11 (c) 10 (d) None of these

Q33. How many numbers from 29 to 79 are exactly divisible by 11?
(a) 5 (b) 6 (c) 4 (d) 7

Q34. If 123x4 is divisible by 4, then the digit in place of x is?
(a) 1 (b) 0 (c) 3 (d) 7

Q35. If 17617* is divisible by 11, then the digit in place of * is?
(a) 1 (b) 3 (c) 5 (d) 6

Q36. If 123xy is divisible by 40, then the value in place of (x + y) is?
(a) 1 (b) 3 (c) 7 (d) 4

Q37. How many numbers between 1 and 400, both included, are not divisible by 3 or 5?
(a) 212 (b) 213 (c) 215 (d) 216

Q38. How many numbers between 100 and 900, both included, are divisible by 11?
(a) 72 (b) 71 (c) 70 (d) 68

Q39. Find the odd value of a if a number 34a6 divisible by 3?
(a) 3 (b) 5 (c) 9 (d) 7

Q40. What is the value of M and N respectively, If M39048458N is divisible by 8 and 11 (where M and N are single digit integers)?
(a) 7, 8 (b) 8, 6 (c) 6, 4 (d) 5, 4

Q41. Find the value or values of a and b if a given number 624ab is divisible by 5 and 8 both?
(a) 0,0 (b) 4,0 (c) 8,0 (d) All of them

Q42. How many 2-digit positive integers are divisible by 4 or 9?
(a) 32 (b) 22 (c) 30 (d) 34

Q43. How many natural numbers below 660 are divisible by 5 and 11 but not by 3?
(a) 8 (b) 9 (c) 10 (d) 11

Q44. How many numbers from 1 to 999, are not divisible by either 5 or 7?
(a) 313 (b) 687 (c) 686 (d) 314

Lowest Common Multiple (LCM) & Highest Common Factor (HCF)

Q45. The LCM of 5,8,12, 20 will not be a multiple of?
(a) 3 (b) 9 (c) 8 (d) 5

Q46. Find L.C.M. of 1.05 and 2.1?
(a) 1.3 (b) 1.25 (c) 2.1 (d) 4.30

Q47. How many numbers between 200 and 600 are divisible by 4, 5 and 6?
(a) 5 (b) 6 (c) 7 (d) 8

Q48. For how many values of k the L.C.M of 6^6, 8^8 and k is 12^{12} (k is a natural number)?
(a) 1 (b) 24 (c) 25 (d) Infinite

Q49. Three bells toll at intervals of 9, 12 and 15 minutes respectively. All three begins to toll at 8 a.m. At what time will they first toll together again?
(a) 11 a.m. (b) 8:30 a.m. (c) 10 a.m. (d) 10:30 a.m.

Q50. A person has to completely put each of the three liquids i.e. 403 liters of petrol, 465 litres of diesel and 496 liters of Mobil oil in bottles of equal size without mixing any of the three types of liquids such that each bottle is completely filled. What is the least possible number of bottles required?
(a) 44 (b) 34 (c) 31 (d) None of these

Q51. Five bells begin to toll together at intervals of 9 s, 6 s, 4 s, 10 s and 8 s, respectively. How many times will they toll together in the span of one hour (excluding the toll at the start)?
(a) 5 (b) 8 (c) 10 (d) None of these

Q52. The least perfect square number which is divisible by 3, 4, 5, 6 and 8, is?
(a) 900 (b) 1200 (c) 2500 (d) 3600

Q53. Monica, Veronica and Rachat begin to jog around a circular stadium. They complete their revolutions in
42s, 56s and 63s, respectively. After how many seconds will they be together at the starting point?
(a) 366 (b) 252 (c) 504 (d) Cannot be determined

Q54. A red light flashes 3 times per minute and a green light flashes 5 times in two minutes at regular intervals. If both start flashing at the same time, how many times do they flash together in each hour?
(a) 30 (b) 31 (c) 4 (d) 60

Q55. Find the largest number of 4-digits divisible by 12, 15 and 18?
(a) 9900 (b) 9750 (c) 9450 (d) 9000

Q56. Six bells commence tolling together and toll at intervals of 2, 4, 6, 8 10 and 12 seconds respectively. In 30 minutes, how many times do they toll together?
(a) 4 (b) 10 (c) 15 (d) 16

Q57. The LCM of $(16 - x^2)$ and (x^2+x-6) is?
(a) $(x-3)(x+3)(4- x^2)$ (b) $4(4- x^2)(x+3)$ (c) $(4- x^2)(x-3)$ (d) None of these

Q58. The least common multiple of two natural numbers a and b, is 399.What is the minimum possible sum of the digits of the number a (given a>b)?
(a) 1 (b) 3 (c) 5 (d) 7

Q59. If the HCF of 2 numbers is 48, and the HCF of 2 other numbers is 36, then what is the HCF of all the four numbers?
(a) 48 (b) 36 (c) 12 (d) 24

Q60. In a meet, persons from five different places have assembled in Bangalore High School. From the five places the persons come to represent are 42, 60, 210, 90 and 84. What is the minimum number of rooms that would be required to accommodate so that each room has the same number of occupants and occupants are all from the same places?
(a) 44 (b) 62 (c) 81 (d) 96

Q61. The product of two numbers is 12960 and their HCF is 36. How many pairs of such numbers can be formed?
(a) 3 (b) 4 (c) 5 (d) 2

Q62. Calculate H.C.F. of 2/3, 16/81 and 8/9?
(a) 2/9 (b) 8/3 (c) 2/81 (d) 3/16

Q63. H.C.F. of two numbers is 13. If these two numbers are in the ratio of 15: 11, then find the numbers?
(a) 230, 140 (b) 215, 130 (c) 195, 143 (d) 155, 115

Q64. The L.C.M. of two numbers is 2310 and their H.C.F. is 30. If one of these numbers is 210, the second number is?
(a) 330 (b) 1470 (c) 2100 (d) 16170

Q65. The L.C.M. of two numbers is 12 times their H.C.F. The sum of H.C.F. and L.C.M. is 403. If one number is 93, then the other is?
(a) 128 (b) 124 (c) 134 (d) None of these

Q66. The LCM of two numbers is 20 times of their HCF and (LCM + HCF) = 2520. If one number is 480, what will be the triple of another number?
(a) 1200 (b) 1500 (c) 2100 (d) 1800

Q67. Three numbers are in the ratio of 3 : 4 : 5 and their LCM is 1200. Find the HCF of the numbers?
(a) 40 (b) 30 (c) 80 (d) 20

Q68. The HCF & LCM of two numbers m and n are respectively 6 and 210. If m+n = 72, then 1/m +1/ n =?
(a) 1/35 (b) 3/35 (c) 5/37 (d) 2/35

Q69. The H.C.F. of two numbers is 23 and the other two factors of their L.C.M. are 13 and 14. The larger of the two numbers is?
(a) 276 (b) 299 (c) 322 (d) 345

Q70. HCF of 3240, 3600 and a third number is 36 and their LCM is ($2^4x3^5x5^2x7^2$). The third number is?
(a) $2^5x5^2x7^2$ (b) $2^3x3^5x7^2$ (c) $2^2x3^5x7^2$ (d) $2^2x5^3x7^2$

Q71. The LCM of three different numbers is 120. Which of the following cannot be their HCF?
(a) 24 (b) 35 (c) 12 (d) 6

Q72. Which is the least number that must be added to 1856 to make it divisible by 7, 12 and 16?
(a) 176 (b) 160 (c) 167 (d) None of these

Q73. A General can draw up his soldiers in the rows of 10, 15 or 18 soldiers and he can also draw them up in the form of a solid square. Find the least number of soldiers with the General?
(a) 100 (b) 3600 (c) 900 (d) 90

Q74. Find the maximum number of students among whom 2002 pens and 1820 pencils can be distributed in such a way that each student gets the same number of pens and same number of pencils?
(a) 180 (b) 91 (c) 273 (d) 182

Q75. Find the side of the largest possible square slabs which can be paved on the floor of a room 2m 50 cm long and 1m 50 cm broad. Also find the number of such slabs to pave the floor?
(a) 25, 20 (b) 30, 15 (c) 50, 15 (d) 55, 10

Q76. Three sets of English, Mathematics and Science Books containing 336, 240 and 96 books respectively have to be stacked in such a way that all the books are stored subject wise and the height of each stack is the same. Total number of stacks will be?
(a) 14 (b) 21 (c) 22 (d) 48

Q77. What is the greatest 4 digit number that when divided by any of the numbers 6, 9, 12, 17 leaves a remainder of 1?
(a) 9997 (b) 9793 (c) 9895 (d) 9487

Q78. The greatest number which can divide 1356, 1868, 2764 leaving same remainder 12 in each case is?
(a) 64 (b) 124 (c) 156 (d) 260

Q79. Three gold coins of weight 780gm, 840gm and 960gm are cut into small pieces, all of which have the equal weight. Each piece must be heavy as possible. If one such piece is shared by two persons, then how many persons are needed to give all the pieces of gold coins?
(a) 86 (b) 70 (c) 43 (d) 35

Q80. Each of X alarm tolls at regular intervals. All of them tolls together twelve times a day. No two alarm at equal intervals of time. If each alarm tolls after a whole number of minutes, what is the maximum possible value of X?
(a) 14 (b) 16 (c) 18 (d) 20

Q81. Find the greatest number, which on dividing 1657 and 2037 leaves remainders 6 and 5 respectively?
(a) 127 (b) 132 (c) 114 (d) 108

Q82. Find the least number which when divided by 5, 6, 7 and 8 leaves a remainder 3, but when divided by 9 leaves no remainder?
(a) 1963 (b) 2523 (c) 1683 (d) 1536

Q83. Find the greatest number that will divide 43, 91 and 183 so as to leave the same remainder in each case?
(a) 4 (b) 7 (c) 9 (d) 13

Q84. The traffic lights at three different road crossings change after every 40 sec, 72 sec and 108 sec respectively. If they all change simultaneously at 5 : 20 A.M., then find the time at which they will change simultaneously?
(a) 5 : 28 (b) 5 : 30 (c) 5 : 38 (d) 5 : 40

Q85. If a person makes a row of toys of 20 each, there would be 15 toys left. If they made to stand in rows of 25 each, there would be 20 toys left, if they made to stand in rows of 38 each, there would be 33 toys left and if they are made to stand in rows of 40 each, there would be 35 toys left. What is the minimum number of toys the person have?
(a) 1255 (b) 3805 (c) 7595 (d) 3795

Factors & Factorials

Q86. Find the following for the number 84?
I. Number of odd factors. II. Number of even factors.
(a) 4,8 (b) 5,5 (c) 8,12 (d) 7,9

Q87. How many factors of 1200 are odd integers?
(a) 6 (b) 8 (c) 12 (d) 22

Q88. Find the total no of prime factors in $4^{11} \times 7^5 \times 11$?
(a) 17 (b) 27 (c) 28 (d) 30

Q89. Find the sum of factors of 18?
(a) 6 (b) 13 (c) 39 (d) 35

Q90. Find the number of factors of 6!?
(a) 25 (b) 30 (c) 35 (d) 32

Q91. Find the number of trailing zeroes in the expansion of 23!?
(a) 5 (b) 4 (c) 20 (d) 21

Q92. Find the number of trailing zeroes in the expansion of 1000!?
(a) 250 (b) 300 (c) 249 (d) 245

Q93. Find the number of zeros in 2*3*4*5……*125?
(a) 30 (b) 35 (c) 38 (d) 31

Q94. Find the highest power of 24 in 150!?
(a) 48 (b) 72 (c) 58 (d) 45

Q95. Find the highest power of 30 in 40!?
(a) 12 (b) 10 (c) 8 (d) 9

Q96. pqr is a three digit natural number such that pqr=p!+q!+r!. What is the value of (q+r)*p?
(a) 1296 (b) 3125 (c) 19683 (d) 9

Remainders

Q97. A number when divided by 54 leaves a remainder of 31. Find the remainder when the same number is divided by 27?
(a) 4 (b) 23 (c) 15 (d) (a) or (b)

Q98. Find the remainder when 2^{93} is divided by 7?
(a) 1 (b) 2 (c) 4 (d) 6

Q99. Find the remainder when 24^5 is divided by 5?
(a) 0 (b) 1 (c) 4 (d) None of these

Q100. The remainder, when $(15^{23} + 23^{23})$ is divided by 19, is?
(a) 4 (b) 15 (c) 0 (d) 18

Q101. What is the remainder when 4^{96} is divided by 6?
(a) 0 (b) 2 (c) 3 (d) 4

Q102. $(7^{4n}-6^{4n})$, where n is an integer > 0, is divisible by?
(a) 13 (b) 5 (c) 17 (d) All of these

Q103. Find the remainder when n is divided by 12 where N = 1821 × 1823 × 1827?
(a) 9 (b) 12 (c) 15 (d) 18

Q104. A number when divided by 5, leaves 3 as remainder. What will be the remainder when the square of this number is divided by 5?
(a) 0 (b) 1 (c) 2 (d) 4

Q105. In a division sum, the remainder is 6 and the divisor is 5 times the quotient and is obtained by adding 2 to the thrice of the remainder. The dividend is?
(a) 40 (b) 42 (c) 80 (d) 86

Q106. In a division sum, the divisor is ten times the quotient and five times the remainder. If the remainder is 46, the dividend is?
(a) 4236 (b) 4306 (c) 4336 (d) 5336

Q107. What is the largest two-digit number that gives a remainder of 3 when it is divided by 7?
(a) 97 (b) 94 (c) 87 (d) None of these

Q108. What is the remainder when the sum of a two digit number and the number formed by reversing the digits is divided by 11?
(a) 10 (b) 1 (c) 0 (d) None of These

Q109. $(2^{28}-1)$ is exactly divisible by two numbers in between 120 and 130.What is the sum of these two numbers?
(a) 256 (b) 248 (c) 251 (d) 157

Q110. What is the remainder when (91+92+93+....+98) is divided by 6?
(a) 3 (b) 2 (c) 0 (d) 5

Q111. A number when divided by 342 gives a remainder 47. When the same number is divided by 19, what would be the remainder?
(a) 5 (b) 9 (c) 4 (d) 0

Q112. What is the remainder when 13x14x16 divided by 6?
(a) 2 (b) 0 (c) 6 (d) 7

Q113. What is the remainder when 3^7 is divided by 8?
(a) 1 (b) 2 (c) 3 (d) 5

Q114. What is the remainder when $(3^{444} + 4^{333})$ is divided by 5?
(a) 0 (b) 1 (c) 3 (d) 4

