

- The summation can only be 0 when there 11 +1's or 11 -1's.
- But then the product will be -1  $\because$  the no. of -1's is odd.

**Prob 19:** Can one form a magic square out of the first 36 prime numbers?

• A "magic square" here means a  $6 \times 6$  array of boxes, with a no. in each box, and such that the sum of the numbers along any row, column or diagonal is constant.

Ans:) Out of the first 36 prime no.s, only 2 is even; the rest are odd.

~~Can be part of~~ The row, column/diagonal whose part 2 is contains 5 odd no.s.  $\therefore$  The sum of the no.s in that row/col/diagonal is odd ( $\because$  5 is odd)

• But all those rows/columns/diagonals where there is no 2 contains 6 odd no.s and hence the sum is even.

$\therefore$  Such a magic square is not possible.

**Prob 21:** A grasshopper jumps along a line. His first jump takes him 1 cm, his second 2 cm, and so on. Each jump can take him to the right or to the left. Show that after 1985 jumps, the grasshopper cannot return to the point at which he started.

Ans:) This problem is <sup>equivalent</sup> ~~similar~~ to solving whether there exists an arbitrary appln. of + and - in between the no.s 1 to 1985 which will give a value 0 to the resulting expression.

• Since, we have 993 odd integers, <sup>an arbitrary</sup> application of + and - in between them will result in an odd integer.

$\therefore$  The final result can never be 0,  $\because$  0 is even.

**Prob 24:** A 17-digit number is chosen, and its digits are reversed, forming a new number. These two numbers are added together. Show that their sum contains atleast one even digit.