

Notes 3-1

Sec 1 H

Sequences and Recursive Equations

Unit 3

Warm-up:

Find the constant rate of change for the tables below.

1.

Time (min)	Jumping Jacks
1	50
2	90
3	130
4	170

$40 \cdot 5$
 $\frac{40 \text{ JJ}}{1 \text{ min}}$
 $x-1$
 x
40 JJ per min

210
 $\frac{210}{5} = 42$
 $f(x-1)$
 $f(x)$

2.

Time (day)	Money (dollars)
5	66
6	58
7	50
8	42

$8-8$
 $\frac{8-8}{1 \text{ day}}$
-8.00 per day

Recursive Equations: How to get to the next item in a table or sequence.

Starting point

Next = Previous \pm change ; $f(x)=y$
 $f(x) = f(x-1) \pm \text{change}$

Ex. 1:

x	0	1	2	3
$f(x)$	5	15	45	135

$\xrightarrow{\cdot 3}$ $\xrightarrow{\cdot 3}$ $\xrightarrow{\cdot 3}$

$f(x) = f(x-1) \cdot 3 ;$
 $f(0) = 5$

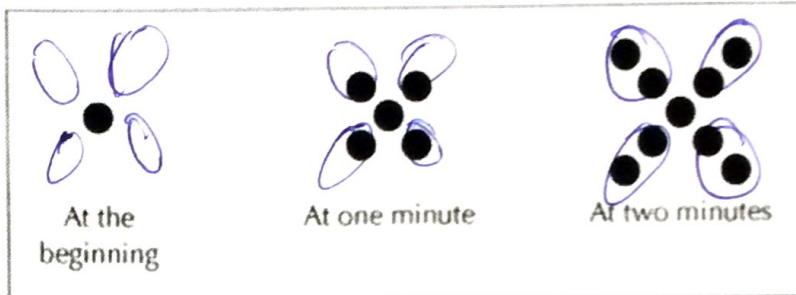
Ex.

x	1	2	3	4
$f(x)$	80	40	20	10

$\xrightarrow{\div 2}$ $\xrightarrow{\div 2}$ $\xrightarrow{\div 2}$
 $\cdot \frac{1}{2}$ $\cdot \frac{1}{2}$ $\cdot \frac{1}{2}$

$f(x) = f(x-1) \cdot \frac{1}{2} ;$
 $f(1) = 80$

Growing Dots



1. Describe the pattern you see to the right.

2. What is the **recursive equation** (together as a class)?

$$f(x) = f(x-1) + 4 ; \quad f(0) = 1$$

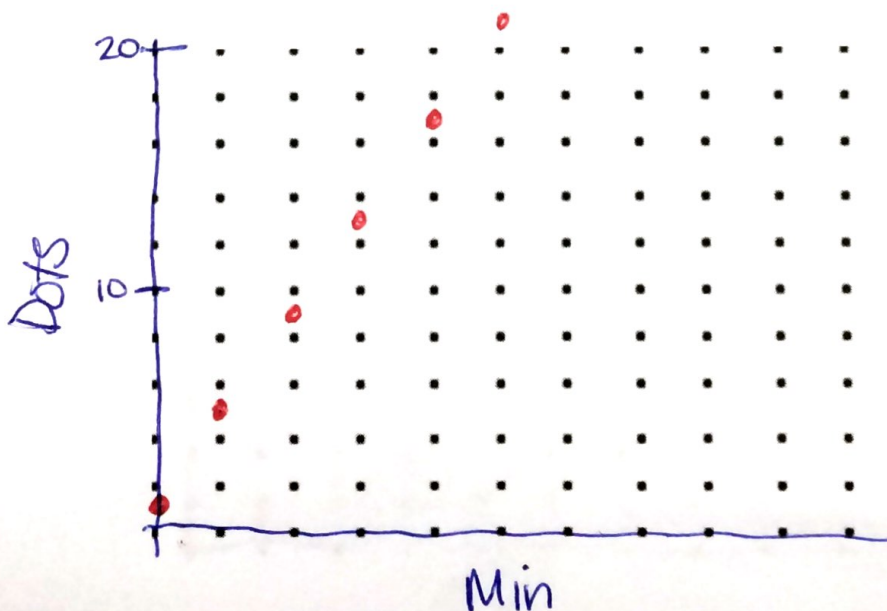
3. Assuming the sequence continues in the same way, how many dots are there at 3 minutes?
How do you know?

