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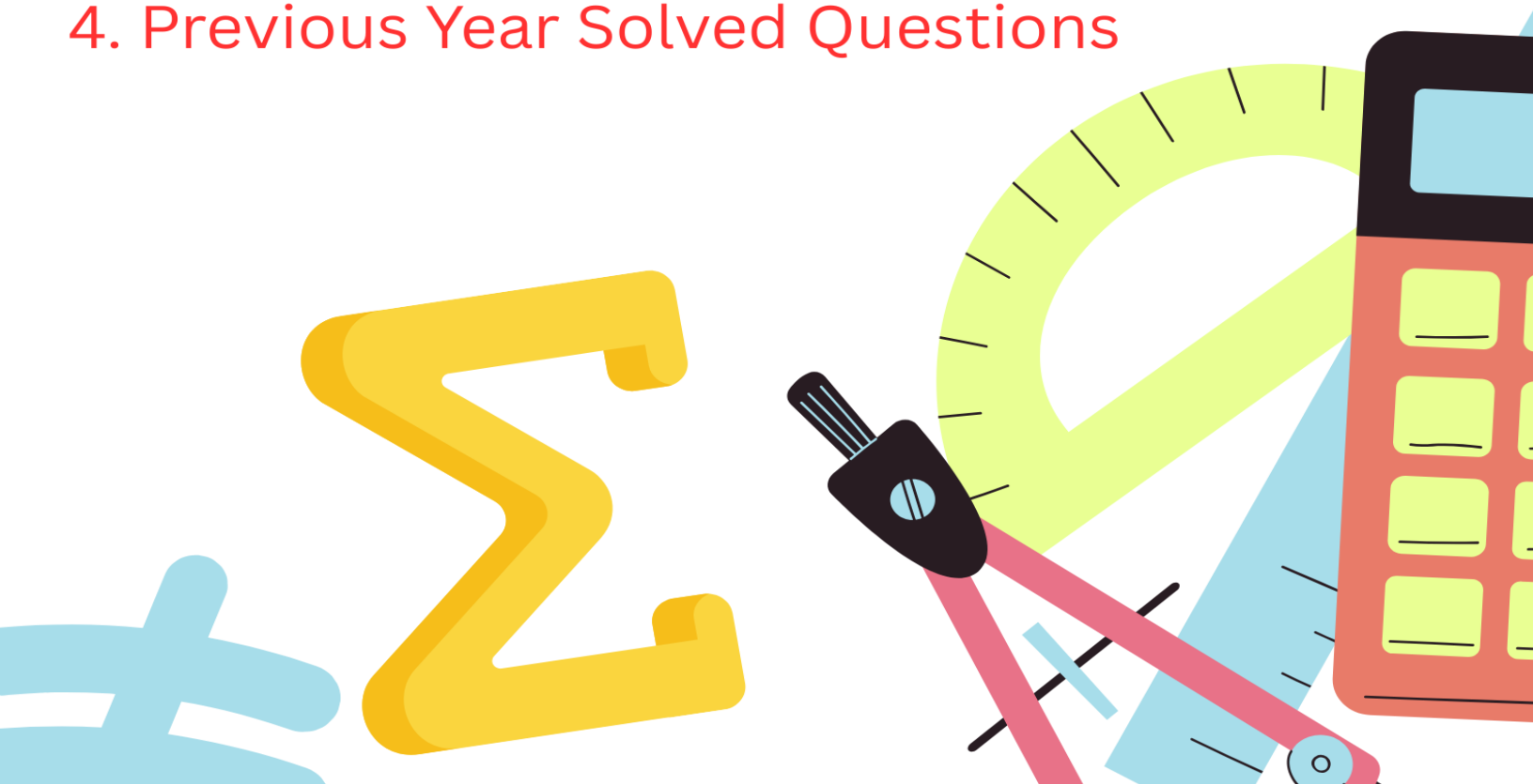

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6. Average

What are Averages?

Averages can be defined as the central value in a set of data. Average can be calculated simply by dividing the sum of all values in a set by the total number of values. In other words, an average value represents the middle value of a data set. The data set can be of anything like age, monety, runs, etc.

Formula

We obtain the average of a number using the formula that is:-
Average = (Sum of observations / Number of observations)

For example average of 1,2,3,4, 5 is 3.
Average can be calculated by sum of all numbers divided by the total number of numbers
Average of 1,2,3,4,5= (1+2+3+4+5)/5 = 15/5 = 3
Which is also the middle number of the series , from here we can also say that in an A.P. i.e arithmetic progression the middle term is the average of the series

The average is also known as arithmetic mean (AM). So average of set of numbers can also be defined as the number by which we can replace each and every number of the set without changing the total of the set of numbers.

For example, the average of 4 numbers 16, 18, 24 and 26 is (16 + 18 + 24 + 26)/4 = 84/ 4 = 21

This means that if each of the 4 numbers of the set were replaced by 15 each, there would be no changes in the total.

This can be visualized as

16 + 5 = 21

18 + 3 = 21

24 – 3 = 21

26 – 5 = 21

Note:

1. The **average** is always calculated for a **set of numbers.**
2. The average always lies above the **lowest number** of the set and below the **highest number** of the set.
3. The net deficit due to the numbers below the average always equals the net surplus due to the members above the average.
4. The average of some numbers is "**A"** , Now all numbers are multiplied by **"N"** then its new average equal to **(A x N)**
5. The average of some numbers is **"A" ,** Now all numbers are divided by **"N"** then its new average equal to **A / N**
6. If average of some numbers is **"A"** and **"N"** is added in each numbers, then new average is **(A + N).**
7. If average of some numbers is **" A"** and **"N"** is subtracted in each number, then new average is **(A -N).**

Average formula – 1 (Weighted Average)

When we have two or more groups whose individual averages are known, then to find the combined average of all elements of all the groups we use **weighted average.**

If we have " **n"** groups with averages **A_1,A_2, A_3, A_4 ..... An** and having **X_1, X_2, X_3, X_4, ... X_n** elements then the weighted average is given by the formula.

Example-1 : A school has only 3 classes that contain 20, 30 and 10 students respectively. The pass percentage

of these classes are 80%, 70% & 60% respectively then find the pass percentage of the entire school?

Solution: From the above formula

The pass percentage of the entire school $= \frac{(20\times80)+(30\times70)+(10\times60)}{20+30+10}$

= 4300/60 = 71.67%

Average formula – 2 (Average age /weight)

The **"N** " persons average (Age/weight) is "**A"**, If a person is included in this group, then its new average is " **M"** included persons age/weight **" P"**

The Age of included person = No. of persons in group × (Increase in average) + New average

i. e P = N x (M – A) + M

The "**N** " persons average (Age/weight) is **"A",** If a person is excluded in this group, then its new average is " **M"**excluded persons age/weight " **P"**

The Age of excluded person = No. of persons in group × (Decreased in average) + New average

i. e P = N x (A -M) + M

Example – 2 : The average age of 30 students is 10 years. If the teacher's age is included, the average age becomes 11 years. What is the teacher's age?

Solution: By straight method to solve this sum

Total age of 30 students = 30 × 10 = 300 years.
Average age of 30 students and one teacher = 11 years
Total of their ages (including the teacher)= 31 × 11 = 341 years
Teacher's age = 341 – 300 = **41 years**

Now by using formula

Teacher's age = 30 (11 -10) + 11 = 30 + 11 = **41 years**

Example – 3: The average weight of 25 students is 30 kgs. If one student excluded, the average remaining students weight becomes 29 kgs. What is the weight of excluded student?

Solution: By straight method to solve this sum

Total weight of 25 students = 25 x 30 = 750 kgs
Average weight of students with out one student = 29 kgs
Total of their weihjt (excluding the student)= 24 x 29 = 696 kgs
Weight of the excluded student = 750 – 696 = **54 kgs**

Now by using formula

Weight of the excluded student = 25 (30 – 29) + 29 = 25 + 29 **= 54 years.**

Average formula – 3 Average age /weight)

When two or more than two persons included in a the group, then average weight of included person is

In the same way we can calculate in case of members excluded the group.

Example – 4: Average age of 20 students is 15 years. After including four new students their average age becomes 16 years, then find the average age of four new students.

Solution: According to above formula

Average age of four new students = [(20 x 1) + (16 x 4)] / 4

= [20 + 64] /4 = 84 / 4 = 21 years.

Average formula – 4: (Average Speed)

$$Average\ Speed = \frac{Total\ distance\ traveled}{Total\ time\ taken}$$

Same distance at two different speeds –

If a person travels two equal distances at a speed of **"a"** km/hr and **"b"** km/hr, then average speed **" A "** km/hr

$$A = \frac{2ab}{a+b}$$

Same distance at three different speeds –

If a person travels three equal distances at a speed of **"a"** km/hr, **"b"** km/hr & **"c"** km/hr, then average speed **" A "** km/hr

$$A = \frac{3abc}{ab+bc+ca}$$

Example – 5 : A student travels to reach a school at a speed of 10 km/hr and returns at the rate of 12 km/hr. What is the average speed of the student?

Solution: According to above formula

Average speed of the student = 2 x 10 x 12 / (10+12)

= 240 / 22 = 10.91 km/hr.

Example – 6 : If a person travels three equal distances at a speed of "15" km/hr, "20" km/hr & "10" km/hr, then find average speed of that person.

Solution: According to above formula

Average speed of the person $= \frac{3 \times 15 \times 20 \times 10}{15 \times 20 + 20 \times 10 + 10 \times 15}$

= (180/13) km/hr

Example – 7: With an average speed of 50 km/hr, a train reaches its destination in time. If it goes with an average speed of 45 km/hr, it is late by 10 minutes. What is the total distance?

Solution: Let take **" x "** km be the total distance

$$Average\ Speed = \frac{Total\ distance\ traveled}{Total\ time\ taken}$$

Total time taken to reach the destination in right time = (x / 50) hours

Time taken while travel at 45 km/hr speed = (x / 45) hours

The difference between both traveling time = 10 minutes = (10/ 60) hours

i.e $\frac{x}{45} - \frac{x}{50} = \frac{10}{60}$

Now simplifying the above equation, we will get x = 75

Total distance = **75 km.**

Example – 8: A person covers half his journey by train at 60 kmph, the remainder half by bus at 30 kmph and the rest by motor vehicle at 20 kmph. Find his average speed during the entire journey.

Solution: Here journey by bus and that by motor vehicle are equal distance.

