Average

An average, or an arithmetic mean, is the sum of `n' different data divided by `n'

$$\text{Average} = \frac{\text{sum of data}}{\text{No. of data}}$$

$$\text{No. of data} = \frac{\text{sum of data}}{\text{Average}}$$

Sum = Average x No. of data

Points to remember:

1. Age of new entrant = New average + No. of old members x change in average
2. Age of one who left = New average - No. of old members x change in average
3. Age of new person = Age of the removed person + No. of members x change in average

In all the above three cases, if there is a decrease in the average, the sign of change in average will be negative.

4. If a certain distance is covered at x km/hr and the same distance is covered by y km/hr, then the average speed during the whole journey is

$$\frac{2xy}{x+y} \text{ km/hr}$$

Examples

1. The average age of 30 boys of a class is equal to 14 years. When the age of the class teacher is included the average becomes 15 years. Find the age of the class teacher.

Total age of 30 boys = 14x30=420 years

Total age when the teacher is included

= 15x31 = 465 years

$\therefore$ Age of the class teacher

= 465 - 420 = 45 years

Direct Formula

Age of new entrant = New average + No. of old members x change in average

= 15+30(15-14) = 45 years.

2. The average weight of 8 men is increased by 1.5 g. when one of the men who weighs 65 kg is replaced by a new man. The weight of the new man is:

Weight of the new man = Weight of the man replaced + (Number x change in average)

= 65 + (8x1.5) = 65+12 = 77 kg.

3. The average of 11 results is 50. If the average of first six results is 49 and that of last six is 52, find the sixth result.

The sum of 11 results = 11x50 = 550

The sum of first 6 results = 6x49 = 294

The sum of last 6 results = 6x52 = 312

Sixth results = 294+312-550 = 56

4. There were 35 students in a hostel. If the number of students increased by 7, the expenses of the mess were increased by Rs. 42 per day, while the average expenditure per head diminished by Re. 1. The original expenditure of the mess was:

Ans: Let the original expenditure per head be Rs. x

Then 35x+ 42 = (x1) 42

35x+ 42 = 42x- 42 or x= 12

5. The average expenditure of a man for the first five months was Rs. 120 and for the next seven months is Rs. 130. What was his monthly average income if he saved Rs. 290 in that years.

Total income for 12 months.

= Rs. (120x5+130x7+290)

= Rs. 1800

∴ Average monthly income

$= \frac{1800}{12} = Rs.150$

6. There are 50 boys in a class. Their average weight is 45 kg. When one boy leaves the class, the average reduces by 100 gms. Find the weight of the boy who left the class.

Weight of the boy left = New average - No. of old members x change in average

= 44.9-50x(-0.1) = 44.9+5 = 49.9kg.

7. The average attendance in a school for the first 4 days of the week is 30 and for the first 5 days of the week is 32. The attendance on the fifth day is:

Total attendance for the first 4 days

= 4x30 = 120

Total attendance for the first 5 days

= 5x32 = 160

Attendance on the fifth day

= 160-120 = 40

PRACTICE TEST

1. The marks obtained by a student in five subjects are 68,73,62,85 and 79. Find the average score.

a) 73 b) 73.4

c) 75 d) 74.5

2. The average income of a group of 9 workers is Rs. 137.30 and that of another group of 7 workers is Rs. 95.06. The average income of all the persons is:

a) Rs. 118.82 b) Rs. 116.18

c) Rs. 125.18 d) Rs. 128.15

3. There are 40 boys in a class. One boy weighing 40 kg goes away, and at the same time another boy joins the class. If the average weight of the class is thus increased by 100 gm, the weight of the new boy is.

a) 39.9 kg b) 44.1 kg

c) 40.1 kg d) 44 kg

4. My average expenses for 4 days is Rs. 6.00. I spend Rs. 7.70 on first day and Rs. 6.30 on second day. If I spent Rs. 10 on third day, what did I spend on the 4th day?

a) Rs. 2/- b) Rs. 3/-

c) Rs. 4/- d) Nothing

5. The average temperature on Tuesday, Wednesday and Thursday was 37° centigrade. The average tempeature on Wednesday, Thursday and Friday was 38° centigrade. If the temperature on Friday was 39° centigrade, the temperature on Tuesday was:

a) 35° C b) 36° C

c) 37° C d) 38° C

6. The average age of students in two classes of 40 students each is 10 years and 8 years respectively. The average age of students in both the classes taken together is:

a) 8 years b) 9 years

c) 10 years d) 11 years

7. The average age of 50 soldiers in troop is 25 years. If the captain's age is included, the average age of all of them still remains the same. What is the captain's age in years?

a) 25 b) More than 25

c) Less than 25 d) Cannot be determined

8. Two towns A and B are some distance apart. A girl cycles from A to B at a speed of 10 km/hr and then back from B to A at the rate of 15 km/ hr. The average speed during the journey is:

a) 12.5 km/hr b) 15 km/hr

c) 12 km/hr d) 13.5 km/hr

9. An employee's average contribution to his provident fund for the first 9 months was Rs. 3,500 each and for each of the remaining 3 months, the contribution was Rs. 5,500. By what amount was his total contribution short of Rs. 58,000?

a) Rs. 4,000 b) Rs. 16,500

c) Rs. 8,000 d) Rs. 10,000

10. What fraction must be subtracted from the sum of $\frac{1}{4}$ and $\frac{1}{6}$ to have an average of $\frac{1}{12}$ of these the two fractiaons?

