What is an arithmetic series?

- An arithmetic series is a sequence in which the terms are summed together.
 - The terms are separated by a "+" sign instead of a comma.

Example 1: Find the sum for each arithmetic series.

a. $1+2+3+4+5+6+7+8+9+10$	b. $-5+(-11)+(-17)+(-23)+(-29)+(-35)+(-41)$

Even with a calculator, finding the sum of any really long arithmetic series will take a long time. Again, let's see if we can find a pattern to make things simpler.

Example 2: Look at this arithmetic series and answer a couple of questions.

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3+6+9+12+15+18+21+24+27+30
```

- Is there a consistent/constant value when adding any 2 numbers together?
- What is the maximum number of ways can you do obtain this value?

All arithmetic series must start with a number, 'a', and finish with another number, 'l or t_n '. They must all have a finite/predetermined # of terms, 'n', to find the sum.

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Using the following variables and any pattern you see, can you develop a general formula to determine the sum of any arithmetic series?

'a' = value of $1^{s^{\dagger}}$ term in sequence	n' = number of terms in sequence
t_n ' = value of n th term in sequence	$S_n' = \text{sum of series with } n' \text{ terms}$

Example 3: Determine the sum of this arithmetic series.

```
8+15+22+29+36+43+50+57+64+71
```

What do we do if we don't know the value of the last term in any arithmetic series?

• Logic would tell us that we should probably try and apply what we've learned from previous sections or know from prior knowledge.

Example 4: Apply one of the general formulas to find the following sums.



Example 5: Determine the sum of the following arithmetic series.

a. 6+10+14+ +82	b. $20+14+8+\ldots+(-40)$

Example 6: Caitlyn is back for the summer after completing her 1st year at Queen's University. She's been offered two jobs that will keep her busy during the 4 months (17 weeks) that she's in town. The 1st job pays \$325/month with a monthly raise of \$100, and the 2nd job pays \$50/week with a weekly raise of \$10. Which job will yield Caitlyn the higher pay and by how much?

Example 7: Apple juice cans are arranged in layers forming an arithmetic sequence. There are 35 cans in the 4th layer and 20 cans in the 9th layer.

a. How many cans are in the 1st layer?

b. How many possible layers are there in total?

c. How many possible cans are there in total?

Homework: