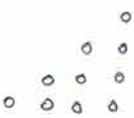
find $1+2+\dots+n$ for $n \in \mathbb{N}$

(GS) — notation: $S_n := 1+2+\dots+n$

└ special cases:

n	S_n
1	1
2	3
3	6
4	10
5	15

(Rep) — geometry: 

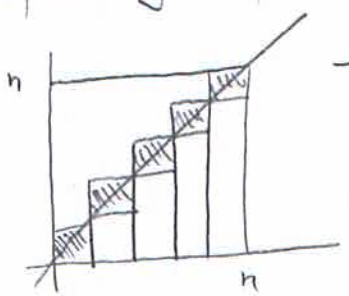
└ algebra: $S_n = 1+2+\dots+n$

(Plan) — exploit symmetry

$$S_n = 1+2+\dots+n$$
$$S_n = n+n-1+\dots+1$$
$$2S_n = (n+n)+(n+n)+\dots+(n+n) \quad (n \text{ times})$$

$$\Rightarrow S_n = \frac{n(n+n)}{2}$$

(Alternative plan) — exploit geometry



$$\rightarrow 2S_n = n^2 + n$$

$$\Rightarrow S_n = \frac{n(n+n)}{2}$$

(?) – no insight from table

└ Do: try alternatives

(!) $S_n \approx \frac{1}{2}n^2$

$S_n > \frac{1}{2}n^2$

(?) – using symmetry?

└ Do: generate approach

- reverse
- add

✓

✓