Q115. What is the remainder when $(5555)^{2222} + (2222)^{5555}$ is divided by 7?
(a) 2 (b) 4 (c) 0 (d) 1

Q116. Find the remainder when 7^{52} is divided by 2402.
(a) 1 (b) 0 (c) 2400 (d) 2401

Q117. What is the remainder when ($x^3 + 2x^2 + 5x + 3$) is divided by ($x + 1$)?
(a) 1 (b) -1 (c) 12 (d) 33

Q118. If ($2x^3 - 3x^2 + 4x + c$) is divisible by ($x – 1$), find the value of c?
(a) 10 (b) -5 (c) 12 (d) -3

Q119. Find the remainder when 2^{88} is divided by 89?
(a) 1 (b) 2 (c) 87 (d) 88

Q120. What number should subtracted from $(x^3 + 4x^2 - 7x + 12)$, if it is to be perfectly divisible by $(x + 3)$?
(a) 42 (b) 39 (c) 13 (d) None of these

Q121. What is the remainder when 40! Is divided by 41?
(a) 1 (b) 0 (c) 40 (d) 2

UNIT DIGIT

Q122. If the unit's digit in the product of (47ax729 x345 x343) is 5, then how many values that a can take?
(a) 9 (b) 3 (c) 7 (d) 5

Q123. The rightmost non - zero digit of the number 30^{2720} is?
(a) 1 (b) 3 (c) 7 (d) 9

Q124. What is the unit digit in 2^9?
(a) 1 (b) 3 (c) 2 (d) 4

Q125. What is the unit's digit of the number ($6^{256} – 4^{256}$)?
(a) 0 (b) 1 (c) 4 (d) 7

Q126. Find the unit digit in the product (243 × 397 × 2497 × 3913)?
(a) 4 (b) 3 (c) 7 (d) 1

Q127. What are the respective digits in the unit's place in the expansions of 7^7 and 17^7?
(a) 2, 6 (b) 3, 3 (c) 1, 4 (d) 9, 9

Q128. Find the unit's digit in ($264^{102}+264^{103}$)?
(a) 0 (b) 2 (c) 4 (d) 6

Q129. Which digits should come in place of @ and # if the number 62684@# is divisible by both 8 and 5?
(a) 4,0 (b) 0,4 (c) 4,4 (d) 1,1

Q130. What will be the last digit of the multiplication $3^{153}*7^{162}$?
(a) 5 (b) 9 (c) 7 (d) 6

Q131. The digit in the unit place of the number 7295 X 3158 is?
(a) 7 (b) 2 (c) 6 (d) 4

Q132. Find the unit digit of $(23)^{25!}$?
(a) 0 (b) 2 (c) 3 (d) 1

Q133. The unit digit of $(137^{13})^{47}$ is?
(a) 1 (b) 3 (c) 5 (d) 7

Q134. The unit digit of $35^{87} + 93^{46}$ is?
(a) 2 (b) 4 (c) 6 (d) 8

Q135. The unit digit of $44^{91} \times 73^{37}$ is?
(a) 2 (b) 4 (c) 6 (d) 8

Q136. The unit digit of $12^{34}-5^{9}$ is?
(a) -1 (b) 1 (c) 9 (d) None of these

Q137. Find the unit digit of given product $(2^{34} \times 14^{832} \times 17^{21})$?
(a) 6 (b) 8 (c) 2 (d) 7

Arithmetic Progression & Geometric Progression

Q138. Find the number of terms in the series 8, 12, 16, . . .72?
(a) 10 (b) 12 (c) 17 (d) 16

Q139. The sum of third and ninth term of an A.P is 8. Find the sum of the first 11 terms of the progression?
(a) 44 (b) 22 (c) 19 (d) None of the above

Q140. Find 4 + 7 + 10 + 13 + 16 + . . . up to 20 terms?
(a) 600 (b) 650 (c) 540 (d) 454

Q141. Find 5^{th} term in the series 5, 15, 45, ...?
(a) 405 (b) 345 (c) 450 (d) 340

Q142. Given $A = 2^{65}$ and $B = (2^{64}+2^{63}+2^{62}+...+2^{0})$. Which one is correct option?
(a) $B = 2^{64} + A$ (b) A =B (c) B = A + 1 (d) A = B + 1

Q143. If log 2, log $(2^{x} -1)$ and log $(2^{x} + 3)$ are in A.P, then x is equal to…?
(a) 5252 (b) $\log_2 5$ (c) $\log_3 2$ (d) 32

Q144. Which term of the A.P. 3, 8, 13 ..... is 78?
(a) 16^{th} (b) 17^{th} (c) 20^{th} (d) 25^{th}

Q145. Is (– 150) a term of the series 11, 8, 5, 2,…?
(a) Yes (b) No (c) Can't be determined (d) Data Insufficient

Q146. Find the 31st term of an A.P. whose 11th term is 38 and the 16th term is 73.
(a) 162 (b) 175 (c) 178 (d) 180

Q147. Which term of the A.P. 3, 15, 27, 39 … will be 132 more than its 54th term?
(a) 82^{nd} (b) 75^{th} (c) 60^{th} (d) 65^{th}

Q148. Write down the 8th term in the Geometric Progression 1, 3, 9, ...
(a) 2187 (b) 2185 (c) 2287 (d) 2021

Q149. Find the number of terms in the geometric progression 6, 12, 24, ..., 1536
(a) 10 (b) 9 (c) 15 (d) 13

Q150. The sum of n terms of an A.P. is $3n^2 + n$, find the nth term.
(a) 6n - 4 (b) 4n - 4 (c) 6n - 2 (d) 4n - 2

Q151. Find the sun of the following series: 3 + 7 + 11 + 15 +……. to 30 terms.
(a) 1830 (b) 1840 (c) 1800 (d) 1940

Q152. Find the position of 62 in the following series 2, 5, 8, ...?
(a) 26 (b) 21 (c) 23 (d) 20

Q153. If you save 1 paise today, 2 paise next day and 3 paise the succeeding day and so on, what will be your savings in 365 days?
(a) 666.75 (b) 665.35 (c) 668.85 (d) 667.95

Logarithm

Q154. Which of the following statements is not correct?
(a) $\log_{10} 10 = 1$ (b) log(2+3) = log(2x3) (c) $\log_{10} 1 = 0$ (d) log (1+2+3)=log 1+log 2+log3

Q155. If log 2 = 0.3010 and log 3 = 0.4771, then what is the value of $\log_5 512$?
(a) 2.870 (b) 2.967 (c) 3.876 (d) 3.912

Q156. If log 27 = 1.431, then what is the value of log 9?
(a) 0.934 (b) 0.945 (c) 0.954 (d) 0.958

Q157. If $\log_{10} 2 = 0.3010$, then $\log_2 10$ is equal to?
(a) 699/301 (b) 1000/301 (c) 0.3010 (d) 0.6990

Q158. If $\log_{10} 2 = 0.3010$, then what is the value of $\log_{10} 80$?
(a) 1.6020 (b) 1.9030 (c) 3.9030 (d) None of these

Q159. If $\log_{10} 5 + \log_{10} (5x + 1) = \log_{10} (x + 5) + 1$, then x is equal to:
(a) 1 (b) 3 (c) 5 (d) 10

Q160. What is the value of the following expression?

$$\frac{1}{\log_3 60} + \frac{1}{\log_4 60} + \frac{1}{\log_5 60}$$

(a) 0 (b) 1 (c) 5 (d) 60

Q161. If log 2 = 0.30103, then the number of digits in 2^{64} is?

(a) 18 (b) 19 (c) 20 (d) 21

Q162. If $\log_x y = 100$ and $\log_2 x = 10$, then what is the value of y?

(a) 2^{10} (b) 2^{100} (c) 2^{1000} (d) 2^{10000}

Q163. What is the value of $\log_2 16$?

(a) 1/8 (b) 4 (c) 8 (d) 16

CHAPTER 3

TIME, SPEED & DISTANCE

The basic relationship between Time, Speed and Distance is given by these formulae.

Speed= Distance / Time

Time= Distance / Speed

Distance= Speed X Time

AVERAGE SPEED

1. Average Speed = (a + b)/2

Applicable when one travels at speed "a" for half the time and speed b for other half of the time. In this case, average speed is the arithmetic mean of the two speeds.

2. Average Speed = 2ab/ (a + b)

Applicable when one travels at speed "a" for half the distance and speed b for other half of the distance. In this case, average speed is the harmonic mean of the two speeds. On similar lines, you can modify this formula for one-third distance.

3. Average Speed = 3abc/(ab + bc + ca)

Applicable when one travels at speed "a" for one-third of the distance, at speed b for another one-third of the distance and speed c for rest of the one-third of the distance.

Note that the generic Harmonic mean formula for n numbers is

Harmonic Mean = n/(1/a + 1/b + 1/c + …)

4. You can also use weighted averages. Note that in case of average speed, the weight is always 'time'. So in case you are given the average speed, you can find the ratio of time as

t1/t2 = (a – Avg)/(Avg – b)

Example 1: Myra drove at an average speed of 30 miles per hour for the first 30 miles of a trip & then at an average speed of 60 miles/hr for the remaining 30 miles of the trip. If she made no stops during the trip what was her average speed in miles/hr for the entire trip?

Solution: Here, distance for which Myra traveled at the two speeds is same.

Average Speed = 2ab/(a+b) = 2*30*60/(30 + 60) = 40 mph

RELATIVE SPEED

Case 1: Two bodies *are moving in opposite directions* at speed V1 & V2 respectively. The relative speed is defined as, ***Vr=V1+V2***

Case 2: Two bodies are moving *in same directions* at speed V1 & V2 respectively. The relative speed is defined as, ***Vr=|V1−V2|***

Example 1:-A train is running at a speed of 90 km/hr. if it crosses a pole in just 10 second, what is the length of the train?

Solution: Speed of the train = 90 km/hr. Speed of the train = 90 × 5/18 m/sec = 25 m/sec. Time taken by the train to cross the pole = 10 seconds. Therefore, length of the train = 25 m/sec × 10 sec = 250 m

Example 2: A train 165 m long is running at the speed of 60 km/hr. In what time will it pass a man who is running at the speed of 6 km/hr in the same direction in which the train is moving?
Solution:- Man moving in the same direction of the train
Speed of train relative to the man = (60 – 6) km/hr = 54 km/hr = (54 × 5/18) m/sec = 15 m/sec
Time taken by the train to cross a man = distance/speed
= length of train/speed of train relative to man
= 165 m/15 m/sec= 11 sec.

Example 3:-Two trains 130 m and 140 m long are running on parallel tracks in the same direction with a speed of 68 km/hr and 50 km/hr. How long will it take to clear off each other from the moment they meet?
Solution:-Relative speed of trains = (68 – 50) km/hr= 18 km/hr = 18 × 5/18 m/sec = 5 m/sec
Time taken by the train to clear off each other = sum of length of trains/relative speed of trains
= (130 + 140)/5 sec = 270/5 sec = 54 sec

Example 4:-Two trains 163 m and 187 m long are running on parallel tracks in the opposite directions with a speed of 47 km/hr and 43 km/hr in. How long will it take to cross each other?
Solution:- Relative speed of train = (47 + 43) km/hr = 90 km/hr
= 90 × 5/18 m/sec = 25 m/sec
Time taken by the two trains to cross each other = sum of length of trains/relative speed of trains
= (163 + 187)/25 sec = 350/25 sec= 14 sec
Therefore, the two trains crossed each other in 14 seconds.

TRAINS

The following things need to be kept in mind while solving the train related problems.
1. When the train is crossing a moving object, the speed has to be taken as the relative speed of the train with respect to the object.
2. The distance to be covered when crossing an object, whenever train crosses an object will be equal to: Length of the train + Length of the object

Example 1:- A 180m long train is running at 54 Kmph. How much time it will take to cross a platform of 120m long?
Solution:- 180+120= 54 x Time
=> 300= 54 x (5/18) x Time => Time= 12 sec.

Example 2:- Two, trains, one from Howrah to Patna and the other from Patna to Howrah, start simultaneously. After they meet, the trains reach their destinations after 9 hours and 16 hours respectively. The ratio of their speeds is:
Solutions:- Let us name the train as A and B.
Then, (A's speed) : (B's speed)= $\sqrt{b}:\sqrt{a}=\sqrt{16}:\sqrt{9}=4:3$.

BOATS & STREAM

Let, U be the velocity of boat in still water & V be the velocity of the stream.

UPSTREAM: While moving in upstream, distance covered, distance covered, S= (U−V) T

Downstream: In case of downstream, distance covered, distance covered, S= (U+V) T

Example 1:- If a man's rate with the current is 15 km/hr and the rate of the current is 11⁄2 km/hr, then his rate against the current is?
Solution:- Speed downstream = 15 km/hr
Rate of the current= 11⁄2 km/hr
Speed in still water = 15 - 11⁄2 = 131⁄2 km/hr
Rate against the current = 131⁄2 km/hr - 11⁄2 = 12 km/hr

Example 2:- A boat goes 8 km upstream in 24 minutes. The speed of stream is 4 km/hr. The speed of boat in still water is?
Solution: Speed upstream =8/(24/60)=8/(24/60) = 20 km/hr
Speed of the stream = 4 km/hr
speed of boat in still water = (20+4) = 24 km/hr

Example 3:- Find the average speed of a boat in a round trip between two places 18 km apart. If the speed of the boat in still water is 9km/h and the speed of the river is 3km/h?

Solution: Average speed = upstream * downstream / man's speed in still water
Average speed = 6 * 12 / 9 = 8km/h

Short Trick: *Average speed = upstream * downstream / man's speed in still water*

RACES

1. Races: A contest of speed in running, riding, driving, sailing or rowing is called a race.
2. Race Course: The ground or path on which contests are made is called a race course.
3. Starting Point: The point from which a race begins is known as a starting point.
4. Winning Point or Goal: The point set to bound a race is called a winning point or a goal.
5. Winner: The person who first reaches the winning point is called a winner.
6. Dead Heat Race: If all the persons contesting a race reach the goal exactly at the same time, the race is said to be dead heat race.
7. Start: Suppose A and B are two contestants in a race. If before the start of the race, A is at the starting point and B is ahead of A by 12 metres, then we say that 'A gives B, a start of 12 metres'.
To cover a race of 100 metres in this case, A will have to cover 100 metres while B will have to cover only (100 - 12) = 88 metres.
In a 100 m race, 'A can give B 12 m' or 'A can give B a start of 12 m' or 'A beats B by 12 m' means that while A runs 100 m, B runs (100 - 12) = 88 m.
8. Games: 'A game of 100, means that the person among the contestants who scores 100 points first is the winner'.
If A scores 100 points while B scores only 80 points, then we say that **'A can give B 20 points.**

EXAMPLE 1:- In a 500 m race, the ratio of the speeds of two contestants A and B is 3: 4. A has a start of 140 m. Then, A wins by?

