

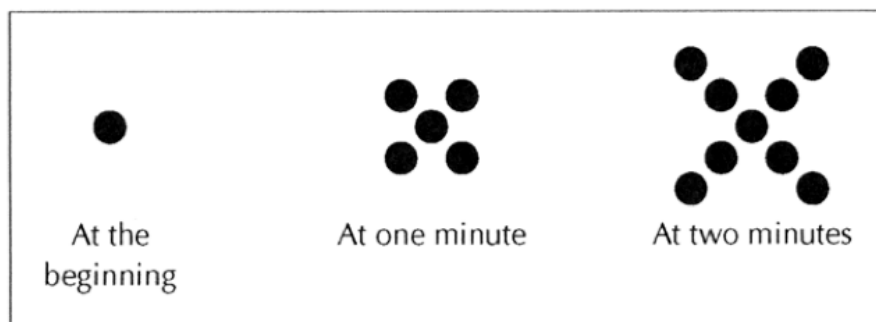
6-1 Arithmetic Sequences

Objectives

I can identify an arithmetic sequence.

I can write an arithmetic sequence as an explicit and recursive equation

Vocabulary - Common Difference, Term, initial value, explicit, recursive, arithmetic



1. Describe the pattern that you see in the sequence of figures above.

Adds 4 dots every minute

2. Assuming the sequence continues in the same way, how many dots are there at 3 minutes? At 4 minutes?

3 min = 13

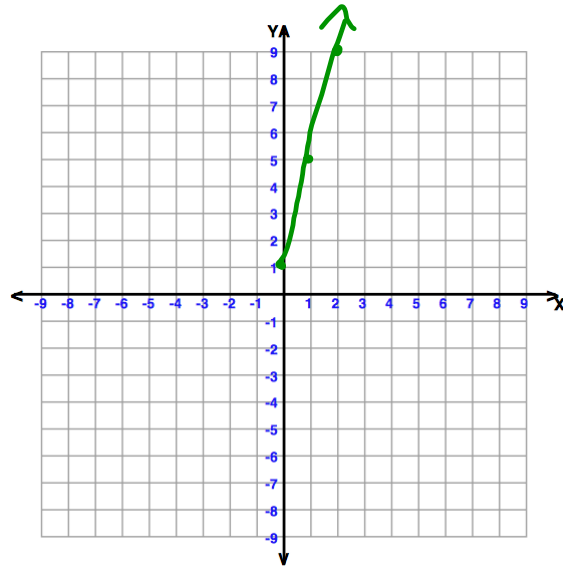
4 min = 17

3. Write an equation to represent the pattern

$$4x + 1$$

4. Make a table of values and graph

X	Minutes	y	dots
0			1
1			5
2			9
3			13



Given the following sequences of numbers, determine the change from term to term and state the next 2 numbers.

$$2, 5, 8, 11, 14, \dots, 17, 20$$

∨ ∨
+3 +3

$$7, 3, -1, -5, \dots, -9, -13$$

∨ ∨ ∨ ∨ ∨
-4 -4 -4 -4 -4

Vocabulary

Sequence: A list of #'s that follow a pattern

Arithmetic: when the same number is being added/subtracted every time

(d) Common Difference: the number that is being added/subtracted

(a) Initial Value: starting term, or the 0th term

Explicit Equation: $f(n) = d \cdot n + a$ *

equation that finds a certain term

Recursive Equation: $f(0) = a$

$f(n) = f(n-1) + d$
equation that finds the next term
term number = n

Find the next 3 terms in each sequence. Identify the common difference. Write a recursive equation and an explicit equation for each sequence. (The first number is the 1st term, not the 0th). Circle the constant difference in both functions.

④ 3, 8, 13, 18, 23, 28, 33, 38, ...

Constant Difference: +5

0th term: $-2 = a$

Recursive Equation:

$$f(0) = -2 \quad f(n) = f(n-1) + 5$$

Explicit Equation:

$$f(n) = 5 \cdot n - 2$$

⑤ 11, 9, 7, 5, 3, 1, -1, -3, ...

Constant Difference: -2

0th term: $13 = a$

Recursive Equation:

$$f(0) = 13 \quad f(n) = f(n-1) - 2$$

Explicit Equation:

$$f(n) = -2 \cdot n + 13$$

⑥ 3, 1.5, 0, -1.5, -3, -4.5, -6, -7.5, ...