Now we can find the average speed of half of the journey by using formula $A = \frac{2ab}{a+b}$

= 2 x 30 x 20 / (30+ 20)

= 1200 / 50 = 24 kmph.

Now half his journey by train at 60 kmph and remaining journey average speed is 24 kmph

The average speed of total journey = 2 x 60 x 24 / (60+24) = **(240/7) kmph.**

Formulas on Average of numbers:

1. Average of first " n" natural numbers = $\frac{n+1}{2}$

2. Average of first " n" even numbers = (n + 1)

3. Average of first " n " odd numbers = n

4. Average of consecutive numbers = $\frac{First\ number + Last\ number}{2}$

5. Average of 1 to "n" odd numbers = $\frac{Last\ odd\ number + 1}{2}$

6. Average of 1 to "n" even numbers = $\frac{Last\ even\ number + 2}{2}$

7. Average of sum of square of first " n" natural numbers = $\frac{(n+1)(2n+1)}{6}$

8. Average of sum of square of first "n" even numbers = $\frac{2(n+1)(2n+1)}{3}$

9. Average of sum of square of first "n" odd numbers = $\frac{4n^2-1}{3}$

10. Average of cubes of first " n" natural numbers = $\frac{n(n+1)^2}{4}$

11. Average of cubes of first "n" even natural numbers = $2n\ (n+1)^2$

12. Average of cubes of first "n" odd natural numbers = $n\ (2n^2 - 1)$

13. Average of first "n "multiple of " m" = $\frac{m(n+1)}{2}$

14. If average of "n_1" observations is "A_1", and average of "n_2" observations is "A_2", then

Average of (n_1 – n_2) observations is $\frac{n_1A_1 - n_2A_2}{n_1 - n_2}$

Examples on Average of numbers:

Example -1: Find average of first 20 natural numbers

Solution: Here n = 20 then according to above formula (20+1)/2 = 10.5

Example – 2: Find average of 2, 4 , 6 , …… 60 even numbers

Solution: Here using two types of formulas

If we count even numbers in given sum then n = 30 and its average (30 +1) = 31

If we take last even numbers i.e n = 60 then average is (60 +2) / 2 = 31

Example – 3: Find average of the series of 51, 53, 55, ……99

Solution: Here we know it is series of odd numbers from 51 to 99, then

First find Average of 1 to "99" odd numbers = (99 + 1)/ 2 = 50

First find Average of 1 to "49" odd numbers = (49 + 1) / 2 = 25

Now average of numbers from 51, 53, 55, ……99 = 50 + 25 = 75.

Example – 4: Find average of the series of 31, 33, 35, ……99

Solution: Here we know it is series of odd numbers from 31 to 99, then

First find Average first 50 odd numbers (i.e 1 to 99) = 50

First find Average first 15 odd numbers (i.e 1 to 29) = 15

Now average of numbers from 31, 33, 35 ……. 99 = 50 + 15 = 65.

Example – 5: Find the average of series 1^2 , 2^2 , 3^2, …… 30^2

Solution: Here we know it is series first 30 natural number. So according to above formula

= (30+1) (2×30 +1) /6

= 31 x 61 / 6 = 1891 /6 = 315.17

Example – 6: Find the average of series of numbers 1^2 , 3^2 , 5^2, …… 99^2

Solution: Here we find it is series of squares of odd numbers from 1 to 99

Average of sum of square of first "50" odd numbers (i.e 1^2 , 3^2 , 5^2, ... 99^2)

=(4 x 50x 50 – 1) / 3 = 9999/3 = 3333

Example – 7: Find the average of series of numbers 8, 64, 216, ... 27000

Solution: Here we find it is series of cubes of even numbers from 2 to 30

Average of sum of cubes of first "15" even numbers (i.e 2^3 , 4^3 , 6^3, ... 30^3) $2n (n +1)^2$

= 2 x 15 x 16 x 16

= 30 x 256 = 7680

Example – 8: Find the average of series of numbers 9, 18, 27, 36,..... 108.

Solution: Here we identifying, it is series of "12" multiples for 9 (108/9 = 12)

According to above formula n = 12 and m = 9

= 9 x (12+1) / 2 = 9 x 13 /2 = 58.5

Example – 9: First 50 natural numbers average

Solution: Here using above formula n = 50

= 50+1 / 2 = 25.5

Average Speed formulas:

1. If distance "P" is covered with speed " X", distance "Q" is covered with speed " Y", "R" is covered with speed " Z", then for whole journey

Average speed = $\frac{P+Q+R}{\frac{P}{X}+\frac{Q}{Y}+\frac{R}{Z}}$

2. If a person covers "P" part of his total distance with speed of "X" , Q parts of total distance with speed of "Y and "R" parts of total distance with speed of "Z" then

Average speed = $\frac{1}{\frac{P}{X}+\frac{Q}{Y}+\frac{R}{Z}}$

Practice sums on average chapter:

Example – 1 : The average of 52 numbers is 45. if two numbers, namely, 55 & 45 are discarded from the set of number, then find average of the remaining numbers.

Solution: The sum of remaining 50 number (i. e 52 – 2)

52 x 45 – 45 – 55 = 2340 – 100 = 2240

The average of remaining numbers = 2240 / 50 = 44.8

Example – 2 : Find the average of the first 97 natural numbers.

Solution: Average of first " n" natural numbers = $\frac{n+1}{2}$

According the formula (97 + 1) / 2 = 49

Example – 3 : Fina the average of first ten whole numbers.

Solution: Average of first " n" whole numbers = $\frac{n-1}{2}$

According to above formula = (10- 1) / 2 = 4.5.

Example – 4: Fins the average of first 10 multiples of 12.

Solution: Average of first "n "multiple of " m" = $\frac{m(n+1)}{2}$

12 (10+1) / 2 = 6 x 11 = 66.

Example – 5 : The average of 5 consecutive numbers is 18. Then find height of these numbers.

Solution: Here the number would from an Arithmetic Progression(AP) with common difference" **1"** and the middle term (3rd term) as 18.

Thus, the number would be 16, 17, 18, 19 & 20.

The highest of these numbers would be 20.

Example- 6: The average of ten numbers is 15. If each number is multiplied by 12, then find the average of the new set of numbers.

Solution: When we multiply each number by " X ", the average would also get multiplied by "X".

Hence the average of new set of numbers = 15 x 12 = 180.

Example – 7: In a certain school, there are 60 boys of age 12 each, 40 of age 13 each, 50 of age 14 each and 50 of age 15 each. Find the average age (in years) of the students of the school.

Solution: Here using *Weighted Average formula*

$$= \frac{60\times12+40\times13+50\times14+50\times15}{60+40+50+50}$$

$$= \frac{720+520+700+750}{200}$$

= 2690 / 200 = 13.45

Example – 8: The average of 25 innings of a batsman is 40 and another 30 innings is 50. What is the average of all the innings?

Solution: Here using Weighted Average formula

= [(25 x 40) + (30 x 50)] / (25 + 30)

= (1000 + 1500) / 55 = 2500 / 55 = 45.45

Example – 9: The average of a batsman after 25 innings was 62 runs per innings. If after the 26th inning his average increased by 1 run, then what was his score in the 26th inning?

Solution: By normal practice

Runs in 26th inning = Runs total after 26 innings – Runs total after 25 innings

= [26 x (62+1)] – [25 x 62]

= 26 x 63 – 25 x 62

= 1638 – 1550 = 88

Shortcut method: Runs scored in 26th inning = new average + [Old innings x Change in average]

= 63 + (25 x 1) = 63 +25 = 88

Example – 10: The average marks of a group of 20 students on a test is reduced by 4 when the topper who scored 90 marks is replaced by a new student. how many marks did the new student have?

Solution: Take initial average of group of 20 students is " A"

Then total marks = 20 x A

Now new average is (A – 4) and new total marks = 20 x (A – 20)

= (20 x A)- 80

So decrease in total marks is 80

The new student marks = 90 – 80 = 10.

Example – 11 : The average of marks obtained by 77 candidates in a certain examination is 17. If the average marks of failed candidates is 8 and passed candidates is 19 then find the number of passed candidates in examination?

Solution: Take number of candidates passed in examination = n , then

Number of candidates failed in examination = 77 – n

Now the equation can be written as

77 x 17 =[(n x 19) + (77 -n) x 8]

11 x n = 77 x 9

n = 7 x 9 = 63.

Example – 12: A batsman his 20th innings, missed a century by 5 runs and there by increased his average by 4. what is his average after 20 innings.

Solution: Take average upto 19th innings is "A"

According to given information 19A + 95 = 20 (A + 4)

So A = 15

Now average runs after 20th innings = 15 + 4 = 19

Example – 13 : The average age of the three boys is 15 years. Their ages are in the ratio 3:5:7. Then find the age of the oldest boy.

Solution: Take oldest boy age = x

Sum of three boys age = 15 x 3 = 45

$$\frac{3x}{7}+\frac{5x}{7}+x=45$$

$$\frac{15x}{7}=45$$

x = 21

Age of the oldest boy = 21 years.

Example – 14 : The average age of a group of men in increased by 5 years when a person aged 18 years is replaced by a new person of aged 38 years. How many men are there in the group?

Solution: Here A person aged 18 years is replaced by new person of age 38 years.

The difference in age = 38 – 18 = 20.

Now the new average increased by 5 years.

So number of persons in that group = 20/5 = 4 persons.

Example – 15: The average of 71 results is 48. If the average of the first 59 results is 46 and that of the last 11 results is 52. Find the 60th result.

Solution: Take the 60th value = x, then the equation can be written as

71 x 48 = (59 x 46) + (11 x 52) + x

3408 = 2714 + 572 + x

x = 3408- 2714 – 572 = 122.

Example – 16 : The average temperature on Monday, Tuesday and Wednesday was 41 °C and on Tuesday, Wednesday and Thursday it was 40 °C. If on Thursday it was exactly 39 °C , then find temperature on Monday.

Solution:

The average temperature of M , Tu , W = 41 °C

The average temperature of Tu, W, Th= 40 and Th = 39 °C

M + Tu + W = 41 x 3 ——— I

Tu + W + Th = 40 x 3 ———— II

Th = 39 °C ————— III

From II & III W + Tu = 120 – 39 = 81 ———- IV

From I & IV M = 123 – 81 = 42

Temperature on Monday = 42 °C

Example – 17 : The average salary of the entire staff in a office is 250 per day. The average salary of officers 750 and that of non- officers is 200. If the number of officers is 15, then find the number of non-officers in the office.