Solution:- To reach the winning post ,A will have to cover a distance of (500 - 140)m, *i.e.,* 360 m. While A covers 3 m, B covers 4 m.
While A covers 360 m, B covers (4/3)*360 = 480m
Thus, when A reaches the winning post, B covers 480 m and therefore remains 20 m behind.
∴ A wins by 20 m.

Example 2:- In 100 m race, A covers the distance in 36 seconds and B in 45 seconds. In this race A beats B by?
Solution:- Distance covered by B in 9 sec. = (100/45)*9 = 20m
∴ A beats B by 20 metres.

CIRCULAR MOTION

FIRST MEETING OF THREE BODIES ON CIRCULAR PATH: In case when three or more bodies start moving simultaneously from the same point on the circumference of the circle, in the same direction around the circle, they will first meet after a time given by LCM of the times that the fastest runner takes in totally overlapping each of the slower runners.
FIRST MEETING AT THE STARTING POINT: In case when three or more bodies start moving simultaneously from the same point on the circumference of the circle, in the same direction around the circle , they will meet again at the starting point after a time calculated by taking LCM of the times that each of the bodies takes to complete on full round.

Practice Exercises

Linear Motion

Q1. If a bus travels 160 km in 4 hrs and a train travels 320 kms in 5 hours at uniform speed, then what is the ratio of distance travelled by them in one hour?
(a) 8 : 5 (b) 5 : 8 (c) 4 : 5 (d) 1 : 2

Q2. A worker reaches his factory 3 minutes late if his speed from his house of the factory is 5 km/hr. If he walks at a speed of 6 km/hr, then he reaches the factory 7 minutes early. The distance of the factory from his house is?
(a) 6 km (b) 5 km (c) 7 km (d) 8 km

Q3. If a train runs at 40 km/hr, it reaches its destination late by 11 min. but if it runs at 50 km/hr it is late by 5 min. only. The correct time for the train to complete its journey is?
(a) 13 min. (b) 15 min. (c) 19 min. (d) 21 min.

Q4. A and B walk from P to Q, a distance of 21 km at 3 and 4 km/hr. B reaches Q and immediately returns and meets A at R. Find PR?
(a) 3 kms (b) 18 kms (c) 15 kms (d) None of these

Q5. If a man cycles at 10 km/hr, then he arrives at a certain place at 1 PM. But if he cycles at 15 Km/hr he will arrive at the same place at 11 AM. At what speed must he travels to get there at noon?
(a) 12 km/hr (b) 13 km/hr (c) 14 km/hr (d) None of these

Q6. A person crosses a 600 m long street in 5 minutes. What is his speed in kmph?
(a) 3.6 kmph (b) 7.2 mkph (c) 8.4 kmph (d) 10 kmph

Q7. If a man runs at 3 m/s, how many kilometers does he run in 1 h 40 min?
(a) 18 km (b) 12 km (c) 20 km (d) 22 km

Q8. Walking at 3/4 th of its usual speed, a man is late by 2 ½ hr the usual time is?
(a) 7.5 hr (b) 6.5 hr (c) 7 hr (d) 5.5 hr

Q9. A train covers a distance in 50 minutes, if it runs at a speed of 48 kmph on an average. The speed at which the train must run to reduce the time of journey to 40 mints is?
(a) 70 kmph (b) 60 kmph (c) 55 kmph (d) 65 kmph

Q10. A man covers a distance on scooter, had he moved 3 kmph faster he would have taken 40 minutes less. If he had moved 2 kmph slower he would have taken 40 minutes more. The distance is?
(a) 40 km (b) 30 km (c) 25 km (d) 45 km

Q11. The ratio between the speeds of two trains is 7:8. If the second train runs 400 km in 4 hrs, then the speed of the first train is?
(a) 75 kmph (b) 70 kmph (c) 87.5 kmph (d) 84 kmph

Q12. It takes 8 hrs for 600 km journey, if 120 km is done by train and the rest by car. It takes 20 minutes more, if 200 km is done by train and rest by car. The ratio of the speed of the train to that of the car is?
(a) 2:3 (b) 3:2 (c) 3:4 (d) 4:3

Q13. In covering a distance of 30 km, Abhay takes 2 hrs more than Sameer. If Abhay doubles his speed, then he would take 1 hr less than Sameer. Then the speed of Abhay is?
(a) 5 kmph (b) 6.25 kmph (c) 6 kmph (d) 7.5 kmph

Average and Relative Speed

Q14. A car travels the first one-third of a certain distance with a speed of 10 km/hr, the next one-third distance with a speed of 20 km/hr and the last one-third distance with a speed of 60 km/hr. The average speed of the car for the whole journey is?
(a) 18 kmph (b) 24 kmph (c) 30 kmph (d) 36 kmph

Q15. A person travels from X to Y at a speed of 40 kmph and returns by increasing his speed by 50%. What is his average speed for both the trips?
(a) 36 kmph (b) 45 kmph (c) 48 kmph (d) 50 kmph

Q16. A train travels at a certain average speed for a distance of 63 km and then travels a distance of 72 km at an average speed of 6 kmph more than its original speed. If it takes 3 hours to complete the total journey, what is the original speed of the train in kmph?
(a) 24 kmph (b) 33 kmph (c) 42 kmph (d) 66 kmph

Q17. If a flight of 600 km an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 kmph and the time of flight increased by 30 minutets. The duration of the flight is?
(a) 1 hr (b) 2 hr (c) 3 hr (d) 4 hr

Q18. A person travelled from one place to another at an average speed of 40 km/hour and back to the original place at an average speed of 50 kms. What is his average speed in km/hour during the entire round-up?
(a) 45 kmph (b) 20 5 kmph (c) 400/9 kmph (d) Can't determine

Q19. A car covers four successive 3 km stretches at 10 km/hr, 20 km/hr, 30 km/hr and 60 km/hr respectively. Its average speed over this distance is?
(a) 10 kmph (b) 20 kmph (c) 25 kmph (d) 30 kmph

Q20. A train travelled 75% of the way from town X to town Y by travelling for A hours at an average speed of B km/hr. The train travels at an average speed of S km/hr for the remaining part of the journey. Which of the following expression represents the average speed of the entire journey?
(a) 0.75B + 0.25 (b) (4BS)/(3S + B) (c) AB/3S (d) 0.75A + 0.25S

Q21. A bus is moving with a speed of 30 km/hr ahead of a car which is moving with a speed of 150 kmph. How many kilometers apart are they if it takes 7.5 minutes for the car to catch up with the bus?
(a) 5 km (b) 7.5 km (c) 12.5 km (d) 15 km

Q22. Paschim Express left Delhi for Mumbai at 14:30 hours travelling at a speed of 60 km/hr. August Kranti Express left Delhi for Mumbai on the same day at 16:30 hours travelling at a speed of 80 km/hr. How far away from Delhi will the two trains meet (stoppages excluded)?
(a) 500 km (b) 480 km (c) 360 km (d) 240 km

Q23. Two cars X and Y starts from two places A and B respectively which are 700 km apart at 9 AM. Both the cars run at an average speed of 60 km/hr. Car X stops at 10 AM and again starts at 11 AM while the other car Y continues to run without stopping. When do the two cars cross each other?
(a) 2:40 PM (b) 3:20 PM (c) 4:10 PM (d) 4:20 PM

Q24. Buses start from a bus terminal with a speed of 20 km/hr at intervals of 10 minutes. What is the speed of a man coming from the opposite direction towards the bus terminal if he meets the buses at intervals of 8 minutes?
(a) 3 kmph (b) 4 kmph (c) 5 kmph (d) 7 kmph

Q25. A carriage driving in a fog passed a man who was walking at the rate of 3 km/hr in the same direction. He could see the carriage for 4 minutes and it was visible to him upto a distance of 100 m. What is the speed of the carriage?
(a) 4.5 kmph (b) 6 kmph (c) 10 kmph (d) 7.5 kmph

Q26. A thief running at 8 km/hour is chased by a policeman whose speed is 10 km/hour. If the thief is 100 meters ahead of the policeman, then the time required for the policeman to catch the thief will be?
(a) 2 min. (b) 6 min. (c) 10 min. (d) 3 min.

Q27. A train starts traveling from A at 7 AM and reaches B at 12 noon. Another train start traveling from B at 9 AM and reaches A at 4 PM. At what time do the two trains cross each other?
(a) 10:45 am (b) 11 am (c) 9:45 am (d) None of these

Q28. Two boys starting from the same place walk at the rate of 5 kmph and 5.5 kmph respectively. What time will they take to be 8.5 km apart, if they walk in the same direction?
(a) 17 hr (b) 15 hr (c) 17.5 hr (d) 16.5 hr

Q29. A thief steals a car at 2.30 pm and drives it at 60 kmph. The theft is discovered at 3 pm and the owner sets off in another car at 75 kmph, when he will overtake the thief?
(a) 4 pm (b) 5 pm (c) 4.30 pm (d) 5.15 pm

Trains

Q30. The speed of a train 150m long is 50 kmph. How much time will it take to pass a platform 600m long?
(a) 50 sec. (b) 54 sec. (c) 60 sec. (d) 64 sec.

Q31. A train of length 110 meter is running at a speed of 60 kmph. In what time, it will pass a man who is running at 6 kmph in the direction opposite to that in which the train is going?
(a) 10 (b) 8 (c) 6 (d) 4

Q32. Ramu sees a train passing over a 1 km long bridge. The length of the train is half that of the bridge. If the train clears the bridge in 2 minutes, the speed of the train is?
(a) 50 kmph (b) 43 kmph (c) 45 kmph (d) None of these

Q33. A train speeds past a pole in 15 sec and crosses past a platform of 100 m long in 30 sec. Find the length of the train?
(a) 75 m (b) 130 m (c) 100 m (d) Can't say

Q34. A man sitting in a train travelling at the rate of 50 km/hr observes that it takes 9 seconds for a goods train travelling in the opposite direction to pass him. If the goods train is 187.5 m long, find its speed?
(a) 25 kmph (b) 40 kmph (c) 35 kmph (d) 36 kmph

Q35. A train 160 m long is running from west to east at a speed of 25 m/s. Another train 460 m long is running on a parallel track but in opposite direction at 35 m/s. In how many minutes smaller train will be completely overlapped by larger train?
(a) 35 sec (b) 18 sec. (c) 36 sec (d) None of these

Q36. Two trains, 130 m and 110 m long, are going in the same direction. The faster train takes one minute to pass the other completely. If they are moving in opposite directions, they pass each other completely in 3 seconds. Find the speed of the faster train?
(a) 38 m/s (b) 46 m/s (c) 42 m/s (d) None of these

Q37. A train travelling with constant speed crosses a 96 m long platform in 12 seconds and another 141 m long platform in 15 seconds. The length of the train and its speed are?
(a) 64 m, 44 kmph (b) 64 m, 54 kmph (c) 84 m, 54 kmph (d) 84 m, 60 kmph

Q38. Two trains running in opposite directions cross a man standing on the platform in 27 seconds and 17 seconds respectively and they cross each other in 23 seconds. The ratio of their speeds is?
(a) 1 : 3 (b) 3 : 2 (c) 3 : 4 (d) None of these

Q39. A train passes a station platform in 36 seconds and a man standing on the platform in 20 seconds. If the speed of the train is 54 km/hr, what is the length of the platform?
(a) 120 m (b) 240 m (c) 300 m (d) None of these

Q40. A jogger running at 9 kmph alongside a railway track in 240 metres ahead of the engine of a 120 metres long train running at 45 kmph in the same direction. In how much time will the train pass the jogger?
(a) 3.6 sec (b) 18 sec (c) 36 sec (d) 72 sec

Q41. Two trains, each 100 m long, moving in opposite directions, cross each other in 8 seconds. If one is moving twice as fast the other, so the speed of the faster train is?
(a) 30 kmph (b) 36 kmph (c) 45 kmph (d) 60 kmph

Boats & Streams

Q42. A boat running upstream covers a distance of 10 km in 30 minutes and while running downstream, it covers the same distance in 25 min. What is the speed of the river current (in kmph)?
(a) 2.5 kmph (b) 2.2 kmph (c) 2 kmph (d) Can't say

Q43. A steamer goes downstream from one port to another in 4 h. It covers the same distance upstream in 5 h. If the speed of the stream is 2 km/h, find the distance between the two ports?
(a) 50 km (b) 60 km (c) 70 km (d) 80 km

Q44. Two boats, travelling at 5 km/h and 10 km/h, head directly towards each other. They begin at a distance of 20 km from each other. How far apart are they (in km) one minute before they collide?
(a) 1/12 km (b) 1/6 km (c) 1/4 km (d) 1/3 km

Q45. At his usual rowing rate, Rahul can travel 12 miles downstream in a certain river in six hours less than it takes him to travel the same distance upstream. But if he could double his usual rowing rate for this 24 mile round trip, the downstream 12 miles would then take only one hour less than the upstream 12 miles. What is the speed of the current in miles per hour?
(a) 7/3 (b) 4/3 (c) 5/3 (d) 8/3

Q46. A swimmer's speed downstream is 11 km/h and speed of the stream is 1.5 km/h. Find the upstream speed of swimmer?
(a) 8 kmph (b) 9.5 kmph (c) 4 kmph (d) 1.2 kmph

Q47. A boat's speed in still water is 5 km/h. While river is flowing with a speed of 2 km/h and time taken to cover a certain distance upstream is 2 h more than time taken to cover the same distance downstream. Find the distance?
(a) 10.5 km (b) 11 km (c) 10.9 km (d) 15 km

Q48. Rohit can row 40 km upstream and 55 km downstream in 13 hours and 30 km upstream and 44 km downstream in 10 hours. What is the speed of Rohit in still water?
(a) 6 kmph (b) 12 kmph (c) 3 kmph (d) 8 kmph

Q49. A man can row 15 km/h in still water. If it takes him twice time as to row up as to row down the river. Find the rate of stream?
(a) 4 kmph (b) 5 kmph (c) 6 kmph (d) 2 kmph

Q50. A man can row 6 km/h in still water and the river is running at 4 km/h. If a man takes 3/2 h to row to a place and back, how far is the place?
(a) 2 km (b) 3.7 km (c) 2.5 km (d) 3 km

Q51. A motorboat whose speed in still water is 10 km/h went 91 km downstream and then returned to its starting point. Calculate the speed of the river flow if the round trip took a total of 20 hrs?
(a) 3 kmph (b) 4 kmph (c) 6 kmph (d) 8 kmph

Q52. A motorist covers a distance of 39 km in 45 min by moving at a speed of x km/h for the first 15 min, then moving at double the speed for the next 20 min and then again moving at his original speed for the rest of the journey. Then, x is equal to?
(a) 31.2 kmph (b) 36 kmph (c) 40 kmph (d) 5 kmph

Q53. Speed of a boat in standing water is 14 kmph and the speed of the stream is 1.2 kmph. A man rows to a place at a distance of 4864 km and comes back to the starting point. The total time taken by him is?
(a) 700 hr (b) 350 hr (c) 1500 hr (d) 900 hr

Circular Motion

Q54. Two persons A and B are running on a circular track of length of 1000 m with a speed of 10 m/s and 15 m/s respectively. If they start simultaneously from point P in the same direction, after how much time will they meet for the first time?
(a) 100 sec (b) 40 sec (c) 66.66 sec (d) 200 sec

Q55. In the above question, if they are running in the opposite direction then after how much time will they meet for the first time?
(a) 100 sec (b) 40 sec (c) 66.66 sec (d) 200 sec

Q56. 'A' walks around a circular field at the rate of one round per hour while 'B' runs around it at the rate of six rounds per hour. They start in the same direction from the same point at 7.30 a.m. They shall first cross each other at?
(a) 8.30 a.m. (b) 8.10 a.m. (c) 7.48 a.m. (d) 7.42 a.m.

