Average Problems, Median, Range

Sunday, October 4, 2020 12:02 PM

Definition of Average (Mean) of a list of numbers is simply the sum of those numbers divided by the number of numbers.

List: 3, 5, 5, 4, 6, 9, 2, 8

Average = (3+5+5+4+6+9+2+8)/8 = 5.25

Average = Sum/(# terms)
Sum = Average*(#terms)

Special Case

Average of consecutive integers:

3, 4, 5, 6, 7, 8, 9 (odd # of integers there are 7)

m-3, m-2, m-1, m, m+1, m+2, m+3

Average of 7 consecutive integers is simply sum of those values above, divided by 7 is equal to 7m/7 = m.

11, 12, 13, 14 (we can call the 2 middle values m-.5, m+.5)

m-1.5, m-.5, m+.5, m+1.5

same cancellation idea. Sum is 4m, where m is the average of the two middle values.

Median - middle value…in an odd # list of terms, it's the actual middle value. In a even # list of terms, it's the average of the middle two values.

Here is a list of values: 4, 9, 6, 4, x. What are the possible values of the median, given that x is some integer.

4, 4, 6, 9, x

if x < 4, median is 4
if x >= 4 and x =< 6, median x

if x > 6, median is still 6

Try same problem even # of values: 9, 8, 3, 9, 11, x

3, 8, 9, 9, 11, x

if x <=8, median is 8.5
if x >= 9 median is still 9

if x doesn't have to be an integer, then if

x > 8 and x < 9, median is (x+9)/2.

Range = max - min

Sometimes the data in average problems will be given with a frequency table

Example: survey we ask people # of siblings they have.

15 people have 0 siblings
13 people have 1 sibling
12 people have 2 siblings
5 people have 3 siblings
2 people have 4 siblings

real data:
0,0,0,0…0, 1,1,1,…,1,2,2,2,…,2,3,3,3,3,3,3,4,4

n (number of people) = 15 + 13 + 12 + 5 + 2 = 47

sum of the data (# of siblings) = 15*0 + 13*1 + 12*2 + 5*3 + 2*4 = 60

Avg # of siblings = 60/47 = 1.2766

1) 5 consec integers starting with a have average b: a,a+1,a+2,a+3,a+4. Average is the middle value which is a+2 = b. The 5 consec integer starting with b are b,b+1,b+2,b+3,b+4. Average is b+2 = a+2+2 = **a+4.**

2) list of 50 #s has an average of 38. If we remove 45,55 from the list what is the new average of the remaining 48 #s.

Sum of 50 #s = 50 x 38 = 1,900
Sum of 48 #s = 1900 - 45 - 55 = 1800
Average of those 48 #s = 1800/48 = 600/16 = 300/8 = **75/2**

3) Ratio W:M is 11:10. Avg age women = 34, avg age men = 32
let there be 11x women, 10x men, for some integer x.
Sum of ages of the women = (11x)34 = 374x
Sum of the ages of men = (10x)32 = 320x
Sum of all ages = 374x + 320x = 694x
Total # of people = 11x + 10x = 21x
Average age of all = 694x/21x = 694/21=**33 1/21**

4) Let X be the sum of the # of problems solved by people who solve in between 4 and 12 problems in total. Let Y equal the total number of people who solved in between 4 and 12 problems in total.

# of people who solved 3 or more = Y + 23 + 5 + 2 + 1 = Y + 31
sum of scores people solved 3 or more = X + 3*23+13*5+14*2+15*1 = X+177

Equation = (X+177)/(Y+31) = 6 --> X+177 = 6Y + 186

# of people who solved 12 or fewer = Y + 23 + 7 + 5 + 9 = Y + 44
Sum of people who solved 12 or fewer = X + 3*23 + 2*7 + 5*1 = X + 88

Equation = (X+88)/(Y+44) = 5 --> X + 88 = 5Y + 220

X + 177 = 6Y + 186 --> X = 6Y + 9
X + 88 = 5Y + 220 --> X = 5Y + 132

6Y + 9 = 5Y + 132
Y = 132 - 9 = 123
X = 6Y + 9 = 6*123 + 9 = 747

Total sum of all = 747 +13*5+14*2+15*1 +3*23 + 2*7 + 5*1
= 747 + 65 + 28 + 15 + 69 + 14 + 5 = **943**