Solution: Take number of non-officers = N, then we write the equation

(15 +N) x 250 = (15 x 750) + (N x 200)

50 x N = 11250 – 3750 = 7500

N = 150.

So numbers of non-officers = 150

Example – 18: They are equal number of groups and average age of "A "group and " B" group is 20 years. If "C" group were to replace" "A group, average would be 19 and if "C" group were to replace "B" group, the average would be 21. What are the ages of groups A, B and C respectively?

Solution:

The Average age of "A" group and "B" group (A+B) = 20 x 2 = 40

The Average age of "C" group and "B" group (B +C) = 19 x 2 = 38

The Average age of "A" group and "B" group (A + C) = 21 x 2 = 42

(A + B) +(B +C) +(A+C) = 40 + 38+ 42

2 (A + B + C) = 120

A + B + C = 60

A's Group average age = 60 – 38 = 22 years [i.e (A +B +C) – (B+C)]

B's Group average age = 60 – 42= 18 years [i.e (A +B +C) – (A+C)]

C's Group average age = 60 – 40 = 20 years [i.e (A +B +C) – (A+B)]

Example – 19: The average of 8 readings is 24.2, out of which the average of first two is 18.5 and that of next three is 21.1. If the sixth reading is 5 less than seventh and 7 less than eighth, what is the sixth reading?

Solution: Here take sixth number = x , then

Seventh reading = x + 5 and 8th reading = x +7

Average of 8 readings is 24.2

Sum of 8 readings = 24.2 x 8 = 193.6

Sum of first five numbers = (18.5 x 2) + (21.1 x 3) = 37 + 63.6 = 100.3

Now the sum of 6th, 7th & 8th = 193.6 – 100.3 = 93.3

So (x + x + 5 + x + 7) = 93.3

3x = 93.3 – 12 = 81.3

x = 27.1

Example -20: Out of three numbers, the first is twice the second and thrice the third. If their average is 121, find the numbers.

Solution: Here take third number = n then

First number = thrice the third number = 3n

Second number = first is twice the second = 3n / 2

Now average of all three numbers = 121 = $\frac{n+3n+\frac{3n}{2}}{3}$

Now simplefying the above equation

n = 121 x 3 x 2 / 11 = 66

The given numbers are 198 , 99, 66.

Example – 21: The student got average marks of 13 papers is 65. The average of the first 7 papers is 75 and last seven papers is 60. Find the marks obtained in the 7th paper.

Solution: Here consider 7th paper marks is " m" then

we can write the equation

13 x 65 = (7 x 75) + (7 x 60) – m (Since the 7th paper marks added as twice)

m = 525 + 420 – 845 = 100.

7th paper marks = 100

Example – 22: A person divides his total journey distance into three equal parts and then he travel each part of distance travel with the speeds of 20, 15, and 10 km/hr respectively. Find his average speed during the whole journey.

Solution: Here using the formula

$$A = \frac{3abc}{ab+bc+ca}$$

a = 20 km/hr, b = 15 km/hr & c = 10 km/hr

$$= \frac{3\times20\times15\times10}{(20\times15)+(15\times10)+(20\times10)}$$

=180/13 = $13\frac{11}{13}$ km/hr

Example – 23 ; One-fourth of a certain journey is covered at the rate of 25 km/hr, one-third at the rate of 30 km/hr and the rest at 50 km/hr. Find the average speed for the whole journey.

Solution: Here consider the whole journey is one unit

1/4th of journey with the speed 25 km/hr

1/3rd of journey with the speed 30 km/hr

Rest of journey means ($1-\frac{1}{4}-\frac{1}{3}$) = 5 / 12 with the speed 50km/hr.

Now using formula $\frac{1}{\frac{P}{X}+\frac{Q}{Y}+\frac{R}{Z}}$

P =1/4 , Q = 1/3 , R = 5/12 , X = 25 km/hr, Y= 30 km/hr & Z = 50 km/hr

$$= \frac{1}{\frac{1}{4\times25}+\frac{1}{3\times30}+\frac{5}{12\times50}}$$

= 1800/ 53

Example – 24 : A person covers 18 km at 10 km/hr, 16km at 8 km/hr and 30km at 6 km/hr. Then find average speed in covering the whole distance.

Solution: Here using the formula $\frac{P+Q+R}{\frac{P}{X}+\frac{Q}{Y}+\frac{R}{Z}}$

P =18 km , Q = 16 km , R =30 km , X = 10 km/hr, Y= 8 km/hr & Z = 6 km/hr

$$= \frac{18+16+30}{\frac{18}{10}+\frac{16}{8}+\frac{30}{6}}$$

= 80/11

The average speed of the whole distance =

80/11 = $7\frac{3}{11}$ km/hr.

Rule 1: In the Arithmetic Progression there are two cases when the number of terms is odd and second one is when number of terms is even.

So when the number of terms is odd the average will be the middle term.
And when the number of terms is even then the average will be the average of two middle terms.

Examples 1: what will be the average of 13, 14, 15, 16, 17?
Solution: Average is the middle term when the number of terms is odd, but before that let's checks whether it is in A.P or not, since the common difference is same so the series is in A.P.

So the middle term is 15 which is our average of the series.

Let's check it in another way.
In the first statement of the article we have written that the average of a set of terms is equal to:
Sum of all terms / Number of terms
So the sum of all terms in this case is 75 and the number of terms is 5 so the average is 15.

Now come to the second form when the number of terms are even

Example 2: What will be the average of 13, 14, 15, 16, 17, 18?

Solution: We have discussed that when the number of terms are even then the average will be the average of two middle terms.

Now the two middle terms are 15 and 16, but before that the average we must check that the series should be A.P. Since the common difference is same for each of the term we can say that the series is in A.P.
And the average is (16+15)/2 = 15.5

Rule 2: The average of the series which is in A.P. can be calculated by ½(first + last term)

Example 1: What will be the average of 216, 217 , 218?
Solution: So the answer would be = ½ (216 + 218) = 217
(Which is also the middle term of the series)

Example 2:
What will be the average of first 10 natural numbers?
Solution: The first 10 natural numbers are
1,2,3,4,5,6,7,8,9,10
So the average will be ½ (1 + 10) = ½ (11) = 5.5

Rule 3: If the average of n numbers is A and if we add x to each term then the new average will be = (A+ x).

For example: The average of 5 numbers is18. If 4 is added to each of the number then the average would be equal to __?
Solution: Old average = 18
New average will be = 4 + old average = 22
This is because each term is increased by 4 so the average would also be increased by 4 so the new average will be 22

Rule 4: If the average of n numbers is A and if we multiply p with each term then the new average will be = (A x p).

For Example: The average of 5 numbers is 18. If 4 is multiplied to each of the number then the average would be equal to __?
Solution: Old average = 18
New average will be = 4 x 18= 72

There are two more operation which can also be applied on the same principle as the above, i.e. subtraction and division.

Rule 5 : In some cases, if a number is included in the series of numbers then the average will change and the value of the newly added term will be = Given average + (number of new terms x increase in average).

This value will also same as the New average + (number of previous terms x increase in average) .

For example: The average age of 12 students is 40. If the age of the teacher also included then the average becomes 44. Then what will be the age of the teacher?

Solution: Average given = 40
Number of students = 12
Therefore the age of the teacher = 40 + (12 + 1) x 4 = 40 + 52 = 92
And this is also calculated as 44 + (12 x 4)= 92
Therefore the average age of the teacher is 92 yrs

Alternatively
The average of 12 = 40 that means the total number of units are 12 x 40 = 480
Now the new average is 44 and the number of terms are 13 so therefore the total number of units are = 44 x 13 = 572
So the included units would be equal to 572 – 480 = 92

Rule 6: In some cases a number is excluded and one more number is added in the series of the number then the average will change by q and the value of the newly added term will be = Replaced Term + (increased in average x number of terms).

For example: The average age of 6 students is increased by 2years when one student whose age was 13 years replaced by a new boy then find the age of the new boy

Solution: The age of the boy will be = Age of the replaced boy +increase in average x number of terms
i.e. the ge of the newly added boy = 13 + 2 x 6 = 25

Rule 7: There are two more cases when the series is divided into two parts and one of the terms is either included or excluded, then the middle term can be calculated by following methods.

Case 1 : When the term is excluded.
Average(total) + number of terms in first part x {average (total) – average (first part)} + number of terms in second part x {average (total) – average (second part)}

Case 2: When the term is included.
Average (total) + number of terms in first part x {average (first part) – average(total) }+ x number of terms in second part x {average (second part) – average (total)}

For Example: The average of 20 numbers is 12 .The averages of the first 12 is 11 and the average of next 7 numbers is 10. The last number will be?
Solution:
Here in this case one number is excluded so the number would be =
Average(total) + number of terms in first part x {average (total) – average (first part)} + number of terms in second part x {average (total) – average (second part)} **i.e. = 12 + 12 x (12-11)+(12-10) x 7 = 38.**

Concepts of Average formulas and tricks

Here we explained different types of concepts along with important formulas. Follow all concepts related to average and practice problems help to score easily without taking much time for any type of question.

Note: 'n' always is the number of observations.

Concepts related to average of natural, even, odd, consecutive numbers.

Concept 1:Average of first 'n' natural numbers = (n+1)/2

Example: Find the average of from 1 to 27 (natural numbers)?

Ans: Total number of natural numbers (n) =27.

Average of 26 natural numbers = $\frac{(n+1)}{2}$

=27+1/2

= 28/2 =14.

Concept 2: Average of first 'n' even numbers = (n+1).

Example: Find the average of 2, 4, 6, 8, 10, 12, 14, 16.

Ans: Total number of given even numbers (n) = 8.

Average of first 8 even numbers = (n+1)=8+1=9.

Concept 3: Average of first 'n' odd numbers = n

Example: Find the average of 1, 3, 5, 7, 9.

Ans: Total number of given odd numbers (n) = 5.

Average of first 5 odd numbers = (n)=5.

Concept 4: Average of consecutive numbers = $\frac{\text{First number + Last number}}{2}$

Note:consecutive numbers means the difference between number after number continuous in series will be **same**.

Example: Find the average of 1, 2, 3, ———21. (The series is consecutive, because of 2-1=3-2=4-3=1)

Ans: Here 1 to 21 are consecutive number. Among these 1 is the first number and 21 is the last number.

According to formula average is = $\frac{1+21}{2}$

=22/2=11.

Concept 5: Average of 1 to n odd numbers = $\frac{\text{Last odd number + 1}}{2}$

Example: Find the average of 1 to 11.