Q57. Three persons A, B and C are running on a circular track of length of 1000 m with a speed of 10 m/s, 15 m/s and 20 m/s respectively. If they start simultaneously from point P in the same direction, after how much time will they meet for the first time?
(a) 100 sec (b) 40 sec (c) 66.66 sec (d) 200 sec

Q58. Sumit and Rajan run on a circular track of circumference 600m with a speed of 5 km/h and 2 km/h. They start from the same place at the same time and in the same direction. When will they be together again for the first time?
(a) 700 sec (b) 750 sec (c) 720 sec (d) 500 sec

DIRECTION (Q59 to Q60): Three friends Mohit, Divya and Rajat run along a circular park with a speed of 8 km/h, 5 km/h and 3 km/h respectively. The circumference of the park is 500 m.

Q59. When will they all be together again for the first time?
(a) 25 min (b) 30 min (c) 40 min (d) 20 min

Q60. When will they all be together again for the first time at the starting point?
(a) 25 min (b) 30 min (c) 40 min (d) 20 min

Clocks

Q61. After every N minutes, minute and hour hand of a clock are together. What is the value of N?
(a) 65 5/11 (b) 60 (c) 65 (d) None of these

Q62. In an accurate clock, in a period of 2 hours 20 minutes, the minutes hand will move over?
(a) 520° (b) 320° (c) 840° (d) 140°

Q63. How many times hour and minute hands of a clock will be in a straight line in 24 hours?
(a) 22 (b) 11 (c) 4 (d) None of these

Q64. How many times hour and minute hands of a clock will be in at right angle in 24 hours?
(a) 22 (b) 24 (c) 44 (d) None of these

Q65. An accurate clock shows the time as 3.00. After hour hand has move 135°, the time would be?
(a) 7.30 (b) 6.30 (c) 8.00 (d) 9.30

Q66. When the time in the wall-clock is 3.25 p.m. the acute angle between the hours-hand and the minutes hand is?
(a) 60° (b) 52 ½ ° (c) 47 ½ ° (d) 42°

Q67. A watch showed a time of fourteen minutes past nine (9 hours and 14 minutes). The positions of the hour-hand and the minute-hand of the watch are exactly interchanged. The new time shown by the watch is closest to which one of the following?
(a) 6 min. to three (b) 13 min. to three (c) 14 min. to three (d) 15 min. to three

Q68. What is the angle between the minute hand and the hour hand when the time is 15:40 hours?
(a) 120° (b) 130° (c) 50° (d) 60°

Q69. At how many points between 10 O'clock and 11 O'clock are the minute hand and hour hand of a clock at an angle of 30 degrees to each other?
(a) 1 (b) 2 (c) 3 (d) 4

Q70. When the hands of clock meet each other in between 2 and 3?
(a) 2 : 10 10/11 pm (b) 2 : 12/10 pm (c) 2 : 12 pm (d) None of these

Races and Games

Q71. In a race of 200 m, A beats S by 20 m and N by 40 m. If S and N are running a race of 100m with exactly same speed as before, then by how many metres will S beat N?
(a) 11.11 m (b) 10 m (c) 12 m (d) 25 m

Q72. In a km race, A beats B by 100 m and B beats C by 150 m. In the same race, by how many metres does A beat C?
(a) 250 m (b) 240 m (c) 225 m (d) 235 m

Q73. In a 1000 m long race, Karan gives Varun a head start of 40 m, and still beats Varun by 10 m. Find the distance by which Karan will beat Varun, if Varun gives a start of 40 m to Karan.
(a) 88 m (b) 52 m (c) 40 m (d) 50 m

Q74. A beats B by 100 m in a race of 1200 m and B beats C by 200 m in a race of 1600 m. Approximately by how many metres can A beat C in a race of 9,600 m?
(a) 1600 m (b) 1800 m (c) 1900 m (d) 2400 m

Q75. A can run 500 m in 30 seconds and B in 35 seconds. How many metres start can A give to B in a km race so that the race may end in a dead-heat?
(a) 139 5/7 m (b) 138 5/7 m (c) 142 6/7 m (d) 140 5/7 m

Q76. A can run 224 metre in 28 seconds and B in 32 seconds. By what distance A beat B?
(a) 20 m (b) 25 m (c) 30 m (d) 28 m

Q77. A and B take part in 100 m race. A runs at 5 kmph. A gives B a start of 8 m and still beats him by 8 seconds. The speed of B is?
(a) 4.4 kmph (b) 4.25 kmph (c) 4.14 kmph (d) 5.15 kmph

Q78. In a km race A can beat B by 100 m and B can beat C by 60 m. In the same race A can beat C by?
(a) 144 m (b) 138 m (c) 149 m (d) 154 m

Moving Escalators and Miscellaneous

Q79. In a shopping Mall, Raja decided to walk down the escalator. He did some quick calculation in his mind. He found that if he walks down thirty steps, he requires 18 seconds to reach the bottom. However, if he is able to step down thirty four stairs, he would only require 6 seconds to get to the bottom. If the time is measured from the moment the top step begins to descend to the time he steps off the last step at the bottom, the height of the stair way in steps is?
(a) 46 (b) 38 (c) 36 (d) 32

Q80. Shyam and Vyom walk up an escalator (moving stairway). The escalator moves at a constant speed. Shyama takes three steps for every two of Vyom's steps. Shyam gets to the top of the escalator after having taken 25 steps, while Vyom (because his slower pace let us the escalator do a little more of the work) takes only 20 steps to reach the top. If the escalator were turned off, how many steps would they have to take to walk up?
(a) 40 (b) 50 (c) 60 (d) 80

Q81. Total time taken by a person in going to a place by walking and returning on cycle is 5 hrs 45 minutes. He would have gained 2 hours by cycling both ways. The time taken by him to walk both ways is?
(a) 6 hrs. 45 min. (b) 7 hrs. 45 min. (c) 8 hrs. 15 min. (d) 8 hrs. 30 min.

Q82. Excluding stoppages, the speed of a bus is 54 km/hr and including stoppages, it is 45 km/hr. For how many minutes does the bus stop per hour?
(a) 9 min. (b) 10 min. (c) 12 min. (d) 20 min.

Q83. Trains are moving from A to B and B to A at a regular interval of 1 hr (24 × 7). They complete their journey in 5 hrs. How many trains coming from station B will cross the train coming from station A that started at 10 A.M. (Assume that the trains start from each of the station at the same time)?
(a) 6 (b) 10 (c) 11 (d) None of these

Q84. Sunil reaches school every day at 5 P.M. to pick up his children. On Sunday, the school got over at 4 P.M. and the children started walking towards home. Sunil met them on the way and returned home 30 minutes early. For how many minutes did the children walk?
(a) 45 min. (b) 60 min. (c) 30 min. (d) None of these

Q85. A starts 3 minutes after B for a place 4.5 km away. B on reaching his destination, immediately returns and after walking a km meets A. If A can walk 1 km in 18 minutes, then what is B's speed?
(a) 5 km/hr (b) 4 km/hr (c) 5.5 km/hr (d) 3.5 km/hr

FAQ'S

Q86. A train met with an accident 150 km from station A. It completed the remaining journey at 5/6 of the previous speed and reached 15 min. late at station B. Had the accident taken place 30 km further, it would have been only 7 min. late. Find the speed of the train and the distance between the two stations A and B?
(a) 55 km/h, 208.5 km (b) 60 km/h, 212.75 km (c) 45 km/h, 206.25 km (d) 48 km/h, 207.25 km

Q87. Two ladies simultaneously leave cities A and B connected by a straight road and travel towards each other. The first lady travels 2 km/hr faster than the second lady and reaches B one hour before the second lady reaches A. the two cities A and B are 24 km apart. How many kilo metres does each lady travel in one hour?
(a) 5 km, 3 km (b) 7 km, 5 km (c) 8 km, 6 km (d) 16 km, 14 km

Q88. Two guns were fired from the same place at an interval of 12 min. but a person in a train approaching the place hears the second shot 10 min. after the first shot. Find the speed of the train if the speed of the sound is 330 m/s?
(a) 66 m/s (b) 165 m/s (c) 60 m/s (d) None of these

Q89. A train approaches a tunnel AB. Inside the tunnel is a cat located at a point that is 3/ 8 th of the distance AB measured from the entrance A. When the train whistles the cat runs. If the cat moves to the entrance of the tunnel, A, the train catches the cat exactly at the entrance. If the cat moves to the exit, B, the train catches the cat at exactly the exit. What is the ratio of the speed of the train to the speed of the cat?
(a) 8 : 1 (b) 4 : 1 (c) 5 : 3 (d) 8 : 3

Q90. Aryan runs at a speed of 40 metre/minute. Rahul follows him after an interval of 5 minutes and runs at a speed of 50 metre/ minute. Rahul's dog runs at a speed of 60 metre/minute and start along with Rahul. The dog reaches Aryan and then comes back to Rahul, and continues to do so till Rahul reaches Aryan. What is the total distance covered by the dog?
(a) 600 m (b) 750 m (c) 980 m (d) 1200 m

Q91. In the above question what is the total distance travelled by the dog in the forward direction?
(a) 600 m (b) 750 m (c) 900 m (d) 1100 m

Q92. A father runs after his son, who is 1000 m ahead. The father runs at a speed of 1 km every 8 minutes and the son runs at a speed of 1 km every 12 minutes. How much distance has the son covered at the point when the father overtakes him?
(a) 2500 m (b) 2000 m (c) 1500 m (d) 1000 m

Q93. Navjivan Express from Ahmedabad to Chennai leaves Ahmedabad at 6:30 a.m. and travels at 50 kmph towards Baroda situated 100 km away. At 7:00 a.m. Howrah-Ahmedabad Express leaves Baroda towards Ahmedabad and travels at 40 kmph. At 7:30 a.m., Mr. Shah, the traffic controller at Baroda realizes that both the trains are running on the same track. How much time does he have to avert a head-on collision between the two trains?
(a) 20 min. (b) 30 min. (c) 45 min. (d) None of these

Q94. A train started from station A and going towards station B at a speed of 48 km/hr. 45 minutes later, another train started from station B and proceeded towards station A at 50 km/hr. If the distance between the two stations is 232 km, at what distance from station A will the trains meet?
(a) 108 km (b) 144 km (c) 132 km (d) None of these

Q95. A man rowed against a stream flowing 1.5 km/hr to a certain point and then turned back, stopping 2 km short of the place from where he originally started. If the whole time occupied in rowing to be 2 hrs 10 minutes and his uniform speed in still water be 4.5 km/hr, the man went up the stream a distance of?
(a) 4 km (b) 8 km (c) 7 km (d) 5 km

Q96. A motorboat going downstream overcame a raft at a point A, 1 hour later; it turned back and after some time passed meets the raft at a distance of 6 km from the point A. By what speed river is flowing?
(a) 6 kmph (b) 5 kmph (c) 3 kmph (d) None of these

CHAPTER 4

DATA INTERPRETATION

PRACTICE EXERCISE

Type 1 – Table Chart

Directions (Q1 to Q5): Study the following table and answer the questions based on it

Expenditures of a Company (in Lakh Rupees) per Annum Over the given Years.

Year	Item of Expenditure				
	Salary	Fuel and Transport	Bonus	Interest on Loans	Taxes
1998	288	98	3.00	23.4	83
1999	342	112	2.52	32.5	108
2000	324	101	3.84	41.6	74
2001	336	133	3.68	36.4	88
2002	420	142	3.96	49.4	98

Q1. What is the average amount of interest per year which the company had to pay during this period?
(a) 32.43 Lakhs (b) 33.43 Lakhs (c) 34.12 Lakhs (d) 36.66 Lakhs

Q2. The total amount of bonus paid by the company during the given period is approximately what percent of the total amount of salary paid during this period?
(a) 0.1 % (b) 0.25 % (c) 1% (d) 1.25%

Q3. Total expenditure on all these items in 1998 was approximately what percent of the total expenditure in 2002?
(a) 62% (b) 66% (c) 69% (d) 71%

Q4. The total expenditure of the company over these items during the year 2000 is?
(a) 544.44 Lakhs (b) 546.44 Lakhs (c) 578.44 Lakhs (d) 560 Lakhs

Q5. The ratio between the total expenditure on Taxes for all the years and the total expenditure on Fuel and Transport for all the years respectively is approximately?
(a) 4:7 (b) 10:13 (c) 15:18 (d) 5:8

Directions (Q6 to Q10): Study the following data related to the performance of 6 batsmen in a tournament.

