Notes 3-2

Sec 1 H Recursive & Explicit Equations for Arithmetic Sequences Unit 3

Example 1: Augustus Gloop is struggling to get his homework done. Since he loves candy so much, his mom offers him a deal. His mom offers no candy on the day she explains the deal (day 0), and offers to give him 20 the next day, 40 the next day, then 60, then 80, continuing that pattern each day as long as he gets his homework done.

1. Write a recursive equation for mom's deal.

$f(0)=0 \quad f(x)=f(x-1)+20$

2. How many candies will Augustus receive on day 14?

$f(14)=14\cdot 20=280.$

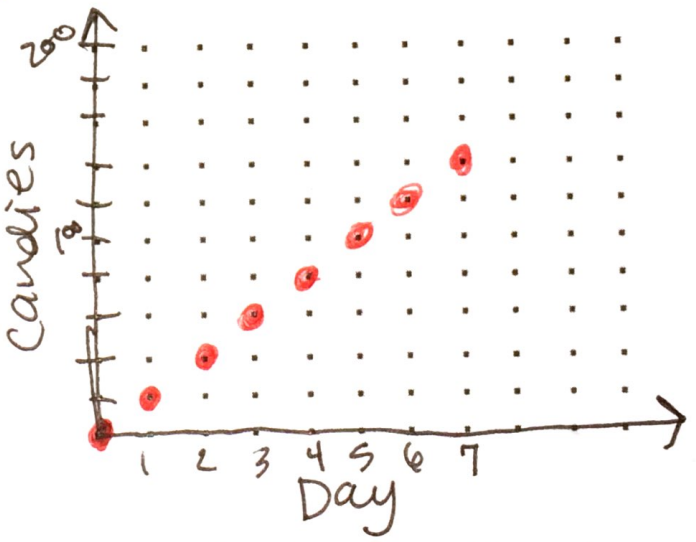
3. How many candies will Augustus receive on day 27?

$f(27)=27\cdot 20=540$

4. Make a table (rule chart)

x Days	Rule	y f(x) # of candies
0	$0+0(20)$	0
1	$0+20$ $0+1(20)$	20
2	$0+20+20$ $0+2(20)$	40
3	$0+20+20+20$ $0+3(20)$	60
4	$0+20+20+20+20$ $0+4(20)$	80
n	$0+n(20)$	$20n$

5. Make a discrete graph



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6. Write an explicit equation to describe how many candies Augustus will receive on the "nth" day of completing his homework.

$y=mx+b$

$f(x)=20x+0 \quad f(n)=20n$

7. Use the equation to determine how many candies Augustus will receive on the day 171.

$f(171)=20(171)=3420.$

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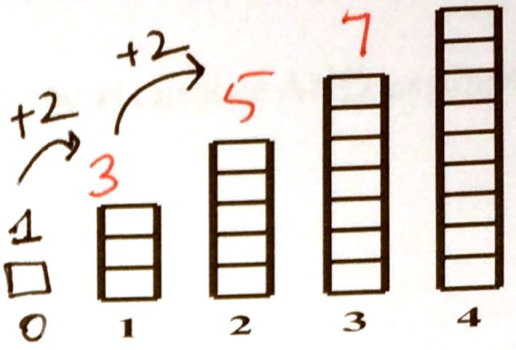
Example 2: Scott has decided to add push-ups to his daily exercise routine. He is keeping track of the number of push-ups he completes each day in the bar graph below, with day one showing he completed three push-ups. After four days, Scott is certain he can continue this pattern of increasing the number of push-ups he completes each day.



8. Write a recursive equation for Scott's workout.

$f(1)=3;\ f(x)=f(x-1)+2$

9. How many push-ups will Scott do on day 10?

10. How many push-ups will Scott do on day 23?

11. Make a table (rule chart) $f(x)$

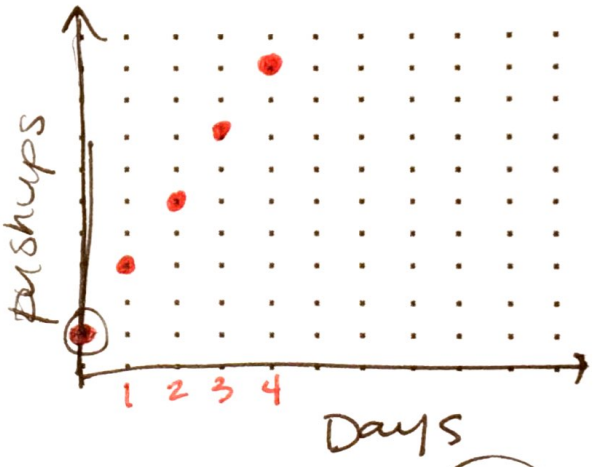
X Day	Rule	y pushups
0	$1+0(2)$	1
1	$1+1(2)$	3
2	$1+2(2)$	5
3	$1+3(2)$	7
4	$1+4(2)$	9
n	$1+n(2)$	$2n+1$

$1+2n$

12. Make a discrete graph

Slope y int

$y=mx+b$ $x=0$



13. Write an explicit equation for how many push-ups Scott will do on day "n".

$f(n)=2n+1$

14. Use the equation to determine how many push-ups Scott will do on day 365.

$f(365)=2(365)+1=731$

15. Ally is also including push-ups in her workout and says she does more push-ups than Scott because she does fifteen push-ups every day. Is she correct? Explain why or why not.

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- Find the next 3 terms in each sequence.
- a • Identify the constant rate.
- b • Write a recursive equation.
- c • Write an explicit equation.
- d • **Circle** where you see the constant rate show up in the **recursive** AND **explicit** equations.

16.

x	1	2	3	4	5	6	7	8
$f(x)$	3	16	29	42	55	68	81	94

0, −10, −13, +13

a) CROC: +13

b) $f(1)=3$; $f(x)=f(x-1)+13$

c) $f(x)=\underline{13}x+\underline{-10}$

$f(x)=13x-10$

17.

x	-2	-1	0	1	2	3	4	5
$f(x)$	3.5	2	0.5	-1	-2.5	-4	-5.5	-7

a) -1.5

b) $f(0)=0.5$; $f(x)=f(x-1)-1.5$

c) $f(x)=\underline{-1.5}x+\underline{0.5}$ when $x=0$

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Now, let's try these. What do you notice about our initial values in these two tables?

- Find the next 3 terms in each sequence.
- Identify the constant rate.
- Write a recursive equation.
- Write an explicit equation. (How can the recursive equation be used to create the explicit equation?)
- **Circle** where you see the constant rate show up in the **recursive** AND **explicit** equations.

18.

x	13	14	15	16	17	18	19	20
$f(x)$	21.4	18.2	15	11.8	8.6	5.4	2.2	−1

a) CROC: −3.2

b) $f(13) = 21.4$; $f(x) = f(x-1) - 3.2$ (x, y, m)

c) $f(x) = -3.2x + 6.3$ when $x = 0$

$y = mx + b$

$21.4 = (-3.2)(13) + b$

$21.4 = -41.6 + b$

$+41.6 \quad +41.6$

$63 = b$

19.

x	-21	-20	-19	-18	-17	-16	-15	-14
$f(x)$	-17	-11	-5	1	7			

20. How does the starting point change the explicit equation?

21. What will the explicit equation always look like for any arithmetic sequence?

$y = mx + b$

$f(x) = mx + b$

CROC / slope

y int / when $x = 0$