Constant Difference: -1.5

Recursive Equation:

$$f(0) = \frac{4.5}{a} \quad f(n) = f(n-1) - \frac{1.5}{d}$$

Explicit Equation:

$$f(n) = \frac{4.5}{a}n - \frac{1.5}{d}n + 4.5$$

x	0	2	4	6
y	-5	-3	-1	1

Common Difference:

Next Term:

Explicit Equation:

Recursive Equation:

x	y
0	11
1	8
2	5
3	2

$\left. \begin{array}{l} \text{ } \\ \text{ } \\ \text{ } \end{array} \right\} -3$
 $\left. \begin{array}{l} \text{ } \\ \text{ } \end{array} \right\} -3$
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 $\left. \begin{array}{l} \text{ } \\ \text{ } \end{array} \right\} -3$

Common Difference: $-3 = d$

Next Term: -1

$a = 11$
 d { Explicit Equation: $f(n) = -3 \cdot n + 11$

a { Recursive Equation:

$$\begin{aligned} f(0) &= 11 \\ f(n) &= f(n-1) - 3 \end{aligned}$$

$$\underbrace{f(4)}_{4^{\text{th}} \text{ term}} = \underbrace{f(3)}_{3^{\text{rd}} \text{ term}} - 3$$

x	y	
1	3	> +4
2	7	> +4
3	11	> +4
4	15	> +4

Common Difference: +4

$$a = -1$$

Explicit Equation:

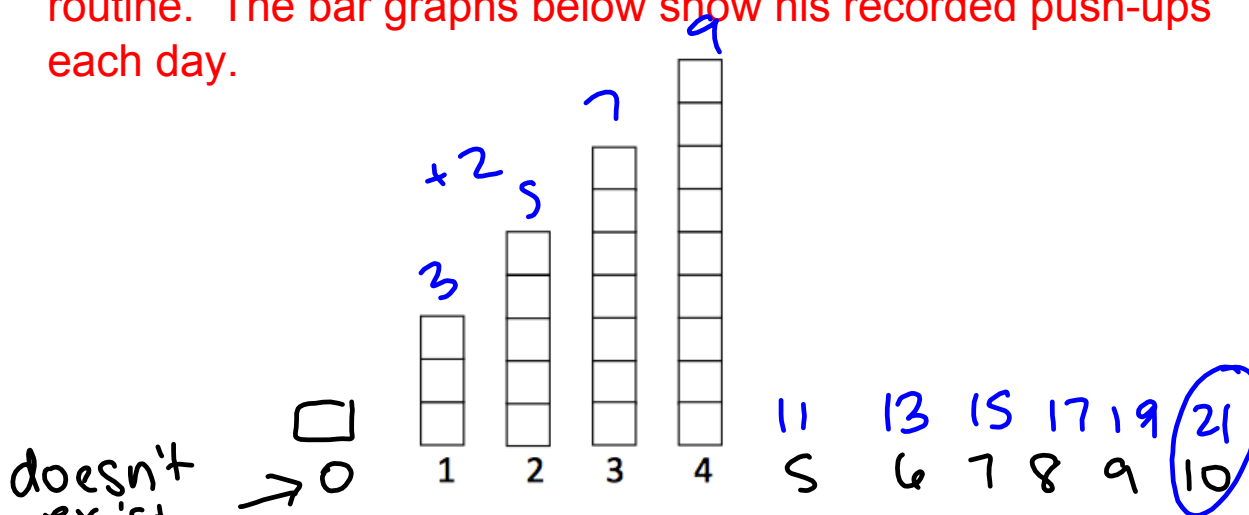
$$f(n) = 4 \cdot n - 1$$

Recursive Equation:

$$f(0) = -1$$

$$f(n) = f(n-1) + 4$$

Scott has decided to add push-ups to his daily exercise routine. The bar graphs below show his recorded push-ups each day.



How many push-ups will he do on day 10?

$$f(n) = 2 \cdot n + 1 = 2(10) + 1 = 21$$

Write an explicit and recursive equation for the number of push-ups Scott does

Write your own example of an arithmetic sequence. Then have your neighbor write the explicit and recursive equations for the sequence you created.