Batsman	No. of matches played	Average runs scored	Total balls faced	Strike rate
Ankit	8	—	—	129.6
Bikas	20	81	—	—
Cheeru	—	38	400	114
Dheeru	—	—	—	72
Eeshan	28	55	1280	—
Farhan	—	—	—	66

Note:

i) Strike rate $= \frac{\text{Total runs scored}}{\text{Total balls faced}} \times 100$

ii) All given batsmen bat in all the given matches played by them.

Q6. The respective ratio between the total number of balls faced by Dheeru and that of Farhan in the tournament is 3 : 4. The total number of runs scored by Farhan in the tournament is what percent more than the total runs scored by Dheeru in the tournament?

(a) 33 1/3 % (b) 22 2/9 % (c) 22 1/9 % (d) 22 %

Q7. If the runs scored by Eeshan in Last 3 matches of the tournament are not considered, his average runs scored in the tournament decreased by 9. If the runs scored Eeshan in 26th and 27th match are below 128 and no two scores among these 3 scores are equal, then what are the minimum possible runs scored by Eeshan in the 28th match?

(a) 133 (b) 135 (c) 137 (d) 140

Q8. In the tournament, the total number of balls faced by Ankit is 74 less than the total number of runs scored by him. What is the average run scored by Ankit in the tournament?

(a) 42.5 (b) 40 (c) 41.8 (d) 40.5

Q9. In the tournament Cheeru and Dheeru played same number of matches. Dheeru scored 24 runs more than that scored by Farhanwhen Farhan faced equal number of balls which was faced by Cheeru. Find the difference in the total runs scored and total ball faced by Dheeru?

(a) 118 (b) 112 (c) 122 (d) 108

Q10. If the average number of the match played by all players is 19, and the maximum possible runs scored by Farhan is 3 times the match played by him when he faced a total number of balls less than 151, then find the minimum possible matches played by Dheeru.?

(a) 12 (b) 10 (c) 13 (d) 8

Directions (Q11 to Q15): Study the following table carefully to answer the questions that follow.

Company / year	Per cent profit earned by six companies over the years					
	P	Q	R	S	T	U
2004	11	12	3	7	10	6
2005	9	10	5	8	12	6
2006	4	5	7	13	12	5
2007	7	6	8	14	14	7
2008	12	8	9	15	13	5
2009	14	12	11	15	14	8

Q11. If the profit earned by Company R in the year 2008 was Rs. 18.9 lakhs, what was the income in that year?
(a) 303.7 lakhs (b) 264.5 lakhs (c) 329.4 lakhs (d) 228.9 lakhs

Q12. What is the percentage rise in profit of Company T in the year 2009 from the year 2004?
(a) 40 (b) 35 (c) 26 (d) 48

Q13. If the profit earned by Company P in the year 2007 was Rs. 2.1 lakhs, what was the expenditure in that year?
(a) 30 lakhs (b) 15 lakhs (c) 23 lakhs (d) 27 lakhs

Q14. What was the average per cent profit of Company S over all the years together?
(a) 13.5 (b) 11 (c) 12 (d) 14

Q15. What is the difference between the per cent profit earned by Company Q in the year 2005 and the average per cent profit earned by the remaining Companies together in that year?
(a) 4 (b) 2 (c) 1 (d) 3

Directions (Q16 to Q20): In the following table, the Investment and profit of three Companies in different countries is given.

	Investment (in mn $.)			Profit (in mn $.)		
State	TCS	Infosys	Accenture	TCS	Infosys	Accenture
Singapore	15000	—	25000	—	8000	12500
UK	—	7000	8000	—	—	14000
UAE	4000	5000	4500	—	—	—
Qatar	9000	10000	—	4500	6000	—
Malaysia	—	—	17000	20000	30000	40000

Note: Some values are missing. You have to calculate these values as per data given in the questions.

Q16. If TCS invested his amount in SINGAPORE state for 9 years and Accenture invested his amount in the same country for 10 years then find the total profit made by all of them from SINGAPORE?
(a) 29250 mn $ (b) 24250 mn $ (c) 27250 mn $ (d) 31200 mn $

Q17. If the total profit earned from UK by all of them is mn $ 32375 and each invested for 9 years then find the ratio of investment of TCS in UK to the profit of Infosys from SINGAPORE?
(a) 16 : 7 (b) 7 : 16 (c) 8 : 13 (d) 13 : 8

Q18. If TCS, Infosys and Accenture invested in UAE for 5 years, 8 years and 6 years respectively then profit earned by Accenture from UAE is what % of the profit earned by TCS and Infosys together from the same Country, if total profit earned by all of them from UAE state is 8700 mn $?
(a) 45% (b) 50% (c) 55% (d) 40%

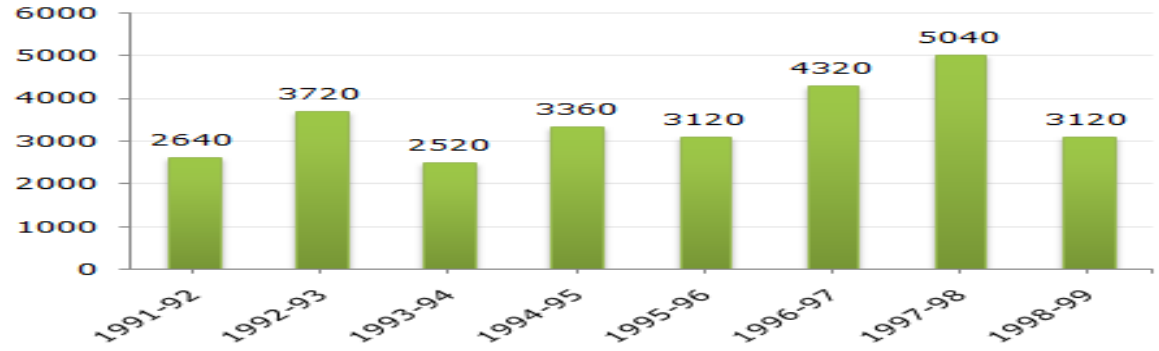
Q19. In Malaysia state total Investment of TCS and Infosys is 85000 mn $, while TCS and Infosys invested their amount for 4 years and 6 years respectively in the same country, then find the number of years that Accenture invested his amount?
(a) 8 years (b) 9 years (c) 20 years (d) Can't say

Q20. Average Investment made by all of them in Qatar is 10,000 mn $ and average profit earned by all of them from the same state is $ 6000 mn , then profit earned by Accenture in the same country is what percent more/less than the amount invested by Accenture in the same state?
(a) 35 1/3 % (b) 37 6/7 % (c) 32 7/11 % (d) 31 9/11 %

Type 2 – Bar Chart

Directions (Q21 to Q25): The bar graph given below shows the foreign exchange reserves of a country (in million US $) from 1991 - 1992 to 1998 - 1999.

Foreign Exchange Reserves of a Country (in million US $).



Q21. The ratio of the number of years, in which the Foreign exchange reserves are above the average reserves, to those in which the reserves are below the average reserves is?
(a) 2:6 (b) 3:4 (c) 3:5 (d) 4:4

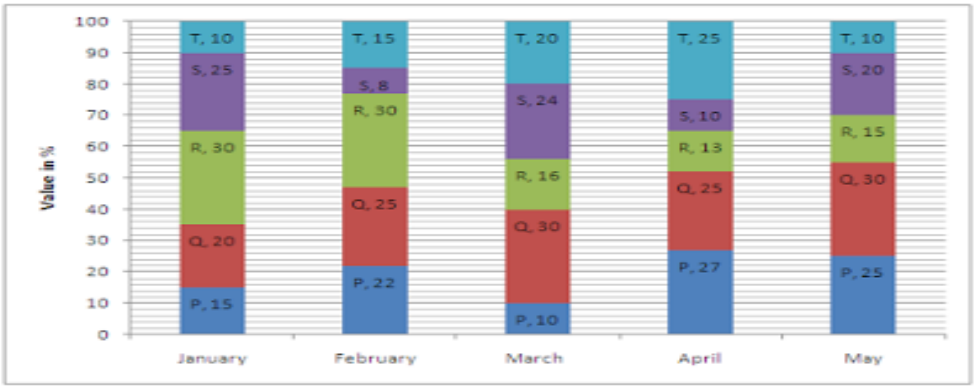
Q22. The foreign exchange reserves in 1997-98 were how many times that in 1994-95?
(a) 0.7 (b) 1.2 (c) 1.4 (d) 1.5

Q23. For which year, the percent increase of foreign exchange reserves over the previous year, is the highest?
(a) 1998-1999 (b) 1993-1994 (c) 1994-1995 (d) 1992-1993

Q24. The foreign exchange reserves in 1996-97 were approximately what percent of the average foreign exchange reserves over the period under review?
(a) 95% (b) 110% (c) 115% (d) 125%

Q25. What was the percentage increase in the foreign exchange reserves in 1997-98 over 1993-94?
(a) 300 (b) 150 (c) 100 (d) 200

Directions (Q26 to Q30): The following graph shows the percentage of discount offered on the total discount given in any month for 5 various products P, Q, R, S and T in a given month by a shopkeeper.



Condition 1: Total value of discount offered on all products increases by 10% every month.
Condition 2: Difference between the discount of R in January and discount of S in April is Rs. 333.8.

Q26. If total discount per month would have been increased by 20% instead of 10% as given above and condition 2 remains the same for new rate then, difference in value of discount of R in January and T in February according to new rate (approximately)?
(a) 315 (b) 330 (c) 305 (d) 405

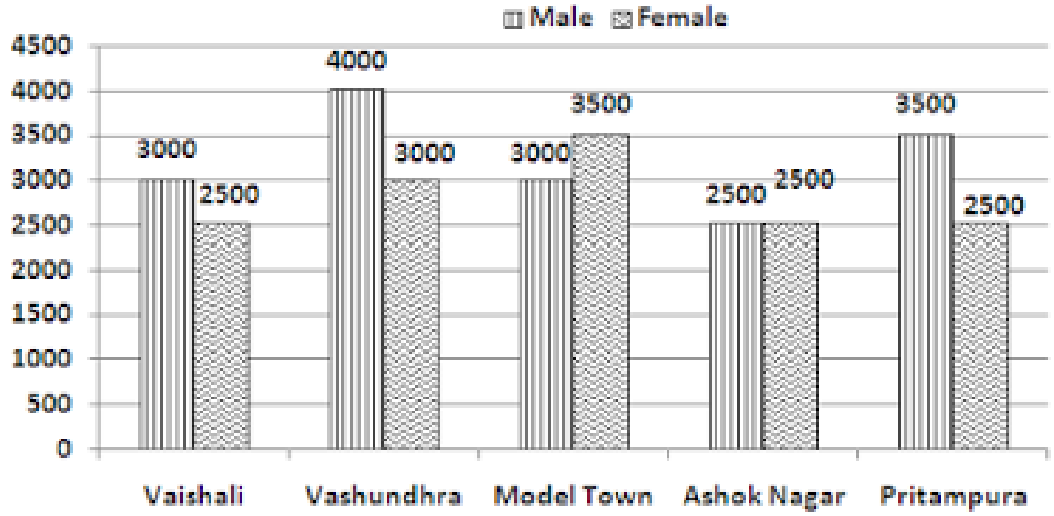
Q27. What is the cost price of article T in February if ratio of cost price of T in February and cost price of S in May are in the ratio 6 : 5 and profit of S in May is Rs 343 (approximately)?
(a) 2400 (b) 2500 (c) 2000 (d) 1800

Q28. Cost price of Q in April is what percent more or less than the cost price of R in January if profit of Q in April is 280 and profit of R in January is 20% more than the discount of T in March (approximately)?
(a) 98% (b) 92% (c) 109% (d) 113%

Q29. If there are 82 articles of R are sold in March and Profit percent per article of R in March is 25/4% more of the percent value of discount of R in March then find the total profit in selling all articles (approximately)?
(a) 22500 (b) 17500 (c) 19250 (d) 24200

Q30. If shopkeeper had 10 units of Q type products in February in which 2 articles are spoiled then he should sell the remaining articles at what price so that there is overall gain of 20% if there is a profit of 125/7% on selling a unit of Q type product initially (approximately)?
(a) 2100 (b) 1800 (c) 1500 (d) 1400

Directions (Q31 to Q35): Study the following graph carefully to answer the questions that follow.



Q31. What is the average number of females from all the organizations together?
(a) 2700 (b) 2500 (c) 2800 (d) 2900

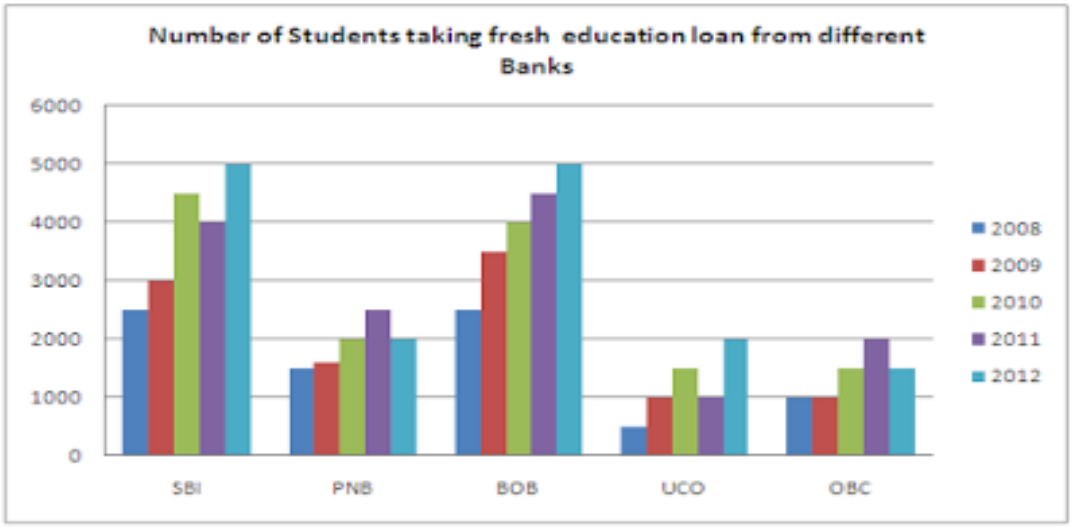
Q32. The total number of males from organization Vaishali and Vashundhra together is approximately what percent of the total number of females from organization Vaishali, Vashundhra and Model Town together?
(a) 33% (b) 55% (c) 66% (d) 78%

Q33. What is the difference between the total number of females and the total number of males from organization Vaishali, Vashundra, Model Town and Ashok Nagar together?
(a) 900 (b) 800 (c) 700 (d) 1000

Q34. What is the ratio of the number of females from organization Vashundra to the number of females from organization Pritampura?
(a) 6 : 5 (b) 5 : 6 (c) 6 : 7 (d) 7 : 6

Q35. The number of males from organization Vashundhra is approximately what percent of the total number of males from all the organizations together?
(a) 23.42% (b) 21.42% (c) 25% (d) 26%

Directions (Q36 to Q40): Read the given bar graph and answer the following questions.