Ans: Here, Last odd number =11

According to formula Average will be = 11+1/2= 12/2= 6.

Concept 6: Average of 1 to n even numbers = $\frac{\text{Last even number + 2}}{2}$

Example: Find the average of 1 to 16.

Ans: Here, Last even number =16

According to formula Average will be = 16+2/2= 18/2= 9.

Concepts related to average of squares, cubes of natural numbers and multiples of any number.

Concept 7: Average of squares of first n natural numbers = $\frac{(n+1)(2n+1)}{6}$

Example: Find the average of squares of 1 to 25.

Ans: Here the n value =25.

According to formula Average will be = (25+1)(2 x 25+1)/6 =(26 x 51)/6

=1326/6

=221.

Concept 8:Average of cubes of first n natural numbers = $n(n+1)^2/4$

Example: Find the average of cubes of 1 to 9.

Ans: Here the n value =9.

According to formula Average will be = $9(9+1)^2/4$

= (100×9)/4

=225.

Concept 9: Average of n multiples of any number = $\frac{\text{Number x (n+1)}}{2}$

Example: Find the average of first 3 multiplies of 5.

Ans: Here the n value =3.

According to formula Average will be = $\frac{5x(3+1)}{2}$

= 20/2

=10.

Concept 10: How to find total average if two or more than two categories and their respective averages given?

If two categories and their respective averages given, then apply the below formula

Assume that 1st Category =n1 and it's average = a1;

And also that 2nd Category =n2 and it's average =a2;

Average of all categories = (n1a1+n2a2)/ (n1+n2)

Note: same process applicable if more than two categories and averages given also. Just add as n3,n4——and a3, a4—— respectively in same formula.

Average of all categories = (n1a1+n2a2+n3a3—)/ (n1+n2+n3+——)

Example: There are 12 boys and 15 girls in a class. If the average age of boys is 12 year and girls is 10 year, then find out average of both girls and boys in class?

Ans: while we applied above formula here, n1= 12 and n2=15 and averages a1=12 and a2=10 respectively.

Average of total girls and boys in class= **(n1a1+n2a2)/ (n1+n2)**

= (12×12)+(15×10)/ (12+10)

= (144+150)/22

= 194/22

=8.81 years.

Concept 11: How to find average of remaining part of total observations?

If the average of total m observations is a and among them the average of n observations is b, then the average of remaining observations in them. Then apply below formula

Average of remaining part of total observations=ma-nb /m-n

Example: The cost of 20 cows is Rs 200000/-. Among them, if the average cost of 12 cows is 12500, then what will be the average cost of remaining cows?

Ans: First we need to find out average cost of 20 cows = Total cost / number of cows

= 200000/20=10000

Here we can assume that m=20, n=12, a= 10000, b= 12500

Average cost of remaining cows (i.e. 20-12=8 cows) =**ma-nb /m-n**

= (20x 10000- 12×12500)/20-12

=200000-150000/8

=50000/8

=Rs 6250/-.

Concept 12: How to find value of observation while change occurred in average by adding observation (or) removing?

Case 1: If average of n observations is a, but while eliminated one observation, then the average changes to b. then the value of eliminated observation = n (a-b)+b.

Example: In a cricket team, the average age of 11 players and the coach is 18 years. If the age of the coach is not considered, then the average decreases by 1 year. Find out the age of the coach?

Answer: We know that

Sum of given observations = Average x Number of given observations,

Total age of 11 players along with coach =12x 18 =216 years,

Total age of 11 players only = 11 x 17 =187 years.

Then age of coach = 216-187= 29 years.

(or)

According to formula

n=11+1=12, initial average (a) = 18 years, changed average (b) = 18-1=17 years.

Age of coach= **n (a-b)+b**

=12(18-17) + 17

=12 (1) + 17

=29 years.

Case 2: If average of n observations is a, but while added one observation, then the average changes to b. then the value of eliminated observation = n (b-a) + b.

Example: The average run scored by a batsman in 20 innings is 32. After 21st innings, the runs average becomes 34. How much runs does the batsman score in his 21st innings?

Answer: We know that

Sum of given observations = Average X Number of given observations,

Total runs scored in 20 innings = 20 x 32 =640.

Runs scored in total 21 innings =21×34 =714.

Net Runs scored in the 21st innings = 714-640 =74

(or)

According to formula = **n (b-a) + b.**

Here n=20; initial average (a)=32; last average (b)=34;

Net Runs scored in the 21st innings = n (b-a) + b.

=20 (34-32)+34

=(20 x 2)+34

=74.

Average formulas and tricks-Average age/ Average weight

Concept 13: If the average (b) increases or decreases, in a set (n) of observations when some observations (a) replaced by new observations, how to find the value of a new observations = a ± n b (+ for increase in average and – for decrease in average)

Case 1: Increase/decrease in average by replacing person then,

Age /weight of new comer = Age/weight of old replaced one ± (number of persons x increase/decrease in average)

(Note: '+' for increase in average and '–' for decrease in average)

Example: The average weight of 3 men is increased by 5 kg, when one of them whose weight is 100kg, is replaced by another one. What is the weight of new one?

Ans: weight of new one = weight of old replaced one + (number of persons x increase in average)

= 100 + (3×5)

=100+15

=115 kg s

Case 2: Increase/decrease in average when a person joined without replacing person then,

Age /weight of new comer =initial average Age/weight ± (total number of persons including new joined one x increase/decrease in average)

(Note: '+' for increase in average and '–' for decrease in average)

Case 3: Increase/decrease in average when a person leaves and nobody joins then,

Age /weight of left person =initial average Age/weight ± (total number of persons after leaving x increase/decrease in average)

(Note: '+' for increase in average and '–' for decrease in average)

Concept 14: How to find the number of passed/ failed candidates, if the average of n students in a class is a, and average of passed students 'x' and average of failed students y, then

Number of students passed = Total students (Total average – Average of failed students)/ Average of passed –Average of failed

Example: In a class, there are 75 students and their average marks in the annual examination is 35. If the average marks of passed students is 55and average marks of failed students is 30, then find out the number of students who passed and failed?

Ans: Number of students passed = Total students (Total average – Average of failed students) /Average of passed –Average of failed

Number of students passed= 75(35-30)/55-30

= 75x 5/25

=15.

Number of students failed =total students – passed students

=75-15=60.

Concept 15: How to find the number of remaining or 2nd part of components, if the average of total components in a group is a, where average of n components 1st part is b and average of remaining components 2nd part is c,

Then apply the below formula

The number of remaining or 2nd part of components = n (a-b)/(c-a)

Example: The average salary of total staff in an office is Rs 200/- per day. The average salary of officers is Rs 550/- and non- officers is Rs 120/-. If the number of officers is 16, then find the numbers of non-officers in the office?

Ans: The number of remaining or 2nd part of components **= n (a-b)/(c-a)**

Assume values of n = 16, a=200, b=550, c=120

= n (a-b)/(c-a)

=16(200-550)/120-200

=16(-350)/-80

=16×35/8

=70.

Average formulas and tricks – Average Speed Calculation

Concept 16:

Average Speed = Total distance travelled/ Total time taken.

Case 1: Find out average speed, if a person covers a certain distance at a speed of x km/h and again covers same distance at a speed of y km/h?

The average speed during the whole journey will be 2xy/x+y.

Example: A person covers a certain distance by car at a speed of 25km/h and comes back at a speed of 40km/h. What is average speed during the whole journey?

Answer: Here Assume X= 25km/h, Y= 40km/h

Average speed =2xy/x+y

=2x25x40/25+40

=30.76km/h.

Case 2: For three equal distances 3xyz/xy+yz+zx

Example: A person covers 3 equal distances by car at a speed of 30km/h, 15km/h and 10km/h. What is average speed during the whole journey?

Answer: Here Assume X= 25km/h, Y= 40km/h

Average speed =3xyz/xy+yz+zx

=3x30x15x10/(30×15)+(15×10)+(10×30)

=15 km/h.

Case 3: If different distance p, q, r kms covered by different speeds respectively x, y, z km/h, then the average speed = P+Q+R+…..
P/x+Q/y+R/z+….

Example: A person covers 3 different 20km, 15km, 10km distances by car at a speed of 5km/h, 3km/h and 2km/h respectively. What is average speed during the whole journey?

Answer: Here Assume P= 20km, Q= 15km, R= 10km and x=5km/h, y= 3km/h, z= 2km/h

Average speed = P+Q+R+…..
P/x+Q/y+R/z+….

= 20+15+10
20/5+15/3+10/2

=45/14 km/h

Case 4: If person covers p part of total distance with speed of x km/h, Q part of total distance with speed of y km/h and R part of total distance with speed of z km/h then average speed

= 1
P/x +Q/y+ R/z+….

Example: A person covers 25% of journey with speed of 10km/h , 45% of journey with speed of 5km/h, and

remaining 30% distance by car at a speed of 15km/h. What is average speed during the whole journey?

Answer: Assume values as

P= 25% =1/4; x=10km/h;

Q=45%=9/20; y=5km/h;

R=30%=30/100; z=15km/h;

Average speed = $\frac{1}{P/x + Q/y + R/z + \ldots}$

= $\frac{1}{1/4\times10 + 9/20\times5 + 3/10\times15}$

= 200/27=7.40km/h

Average Practice SET 1

1. In the first 10 overs of a cricket game, the run rate was only 3.2. What should be the run rate in the remaining 40 overs to reach the target of 282 runs?

a) 6.25

b) 5.5

c) 7.4

d) 5

2. A grocer has a sale of Rs. 6435, Rs. 6927, Rs. 6855, Rs. 7230 and Rs. 6562 for 5 consecutive months. How much sale must he have in the sixth month so that he gets an average sale of Rs. 6500?

a) 4800

b) 4991

c) 5004

d) 5000

3. The average of 20 numbers is zero. Of them, How many of them may be greater than zero, at the most?

a) 1

b) 20

c) 0

d) 19

4. The captain of a cricket team of 11 members is 26 years old and the wicket keeper is 3 years older. If the ages of these two are excluded, the average age of the remaining players is one year less than the average age of the whole team. Find out the average age of the team.

a) 23 years

b) 20 years

c) 24 years

d) 21 years

5. The average monthly income of A and B is Rs. 5050. The average monthly income of B and C is Rs. 6250 and the average monthly income of A and C is Rs. 5200. What is the monthly income of A?

