

# 1.11 I Know ... What Do You Know?

## A Practice Understanding Task



CC BY Jim Larrison

<https://flic.kr/p/9mp2c9>

In each of the problems below I share some of the information that I know about a sequence. Your job is to add all the things that you know about the sequence from the information that I have given. Depending on the sequence, some of the things you may be able to figure out for the sequence are:

- a table;
- a graph;
- an explicit equation;
- a recursive formula;
- the constant ratio or constant difference between consecutive terms;
- any terms that are missing;
- the type of sequence;
- a story context.

Try to find as many as you can for each sequence, but you must have at least 4 things for each.

1. I know that: the recursive formula for the sequence is  $f(1) = -12, f(n) = f(n-1) + 4$

What do you know?

Table

$n$	$f(n)$
1	-12
2	-8
3	-4
4	0
...	

Explicit:  $f(n) = -12 + 4(n-1)$   
 $f(n) = 4n - 16$

Common Difference: 4  
 Arithmetic

2. I know that: the first 5 terms of the sequence are 0, -6, -12, -18, -24 ...

What do you know?

$n$	$f(n)$
1	0
2	-6
3	-12
4	-18
5	-24
...	

C.d = -6  
 Arithmetic

Recursive:  $f(1) = 0, f(n) = f(n-1) - 6$   
 Explicit:  $f(n) = 0 - 6(n-1)$   
 $f(n) = -6n + 6$

3. I know that: the explicit formula for the sequence is  $f(n) = -10(3)^n$

What do you know?

Geometric  
 C.R = 3

n	f(n)
1	-10
2	-30
3	-90
4	-270
5	-810

Recursive:  $f(1) = -10$   
 $f(n) = 3f(n-1)$

4. I know that: The first 4 terms of the sequence are 2, 3, 4.5, 6.75 ...

What do you know?

Geometric  
 C.R = 1.5

n	f(n)
1	2 $\swarrow \times 1.5$
2	3 $\swarrow \times 1.5$
3	4.5 $\swarrow \times 1.5$
4	6.75 $\swarrow \times 1.5$
...	

Recursive:  $f(1) = 2$   $f(n) = 1.5f(n-1)$   
 Explicit:  $f(n) = 2(1.5)^{n-1}$

5. I know that: the sequence is arithmetic and  $f(3) = 10$  and  $f(7) = 26$

What do you know?

$$C.D = \frac{26-10}{7-3} = \frac{16}{4} = 4$$

Recursive:  $f(1) = 2$   
 $f(n) = f(n-1) + 4$

n	f(n)
1	2
2	6
3	10
4	14
5	18
6	22
7	26

Explicit:  $f(n) = 2 + 4(n-1)$   
 $f(n) = 4n - 2$

6. I know that: the sequence is a model for the perimeter of the following figures:

Figure 1

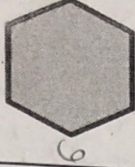


Figure 2

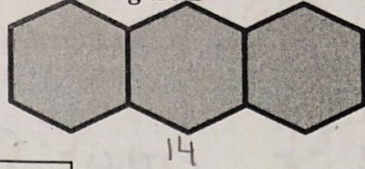
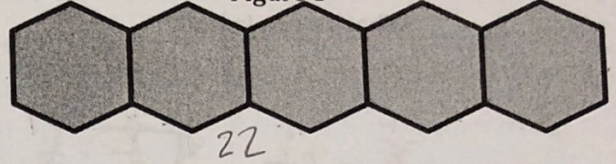


Figure 3



Length of each side = 1

$n$	$f(n)$
1	6
2	14
3	22
$\vdots$	

What do you know?

Arithmetic

CD = 8

Recursive:  $f(1) = 6$   $f(n) = f(n-1) + 8$

Explicit:  $f(n) = 6 + 8(n-1)$

$f(n) = 8n - 2$

7. I know that: it is a sequence where  $f(1) = 5$  and the constant ratio between terms is  $-2$ .

What do you know?

$n$	$f(n)$
1	5
2	-10
3	20
4	-40
$\vdots$	

Geometric

Recursive:  $f(1) = 5$   $f(n) = -2f(n-1)$

Explicit:  $f(n) = 5(-2)^{n-1}$

8. I know that: the sequence models the value of a car that originally cost \$26,500, but loses 10% of its value each year.

