

Name:

## Sequences and Functions: End-of-Unit Assessment

You may use a scientific calculator.

1. Which formula defines the sequence  $f(1) = 2$ ,  $f(2) = 6$ ,  $f(3) = 10$ ,  $f(4) = 14$ ,  $f(5) = 18$ ?

A.  $f(1) = 2$ ,  $f(n) = 6 + f(n - 1)$  for  $n \geq 2$

B.  $f(1) = 2$ ,  $f(n) = 4 + f(n - 1)$  for  $n \geq 2$

C.  $f(1) = 2$ ,  $f(n) = 2 + f(n - 1)$  for  $n \geq 2$

D.  $f(1) = 6$ ,  $f(n) = 4 + f(n - 1)$  for  $n \geq 2$

2. A sequence is defined by  $f(1) = 3$  and  $f(n) = 2 \cdot f(n - 1)$  for  $n \geq 2$ . Which of the following statements defines the  $n^{\text{th}}$  term of  $f$ ?

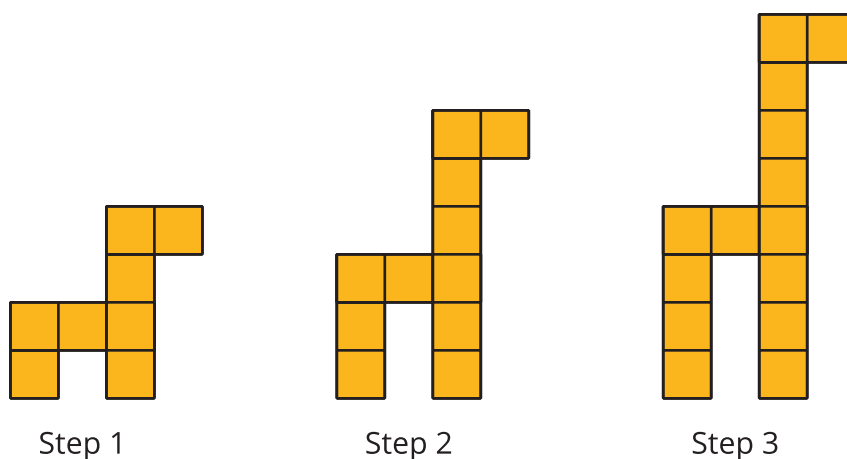
A.  $f(n) = 3 + 2(n - 1)$  for  $n \geq 1$

B.  $f(n) = 3 + 2n$  for  $n \geq 1$

C.  $f(n) = 3 \cdot 2^{n-1}$  for  $n \geq 1$

D.  $f(n) = 3 \cdot 2^n$  for  $n \geq 1$

3. Here is a growing pattern of squares:



Select **all** the expressions that represent the number of squares in Step  $n$ .

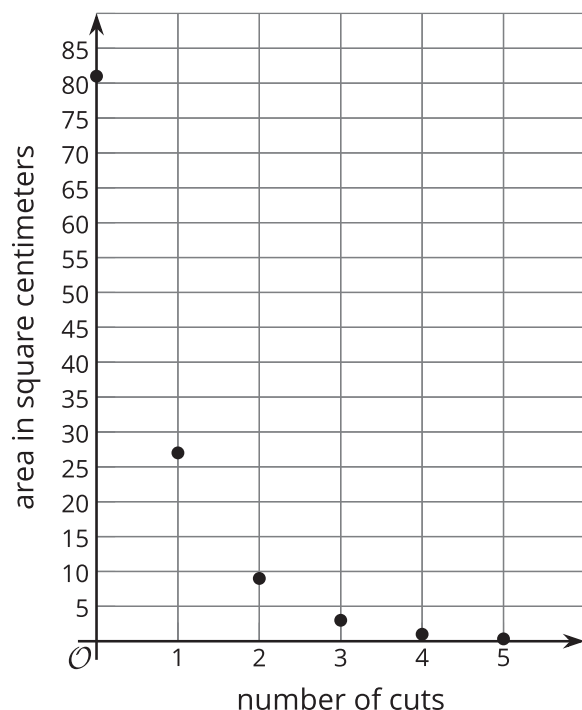
- A.  $f(n) = 8 + 3(n - 1)$  for  $n \geq 1$
- B.  $f(n) = 3 + 8(n - 1)$  for  $n \geq 1$
- C.  $f(1) = 8, f(n) = 3 + f(n - 1)$  for  $n \geq 2$
- D.  $f(1) = 8, f(n) = 8 + f(n - 1)$  for  $n \geq 2$
- E.  $f(n) = 3 + 8n$  for  $n \geq 1$
- F.  $f(n) = 3n + 5$  for  $n \geq 1$