a) A. 2000 \

b) B. 3000

c) C. 4000

d) D. 5000

6. A car owner buys diesel at Rs.7.50, Rs. 8 and Rs. 8.50 per litre for three successive years. What approximately

is the average cost per litre of diesel if he spends Rs. 4000 each year?

a) Rs. 8

b) Rs. 7.98

c) Rs. 6.2

d) Rs. 8.1

7. In Kiran's opinion, his weight is greater than 65 kg but less than 72 kg. His brother does not agree with Kiran and he thinks that Kiran's weight is greater than 60 kg but less than 70 kg. His mother's view is that his weight cannot be greater than 68 kg. If all are them are correct in their estimation, what is the average of different probable weights of Kiran?

a) 70 kg

b) 69 kg

c) 61 kg

d) 67 kg

8. The average weight of 16 boys in a class is 50.25 kg and that of the remaining 8 boys is 45.15 kg. Find the average weights of all the boys in the class.

a) 48.55

b) 42.25

c) 50

d) 51.25

9. A library has an average of 510 visitors on Sundays and 240 on other days. What is the average number of visitors per day in a month of 30 days beginning with a Sunday?

a) 290

b) 304

c) 285

d) 270

10. A student's mark was wrongly entered as 83 instead of 63. Due to that the average marks for the class got increased by $\frac{1}{2}$.What is the number of students in the class?

a) 45

b) 40

c) 35

d) 30

11. A family consists of two grandparents, two parents and three grandchildren. The average age of the grandparents is 67 years, that of the parents is 35 years and that of the grandchildren is 6 years. The average age of the family is

a) $32\frac{2}{7}$ years

b) $31\frac{5}{7}$ years

c) $28\frac{1}{7}$ years

d) $30\frac{5}{7}$ years

12. The average weight of A, B and C is 45 kg. If the average weight of A and B be 40 kg and that of B and C be 43 kg, what is the weight of B?

a) 31 kg

b) $28\frac{1}{2}$ kg

c) 32kg

d) $30\frac{1}{2}$kg

13. If the average marks of three batches of 55, 60 and 45 students respectively is 50, 55, 60, what is the average marks of all the students?

a) 53.23

b) 54.68

c) 51.33

d) 50

14. The average age of husband, wife and their child 3 years ago was 27 years and that of wife and the child 5 years ago was 20 years. What is the present age of the husband?

a) 40

b) 32

c) 28

d) 30

15. The average weight of 8 person's increases by 2.5 kg when a new person comes in place of one of them weighing 65 kg. What is the weight of the new person?

a) 75 Kg

b) 50 Kg

c) 85 Kg

d) 80 Kg

16. There are two divisions A and B of a class, consisting of 36 and 44 students respectively. If the average weight of divisions A is 40 kg and that of division b is 35 kg. What is the average weight of the whole class?

a) 38.25

b) 37.25

c) 38.5

d) 37

17. A batsman makes a score of 87 runs in the 17th inning and thus increases his averages by 3. What is his average after 17th inning?

a) 39

b) 35

c) 42

d) 40.5

18. A student needed to find the arithmetic mean of the numbers 3, 11, 7, 9, 15, 13, 8, 19, 17, 21, 14 and x. He found the mean to be 12. What is the value of x?

a) 12

b) 5

c) 7

d) 9

19. Arun obtained 76, 65, 82, 67 and 85 marks (out in 100) in English, Mathematics, Chemistry, Biology and Physics. What is his average mark?

a) 53

b) 54

c) 72

d) 75

20. Distance between two stations A and B is 778 km. A train covers the journey from A to B at 84 km per hour and returns back to A with a uniform speed of 56km per hour. Find the average speed of the train during the whole journey?

a) 69.0 km /hr

b) 69.2 km /hr

c) 67.2 km /hr

d) 67.0 km /hr

21. The average age of boys in a class is 16 years and that of the girls is 15 years. What is the average age for the whole class?

a) 15

b) 16

c) 15.5

d) Insufficient Data

22. The average age of 36 students in a group is 14 years. When teacher's age is included to it, the average increases by one. Find out the teacher's age in years?

a) 51 years

b) 49 years

c) 53 years

d) 50 years

23. The average of five numbers id 27. If one number is excluded, the average becomes 25. What is the excluded number?

a) 30

b) 40

c) 32.5

d) 35

24. The batting average for 40 innings of a cricket player is 50 runs. His highest score exceeds his lowest score by 172 runs. If these two innings are excluded, the average of the remaining 38 innings is 48 runs. Find out the highest score of the player.

a) 150

b) 174

c) 180

d) 166

25. The average score of a cricketer for ten matches is 38.9 runs. If the average for the first six matches is 42, what is the average for the last four matches?

a) 34.25

b) 36.4

c) 40.2

d) 32.25

26. The average of six numbers is x and the average of three of these is y. If the average of the remaining three is z, then

a) None of these

b) x = y + z

c) 2x = y + z

d) x = 2y + 2z

27. Suresh drives his car to a place 150 km away at an average speed of 50 km/hr and returns at 30 km/hr. What is his average speed for the whole journey ?

a) 32.5 km/hr.

b) 35 km/hr.

c) 37.5 km/hr

d) 40 km/hr

28. The average age of a husband and his wife was 23 years at the time of their marriage. After five years they have a one year old child. What is the average age of the family ?

a) 21 years

b) 20 years

c) 18 years

d) 19 years

29. In an examination, a student's average marks were 63. If he had obtained 20 more marks for his Geography and 2 more marks for his history, his average would have been 65. How many subjects were there in the examination?

a. 12

b. 11

c. 13

d. 14

30. The average salary of all the workers in a workshop is Rs.8000. The average salary of 7 technicians is Rs.12000 and the average salary of the rest is Rs.6000. How many workers are there in the workshop?

a. 21

b. 22

c. 23

d. 24

Solutions SET 1

Q1. Option A

Runs scored in the first 10 overs = 10 × 3.2 = 32

Total runs = 282

Remaining runs to be scored = 282 - 32 = 250

Remaining overs = 40

Run Rate needed = $\frac{250}{40} = 6.25$

Q2. Option B

Let the sale in the month = x

Then $\frac{6435+6927+6855+7230+6562+x}{6} = 6500$

$$6435 + 6927 + 6855 + 7230 + 6562 + x = 6 \times 6500$$

$$34009 + x = 39000$$

$$x = 39000 - 34009 = 4991$$

Q3. Option D

Average of 20 numbers = 0

$$\frac{Sum\ of\ 20\ numbers}{20} = 0$$

Sum of 20 numbers = 0

Hence at most there can be 19 positive numbers

Q4. Option A

Number of members in the team = 11

Let the average age of the team = x

$$\frac{Sum\ of\ ages\ of\ all\ 11\ members}{11} = x$$

$$Sum\ of\ the\ ages\ of\ all\ 11\ members = 11x$$

Ages of the captain = 26

age of the wicket keeper = 26+3=29

Sum of the ages of 9 members od the team excluding captain and wicket keeper

$= 11x - 26 - 29 = 11x - 55$

Average age of 9 members of the team excluding captain and wicket keeper

$$= \frac{11x - 55}{9}$$

$Given\ that$

$$\frac{11x - 55}{9} = (x - 1)$$

$$11x - 55 = 9(x - 1)$$

$$11x - 55 = 9x - 9$$

$$2x = 46$$

$$x = \frac{46}{2} = 23 years$$

Q5. Option C

Let monthly income of A = a

monthly income of B = b

monthly income of C = c

$$a + b = 2 \times 5050 \quad - x$$

$$b + c = 2 \times 6250 \quad - y$$

$$a + c = 2 \times 5200 \quad - z$$

$$x + y - z$$

$$a + b + a + c - (b + c)$$

$$= (2 \times 5050) + (2 \times 5200) - (2 \times 6250)$$

$$2a = 2(5050 + 5200 - 6250)$$

$$a = 4000$$

Q6. Option B

Total Cost = 4000×3

Total Diesel used = $\frac{4000}{7.5} + \frac{4000}{8} + \frac{4000}{8.5}$

Averag cost per litre of diesel

$$= \frac{4000 \times 3}{\frac{4000}{7.5} + \frac{4000}{8} + \frac{4000}{8.5}}$$

$$= \frac{3}{\frac{1}{7.5} + \frac{1}{8} + \frac{1}{8.5}}$$

It is important how you proceed from this stage. Remember time is very important and if we solve this in the normal method, it may take lot of time. Instead, we can find out the approximate value easily and select the right answer from the given choices.

In this case, answer

$$= \frac{3}{\frac{1}{7.5}+\frac{1}{8}+\frac{1}{8.5}}$$
$$\approx \frac{3}{\frac{1}{8}+\frac{1}{8}+\frac{1}{8}} \approx \frac{3}{\frac{3}{8}} \approx 8$$

We got that answer as approximately equal to 8. From the given choices, the answer can be 8 or 7.98 or 8.1 . But which one from these?

It is easy to figure out. We approximated the denominator, $\left(\frac{1}{7.5}+\frac{1}{8}+\frac{1}{8.5}\right)$ $to \frac{3}{8}$

$However$

$$\frac{1}{7.5}+\frac{1}{8.5}$$
$$= \frac{1}{8-0.5}+\frac{1}{8+0.5}$$
$$= \frac{8+0.5+8-0.5}{(8-0.5)(8+0.5)}$$
$$= \frac{16}{8^2-0.5^2}$$
$$= \frac{64}{64-0.25}$$

i.e $\frac{1}{7.5}+\frac{1}{8.5} = \frac{16}{64-0.25}$

$We\ know\ that \frac{1}{8}+\frac{1}{8} = \frac{1}{4} = \frac{16}{64}$

$i.e \frac{1}{7.5}+\frac{1}{8.5} > \frac{1}{8}+\frac{1}{8}$

Early we had approximated the denominator to $\frac{3}{8}$. However, from the above mentioned equations, now we know that actual denominator is slightly greater than $\frac{3}{8}$. It means answer is slightly lesser than 8. Hence we can pick the choice 7.98 as the answer

Q7. Option D
Let Kiran's weight = x. Then

According to Kiran, 65 < x < 72 ----(equation 1)

According to brother, 60 < x < 70 ----(equation 2)

According to mother, x ≤ 68 ----(equation 3)

Given that equation 1,equation 2 and equation 3 are correct. By combining these equations,we can write as

65<x≤6865<x≤68

i.e., x = 66 or 67 or 68

Average of different probable weights of Kiran
$= \frac{66+67+68}{3} = 67$

Q8. Option A

Average weight of 16 boys = 50.25
Total weight of 16 boys = 50.25 × 16

Average weight of remaining 8 boys = 45.15
Total weight of remaining 8 boys = 45.15 × 8

Total weight of all boys in the class = (50.25 × 16)+ (45.15 × 8)
Total boys = 16 + 8 = 24

Average weight of all the boys = $\frac{(50.25\times16)+(45.15\times8)}{24}$
$$= \frac{(50.25 \times 2)+(45.15 \times 1)}{3}$$
$$= 16.75 \times 2 + 15.05$$
$$= 33.5 + 15.05$$
$$= 48.55$$

Q9 Option C
In a month of 30 days beginning with a Sunday, there will be 4 complete weeks and another two days which will be Sunday and Monday.