What do you know?

$n$	$f(n)$
0	26,500
1	23,850
2	21,465
3	19,318.5
4	17,386.65

Geometric

CR = .9

Recursive:  $f(0) = 26,500$

$f(n) = .9 f(n+1)_n$

Explicit:  $f(n) = 26,500(.9)^n$

Could be either

9. I know that: the first term of the sequence is -2, and the fifth term is  $-\frac{1}{8}$ .

What do you know?

$f(1) = -2$     $f(5) = \frac{1}{8}$

$-\frac{1}{8} = \frac{1}{16} \cdot \frac{1}{2}$     $\sqrt[4]{\frac{1}{16}} = \frac{1}{2}$

CR =  $\frac{1}{2}$

Geometric

n	f(n)
1	-2
2	-1
3	$-\frac{1}{2}$
4	$-\frac{1}{4}$
5	$-\frac{1}{8}$

Recursive:  $f(1) = -2$   
 $f(n) = \frac{1}{2} f(n-1)$

Explicit:  $f(n) = -2 \left(\frac{1}{2}\right)^{(n-1)}$

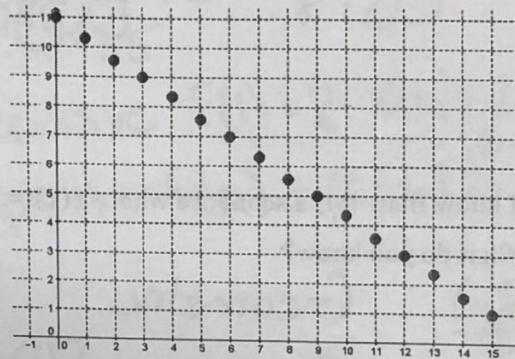
10. I know that: a graph of the sequence is:

What do you know?

Arithmetic

CD =  $-\frac{2}{3}$

n	f(n)
0	11
1	10.33
2	9.67
3	9
4	8.33
⋮	

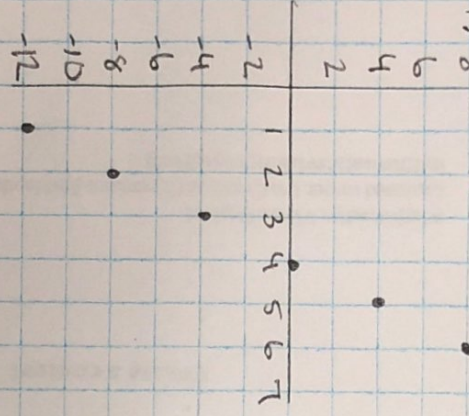


$f(0) = 11$     $f(3) = 9$   
 $\frac{9-11}{3-0} = -\frac{2}{3}$

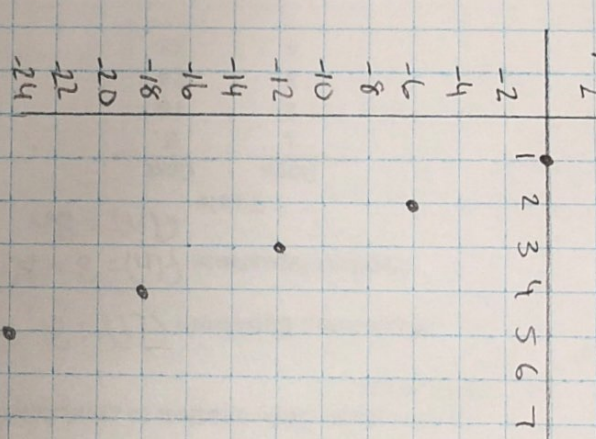
Recursive:  $f(0) = 11$   
 $f(n) = f(n-1) - \frac{2}{3}$

