

Let

$x = \text{the number of boys in the class}$

$y = \text{the number of girls in the class} > 15$

Then the total number N of students in the class is

$$N = x + y; y > 15 \quad (1)$$

Given that the average mark of the class is 35.5 marks, then the total marks T_{total} of the entire class is

$$T_{total} = 35.5N = 35.5(x + y) \quad (2)$$

It is also **given that** 15 female students have a an average score of 28 marks, so that their total score is

$$T_{f15} = 15 \times 28 = 420 \quad (3)$$

Moreover, the average score of all male students is 40, so that their total score is

$$T_{male} = 40x \quad (4)$$

From equations (2) and (4) above, we can get the total female T_{female} score by taking $T_{female} = T_{total} - T_{male}$ that is

$$T_{female} = 35.5(x + y) - 40x$$

$$T_{female} = 35.5x + 35.5y - 40x$$

Therefore

$$T_{female} = -4.5x + 35.5y \quad (5)$$

Now since the total number of female students is y then the average score of **all female** students A_{female} is

$$A_{female} = \frac{T_{female}}{y}$$

$$A_{female} = \frac{-4.5x + 35.5y}{y} \quad (6)$$

Now, note from above that

- 15 female students have an average score of 28 and hence
- $y - 15$ female students have an average score of $A_{y15} = A_{female} - 28$ and therefore

$$A_{y15} = \frac{-4.5x + 35.5y}{y} - 28 \quad (7)$$

In addition, all boys have an average score of 40, that is

$$A_{boys} = 40 \quad (8)$$

Finally the combined average mark A_{comb} of all boys and all girls is 35.5; i.e.

$$A_{comb} = \frac{A_{boys} + A_{female}}{2} = 35.5$$

$$A_{comb} = \frac{\left(\frac{-4.5x + 35.5y}{y} - 28\right) + 28 + 40}{2} = 35.5$$

Therefore

$$\left(\frac{-4.5x + 35.5y}{y} - 28\right) + 28 + 40 = 71$$

And upon more simplifications

$$\frac{-4.5x + 35.5y}{y} - 28 + 28 + 40 = 71$$

$$\frac{-4.5x + 35.5y}{y} + 40 = 71$$

$$\frac{-4.5x + 35.5y}{y} = 31$$

$$-4.5x + 35.5y = 31y$$

$$-4.5x + 4.5y = 0$$

$$4.5x - 4.5y = 0$$

which finally simplifies to $y = x$ indicating that there is an equal number of boys and girls in the class.

Most important, we are told that there are at least 15 girls and since the number of girls and boys is equal, likewise there are at least 15 boys in the same class and therefore, the number of students in the class is a multiple of 2 which is either $16 \times 2 = 32$ or higher i.e the total number of students N in the class is

$$N = [32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, \dots \dots \dots]$$

Therefore $N \geq 32$, N is even or simply

$$N = 30 + 2n; \text{ where } n = 1, 2, 3, \dots \dots \dots$$

Please try to examine the different tables below

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Class' overall average mark=35.5			AVERAGES
35.5		Total marks	
Total Number of students in the class	32	1136	35.50
Total Number of FEMALE students in the class	16		
Number of FEMALE students with average mark 28	15	420	28.00
Number of FEMALE students with OTHER AVERAGE	1	76	76.00
Total Number of MALE students in the class	16		
MALE students' AVERAGE MARK	40	640	40.00
TOTAL MARKS OF THE WHOLE CLASS	1136	AVERAGE	35.50

Class' overall average mark=35.5			AVERAGES
35.5		Total marks	
Total Number of students in the class	34	1207	35.50
Total Number of FEMALE students in the class	17		
Number of FEMALE students with average mark 28	15	420	28.00
Number of FEMALE students with OTHER AVERAGE	2	107	53.50
Total Number of MALE students in the class	17		
MALE students' AVERAGE MARK	40	680	40.00
TOTAL MARKS OF THE WHOLE CLASS	1207	AVERAGE	35.50

Class' overall average mark=35.5			AVERAGES
35.5		Total marks	
Total Number of students in the class	36	1278	35.50
Total Number of FEMALE students in the class	18		
Number of FEMALE students with average mark 28	15	420	28.00
Number of FEMALE students with OTHER AVERAGE	3	138	46.00
Total Number of MALE students in the class	18		
MALE students' AVERAGE MARK	40	720	40.00
TOTAL MARKS OF THE WHOLE CLASS	1278	AVERAGE	35.50

Class' overall average mark=35.5			AVERAGES
35.5		Total marks	
Total Number of students in the class	38	1349	35.50
Total Number of FEMALE students in the class	19		
Number of FEMALE students with average mark 28	15	420	28.00
Number of FEMALE students with OTHER AVERAGE	4	169	42.25
Total Number of MALE students in the class	19		
MALE students' AVERAGE MARK	40	760	40.00
TOTAL MARKS OF THE WHOLE CLASS	1349	AVERAGE	35.50