Hence there will be 5 Sundays and 25 other days in a month of 30 days beginning with a Sunday

Average visitors on Sundays = 510
Total visitors of 5 Sundays = 510 × 5

Average visitors on other days = 240
Total visitors of other 25 days = 240 × 25

Total visitors = (510 × 5) + (240 × 25)
Total days = 30
Average number of visitors per day

$= \frac{(510 \times 5) + (240 \times 25)}{30}$

$= \frac{(51 \times 5) + (24 \times 25)}{3}$

$= (17 \times 5) + (8 \times 25)$

=85+200

=285

Q10. Option B

Let the total number of students = x

The average marks increased by $\frac{1}{2}$ due to an increase of 83 - 63 = 20 marks.

But total increase in the marks = $\frac{1}{2}$×x = $\frac{x}{2}$

Hence we can write as

$\frac{x}{2}$=20⇒x=20×2=40

Q11.Option B

Total age of the grandparents = 67 × 2

Total age of the parents = 35 × 2

Total age of the grandchildren = 6 × 3

Average age of the family

$=\frac{(67\times2)+(35\times2)+(6\times3)}{7}$

$=\frac{134+70+18}{7}$

$=\frac{222}{7}$

$= 31\frac{5}{7}$

Q12. Option B

Let the weight of A, B and C are a,b and c respectively.

Average weight of A,B and C = 45

a + b + c = 45 × 3 = 135 --- equation(1)

Average weight of A and B = 40

a + b = 40 × 2 = 80 --- equation(2)

Average weight of B and C = 43

b + c = 43 × 2 = 86 --- equation(3)

equation(2) + equation(3) - equation(1)

=> a + b + b + c - (a + b + c) = 80 + 86 - 135

=> b = 80 + 86 -135 = 166 - 135 = 31

Weight of B = 31 Kg

Q13.Option B

Average marks of batch1 = 50

Students in batch1 = 55

Total marks of batch1 = 55 × 50

Average marks of batch2 = 55

Students in batch2 = 60

Total marks of batch2 = 60 × 55

Average marks of batch3 = 60

Students in batch3 = 45

Total marks of batch3 = 45 × 60

Total students = 55 + 60 + 45 = 160

$=\frac{(55\times50)+(60\times55)+(45\times60)}{160}$

$=\frac{275+330+270}{16}$

$=\frac{875}{16}$

=54.68

Q14. Option A

Let the present age of the husband = h

Present age of the wife = w

Present age of the child = c

3 years ago, average age of husband, wife and their child = 27

=> Sum of age of husband, wife and their child before 3 years = 3 × 27 = 81

=> (h-3) + (w-3) + (c-3) = 81

=> h + w + c = 81 + 9 = 90 --- equation(1)

5 years ago, average age of wife and child = 20

=> Sum of age of wife and child before 5 years = 2 × 20 = 40

=> (w-5) + (c-5) = 40

=> w + c = 40 + 10 = 50 --- equation(2)

Substituting equation(2) in equation(1)

=> h + 50 = 90

=> h = 90 - 50 = 40

i.e., Present age of the husband = 40

Q15. Option C

Total increase in weight = 8 × 2.5 = 20

If x is the weight of the new person, total increase in weight = x–65

=> 20 = x - 65

=> x = 20 + 65 = 85

Q16. Option B

Total weight of students in division A = 36 × 40

Total weight of students in division B = 44 × 35

Total students = 36 + 44 = 80

Average weight of the whole class

$$= \frac{(36 \times 40) + (44 \times 35)}{80}$$

$$= \frac{(9 \times 40) + (11 \times 35)}{20}$$

$$= \frac{(9 \times 8) + (11 \times 7)}{4}$$

$$= \frac{72 + 77}{4}$$

$$= \frac{149}{4}$$

$$= 37.25$$

Q17. Option A

Let the average after 17 innings = x

Total runs scored in 17 innings = 17x

Average after 16 innings = (x-3)

Total runs scored in 16 innings = 16(x-3)

Total runs scored in 16 innings + 87 = Total runs scored in 17 innings

=> 16(x-3) + 87 = 17x

=> 16x - 48 + 87 = 17x

=> x = 39

Q18. Option C

$$\frac{3 + 11 + 7 + 9 + 15 + 13 + 8 + 19 + 17 + 21 + 14 + x}{12}$$

$$= 12$$

$$\frac{137 + x}{12} = 12$$

$$137 + x = 144$$

$$x = 144 - 137 = 7$$

Q19.Option D

Average mark = $\frac{76+65+82+67+85}{5} = \frac{375}{5} = 75$

Q20.Option C

If a car covers a certain distance at x kmph and an equal distance at y kmph. Then,

average speed of the whole journey = $\frac{2xy}{x+y}$ kmph

$= \frac{2\times84\times56}{84+56} = \frac{2\times84\times56}{140}$

$= \frac{2\times21\times56}{35} = \frac{2\times3\times56}{5}$

$= \frac{336}{5} = 67.2$

Q21.Option D

We do not have the number of boys and girls. Hence we cannot find out the answer.

Q22. Option A

average age of 36 students in a group is 14

Sum of the ages of 36 students = 36 × 14

When teacher's age is included to it, the average increases by one

=> average = 15

Sum of the ages of 36 students and the teacher = 37 × 15

Hence teachers age

= 37 × 15 - 36 × 14

= 37 × 15 - 14(37 - 1)

= 37 × 15 - 37 × 14 + 14

= 37(15 - 14) + 14

= 37 + 14

= 51

Q23. Option D

Sum of 5 numbers = 5 × 27

Sum of 4 numbers after excluding one number = 4 × 25

Excluded number

= 5 × 27 - 4 × 25

= 135 - 100 = 35

Q24. Option B

Total runs scored by the player in 40 innings = 40 × 50

Total runs scored by the player in 38 innings after excluding two innings = 38 × 48

Sum of the scores of the excluded innings = 40 × 50 - 38 × 48 = 2000 - 1824 = 176

Given that the scores of the excluded innings differ by 172. Hence let's take

the highest score as x + 172 and lowest score as x

Now x + 172 + x = 176

=> 2x = 4

=> x = $\frac{4}{2}$ = 2

Highest score = x + 172 = 2 + 172 = 174

Q25. Option A

Total runs scored in 10 matches = 10 × 38.9

Total runs scored in first 6 matches = 6 × 42

Total runs scored in the last 4 matches = 10 × 38.9 - 6 × 42

Average of the runs scored in the last 4 matches = $\frac{10\times38.9-6\times42}{4}$

$= \frac{389-252}{4} = \frac{137}{4} = 34.25$

Q26. Option C

Average of 6 numbers = x

=> Sum of 6 numbers = 6x

Average of the 3 numbers = y

=> Sum of these 3 numbers = 3y

Average of the remaining 3 numbers = z
=> Sum of the remaining 3 numbers = 3z

Now we know that 6x = 3y + 3z
=> 2x = y + z

Q27. Option C
If a car covers a certain distance at x kmph and an equal distance at y kmph. Then,
average speed of the whole journey $=\frac{2xy}{x+y}\text{kmph}$

$=\frac{2\times50\times30}{50+30}=\frac{2\times50\times30}{80}$
$=\frac{2\times50\times3}{8}=\frac{3\times50}{4}$
$=\frac{75}{2}=37.5$

Q28. Option D
Total age of husband and wife (at the time of their marriage) = 2 × 23 = 46

Total age of husband and wife after 5 years + Age of the 1 year old child
= 46 + 5 + 5 + 1 = 57

Average age of the family = $\frac{57}{3}=19$

Q29. Option B
Let the number of subjects = x
Then, total marks he scored for all subjects = 63x

If he had obtained 20 more marks for his Geography and 2 more marks for his history, his average would have been 65
=> Total marks he would have scored for all subjects = 65x

Now we can form the equation as 65x - 63x = additional marks of the student = 20 + 2 = 22
=> 2x = 22

$$x=\frac{22}{2}=11$$

Q30. Option A
Let the number of workers = x

Given that average salary of all the workers = Rs.8000
Then, total salary of all workers = 8000x

Given that average salary of 7 technicians is Rs.12000
=> Total salary of 7 technicians = 7 × 12000 = 84000

Count of the rest of the employees = (x - 7)
Average salary of the rest of the employees = Rs.6000
Total salary of the rest of the employees = (x - 7)(6000)

8000x = 84000 + (x - 7)(6000)
=> 8x = 84 + (x - 7)(6)
=> 8x = 84 + 6x - 42
=> 2x = 42
$x=\frac{42}{2}=21$

Average Practice Set 2

1. There are, 20 toys; some of them are green and the others are yellow. The average cost of all toys is Rs. 38, average cost of green toys is Rs. 35 and that of yellow toys is Rs. 40, the number of yellow toys is:
   A) 8
   B) 12
   C) 14
   D) 10
   E) None of these

2. The average marks obtained by 50 students of a class in Jesus Mary School is 92. If the 5 highest marks are removed, the average of the class reduces by two mark. The average marks of the top 5 students of the class is
   A) 95
   B) 102
   C) 110
   D) 105
   E) None of these

3. If the average mark of 1/4th understudies of the class is 85% and that of 1/3 rd of the understudies of the class is 70% and the average mark of rest of the class is 56%.then the average of the entire class is
   A) 67.91
   B) 70.32
   C) 68.5
   D) 69.25
   E) None of these

4. The average score of Munish diminished by one, when he supplanted the subject in which he has scored 40 score by the other two subjects in which he has scored 23 and 25 marks individually. Later he has likewise included 57 score of brain science subject, at that point the average marks expanded by two. So general what number subjects were there at first?
   A) 16
   B) 12
   C) 14
   D) 15
   E) None of these

5. Among the three yearly examinations, each of them with a sum of 500 marks, an understudy secured average marks of 56% and 64% in the first and second yearly examinations among three. To have a general average of 64%, what number of marks does the understudy need to secure in the third yearly examination ?