4. Here are some values of sequence  $Q$ . Write a recursive definition for the sequence.

$n$	$Q(n)$
1	3
3	8
7	18

5. A piece of paper has an area of  $81 \text{ cm}^2$ . A strip is cut off that is  $\frac{1}{3}$  the original area. From that strip, another strip is cut off that is  $\frac{1}{3}$  the area of the first, and so on.

Here is a graph and table representing sequence  $k$ , where  $k(n)$  is the area in square centimeters of the strip of paper after  $n$  cuts.



number of cuts	area in square centimeters
0	81
1	27
2	9
3	3
4	1

- Is sequence  $k$  geometric or arithmetic? Explain how you know.
- Write an equation to define sequence  $k$  recursively.
- For term  $k(n)$ , what are some values of  $n$  that make sense to use? What are some values of  $n$  that don't make sense to use? Explain your reasoning.

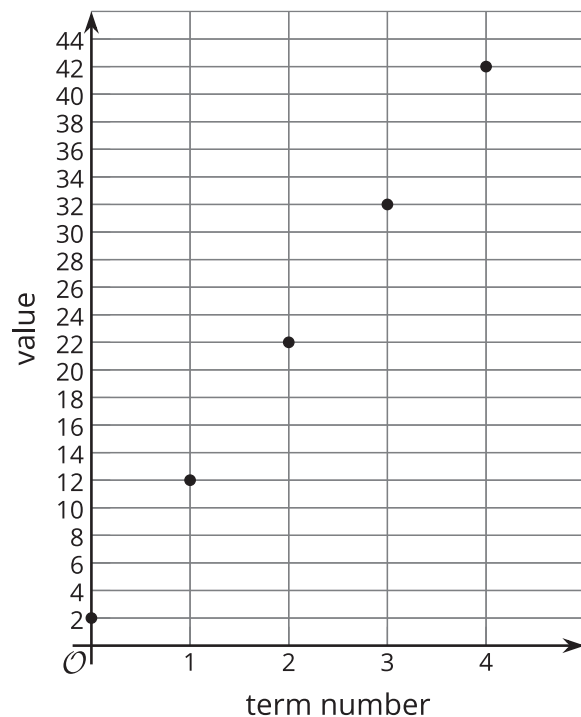
6. The first two numbers in a sequence  $h$  are  $h(1) = 2$  and  $h(2) = 6$ .
- a. If  $h$  is an arithmetic sequence, write a definition for the  $n^{\text{th}}$  term of  $h$ . Explain or show your reasoning.
- b. If  $h$  is a geometric sequence, write a definition for the  $n^{\text{th}}$  term of  $h$ . Explain or show your reasoning.

7. Here are two sequences:

Sequence *A*

term number	value
0	$\frac{1}{4}$
1	$\frac{1}{2}$
2	1
3	2
4	4

Sequence *B*



- For sequence *A*, describe a way to produce each new term from the previous term.
- For sequence *B*, describe a way to produce each new term from the previous term.
- Write a definition for the  $n^{\text{th}}$  term of sequence *A*.
- Write a definition for the  $n^{\text{th}}$  term of sequence *B*.
- If these sequences continue, then which is greater,  $A(9)$  or  $B(9)$ ? Explain or show how you know.