Explicit:  $f(n) = 11 - \frac{2}{3}n$

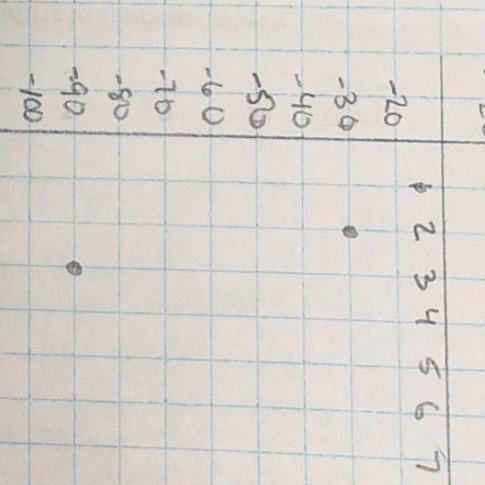
1) 10



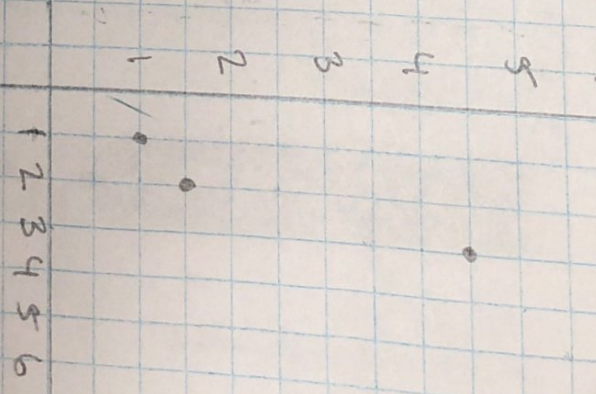
2) 2



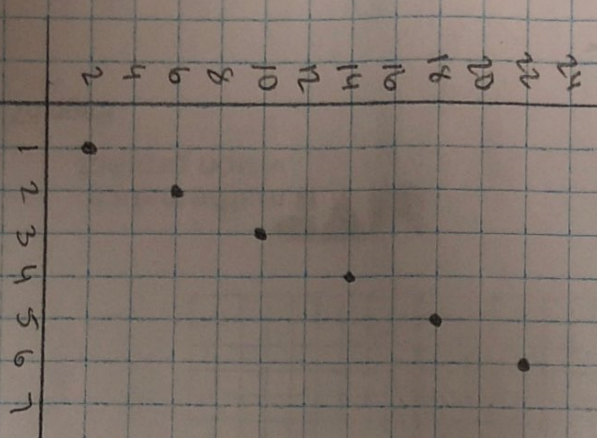
3) 20



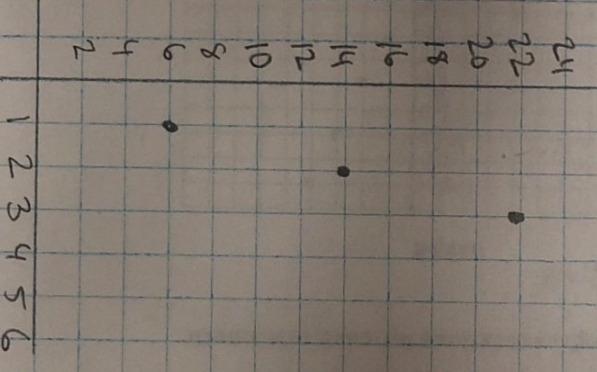
4) 6



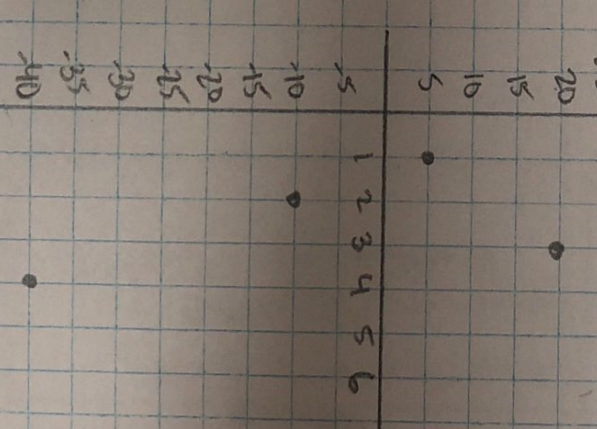
5) 10



6) 24



7) 25



8) 25,000