   A) 360
   B) 340
   C) 320
   D) 270
   E) None of these

6. The average weight of 18 students in class 6^{th} of Loyola high is 52.5 kg and that of the remaining 6 students of class is 43.25 kg. Find the average weights of the class 6th.
   A) 49kg
   B) 47.65kg
   C) 50.18kg
   D) 51.2kg
   E) None of these

7. When Rocky was married 10 years ago his wife was the 6th member of the family. Today his father died and a baby born to him.The average age of his family during his marriage is same as today. What is the age of his Father when he died ?
   A) 56yrs
   B) 55yrs
   C) 58yrs
   D) 60yrs
   E) None of these

8. The average age of the group having 3 members is 83. A new person joins the group and now the average age of the group becomes 80. Now a fifth person comes in the group whose age is 3 years more than that of fourth person and he replaces the first person. After this change,

the average age of the group becomes 79. What is the weight of the first person?
A) 78
B) 64
C) 72
D) 78
E) None of these

9. A train cover a certain distance at a speed of 100 km/hr however it will halt for fixed time interval in each hour its average speed get reduced to 75 km/hr. What is the time interval for which the train halt in each hour? It will halt for fixed time interval in each hour its average speed reduced 50 km/hr. What is the time interval for
A) 12min
B) 15min
C) 10min
D) 14min
E) None of these

10. In Infosys Gurugram branch there are 100 emplyee in Automation branch. The average age of all the 100 employees in that branch is 29 years, where 2/5 employees are ladies and the ratio of average age of men to women is 5 : 7. The average age of female employees is
A) 26yrs
B) 28yrs
C) 35yrs
D) 32yrs
E) None of these

11. The average age of Suraj's family consisting of 5 members 3years ago was 31years. One year ago a new born baby was born in this family. Three years hence the average age of the family will be.
A) 32
B) 31 1/2
C) 31 5/6
D) 32 1/4
E) None of these

12. 10 year prior the average age of all the 25 workers in an IT organization was 45 years. 4 years prior, the chief of the organization resigned from the post at 60 years old years. So following one year from that another executive whose age was 54 years enrolled from outside. What is the present average age of the considerable number of representatives, if the new executive is additionally considered as a worker:
A) 54yrs
B) 55yrs
C) 54 18/25yrs
D) 56 12/19yrs
E) None of these

13. Bikash conducted a test in which the average of 11 test result came to be 90, while the average of first five test result was 87, and that of the last five was 84. What was the measure of the 6th test result?
A) 135
B) 140
C) 145
D) 150
E) None of these

14. The average income of all the 80 employees in a Wipro office is Rs. 15,000 per month. If the number of executives is thrice the number of non-executive employees then what will be the average income of all the non-executive employees in that wipro office?
A) Rs6000
B) Rs8000
C) Can't determined
D) Rs7500
E) None of these

15. A Man took the car and travel from kolkata to diamond harbour by his car at the speed of 30 km//hr and then, the same distance he travelled on his bicycle at the speed of 20 km/hr from Diamond harbour to Raichak. Then he returned from raichak to kolkata via diamond harbour at the speed of 16 km/hr on his foot. The average speed of the whole journey is:

A) 20km/hr
B) 21.5km/hr
C) 22km/hr
D) 19.2 km/hr
E) None of these

16. The average weight of 3 men Alvin, Bush and Cooper is 84 kg. Another man David joins the group and the average now becomes 80 kg. If another man Earl, whose weight is 3 kg more than that of David, replaces Alvin, then average weight of Bush, Cooper, David and Earl becomes 79 kg. The weight of Alvin is?

(Take Alvin=A, Bush= B, Cooper= C, David= D and Earl= E)
A) 80kg
B) 72kg
C) 75kg
D) 78kg
E) None of these

17. In Political science exam, a student scored 40% marks in paper 1 out of a total of 150. How much should he score in paper 2 of political science out of a total of 150, if he is to get an overall average of 50%?
A) 70
B) 60
C) 66
D) 74
E) None of these

18. Rohan was running effective shop and he set average cost of 10 lichis is Rs. 12 while the average cost of 8 of these lichis is Rs. 11.75. Of the staying two lichis, if the cost of one lichi is 60% more than the cost of the other, what is the cost of each of these two lichis?
A) Rs 10 and Rs 16
B) Rs 12 and Rs 18
C) Rs 10 and Rs 24
D) Rs 20 and Rs 16
E) None of these

19. The present average age of a Gujrati family of 5 members is 40 years. If the youngest member of the Gujrati family is 15 years old, then find the average age of the gujrati family at the time of birth of the youngest member.
A) 32yrs
B) 31 1/4yrs
C) 33 2/3yrs
D) 33yrs
E) None of these

20. The captain of a cricket team of 11 members is 30 years old and the wicket keeper is 3 years older. If the ages of these two are excluded, the average age of the remaining players is one year less than the average age of the whole team. What is the average age of the team?
A) 30yrs
B) 27yrs
C) 25yrs
D) 32yrs
E) None of these

21. The average weight of a group of 54 girls of holy cross school was calculated as 58 kg .It was later discovered that the weight of one of the girls was read as 70 kg ,whereas her actual weight was 65kg. What is the actual average weight of the group of 54 girls of holy cross school?
A) 57.5
B) 58.5
C) 57.9
D) 55.8
E) 54.0

22. The average weight of 50 stduents in an academy was calculated as 42 kg .It was later found that the weight of two students in the academy was wrongly calculated .The actual weight of one of the boys Raja in the academy was 38kg ., but it was calculated as 40 kg ,and the weight of another boy Ankesh in the academy was 55kg , whereas it was calculated as 50 kg .What is the actual

average weight of the 50 students in the academy ?

A) 42.06
B) 45
C) 47.3
D) 58
E) 40.75

23. In sunny 's opinion his weight is greater than 65 kg but less than 72 kg .His cousin does not agree with sunny and he thinks that sunny's weight is greater than 60kg but less than 70 kg .His elder brother 's view is that his weight cannot be greater than 68 kg .If all of them are correct in their estimation ,what is the average of different probably weights of sunny ?

A) 70 kg
B) 65 kg
C) 62 kg
D) 77 kg
E) Data inadequate

24. There are 5 consecutive odd numbers .If the difference between the square of the average of the initial two odd numbers and square of the average of the last two odd numbers is 492 ,what is the smallest odd number in the series ?

A) 35
B) 40
C) 37
D) 34
E) 48

25. An Indian batsman played three matches in a tournament against south africa .The respective ratio between the scores of 1st and 2nd matches was 5 :4 and that between the scores of 2nd and 3rd matches was 2 :1 .The difference between the 1st and 3rdmatches was 48 runs . What was the Indian batsman's average score in all the three matches ?

A) 42(1/2)
B) 58(2/3)
C) 49(4/7)
D) 52(1/3)
E) 48(1/8)

26. In the year of 2001 ,the average monthly income of a person was Rs. 3000 . For the initial 8 months of the year ,his average monthly income was Rs. 4000 and for the final 5 months ,it was Rs. 4120 .His income in the 8th month of the year ?

A) Rs. 3147
B) Rs . 8000
C) Rs. 10,254
D) Rs. 8800
E) Rs. 7425

27. Out of three numbers , the first number is double of the second number and also is half of the third number .If the average of the three numbers is 560 ,the three numbers in order are :

A) 45 , 78 ,54
B) 47, 75 , 62
C) 52 , 68 , 80
D) 480 , 240 , 960
E) None of these of these

28. A bike covers the four sides of square football field at speeds of 20 km/hr , 40km/hr , 60km/hr and 80 km/hr .Then the average speed of the bike in the entire journey is ?

A) 38.4 km/hr
B) 40km/hr
C) 45km/hr
D) 57.5 km/hr
E) 68.6 km/hr

29. The average salary of the entire staff in a office is Rs. 130 per month . The average salary of officers is Rs. 540 and that of cleaners is Rs . 114 . If the number of officers is 16 ,then find the number of cleaners in the office .

A) 442
B) 571
C) 410
D) 550
E) None of these of these

30. In Gurugram there is a mango garden in which (x+2) trees yield 6 mangoes per year per tree , x trees yield 12 mangoes per year per tree and (x-2) trees yield 18 mangoes per year per tree .If the average yield per year per tree be 10 mangoes .Find the value of x ?
A) 8
B) 10
C) 4
D) 12
E) 16

ANSWER SET 2

1. Option B
green toy price …….yellow toy price
…..35 ……..40
. 38
2 3
Ratio 2:3
Then 5 20(total toy)
3 ? ==> 12 toys.

2. Option C
Average mark of 50 student is 92
Their sum is 50*92=4600
5 highest marks removed.
Average mark of 45 student is 90
Their sum is 45*90=4050
Total Sum of the removed 5 students is 4600-4050=550
Their average 550/5=110.

3. Option A
Let x be the total no of students in whole class.
Then (x/4*85/100 + x/3 *70/100+ 5x/12 * 56/100)*100
=67.91.

4. Option D
Total subjects = x ; Average Marks = y
(x + 1)(y – 1) = (xy – 40) + (23 + 25)
y – x = 9 –(1)
(x + 2)(y + 1) = (xy – 40) + (23 + 25)+ 57
xy + 2y + x + 2 = xy + 65
2y + x = 63 –(2)
From Equation (1) and (2) => x = 15.

5. Option A
Total marks for three examinations = 3x 500 = 1500
Total required marks in three examinations = 64% of 1500 = 960
Marks secured in first examination = 56 % of 500 =280
Marks secured in third examination = 64 % of 500 =320
Thus, the required marks in third examination
=960 – (280 + 320)
=960 – 600
= 360.

6. Option C
The average weights of all the students in the class
=[(18*52.5) +(6*43.25)]/(18+6)
=945+259.5 /24
=50.18kg.

7. Option D
Let the Father be x years when he died
Average Age 10 years ago be A
Total Age 10 years ago = 6*A
Total Age after 10 years (Just before father's Death) = 6A + 6*10 = 6A + 60
Father Died and Baby was born

=> the Total number of people in the family is Same (6)
(6A +60 – x)/6 = 6A/6
= A + 10 -(x/6) = A
= x/6 = 10
= x = 60yrs.

8. Option A
Let the group of members are A, B, C, D, E
A+B+C = 83*3 = 249
A+B+C+D = 80*4 = 320
Then D = 320-249 = 71 and E = 71+3 = 74
Now B+C+D+E = 79*4 = 316
(A+B+C+D) – (B+C+D+E) = 320- 316
A-E = 4
Then A = 74+4=78.