Q36. Approximately how many students taking a loan from UCO in 2009 and PNB in 2010 were defaulters if 23% from UCO in 2009 and 20% from PNB in 2010 have defaulted?
(a) 630 (b) 650 (c) 600 (d) 750

Q37. In 2007, no of defaulters in SBI was 5%. However each year no of defaulters increases by 10% in number. What will be the difference between the number of defaulters of SBI in the Month 2009 and 2012?
(a) 1500 (b) 2000 (c) 1325 (d) Can't say

Q38. In which of the following years, the difference in no. of students taking the loan from Bank BOB from the previous year is highest?
(a) 2008 (b) 2009 (c) 2010 (d) 2012

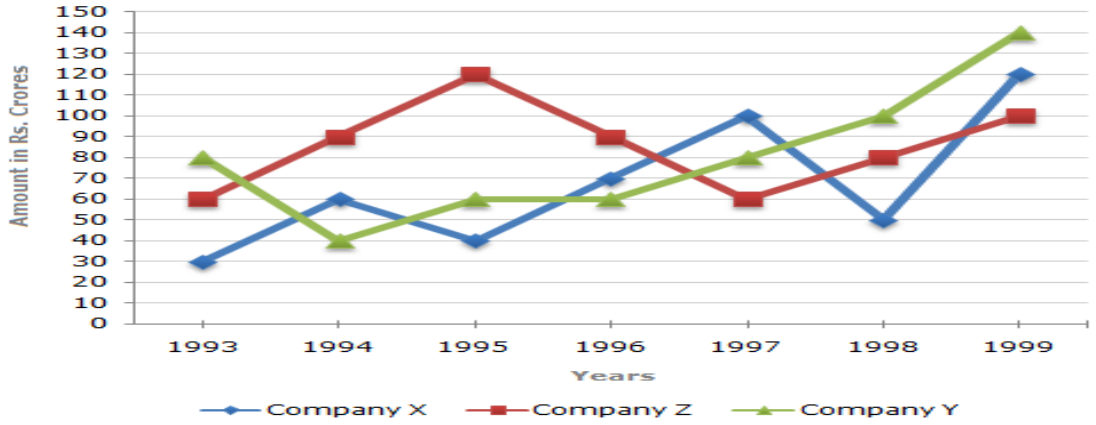
Q39. If on average, Rs. 175000 per students education loan sanctioned by OBC bank all over the years. What will be total amount sanctioned by OBC in all given years?
(a) 1055600000 (b) 1055800000 (c) 1620000000 (d) 1225000000

Q40. What is the ratio of Number of students taking Education Loans from SBI and BOB together in all the Years and the total no of students taking Education loans in 2010 and 2011 together?
(a) 8 : 5 (b) 5 : 7 (c) 7 : 5 (d) 9 : 7

Type 3 – Line Chart

Directions (Q41 to Q45): Study the following line graph and answer the questions

Exports from Three Companies over the Years (in Rs. crores)



Q41. For which of the following pairs of years the total exports from the three Companies together are equal?

(a) 1995 & 1998 (b) 1996 & 1998 (c) 1997 & 1998 (d) 1995 & 1996

Q42. Average annual exports during the given period for Company Y is approximately what percent of the average annual exports for Company Z?

(a) 87.12% (b) 89.64% (c) 91.21% (d) 93.33%

Q43. In which year was the difference between the exports from Companies X and Y the minimum?

(a) 1994 (b) 1995 (c) 1996 (d) 1997

Q44. What was the difference between the average exports of the three Companies in 1993 and the average exports in 1998?

(a) Rs. 15 crores (b) Rs. 18 crores (c) Rs. 20 crores (d) Rs. 22 crores

Q45. In how many of the given years, were the exports from Company Z more than the average annual exports over the given years?

(a) 2 (b) 3 (c) 4 (d) 5

Directions (46-50): Study the graph carefully to answer the questions that follow.

PERCENT INCREASE IN PROFIT OF THREE COMPANIES OVER THE YEARS

Q46. What was the per cent increase in profit of company Y in the year 2008 from the previous year?
(a) 2 (b) 10 (c) 20 (d)14

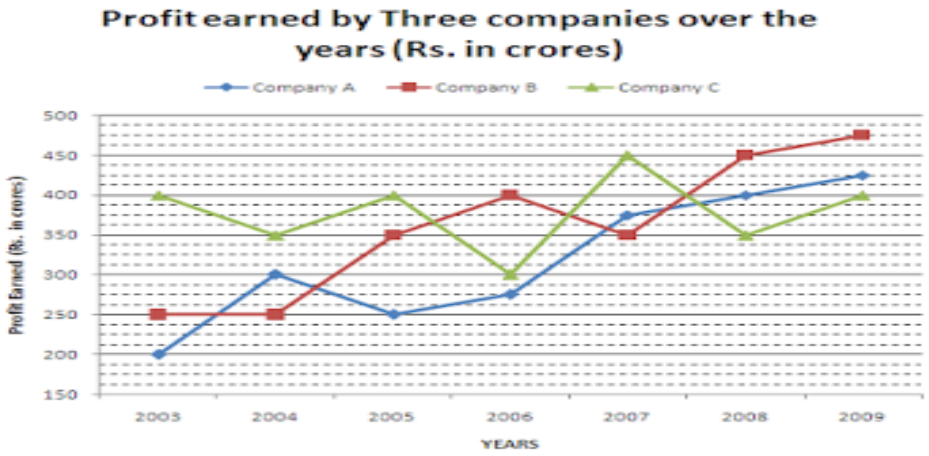
Q47. What was the approximate percent increase in the profit of company Z in the year 2005 from the previous year?
(a) 14 (b) 21 (c) 8 (d) 26

Q48. If the profit earned by company X in the year 2004 was Rs. 2,65,000, what was its profit in the year 2006?
(a) Rs 6,21,560 (b) Rs 4,68,290 (c) Rs 7,05,211 (d) Rs 4,82,300

Q49. What is the average per cent increase in profit of company Z over the years?
(a) 40 5/6 % (b) 41 2/3 % (c) 28 1/6 % (d) 23 1/3 %

Q50. What is the ratio of profit percent of company Y in 2005 to company Z in 2007?
(a) 3:4 (b) 4:3 (c) 5:9 (d) 9:5

Directions (Q51 to Q55): Study the following graph carefully and answer the questions given below:**.**



Q51. What was the average profit earned by all the three companies in the year 2008?
(a) Rs. 300 crore (b) Rs. 400 crore (c) Rs. 350 crore (d) Rs. 520 crore

Q52. In which of the following years was the difference between the profits earned by company B and company A the minimum?
(a) 2003 (b) 2004 (c) 2005 (d) 2007

Q53. In which of the following years was the total profit earned by all three companies together with the highest?
(a) 2004 (b) 2007 (c) 2008 (d) 2009

Q54. What was the approximate percentage increase in the profit earned by Company A from 2006 to 2007?
(a) 36 (b) 24 (c) 40 (d) 20

Q55. What was the difference between the profit earned by company A in 2004 and the profit earned by company C in 2009?
(a) Rs.50 crore (b) Rs.1 crore (c) Rs.100 crore (d) Rs.200 crore

Directions (Q56 to Q60): Study the following graph to answer the given questions.
Percent profit earned by two companies over the given years

$$\% \text{ profit} = \frac{\text{Income} - \text{Expenditure}}{\text{Expenditure}} \times 100$$

Q56. For Company M, its income in 2009-10 was equal to its expenditure in 2010-11, what was the ratio of its respective incomes in these two years?
(a) 4:5 (b) 3:4 (c) 5:7 (d) Can't say

Q57. If the income of Company M in 2006-07was equal to the expenditure of Company N in 2009-10 what was the ratio of their respective profits?
(a) 13:15 (b) 15:26 (c) 13:26 (d) 5:33

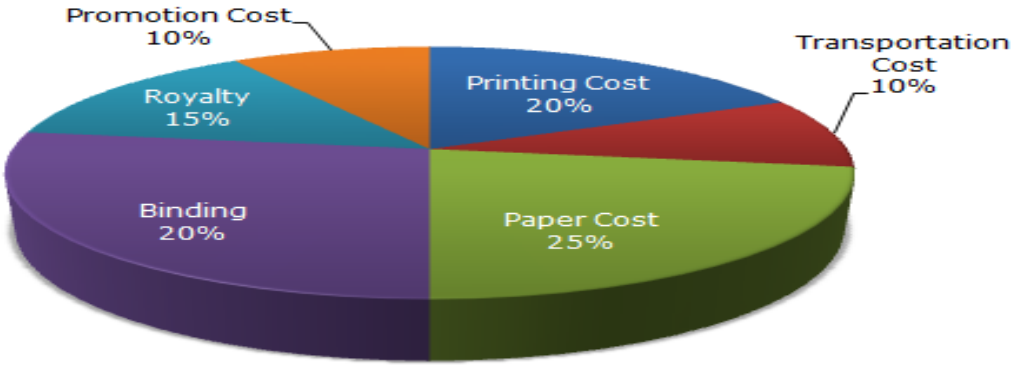
Q58. What was the difference in the expenditures of the two companies in 2007-08?
(a) 10 (b) 100 (c) 1000 (d) Can't say

Q59. In 2010-11 the income of Company N was Rs. 119 crores. What was its expenditure in that year?
(a) Rs. 76.8 crore (b) Rs. 64 crore (c) Rs. 70 crore (d) Can't say

Q60. For Company N, in which year is the percent of increase in percent profit over that of previous year the highest?
(a) 2011-12 (b) 2007-08 (c) 2010-11 (d) Can't say

Type 4 – Pie Chart

Directions (Q61 to Q65): The following pie-chart shows the percentage distribution of the expenditure incurred in publishing a book. Study the pie-chart and the answer the questions based on it.
Various Expenditures (in percentage) Incurred in Publishing a Book



Q61. If for a certain quantity of books, the publisher has to pay Rs. 30,600 as printing cost, then what will be the amount of royalty to be paid for these books?
(a) Rs. 19,450 (b) Rs. 21,200 (c) Rs. 22,950 (d) Rs. 26,150

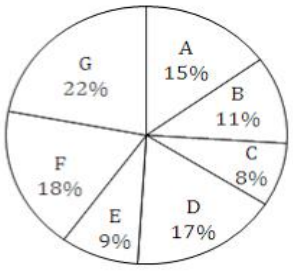
Q62. What is the central angle of the sector corresponding to the expenditure incurred on Royalty?
(a) 15 (b) 24 (c) 54 (d) 48

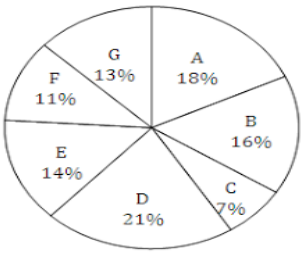
Q63. The price of the book is marked 20% above the C.P. If the marked price of the book is Rs. 180, then what is the cost of the paper used in a single copy of the book?
(a) Rs. 36 (b) Rs. 37.50 (c) Rs. 42 (d) Rs. 44.25

Q64. If 5500 copies are published and the transportation cost on them amounts to Rs. 82500, then what should be the selling price of the book so that the publisher can earn a profit of 25%?
(a) Rs. 187.50 (b) Rs. 191.50 (c) Rs. 175 (d) Rs. 180

Q65. Royalty on the book is less than the printing cost by?
(a) 5% (b) 33.33% (c) 20% (d) 25%

Directions (Q66 to Q70): These questions based on the following graphs.
Classification of appeared candidates in a test from different states and qualified candidates from those states.
Appeared candidates = 45000. **Qualified candidates = 9000**





Q66. What is the ratio of the number of appeared candidates from states C and E together to that of the appeared candidates from states A and F together?
(a) 17: 33 (b) 11 : 13 (c) 13 : 27 (d) 17 : 27

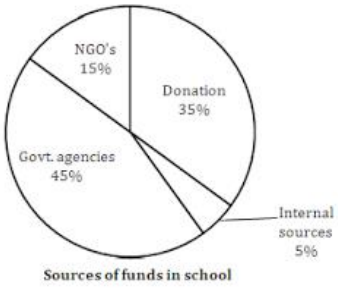
Q67. In which state, the percentage of qualifies candidates with respect to that of appeared candidates is minimum?
(a) C (b) F (c) D (d) G

Q68. What is the difference between the number of qualified candidates of states D and those of G?
(a) 690 (b) 670 (c) 780 (d) 720

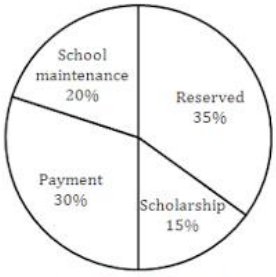
Q69. What is the percentage of qualified candidates with respect to appeared candidates from states B and C taken together? (rounded to two decimal places)
(a) 23.11 (b) 24.21 (c) 21.24 (d) 23

Q70. What is the ratio between the number of candidates qualified from states B and D together to the number of candidates appeared from states 'C', respectively?
(a) 8 : 37 (b) 11 : 12 (c) 37 : 40 (d) 7 : 37

Directions (Q71 to Q75): Study the following pie-charts carefully and answer the questions given below.
The entire fund that school gets from different sources in equal to Rs. 500 lakhs.



