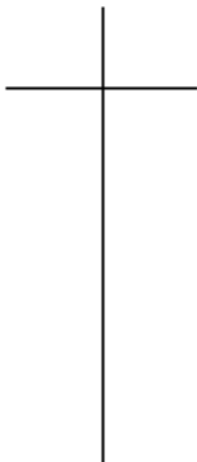# CH. 4, L5 – CONVERT BETWEEN EXPLICIT AND RECURSIVE FUNCTION

Objective: Given a function rule, I will translate between recursive and explicit formulas for the same sequence.

Think About It: Rewrite the function $f(x) = -2x + 14$ as a recursive function using any method.

Key Point #1:

Given a _____ or _____ function, creating a _____ of values can be used to _____ in the _____ form.

Keywords: *explicit, recursive*

Big Idea:

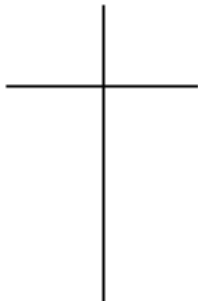CFS: 1
1. Table or sequence is created from the function
2. Recursive functions have initial value and recursive rule
3. Explicit functions are written in linear or exponential form
4. Functions are checked to be equivalent by testing a value
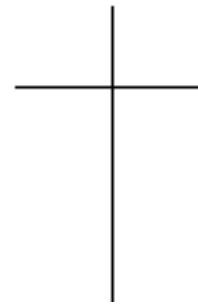
Interaction with New Material:

Ex. 1) Two bank accounts are earning money at different rates as shown in the two functions below. If $f(x)$ and $g(x)$ represent the value of each bank account after x number of years, which account has more money and by how much after 15 years?

Account A:	Account B:
$f(1) = 1050, \ f(x) = (1.05)f(x-1)$	$g(1) = 1817.75, \ g(x) = g(x-1) + 17.75$
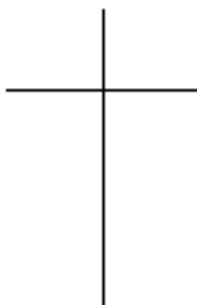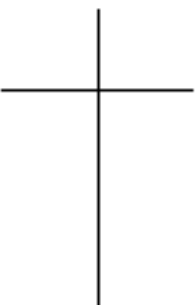
CFS:
1. Table or sequence is created from the function
2. Recursive functions have initial value and recursive rule
3. Explicit functions are written in linear or exponential form
4. Functions are checked to be equivalent by testing a value

Partner Practice:

    1. Write the explicit functions as recursive functions:

a. $a(n) = 3n + 1$	b. $a(n) = 2(3)^n$	c. $a(n) = n$

    2. Write the recursive functions as explicit functions:

a. $a(1) = 5, \quad a(n) = a(n-1) + 4$	b. $a(1) = 3, \quad a(n) = (2)a(n-1)$	c. $a(1) = 10, \quad a(n) = \left(\frac{1}{2}\right)a(n-1)$

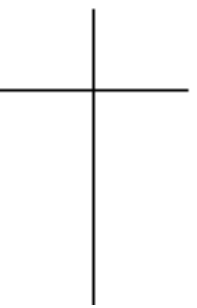CFS: 3
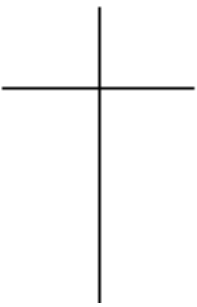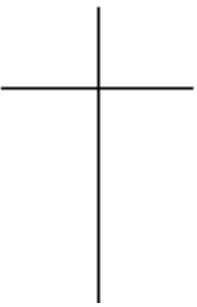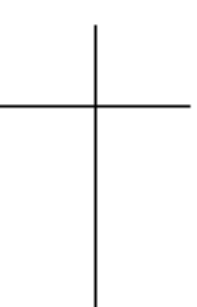1. Table or sequence is created from the function
2. Recursive functions have initial value and recursive rule
3. Explicit functions are written in linear or exponential form
4. Functions are checked to be equivalent by testing a value

3. Which of the following functions will have a greater output when *n* is equal to 100?

$$a(1) = 101, \quad a(n) = (1.01)a(n-1)$$

$$b(1) = 101.7, \quad b(n) = b(n-1) + 1.7$$

Account A: **Account B:**

_____
_____
_____
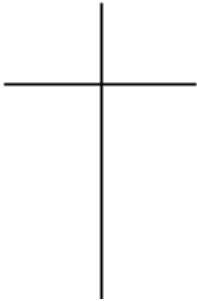
4. Adam proposes that his mother changes his allowance according to the following rule: "The first week, you'll only give $0.02. Then each week after the first week, you'll pay twice what you paid the week before." His mother says that she will not agree to his plan, instead she proposes that Adam gets $5 in allowance each week.[i]

    a. Write explicit equations to model both Adam and his mother's plans.

    b. Write recursive equations to model both of the plans.

    c. Why would Adam's mother not agree to his plan? Explain.

_____
_____
_____
_____

CFS: 4
1. Table or sequence is created from the function
2. Recursive functions have initial value and recursive rule
3. Explicit functions are written in linear or exponential form
4. Functions are checked to be equivalent by testing a value

5. James saves $85. He wants to put it in a savings account so it will gain interest. Bank L makes the following offer: "If you keep your money with us, at the end of every year we'll give you $5." Across the street from Bank L is Bank E. It offers James the following investment plan: "Every year, we'll add 5% of the money you had the previous year to your account."

    a.   Write an explicit equation to model the plans for each bank.

    b.   Which recursive functions below match Bank L and Bank E's plans? Explain how you know.

A. $a_1 = 85$
   $a_n = 85 + 5a_{n-1}$

D. $a_1 = 89.25$
   $a_n = 1.05a_{n-1}$

G. $a_1 = 90$
   $a_n = 85 + 5a_{n-1}$

B. $a_1 = 85$
   $a_n = 85 \cdot 1.05a_{n-1}$

E. $a_1 = 85$
   $a_n = a_{n-1} + 5$

H. $a_1 = 90$
   $a_n = a_{n-1} + 5$

C. $a_1 = 85$
   $a_n = 1.05a_{n-1}$

F. $a_1 = 89.25$
   $a_n = 1.05^{a_{n-1}}$

I. $a_1 = 90$
   $a_n = 5a_{n-1}$

    c.   Which bank offers the greater return on James's money in the short run? In the long run?

_____
_____
_____
_____

CFS:
1. Table or sequence is created from the function
2. Recursive functions have initial value and recursive rule
3. Explicit functions are written in linear or exponential form
4. Functions are checked to be equivalent by testing a value

_____

CFS:
1. Table or sequence is created from the function
2. Recursive functions have initial value and recursive rule
3. Explicit functions are written in linear or exponential form
4. Functions are checked to be equivalent by testing a value