1.2 - Applications

1. Finding the value of a sum:

You need to use the formula and you need to know/find the number of terms, and the values of the first and last terms…
2. Finding the general term when you are given the values of 2 sums:

By combining the 2 main formulas, you get: $S\_{n}= \frac{n}{2}\left(2t\_{1}+\left(n-1\right)d\right)$ which allows you to express each sum in terms of t1 and d…
You get 2 equations with 2 variables, which you know how to solve…

example: S5 = 55 and S20 = 670.
 🡪 $55=\frac{5}{2}\left(2t\_{1}+4d\right)$ and $670=\frac{20}{2}\left(2t\_{1}+19d\right)$
 110 = 10*t1* + 20*d*  670 = 20*t1* + 190*d*
 or simply 11 = *t1* + 2*d* and 67 = 2*t1* + 19*d*
 I can solve this system by substitution or by combination…
 Let’s do combination:
 $\left\{\begin{array}{c}11 = t1 + 2d \\67 = 2t1 + 19d \end{array}\right.$
 To cancel t1, I multiply the 1st equation by -2 (or 2)…
 $\left\{\begin{array}{c}-22= -2t\_{1}-4d\\ 67=2t\_{1}+19d\end{array}\right.$ which gives: *d* = 3
 To cancel *d*, I multiply the 1st equation by 19 and the 2nd by -2 (or 2)…
 $\left\{\begin{array}{c} 209=19 t\_{1}+38d\\-134=-4t\_{1}-38d\end{array}\right.$ which gives: $t\_{1}=5$
 Finally: $t\_{n}=5+(n-1)×3$ or $t\_{n}=3n+2$