9. Option B
Train Halt time,
= 1 – (slower speed/faster speed)
= 1 – 75/100
= 1/4 hours = 15 min.

10. Option C
Let the average of men and women be 5x and 7x resp.
(3*5x/5)*100 + (2*7x/5)*100=29*100
300x+280x = 2900
X=5.
Then average age of females 7x=7*5=35yrs.

11. Option B
3yrs ago total age of 5members 5*31=155
At the time of birth of new born baby the total age of family 155+ (2*5)=165.
The present total age of family 165+ (1*6) =171
Then 3 years hence, the average age of the family =171+ (6*3)/6
=171+18/6==>189/6=31 1/2 .

12. Option C
10yrs ago , the average age of 25 employees=45.
The present average age of all the employees=45+10=55
Total age of all the employees =25*55=1375
From the present age after 1 yrs the director is appointed.then at present the age of Director is 53(54-1).
Director age difference is 60-53=7
The actual total age of all employees =1375-7=1368.
Then required average=1368/25=54 18/25

13. Option
Total Test 11*90=990
First 5 Test 5*87=435
Last 5 Test 5*84=420
6 th Test =990 – (435+420)==>135

14. Option C
Total employees 80
NE:E==>3:1
So 4 80
3 ? 60 NE
1 ? 20 E
Total income = 60*NE income+20*E income
We don't have that incomes So we cant find the solution.

15. Option D
The distance between Kolkata and Diamond harbour is equal to distance between DH and Raichak.
So the average speed is
2*30*20/(20+30)=24km/hr
Again he return from same route the distance is same
Then the average is
2*24*16/(24+16)=19.2km/hr

16. Option C
A, B,C weight 84*3=252kg
A,B,C,D weight 80*4=320kg
Then D weight 320-252=68kg.
And E's weight=68+3=71kg.
B,C,D,E weight 79*4=316kg.
A,B,C,D weight- B,C,D,E weight=320-316=4kg
A-E=4kg
A-71=4==>A=75kg.

17. Option B
Let the second paper percentage be x%
Total marks =150+150=300
40% of 150 + x% of 150 = 50% of 300
60+ x/100*150=150
X*3/2=90==>x=60%

18. Option A
Total price of the two lichis= Rs. [(12 x 10) – (11.75 x 8)]
= Rs. (120 – 94) = Rs. 26

Let the price of one cartoon be Rs.x
Then, the price of other cartoon = Rs. (x + 60% of x)
= x + (3/5)x= (8/5)x
=x +(8/5)x=26
=13x=26*5==> x=10
The prices of the two lichis are Rs. 10 and Rs. 16

19. Option B
Present age of the family = 5*40 = 200 years.
15 years ago at the time of the birth of youngest member, age of family = 200 – 15*5 = 125.
So average age = 125/4 = 31 1/4 year

20. Option B
Let the average age of the whole team by x years.
11x – (30 + 33) = 9(x -1)
11x – 9x = 54
2x = 54
x = 27

21. Option C
Actual weight of 54 girls = 54 * 58 + 65 – 70 = 3127
Required actual average weight = 3127/ 54 = 57.9

22. Option A
Actual weight of all the students = 50 * 42 – 40 + 38 – 50 +55 = 2103
Actual average weight = 2103/50 = 42.06

23. Option E
sunny 's opinion = 65 < W< 72
cousin's opinion = 60 < W < 70
Elder brother's opinion = W (not greater than) 68 or W (is less than equals to) 68

24. Option C
Five consecutive odd numbers = x , x+2, x +4 , x+6 and x +8
Now ,
[(x+6+x+8) /2]2 – [(x+x+2)/2]2 = 492
=>x= 444/12 = 37
Smallest odd number = 37

25. Option B
Match 1 : Match 2 = 5 :4
Match 2 : Match 3 = 2 : 1 = 4 :2
Therefore ,
Match 1 :Match 2 :Match 3 = 5 :4 : 2
Now ,
5x – 2x = 48
=> x= 16
Total runs scored in three matches = 5x + 4x +2x =11x
= 11 * 16 = 176
Required average = (176/3) =58(2/3)

26. Option B
Income in the 8th month = (8*3000 + 5*4000 – 12 * 3000) = Rs. 8000

27. Option D
Suppose the numbers are n1 ,n2 and n3 .
Then ,
n1 : n2: n3 = 2 : 1 : 4
And
n1 + n2 + n3 = 560 * 3 = 1680
n1 = (2/7) * 1680 = 480
n2 = (1/7) * 1680 = 240
n3 = (4/7) * 1680 = 960

28. Option A
Suppose the side of the square is 240 km
[LCM of 20,40,60 and 80 is 240 kms] Now,
Average speed = Total distance / Total time = (240 * 4) /[(240/20) + (240/40) +(240/60)+(240/80)] = 960/25 = 38.4 km /hr

29. Option C

Officers		Cleaners
540		114
	130	
(130 – 114)	:	(540 – 130)
16	:	410

30. Option C
[6(x+2) +12x + 18(x-2)]/[x+2+x+x-2] = (36x-

24)/ 3x =10
=> x = 24/6 =4

Q. 1) The average weight of 4 men is increased by 3 kg when one of them who weighs 120 kg is replaced by another man. What is the weight of the new man?

*Weight of new person = Weight of removed person + No. of persons * Increase in Average = 120+3*4*
Weight of new person = 132 kg

Q. 2) The average marks obtained by 120 candidates in a certain examination is 35. If the average marks of passing candidates is 39 and that of the failed candidates is 15, what is the number of candidates who passed the exam?

Such questions are best dealt with allegation formula:
Mean value = 35, Dearer value = 39 and Cheaper = 15
Failed students : Passed students = (Dearer - Mean) : (Mean - Cheaper) = 39 - 35 : 35 - 15 = 4 : 20
*No. of students who passed = (5/6) * 120 = 100*

Q. 3) The average of 20 numbers is calculated as 35. It is discovered later, that while calculating the average, one number, namely 85, was read as 45. The correct average is
(A) 37.5 (B) 36
(C) 36.5 (D) 37

Correct Average = Incorrect average + (Correct value - Incorrect value)/Total observations

Correct Average = 35 + (85 - 45)/20 = 37

Answer: (D)

Q. 4) If average of two numbers x and $\frac{1}{x}$ (where $x \neq 0$) is A, what will be the average of x^3 and $\frac{1}{x^3}$?
(A) $4A^3 - 4A$ (B) $4A^3 - A$
(C) $4A^3 - 2A$ (D) $4A^3 - 3A$

Take x = 1

Then A = (1 + 1)/2 = 1

Average of x^3 + 1/x^3 = (1 + 1)/2 = 1

Now put A = 1 in all the four options and check which one is giving '1' as the output

Answer: (D)

Q. 5) If the average of eight consecutive even numbers be 93, then the greatest number among them is
(A) 86 (B) 98 (C) 100 (D) 102

For consecutive numbers:
If the number of terms is odd (e.g. A, B, C), then their average is the middle term(i.e. B).
If the number of terms is even(e.g. A, B, C, D) then their average is (B+C)/2
So here, the average of eight consecutive even numbers = (5th term + 4th term)/2
Given, (5th term + 4th term)/2 = 93
5th term + 4th term = 186
We know, 5th term - 4th term = 2
Adding the equations, we get 5th term = 94
Hence 8th term = 5th term + 2 + 2 + 2 = 100
Answer: (C)

Q. 6) The frequency distribution data is given below. If the average age is 17 years, the value of m is

Age (in years)	:	8	20	26	29
Number of people	:	3	2	m	1

(A) 1 (B) 2 (C) 3 (D) 4

*Average = (8*3 + 20*2 + 26*m + 29*1)/(3 + 2 + m + 1)*
17 = (93 + 26m)/(6 + m)
102 + 17m = 93 + 26m
m = 1
Answer: (A)

Q. 7) If the arithmetic mean of 3a and 4b is greater than 50, and a is twice b, then the smallest possible integer value of a is
(A) 18 (B) 19 (C) 20 (D) 21

Given, (3a + 4b)/2 > 50

3a + 4b > 100

5a > 100 [Since a = 2b]

a > 20

Hence the smallest value of a is 21

Answer: (D)

Q. 8)

The average of six numbers is 3.95. The average of two of them is 3.4, while the average of the other two is 3.85. The average of the remaining two numbers is
(A) 4.5 (B) 4.7 (C) 4.6 (D) 4.8

Average of six numbers a,b,c,d,e,f = (Average of a,b + Average of c,d + Average of e,f)/3

*3.95*3 = 3.4 + 3.85 + x*

x = 4.6

Answer: (C)

Q. 9) The average of 11 numbers is 50. The average of first six numbers is 49, and that of last six is 52. Find the sixth result.

This is a common CGL question and a short-cut to solve it is:

Sixth result = 50 + 6{(52 - 50) + (49 - 50)} = 50 + 6(2 - 1) = 56

Answer: 56

Q. 10)

The average age of 30.students of a class is 14 years 4 months. After admission of 5 new students in the class the average becomes 13 years 9 months. The youngest one of the five new students is 9 years 11 months old. The average age of the remaining 4 new students is
(A) 13 years 6 months
(B) 10 years 4 months
(C) 11 years 2 months
(D) 12 years 4 months

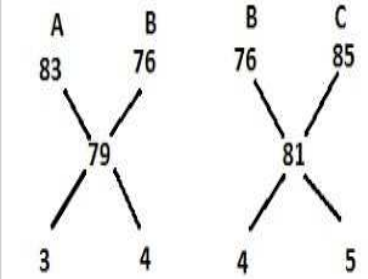
$$30\left(14\frac{1}{3}\right) + 9\frac{11}{12} + 4a = 35\left(13\frac{3}{4}\right)$$

$a = 10\frac{1}{3}$ years = 10 years 4 months

Answer: (B)

Q.11)

Three science classes A, B and C take a Life Science test. The average score of class A is 83. The average score of class B is 76. The average score of class C is 85. The average score of class A and B is 79 and average score of class B and C is 81. Then the average score of classes A, B and C is.
(A) 80.5 (B) 81.5 (C) 80 (D) 81



A : B = 3 : 4 and B: C = 4 : 5
A : B : C = 3 : 4 : 5
Average score of classes A, B and C =

$$\frac{3(83)+4(76)+5(85)}{3+4+5} = 81.5$$

Answer : (B)