a) $\frac{1}{3}$ b) $\frac{1}{2}$ c) $\frac{1}{4}$ d) $\frac{1}{8}$

11. The average marks of 12 students was calculated as 40. But it was later found that marks of one student had been entered wrongly as 42 instead of 54 and of another as 74 instead of 50. The correct average is:

a) 39 b) 40 c) 41 d) 43

12. The average salary of workers in an industry is Rs. 2000, the average salary of 150 technicians being Rs. 4000, and the non-technicians being Rs. 1,250. The total number of workers is

a) 450 b) 300

c) 550 d) 500

13. The average age of a husband and a wife who were married four years ago was 20 years then. What will be the average age of the family now if they have a three years old child?

a) $15\frac{2}{3}$ years b) $16\frac{1}{3}$ years

c) 17 years d) 16 years

14. The average of three consecutive odd numbers is 39. What is the sum of the first two of these numbers?

a) 78 b) 76 c) 24 d) 11

15. If the average of 9 consecutive numbers is 20, the highest of these numbers is:

a) 20 b) 21 c) 24 d) 26

16. The sum of two consecutive even numbers is 23 more than the average of these two numbers. What is the second number?

a) 22 b) 24 c) 26

d) Data indequate

17. The average of 17 numbers is 10.9 If the average of first nine is 10.5 and that of the last nine is 11.4, the middle number is

a) 11.8 b) 11.4

c) 10.9 d) 11.7

18. The average monthly expenditure of a family was Rs. 2,200 during first 3 months, Rs. 2,550 during next 4 months and Rs. 3,120 during last 5 months of the year. If the total saving during the year was Rs. 1,260, find average monthly income.

a) Rs. 3,960 b) Rs. 760.8

c) Rs. 2,805 d) Rs. 3,125

19. 30 pens and 75 pencils were purchased for Rs. 510. if the average price of a pencil was Rs. 2.00, find the average price of a pen.

a) Rs. 12 b) Rs. 15

c) Rs. 19 d) Rs. 25

20. the average age of the husband and wife who were married 7 years ago was 25 years then. The average age of the family including the husband, wife and the child born during the interval is 22 years, now. How old is the child now?

a) 2 years b) 3.5 years

c) 1 years d) 4 years

21. Average monthly income of a family of four earning members was Rs. 735. One of the earning members died and therefore the average income came down to Rs. 650. The income of the deceased was:

a) Rs. 820 b) Rs. 990

c) Rs. 692.50 d) Rs. 1,385

22. A batsman has certain average runs for 20 innings. In the 21st inning, he served 107 runs thereby increasing his average by 2. What is his average after 21 innings?

a) 67 b) 65 c) 60 d) 72

23. Nine men went to hotel. 8 of them spent Rs. 3 each over their meals and the ninth spent Rs. 2 more than the average expenditure of all the nine. The total money spent by all of them was

a) Rs. 26 b) Rs. 40

c) Rs. 27 d) Rs. 29

24. Keshav is given 12 days to drive a destination 1200 km. away. for the first 6 days he goes 100km a day. Due to accident, he cannot drive for 2 days. What is the average distance per day that he has to drive to reach his destination in time?

a) 50 km b) 100 km.

c) 150 km d) 200 km.

25. In a cricket team eleven, the average age of eleven players is 28 years. Out of these, the average of three groups of three players each are 25 years, 28 years and 30 years. The captain and the youngest player who is 11 years younger than the captain are not included in these groups. The age of the captain is

a) 33 years b) 34 years

c) 35 years d) 36 years

26. Average income of A and B is Rs. 3000 and of C and D is Rs. 500. What is the average income of A, B, C and D.

(a) 1500 (b) 1750

(c) 1700 (d) 2000

27. Five years ago average age of P and Q was 15 years. Average age of P, Q and R today is 20 years. How old R will be after 10 years.

(a) 32 yrs. (b) 25 yrs.

(c) 35 yrs. (d) 30 yrs.

28. One of the two buses complete a journey of 300 km in $7\frac{1}{2}$ hrs. and the other a journey of 450 km in 10 hrs. Find the ratio of their average speeds.

(a) 4:5 b) 9:8

(c) 8:9 d) 5:4

29. A man spends Rs. 1800 per month on an average for the first four months and Rs. 2000 per month for the next 8 months and saves Rs. 5600 a year. What is his average monthly income?

a) Rs. 2400 b) Rs. 2000

c) Rs. 1800 d) Rs. 2500

30. In a class there are three divisions. The number of students and the average marks in mathematics in the three divisions are 30, 40, 30 and 40%, 30% and 50% respectively. What are the average marks in mathematics of the class?

a) 39 b) 40 c) 41 d) 51

31. Visitors to a show were charged Rs. 15.00 each on the first day, Rs. 7.50 on the second day, Rs. 2.50 on the third day and total attendance on the three days were in the ratio 2:5:13 respectively. The average charge per person for the whole show is

a) Rs. 3.00 b) Rs. 4.50

c) Rs. 5.00 d) Rs. 7.50

ANSWERS TO PRACTICE TEST

1.	(b)	2.	(a)	3.	(d)	4.	(d)	5.	(b)	6.	(b)	7.	(a)	8.	(c)
9.	(d)	10.	(c)	11.	(a)	12.	(c)	13.	(c)	14.	(b)	15.	(c)	16.	(b)
17.	(a)	18.	(c)	19.	(a)	20.	(a)	21.	(b)	22.	(a)	23.	(d)	24.	(c)
25.	(c)	26.	(b)	27.	(d)	28.	(c)	29.	(a)	30.	(a)	31.	(c)		