Class' overall average mark=35.5			AVERAGES
35.5		Total marks	
Total Number of students in the class	40	1420	35.50
Total Number of FEMALE students in the class	20		
Number of FEMALE students with average mark 28	15	420	28.00
Number of FEMALE students with OTHER AVERAGE	5	200	40.00
Total Number of MALE students in the class	20		
MALE students' AVERAGE MARK	40	800	40.00
TOTAL MARKS OF THE WHOLE CLASS	1420	AVERAGE	35.50

Class' overall average mark=35.5			AVERAGES
35.5		Total marks	
Total Number of students in the class	42	1491	35.50
Total Number of FEMALE students in the class	21		
Number of FEMALE students with average mark 28	15	420	28.00
Number of FEMALE students with OTHER AVERAGE	6	231	38.50
Total Number of MALE students in the class	21		
MALE students' AVERAGE MARK	40	840	40.00
TOTAL MARKS OF THE WHOLE CLASS	1491	AVERAGE	35.50

Class' overall average mark=35.5			AVERAGES
35.5		Total marks	
Total Number of students in the class	44	1562	35.50
Total Number of FEMALE students in the class	22		
Number of FEMALE students with average mark 28	15	420	28.00
Number of FEMALE students with OTHER AVERAGE	7	262	37.43
Total Number of MALE students in the class	22		
MALE students' AVERAGE MARK	40	880	40.00
TOTAL MARKS OF THE WHOLE CLASS	1562	AVERAGE	35.50

Class' overall average mark=35.5			AVERAGES
35.5		Total marks	
Total Number of students in the class	46	1633	35.50
Total Number of FEMALE students in the class	23		
Number of FEMALE students with average mark 28	15	420	28.00
Number of FEMALE students with OTHER AVERAGE	8	293	36.63
Total Number of MALE students in the class	23		
MALE students' AVERAGE MARK	40	920	40.00
TOTAL MARKS OF THE WHOLE CLASS	1633	AVERAGE	35.50

Class' overall average mark=35.5			AVERAGES
35.5		Total marks	
Total Number of students in the class	48	1704	35.50
Total Number of FEMALE students in the class	24		
Number of FEMALE students with average mark 28	15	420	28.00
Number of FEMALE students with OTHER AVERAGE	9	324	36.00
Total Number of MALE students in the class	24		
MALE students' AVERAGE MARK	40	960	40.00
TOTAL MARKS OF THE WHOLE CLASS	1704	AVERAGE	35.50

Class' overall average mark=35.5			AVERAGES
35.5		Total marks	
Total Number of students in the class	50	1775	35.50
Total Number of FEMALE students in the class	25		
Number of FEMALE students with average mark 28	15	420	28.00
Number of FEMALE students with OTHER AVERAGE	10	355	35.50
Total Number of MALE students in the class	25		
MALE students' AVERAGE MARK	40	1000	40.00
TOTAL MARKS OF THE WHOLE CLASS	1775	AVERAGE	35.50

Class' overall average mark=35.5			AVERAGES
35.5		Total marks	
Total Number of students in the class	52	1846	35.50
Total Number of FEMALE students in the class	26		
Number of FEMALE students with average mark 28	15	420	28.00
Number of FEMALE students with OTHER AVERAGE	11	386	35.09
Total Number of MALE students in the class	26		
MALE students' AVERAGE MARK	40	1040	40.00
TOTAL MARKS OF THE WHOLE CLASS	1846	AVERAGE	35.50

Class' overall average mark=35.5			AVERAGES
35.5		Total marks	
Total Nunber of students in the class	54	1917	35.50
Total Number of FEMALE students in the class	27		
Number of FEMALE students with average mark 28	15	420	28.00
Number of FEMALE students with OTHER AVERAGE	12	417	34.75
Total Number of MALE students in the class	27		
MALE students' AVERAGE MARK	40	1080	40.00
TOTAL MARKS OF THE WHOLE CLASS	1917	AVERAGE	35.50

Class' overall average mark=35.5			AVERAGES
35.5		Total marks	
Total Nunber of students in the class	56	1988	35.50
Total Number of FEMALE students in the class	28		
Number of FEMALE students with average mark 28	15	420	28.00
Number of FEMALE students with OTHER AVERAGE	13	448	34.46
Total Number of MALE students in the class	28		
MALE students' AVERAGE MARK	40	1120	40.00
TOTAL MARKS OF THE WHOLE CLASS	1988	AVERAGE	35.50

Class' overall average mark=35.5			AVERAGES
35.5		Total	

		marks	
Total Number of students in the class	58	2059	35.50
Total Number of FEMALE students in the class	29		
Number of FEMALE students with average mark 28	15	420	28.00
Number of FEMALE students with OTHER AVERAGE	14	479	34.21
Total Number of MALE students in the class	29		
MALE students' AVERAGE MARK	40	1160	40.00
TOTAL MARKS OF THE WHOLE CLASS	2059	AVERAGE	35.50