

$$N=n$$

$$\Rightarrow$$

1. $\frac{n}{2}(1+n)$ This is the sum of numbers 1 to n

2. $\frac{n}{2}(1+n) - x$ This is the sum, take away x, the wiped out number

3. $\frac{\frac{n}{2}(1+n) - x}{n-1}$ This is the mean, without x

4. $\frac{\frac{n}{2} + \frac{n^2}{2} - x}{n-1}$ //

5. ~~$\frac{n^2 + n - 2x}{2n-2}$~~ $\frac{n^2 + n - 2x}{2n-2}$ // Simplify

6. $\frac{n^2 + n - 2x}{2n-2}$ //

7. $\frac{(n+2)(n-1) + 2 - 2x}{2(n-1)}$ // Factorise

8. $\frac{(\frac{1}{2}n+1)(n-1) + 1 - x}{(n-1)}$ //

9. $\frac{n+2}{2} + \frac{1-x}{n-1}$ (10.) $\frac{1-x}{n-1} = 0$ or $\frac{1-x}{n-1} = -1$
 \downarrow \downarrow $1-x=0$ $1-x=-n+1$
 $x=1$ $x=n$

n: even

n-1: odd

$\frac{n+2}{2}$: even whole

$\frac{1-x}{n-1}$ must be 0 or -1 to make a whole number*

x can't be $> n$, $x > 0$

\therefore x must be 1 or n if n is even

*it is not possible for $\frac{1-x}{n-1}$ to be a positive number since x can't be less than $\frac{n-1}{n-1}$ 0.

21/6/24

If n is odd:

$$\frac{n+2}{2} + \frac{1-x}{n-1}$$

$\frac{n+2}{2}$ is not a whole number, decimal ending ~~in~~ .5

$\frac{1-x}{n-1}$ also needs to end .5

The answer is still negative since x can't be ~~more than~~ less than 0.

The answer must be ~~less than~~ more than -1 because x ~~is~~ cannot be more than n .

$n-1$ is even

$1-x$ must be $-\frac{1}{2}$ of $n-1$

$$1-x = -\frac{1}{2}(n-1)$$

$$2x-2 = n-1$$

$$2x = n+1$$

$$x = \frac{n+1}{2}$$

\therefore x is $\frac{1}{2}$ of $(n+1)$ when n is odd
to make the mean of the ~~sequence~~ numbers
1 to n when x is removed a whole number.

This does not work when n is 1 as the sequence would only have 1 number and it would have to be wiped out.

We can check it is correct using step 3

$$3. \frac{\frac{n}{2}(n+1) - x}{n-1}$$

If odds $\frac{\frac{n}{2}(n+1) - \frac{1}{2}(n+1)}{n-1}$

If even $\frac{\frac{n}{2}(n+1) - n}{n-1}$

$$\cdot \frac{n^2 + n - n - 1}{2}$$

$$\frac{\quad}{n-1}$$

$$\cdot \frac{n^2 + n - n}{2}$$

$$\frac{\quad}{2n-1}$$

$$\cdot \frac{n^2 - 1}{2(n-1)}$$

$$\cdot \frac{n + n - 2n}{2}$$

$$\frac{\quad}{2n-1}$$

$$\cdot \frac{(n+1)(n-1)}{2(n-1)}$$

$$\cdot \frac{n - n}{2(n-1)}$$

$$\cdot \frac{n(n-1)}{2(n-1)}$$

$$\cdot \boxed{\frac{n+1}{2}}$$

$$\cdot \boxed{\frac{n}{2}}$$

∴ If n is odd $\frac{n+1}{2}$ gives a whole number

∴ If n is even $\frac{n}{2}$ gives a whole number

If $x=1$ or n being even: $\frac{\frac{n}{2}(n+1) - 1}{n-1}$

$$\frac{n^2 + n - 2}{2(n-1)}$$

$$\frac{(n+2)(n-1)}{2(n-1)}$$

$$\frac{n+2}{2}$$

21/6/24

$$1, 2, 3, 4, 5, 6 \quad \text{Sum} = 21$$

$$\frac{21-x}{5} : \text{Whole number}$$

$21-x$ must be a multiple of 5 for this to be true so $x = 1$ or 6

$$1-6 \quad \text{Sum} = 21$$

$$3 \cdot 6 \times 5 = 18$$

$$21 - 18 = 3$$

$\therefore 3$ was wiped out

$$1-15 \quad \text{Sum} = 120$$

$$7 \cdot 714285 = \frac{54}{7}$$

$$\frac{54}{7} \times 14 = 108$$

$$120 - 108 = 12$$

$\therefore 12$ was wiped out