4. How many dots are there at 100 minutes? How do you know?

401

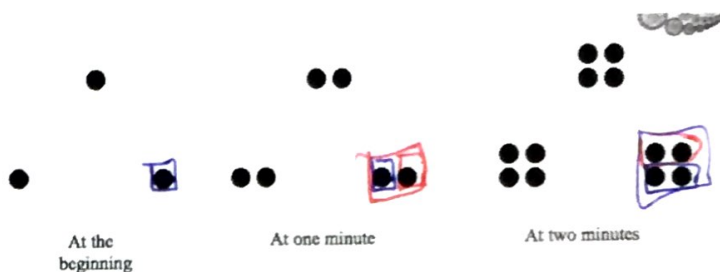
5. Use the information to create a **table** and a **discrete graph**.

Minute	x	0	1	2	3	4	5	6	7
# of Dots	$f(x)$	1	5	9	13	17	21	25	29



Growing, Growing Dots

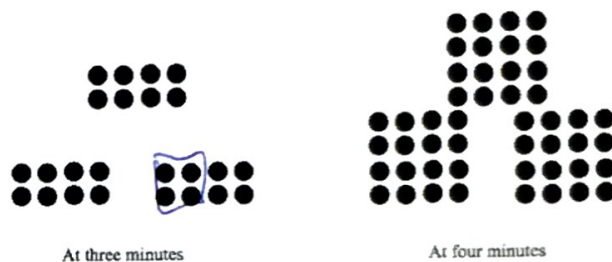
1. Describe and label the pattern of change you see in the above sequence of figures.



2. Write a **recursive** formula to describe how many dots there will be after t minutes.

$$f(x) = f(x-1) \cdot 2;$$

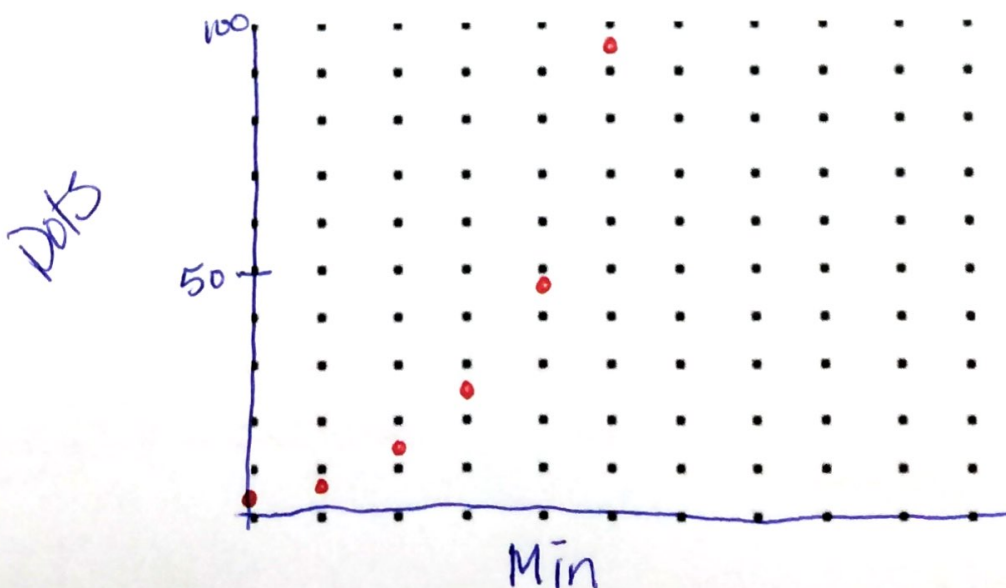
$$f(0) = 3$$



3. Assuming the sequence continues in the same way, how many dots are there at 5 minutes? How do you know?

4. Use the information to create a **table** and a **discrete graph**.

Minute x	0	1	2	3	4	5		
# of Dots $f(x)$	3	6	12	24	48	96		



Notes 3-1

PRACTICE QUESTIONS:

2nd - 1st

1.

Term x	0	1	2	3	4	5	6	7
Value $f(x)$	-6	-1	4	9	14	19	24	29

- a) What is the **change** for the sequence above? +5
- b) Is the sequence **ARITHMETIC** or **GEOMETRIC**? _____
- c) Complete the table.
- d) Write a **recursive equation** for the table.

$f(x) = f(x-1) + 5 ; f(0) = -6$

2.

Term x	1	2	3	4	5	6	7	8
Value $f(x)$	1/2	2	8	32	128	512	2048	8192

2nd / 1st

- a) What is the **change** for the sequence above? 0.4
- b) Is the sequence **ARITHMETIC** or **GEOMETRIC**? _____
- c) Complete the table.
- d) Write a **recursive equation** for the table.

$f(x) = f(x-1) \cdot 4 ; f(1) = 1/2$

Arithmetic: When a sequence is changing by adding or subtracting. Has CROC

Geometric: When a sequence is changing by multiplication. Has a common ratio