

The sum of the first 30 odd numbers is 900

The sum of the first 60 odd numbers is 3600

When I was solving the problem I spotted a pattern

$$1+3=4$$
$$4=2^2$$

$$1+3+5=9$$
$$9=3^2$$

$$1+3+5+7=16$$
$$16=4^2$$

Formula: $n^2 = y$

let n = number of odd numbers

let y = sum of the odd numbers

$$30^2 = 900$$

$$60^2 = 3600$$

You can make 3249 by adding odd numbers

$$n^2 = 3249$$
$$\sqrt{n^2} = \sqrt{3249}$$

cancel

The first 57 odd numbers will add up to 3249.

$$n = \sqrt{3249}$$

$$n = 57$$

To find the amount of odd numbers in 153, we can see how many are in 10.

1, 2, 3, 4, 5, 6, 7, 8, 9, 10

5/10 are odd

$$\begin{array}{r} 25 \\ \times 15 \\ \hline 75 \end{array}$$

75 odd numbers in 150

$$\begin{array}{r} 151 \quad 152 \quad 153 \\ \hline \end{array}$$

add two more for 153

77 odd numbers in 153

to find the value of $1+3+\dots+153$ we can do $77^2 = 5929$

Lets try for $1+3+\dots+83$

$$\begin{array}{r} 5 \\ \times 8 \\ \hline 40 \end{array}$$

40 odd numbers in 80

81, 82, 83

42 odd numbers in 83.

Now, to find the sum, you do $42^2 = 1764$.

Now, to find $51+53+\dots+153$

we have to find the amount of $1+3+\dots+153$,

We did this previously and know it equals $= 5929$

So then we find $1+3+\dots+51$

odd numbers $= (5 \times 5) + 1$

odd numbers $= 26$

$26^2 = 676$ then we do $5929 - 676 = 5253$

$5253 + 51 = 5304$

First, I wrote out $1+2+3+4+5+6+7+8$

$$1+3+5+7=4^2$$

$$2+4+6+8=4^2+4$$

So even number formula $= x^2 + x$

x = number of even/odd in the set.

So if there is 77 even numbers in 154

we do $77^2 + 77 = y$

$$5929 + 77 = y$$

$$(6006) = y$$

Sum of $2+6+\dots+298+302+306?$

$$\begin{array}{r} 300 \\ 2 \\ \hline 150 \\ 2 \\ \hline 75 + 2 = 77 \\ 302 \quad 306 \\ 2 \text{ extra} \end{array}$$

77 numbers in the set

$2+6+10,\dots$

$$\begin{aligned} 2 &= 2 \times 1 + 2 \\ 6 &= 2 \times 3 + 2 \\ 10 &= 2 \times 5 + 2 \\ 14 &= 2 \times 7 + 2 \end{aligned}$$

$$1+3+5+7+9$$

5/10 odd

$$\begin{array}{r} 5 \\ \times 75 \\ \hline 75 \end{array} \begin{array}{l} 2 \\ 77 \text{ odd} \end{array}$$

rewrite this as
 $(2 \times 1) + (2 \times 3) + (2 \times 5) + (2 \times 7) \dots (2 \times 149) (2 \times 151) (2 \times 153)$

lets factor 2 out of the number =

$$2(1+3+5+7,\dots+149+151+153)$$

In the parenthesis we have the sum of odd numbers from 1-153

$$77^2 = \text{odd numbers sum}$$

$$77^2 = 5929$$

$$2(5929)$$

$$(11,858)$$

$$2+6+\dots+298+302+306 = (11,858)$$