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## Problem 1 - Sum of Arithmetic Sequences

Step 1: Press STAT ENTER and enter the numbers 1 to 10 in list L1.

Step 2: Enter the numbers in reverse order into list L2.
Step 3: Now, arrow to the top of the L3. Enter L1+L2 by pressing 2nd $1 \rightarrow$ 2nd 2 ENTER.

| L1 | L2 | 4 | 3 |
| :---: | :---: | :---: | :---: |
| 1 | 10 |  |  |
| E | 㫛 |  |  |
| 4 | 7 |  |  |
| $\stackrel{\mathbf{5}}{\mathbf{6}}$ | 5 |  |  |
| 7 |  |  |  |
| L三 $=L_{1}+L \Sigma$ |  |  |  |

- What do you notice about the sums in list L3?
- How do you find the sum of L3 without adding all the values individually?
- How does the sum of L3 compare to the sum of L1?

Repeat the steps above for lists:
$-3,0,3,6,9,12,15 \quad$ and $10,8,6,4,2,0,-2$
Note: You will need to clear L1, L2 and L3 each time by arrowing up to the top of each list and pressing CLEAR.


- Based upon what you have observed from the three previous investigations, conjecture a formula for the sum of an arithmetic sequence.
- Apply the formula to find the sum of the following sequences. Show your work.
o $9,1,-7,-15,-23,-31,-39$
o $3,13,23,33,43,53,63,73,83,93,103,113$


## Sums of Sequences

## Problem 2 - Sum of Geometric Sequences

Step 1: Press STAT ENTER and enter the numbers 1, 2, 4, 8, 16 in list L1. Examine L1 to determine the common ratio between the terms.

Step 2: Multiply each of the terms in L1 by the common ratio. Arrow to the top of L2 and enter L2*(your common ratio).

| L1 | Tir | LЗ | 2 |
| :---: | :---: | :---: | :---: |
| $\begin{aligned} & 1 \\ & \frac{1}{2} \\ & 4 \\ & 1 \\ & 16 \end{aligned}$ |  |  |  |
| Lz $=L_{1}$ 't: |  |  |  |

Notice the diagonals of the two columns have the same values. If you subtract the values that are the same, only two values remain.

Step 3: What is the difference between these two values?

Step 4: What number do you need to divide your difference value in order to get the sum of the values in L1?

- Rewrite each value in L1 using the common ratio. How can you find the difference value you calculated only using the values in L1?

Step 5: Repeat the steps above for lists:

$$
1,3,9,27,81 \quad \text { and } \quad 1,4,16,64,256
$$

Remember to clear your lists after each investigation.

- Based upon what you have observed from the three previous investigations, conjecture a formula for the sum of a geometric sequence.
- Apply the formula to find the sum of the following sequences. Show your work.
o $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}$
o $1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}$
o $1,-2,4,-8,16,-32,64$