Sources of funds in school



Uses of funds by school

Q71. What is the difference between the funds acquired by the school from NGO's and internal sources?
(a) Rs. 50 lakh (b) Rs. 45 lakh (c) Rs. 75 lakh (d) Rs. 25 lakh

Q72. If the school managed school maintenance from the government agencies fund only, then how much fund from government agencies would still left for other use?
(a) Rs. 120 lakh (b) Rs. 150 lakh (c) Rs. 110 lakh (d) Rs. 125 lakh

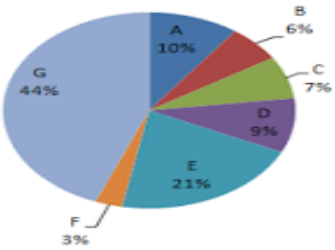
Q73. If scholarship has to be paid out of the donation fund, then what is the approximate per cent of donation fund used for his purpose?
(a) 43% (b) 53% (c) 37% (d) 45%

Q74. What is the total amount used by the school for payment?
(a) Rs. 100 lakh (b) Rs. 110 lakh (c) Rs. 150 lakh (d) Rs. 140 lakh

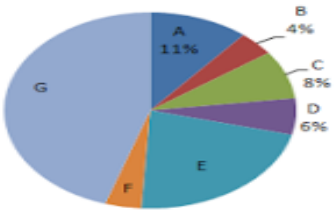
Q75. What amount of the fund is acquired by the school from government agencies?
(a) Rs. 220 lakh (b) Rs. 310 lakh (c) Rs. 255 lakh (d) Rs. 225 lakh

Directions (Q76 to Q80): Study the following pie chart and answer the following questions.

Percentage distribution of Income of 7 firms in year 2010 and 2013 is given below in pie chart. Percentage distribution of some firms is not given. You have to calculate these values if required to answer the questions.
Note: Ratio of total Income of all 7 firms in 2010 to 2013 is 5 : 7.



2010



2013

Q76. If expenditure of B in 2010 is 80% of its income and expenditure of E in 2013 is 60% of its income and income of E in 2013 is 100/3% more than the income of E in 2010 then saving of B in 2010 is what percent of saving of E in 2013?
(a) 75/7% (b) 38/9% (c) 100/3% (d) 50/3%

Q77. If difference between the total income of all firms in 2010 and total income of all firms in 2013 is 'D', then what is the ratio of average income of firm A, B and E together in 2010 to the average of income of firm B, C and D together in 2013?
(a) 203 : 201 (b) 133 : 123 (c) 185 : 126 (d) 119 : 143

Q78. If income of firm E in 2013 is 400/7% of income of E in 2010 and ratio between percentage distribution of income of firm F and G is 11 : 8 in 2013 then what is the percentage distribution of income of firm F in 2013?
(a) 45/23% (b) 133/7% (c) 253/7% (d) 255/103%

Q79. Income of firm A, B and E together in 2010 is what % more or less than income of firm C, D and E together if the income of firm E in 2013 is 50% more than income of firm A in 2010(approximately)?
(a) 7% (b) 5% (c) 5.1% (d) 8%

Q80. If income of firm A and B together in 2013 is 120% of income of firm A and B together in 2012 then income of firm A and B together increase/decrease by what percent in 2012 with respect to 2010?
(a) 30% (b) 23% (c) 20% (d) 9%

Type 5 – Data Caselets

Directions (Q81 to Q85): Read the given information and answer the following questions.
Krishna distributed 10-acre land to Gopal and Ram who paid him the total amount in the ratio 2: 3. Gopal invested a further Rs. 2 lakh in the land and planted coconut and lemon trees in the ratio 5: 1 on equal areas of land. There were a total of 100 lemon trees. The cost of one coconut was Rs. 5. The crop took 7 yr to mature and when the crop was reaped in 1997, the total revenue generated was 25% of the total amount put in by Gopal and Ram together. The revenue generated from the coconut and lemon trees was in the ratio 3: 2 and it was shared equally by Gopal and Ram as the initial amounts spent by them were equal.

Q81. What was the ratio of yield per acre of land for coconuts and lemons (in terms of number of lemons and coconuts)?
(a) 3: 2 (b) 2: 3 (c) 1: 1 (d) Can't say

Q82. What was the value of output per tree for coconuts?
(a) Rs 36 (b) Rs 360 (c) Rs 3,600 (d) Rs 240

Q83. What was the amount received by Gopal in 1997?
(a) Rs. 1.5 lakh (b) Rs. 3 lakh (c) Rs. 6 lakh (d) Rs. 4 lakh

Q84. What was the value of output per acre of the lemon tree planted (in lakh/acre)?
(a) 0.24 (b) 2.4 (c) 24 (d) Can't say

Q85. What was the total output of coconuts?
(a) 24,000 (b) 36,000 (c) 18,000 (d) 48,000

Directions (Q86 to Q90): The following information is about the production of cars by 3 different companies from Monday to Friday in a specific week. Read the information carefully and answer the following question.
The total production by 3 companies on Monday was 540 out of which 100/3% cars were produced by Tata. The number of cars produced by Renault on Monday is less than the cars produced by Tata on Monday by the same extent as the number of cars produced by Maruti on Monday is more than the cars produced by Tata on Monday. The difference between cars produced by Renault and Maruti on Monday is 40.
150 cars are produced by Tata on Tuesday, which is 100 less than the cars produced by the same company on Wednesday. A total of 910 cars were produced by Tata from Monday to Friday. The ratio between cars produced by Tata on Thursday to cars produced by the same company on Friday is 5 : 6.
220 cars were produced by Renault on Tuesday, which is 80 less than the cars produced by Maruti on Wednesday. A total of 570 cars were produced on Tuesday, which is 76% of the total cars produced on Wednesday. The number of cars produced by Maruti on Thursday is 200/3% more than cars produced by Tata on the same day. Total 580 cars were produced on Thursday. The number of cars produced by Maruti on Friday is same as that on Monday. 140 cars were produced by Renault on Friday.

Q86. Find the ratio between total cars produced on Monday to that on Wednesday?
(a) 18 : 29 (b) 18 : 25 (c) 18 : 31 (d) 3 : 5

Q87. Find the total number of cars produced by Renault from Monday to Friday?
(a) 900 (b) 980 (c) 950 (d) 960

Q88. Find the average number of cars produced per day by Maruti from Monday to Friday?
(a) 250 (b) 220 (c) 270 (d) 230

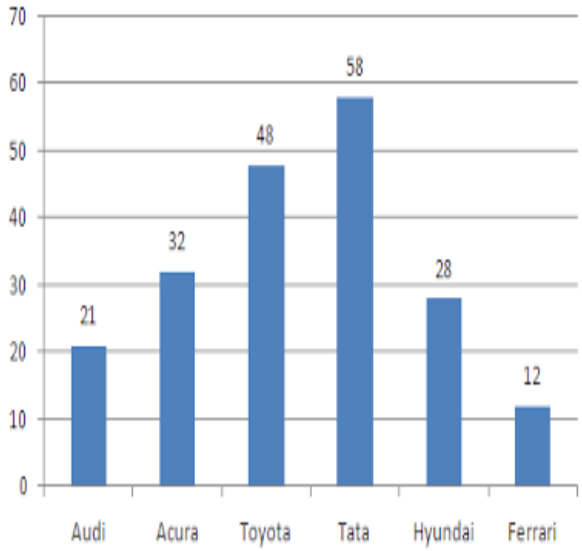
Q89. On which day the total number of cars produced was the maximum?
(a) Monday (b) Tuesday (c) Wednesday (d) Thursday

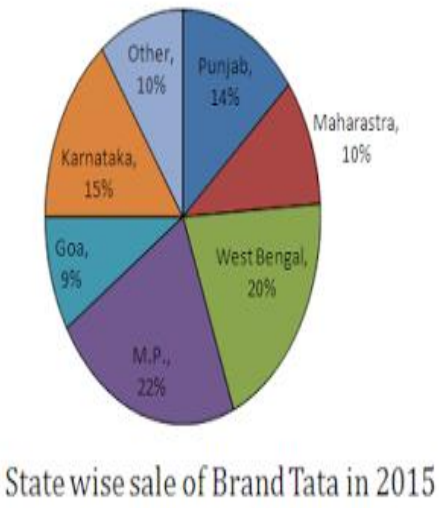
Q90. On which pair of days out of the following, the number of cars produced by Tata is the same?
(a) Tuesday and Wednesday (b) Wednesday and Thursday

(c) Tuesday and Thursday (d) Monday and Wednesday

Type 6 – Mixed Chart

Directions (Q91 to Q95): The bar graph shows the sales of six different car-manufacturers in 2015 (in thousands of units) in India.
The pie-chart shows the break-up of sales of Brand TATA in 2013 in different states of India.
Note→ All manufactured cars are sold in these given 7 states.





Q91. What is the difference between the sales of Tata in West Bengal and that in Goa?
(a) 50600 (b) 6380 (c) 6567 (d) 6220

Q92. By what percent should the sales of brand Tata is increased so that it sales volume in Punjab becomes 15000, while the volume of sales in all other state remains the some (approximately)?
(a) 10% (b) 9% (c) 7% (d) 12%

Q93. If in 2016, the total sale of Brand Tata increase by 12%, while its sale in Maharashtra is increased by 34% and in M.P. by 22%, what is the approximate sales increase in the rest of the states?
(a) 7000 (b) 6500 (c) 8000 (d) 10,000

Q94. Total sale of Audi, Acura and Toyota in 2015 is what percent of the total sales of Tata in all states together in that year 2015 (approximately)?
(a) 100% (b) 113% (c) 190% (d) 175%

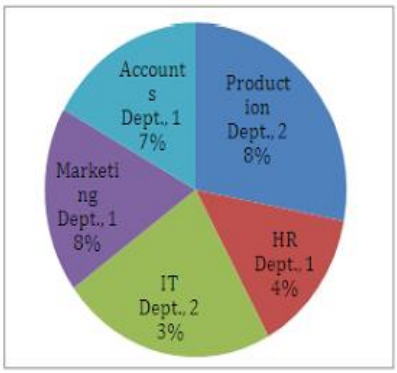
Q95. If total sale of all brands together increases by 20% in 2016 and sale of Tata in West Bengal increase by 10% keeping % percentage distribution of Tata in these seven states same as previously then, what is the total sale of all cars in 2016 of all brands except brand Tata?
(a) 1,75,000 (b) 1,50,000 (c) 2,00,000 (d) 1,00,000

Directions (Q96 to Q100): Study the following pie chart and table carefully to answer the following questions that follow.

Percentages break up of employees working in various departments of an organization and the ratio of men to women in them.

Total Number of Employees = 1800

Percentage Break up of employees



Ratio of Men to Women		
Department	Men	Women
Production	11	1
HR	1	3
IT	5	4
Marketing	7	5
Accounts	2	7

Q96. What is the number of men working in the marketing department?

(a) 132 (b) 174 (c) 126 (d) 189

Q97. The number of women working in the IT department of the organization forms approximately what per cent of the total number of employees in the organizations from all departments together?

(a) 7 (b) 5 (c) 19 (d) 10

Q98. What is the respective ratio of the number of women working in the HR department of the organization and the total number of employees in that department?

(a) 3 : 4 (b) 2 : 5 (c) 2 : 9 (d) 3 : 7

Q99. What is the respective ratio of the number of men working in the Accounts departments to the total number of employees working in that department?

(a) 9 : 2 (b) 7 : 6 (c) 2 : 9 (d) 6 : 7

Q100. The number of men working in the production department of the organization forms what per cent of the total number of employees working in that department? (Rounded off to two digits after decimal)

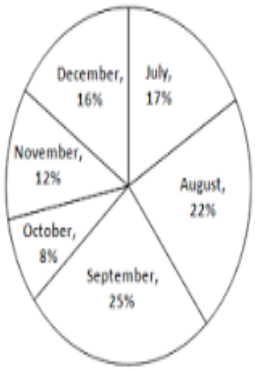
(a) 89.76 (b) 91.67 (c) 88.56 (d) 94.29

Directions (Q101 to Q105): Study the following pie-chart and table carefully and answer the questions given below.

Percentages wise distribution of the number of mobile phones sold by a shopkeeper during six months in Pie chart.

The ratio between the numbers of mobile phones sold of Company A and Company B during six months in a table.

Total number of mobile phones sold = 45000



Month	Ratio
July	8 : 7
August	4 : 5
September	3 : 2
October	7 : 5
November	7 : 8
December	7 : 9

Q101. What is the ratio of the number of mobile phones sold of Company B during July to those sold during December of the same company?
(a) 119 : 145 (b) 116 : 135 (c) 119 : 135 (d) 119 : 130

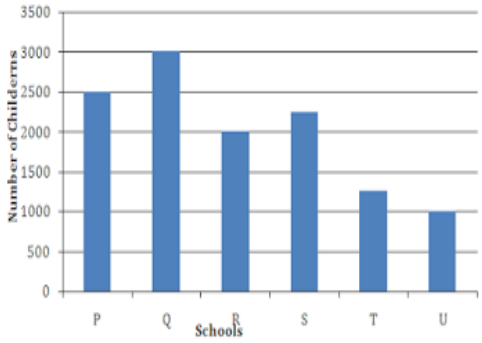
Q102. If 35% of the mobile phones sold by Company A during November were sold at a discount, how many mobile phones of Company A during that month were sold without a discount?
(a) 882 (b) 1635 (c) 1638 (d) 885

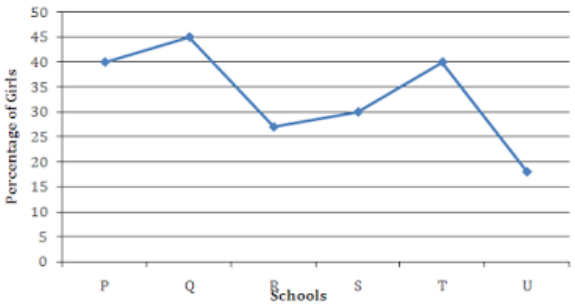
Q103. If the shopkeeper earned a profit of Rs. 433 on each mobile phone sold of Company B during October, what was his total profit earned on the mobile phones of that company during the same month?
(a) Rs. 6,49,900 (b) Rs. 6,45,900 (c) Rs. 6,49,400 (d) Rs. 6,49,500

Q104. The number of mobile phones sold of Company A during July is approximately what percent of the number of mobile phones sold of Company A during December?
(a) 110 (b) 140 (c) 150 (d) 130

Q105. What is the total number of mobile phones sold of Company B during August and September together?
(a) 10000 (b) 15000 (c) 10500 (d) 9500

Directions (Q106 to 110): Study the graphs carefully to answer the questions that follow.
Total number of children in 6 different schools and the percentage of girls in them





