Sequences &
Series Introduction

Definition	Facts/Characteristics
An ordered list of numbers called Terms	- Has a pattern - Can be infinite (contin without end - can be finite - has a last Term
Examples	Non-examples
1, 2, 4, 8... 5, 7, 9, 11...	14, 16, 21, 18, 19, 54

Sequence

The petals of a flower are as follows:

1, 1, 2, 3, 5, 8, 13, …

Can you find the next four values?

Sequence

- **Terms represented by t :**

$$t_1, t_2, t_3, \ldots, t_{n-1}, t_n$$

The
term before t_n

$$t_n \quad t_{n-1}$$
$$t_{11} \quad t_{11-1} = t_{10}$$
$$t_4 \quad t_3$$

Explicit Formula

- Formula that defines the nth term.

(Plugging in the term # "n")

Write the first four terms of the sequence defined by the explicit formula :

$$t_n = -4n + 5$$

t_1

-4(1)+5
-4(2)+5   -4(3)+5   -4(4)+5

n	1	2	3	4		
t	1	-3	-7	-11		

1, -3, -7, -11 . . . .

Write the first four terms of the sequence defined by the explicit formula :

$$t_n = 2^n - 1$$

n	1	2	3	4		
t	1	3	7	15		

Write the first four terms of the sequence defined by the explicit formula :

$$t_n = 2 + (-1)^n$$

n						
t						

Recursive Formula

- **One or more previous terms are used to generate the next term.**

- **Find the next three terms:**
- **4, 7, 10, 13, 16,** *19, 22, 25*
  ×3 ×3   ×3

- **2, -6, 18, -54,** *162, -486, 1,458*
  ·-3   ·-3

- **1, 4, 9, 16,**

Write the first four terms of the sequence defined by the recursive formula :

$$t_2 = 2t_{n-1} + 8$$

$$t_1 = 5$$

$t_2 = 2t_1 + 8$
$2(5) + 8$

$t_3 = 2t_2 + 8$
$2(18) + 8$

$t_4 = 2t_3 + 8$

n	1	2	3	4		
t	5	18	44	96		

Write the first four terms of the sequence defined by the recursive formula :

$$t_n = -3t_{n-1} + 2$$

$$t_1 = 2$$

n		1					
t		2	-4	14	-40		

Back to the petals of a flower:

1, 1, 2, 3, 5, 8, 13, …

$$t_n = t_{n-2} + t_{n-1}$$

Can you write a recursive formula for this?

$$t_n = t_{n-1} + t_{n-2}$$

Write a recursive formula for the sequence shown below and find the next three terms.

$$2, 8, 14, 20, 26, \ldots$$

$\times 6 \quad \times 6$

$$t_n = t_{n-1} + 6$$

Write a recursive formula for the sequence shown below and find the next three terms.

$$7, 11, 15, 19, \ldots$$

Write a recursive formula for the sequence shown below and find the next three terms.

$$2, 7, 22, 67, \ldots$$

$$t_n = 3t_{n-1} + 1$$