Q106. What is the total percentage of boys in schools R and U together? (Rounded off to two digits after decimal)
(a) 78.55 (b) 72.45 (c) 76.28 (d) 75.83

Q107. What is the total number of boys in school T?
(a) 500 (b) 600 (c) 750 (d) 850

Q108. The total number of students in school R, is approximately what per cent of the total number of students in school S?
(a) 89 (b) 75 (c) 78 (d) 82

Q109. What is the average number of boys in schools P and Q together?
(a) 1425 (b) 1575 (c) 1450 (d) 1625

Q110. What is the respective ratio of the number of girls in schools P to the number of girls in school Q?
(a) 27 : 20 (b) 17 : 21 (c) 20 : 27 (d) 21 : 17

CHAPTER 5

DATA SUFFICIENCY

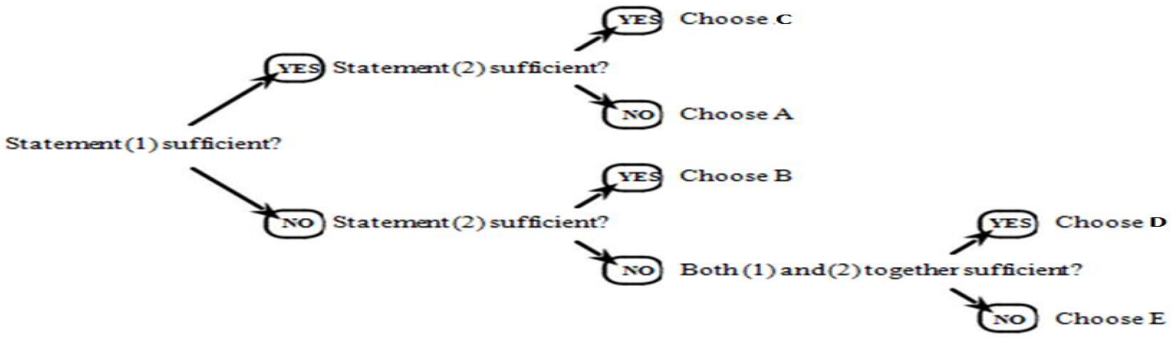
Approach to Questions:

The following is an outline of the core approach that you should use every time you answer a Data Sufficiency question:

1. Read the question carefully and assess all information that is provided (or not provided) in the question stem. Organize this information so that you under-stand exactly what you will need to sufficiently answer the question.
2. Avoid careless assumptions. Do not assume anything that is not explicitly provided in the question stem or the statements that follow.
3. For instance, do not assume that x and y are integers unless it is explicitly given or can be deduced from the question stem or statements. Unless instructed otherwise, assume that fractions, negatives, and zero are all included in the set of potential values.
4. Make a quick judgment on which statement is easier to assess and start with that one.
5. The order in which statements are analyzed does not matter.
6. By starting with the easier statement, you simplify the decision tree and leverage easier information first.
7. To internalize the answer choices and have a system to attack them, you should use a system.

For every question, ask yourself the following questions (if starting with statement (1)):
Is the information in statement (1) alone enough to answer the question?
Is the information in statement (2) alone enough to answer the question?
Can I answer the question if I combine the information from statements (1) and (2)?
(Only ask this of yourself if neither statement alone was enough to answer the question.)

Data Sufficiency Decision Tree:-
Assess each statement to determine whether it is sufficient or not, and this tree will lead you to the correct answer:



Practice Exercise

Directions (Q1 to Q27): Each problem consists of a question and two statements, labeled (I) and (II), in which certain data are given. You have to decide whether the data given in the statements are sufficient for answering the question. Mark,

A. If statement (i) ALONE is sufficient, but statement (ii) alone is not sufficient to answer the question asked.

B. If statement (ii) ALONE is sufficient, but statement (i) alone is not sufficient to answer the question asked.

C. If EACH statement ALONE is sufficient to answer the questions asked.

D. If BOTH statements (i) and (ii) TOGETHER are sufficient to answer the question asked, but NEITHER statement ALONE is sufficient

E. If statements (i) and (ii) TOGETHER are NOT sufficient to answer the question asked and additional data specific to the problem are needed.

Q1. Five persons are to be seated in a round table conference, who will be seated between Ram and Gita?
I. Ram will sit on the right of Vinay and on the left of Kamal.
II. There will be two persons seated between Vinay and Kamal.

Q2. When is the next bus scheduled for Mumbai from Delhi?
I. In Every 30 minutes a bus is scheduled for Mumbai from Delhi. The return bus leaves Mumbai from Delhi every 45 minutes.

II. It is 4.45pm now .15 minutes ago one bus has left for Mumbai as per the schedule whereas the bus from Mumbai has arrived about 30minutes ago.

Q3. Among four friends P,Q,R and S, who has scored the highest runs in the cricket match?
I. P took more wickets than S but scored less runs than R.
II. Q scored more runs than P but took less wickets than S and R.

Q4. Among five friends P,Q,R,S and T, who ranks 3rd in terms of salary obtained by them?
I. T's salary is more than P and Q but not more than S. II. R's salary is the lowest among them.

5. How long does it take to reach city Y from city X?
I. Sangeeta was scheduled to leave the city X at 17.15 hours but got late by 45minutes and reached city Y at 16.15 hours the next day.
II. Sangeeta reached the bus stand of city X at 14.25 hours and got the bus after waiting for 35 minutes. She reached city Y at 3.15 hours the next day.

Q6. Among P, K, D and R, who is the son of M?
I. P and K are sisters II. D is the mother of K and wife of M.

Q7. Who among N, F, P, J and D is youngest?
I. P and J are younger than N and D. II. F is younger than N, D and P but older than J.

Q8. Who among T, R and S is (are) to the East of P?
I. R, who is to the West of P, is not as near to S as P, S is in the farthest East.
II. P is not as far away from S and T

Q9. What is K's rank from the bottom in a class of thirty students?
I.M's position is 3rd from the top and there are five students between M and K.
II. P's position is 4th from the bottom and there are 7th students between P and K.

Q10. Who is to the immediate right of Mohan when Mohan, Salil, Bhusan, Suresh and Jayesh are sitting around a circle facing at the centre?
I. Salil is 3rd to the left of Mohan. II. Bhusan is between Salil and Jayesh.

Q11. What is the rate of interest p.a on an amount of Rs. 12000 deposited in a bank?
I. The difference between the simple interest and the compound interest is Rs 172.8.
II. The simple interest for two years is Rs. 2880.

Q12. What is the profit earned by selling the laptop for Rs 26,250?
I. The cost price of five such laptops is equal to selling price of 4 such laptops.
II. 25% of the profit is earned by selling each laptop.

Q13. How many women can complete a piece of work in 15 days?
I. If 12 women can complete the same piece of work in 20 days.
II. If 10 men can complete the same piece of work in 12 days.

Q14. What is the three digit number?

I. The three digit number is an exact multiple of 13. II. The first and the third digit are 7.

Q15. What is the age of C in a group of A, B, C, D and E whose average is 45 years?
I. Average of the ages of A and B is 53. II. Average of the ages of D and E is 47.

Q16. In a library 10% of the books are added every year, what was the number of books that the library had in 1994?
I. During 1996, 10,000 books were added. II. During 1995, the library had 1,00,000 books

Q17. What is the difference in the ages of P and K?
I. P is 20 years older than M II. M is 2 years younger than Z

Q18. D is the sister of C. how is D related to A?
I. A is the sister of B II. B is the brother of C

Q19. A, B,C,D and E are sitting in a row. What is the position of B from the left end?
I. A is sitting at one end second right of D who is the immediate neighbour of C and B
II. E is to the left of B

Q20. How INDIA will be coded?
I. If ALIVE is coded as LAIEV II. If JAPAN is coded as AJPNA

Q21. What will come in place of c in the series a,b,c,d,e?
I. a,b,c,d,e are five consecutive even numbers
II. common difference between two consecutive numbers is 2 and a is the second smallest natural number

Q22. Who among A,B,C,D and E is the smallest?
I. B is taller than E and D is taller than A but smaller than E.
II. D is not the tallest and C is not the smallest

Q23. X borrowed Rs. 1000 from Y on SI. What is the rate per annum?
I. After 4yrs, X paid Rs. 100 as interest. II. After 4yrs, X paid Rs. 1100 to settle the loan.

Q24. What is the total salary of Mr. X and his wife at present?
I. Salary of X and his wife together is 20% more than what they earned last month.
II. Last month salary of X was Rs. 600 more than that of his wife.

Q25. A figure is composed of ten 1- inch cubes. What is the weight?
I. The cubes are arranged in five rows to two each. II. The cubes have an average weight of 1 ounce each.

Q26. What is the value of x?
I. $x^2 = 64$ II. $x^3 = 512$

Q27. Is x odd?
I. $3x - 12 = 12$ II. $2x + 16 = 24$

Directions (Q28 to Q40): Read all the statements carefully and find which of the statements is/are sufficient to answer the given question. Choose the correct alternative in each question.

Q28. What is Suman's rank from the top in a class of forty students?
I. Suman is 3 ranks below Deepak from the top. II. Deepak's rank from the bottom is 23.
III. Suman is 3 ranks above Deepak from the bottom.
(a) Any two of the three (b) Only I and II (c) Only II and III
(d)All I, II and III (e) Only II and either I or III

Q29. Five persons - A, B, C, D and E are sitting in a row. Who is sitting in the middle?
I. B is between E and C. II. B is to the right of E. III. D is between A and E.
(a) Only I and II (b) Only II and III (c) Only I and III
(d) All I, II and III (e) None of these

Q30. In which year was Sanjay born?
I. Sanjay is six years older than Gopal. II. Gopal's brother was born in 1982.
III. Sanjay's brother is two years younger than Gopal's brother who was eight years younger than Gopal.
(a) Only I and II (b) Only II and III (c) Only I and III
(d) All I, II and III (e) None of these

Q31. Among P, Q, R, S and T, Q is the second tallest and S is immediate taller than the shortest. Who among them is in the middle when they stand in the order of their heights?
I. T is not the shortest. II. R is taller than S but shorter than Q.
III. P ranks third in height above S when all are arranged in the order of height.
(a) Only I and II (b) Either II only or I and III only (c) Only II
(d) Only II and III (e) None of these

Q32. 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 a.m., 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) Either I only or II only (c) Only II
(d) Only II and III (e) Only I and either II or III

Q33. What is the total monthly salary of Vasu?
I. Vasu's basic salary is Rs 100 more than Rajan's salary who also serves in Vasu's company.
II. Other allowances drawn by Rajan besides his basic salary are Rs 2000 per month which is Rs 50 less than Vasu's salary.
III. Rajan's basic salary is Rs 1550 per month,
(a) Only II (b) Only II and III (c) Only I and II
(d) Only I and III (e) All I, II and III

Q34. Who is the tallest among six boys P, T, N, D, Q and R?
I. P is taller than D and N but not-as tall as T. II. R is taller than Q but not as tall as T.
III. Q is not taller than T and R.
(a) Only I and II (b) Only II and III (c) Only I and III

(d) All I, II and III (e) Only I and either II or III

Q35. How is the girl in the photograph related to Kunal?
I. Pointing to the photograph, Kunal said, "She is the mother of my father's only granddaughter".
II. Kunal has no siblings.
III. Pointing to the photograph, Kunal said, "She is the only daughter-in-law of my mother."
(a) Any two of the three (b) Only I and II (c) Only II and III
(d) Either only III or only I and II (e) None of these

Q36. How many sons does X have?
I. Q and U are brothers of T. II. R is sister of P and U. III. R and T are daughters of X.
(a) Only I and II (b) Only II and III (c) All I, II and HI
(d) I, II and III together are not sufficient (e) None of these

Q37. What is the time taken by Rohit from his house to school?
I. If he walks 20% faster than his usual speed then he reaches 20 seconds earlier than usual time.
II. If he walks at 66.67% of his usual speed, he takes 60 seconds more to reach the school.
III. If he walks half of his usual speed, he takes 120 seconds more to reach the school.
(a) The data in both the statement I and II together is sufficient to answer the question, while the data in statement III alone is not sufficient to answer the question.
(b) The data in both the statement II and III together is sufficient to answer the question, while the data in statement I alone is not sufficient to answer the question.
(c) All statements I, II and III alone is sufficient to answer the question.
(d) The data in both the statement I and III together is sufficient to answer the question, while the data in statement II alone is not sufficient to answer the question.
(e) The data given in all statements I, II and III are not sufficient to answer the question.

Q38. What is the Weight of the Teacher?
I. There are 24 students in the class.
II. The average weight of students and the professor is 64 Kg.
III. The average weight of the professor and students is 2 Kg more than that of students
(a) The data in statement I and II are sufficient to answer the question, while the data in statement III alone are not sufficient to answer the question.
(b) The data in statement II alone are sufficient to answer the question, while the data in statement I alone are not sufficient to answer the question.
(c) The data in statement I alone or in statement II alone are sufficient to answer the question.
(d) The data in all the statement I, II and III are not sufficient to answer the question.
(e) The data in all the statement I, II and III together are necessary to answer the question.

Q39. Mohan sells mobile phones at profit of 25%. How much total amount he gains in profit?
I. He sells 12 mobiles.
II. He sells mobile at Rs.15000 per unit.
III. He bought a mobile on a 15% discount.
(a) The data in both the statement I and II together is sufficient to answer the question, while the data in statement III alone is not sufficient to answer the question.
(b) The data in both the statement II and III together is sufficient to answer the question, while the data in statement I alone is not sufficient to answer the question.
(c) The data in both the statement I and III together is sufficient to answer the question, while the data in statement II alone is not sufficient to answer the question.

(d) The data given in all statements I, II and III together are necessary to answer the question.
(e) The data given in all statements I, II and III are not sufficient to answer the question.

Q40. A seller makes a profit of 90 rupees after giving a discount of 20% on a cycle. What is the cost price of cycle?
I. Marked price is 2 times of cost price.
II. The profit would have been 20%, if a discount of 40% was given.
(a) The data in statement I alone is sufficient to answer the question, while the data in statement II alone is not sufficient to answer the question.
(b) The data in statement II alone is sufficient to answer the question, while the data in statement I alone is not sufficient to answer the question.
(c) The data in statement I alone or in statement II alone is sufficient to answer the question.
(d) The data in both the statements I and II is not sufficient to answer the question.
(e) The data in both the statements I and II together is necessary to answer the question.