Name



Exploring Patterns

For each pattern, follow these instructions:

- **1.** Study the pattern your teacher has provided.
- 2. Build step 4.
- **3.** Make a sketch of step 4 and step 5. How many units make up each step?
- **4.** Use the pattern you discover to sketch step 10. How many units make up step 10?
- **5.** Describe any number patterns you notice.
- 6. Suggest other ways to describe how this pattern grows.

Function _____

step 4	step 5	step 10
		e .
units:	units:	units:

What	nottorne	do	17011	notico?
what	patterns	uo	you	notice?

0		and march	atlana		11-1-			~~~~?	
i an	VOII	SHOPEST	orner	wavs	THIS	Darrern	might	prow?	
Ourr	Juu	Juggeor	Ottici	majo	CTITO	paccelli	11110110	5-0	

Function ____

step 4	step 5	step 10						
units:	units:	units:						
What patterns do you notice?	What patterns do you notice?							
Can you suggest other ways this pattern might grow?								

Function			
step 4	step 5	step 10	
units:	units:	units:	
What patterns do y	ou notice?		
Can you suggest ot	her ways this pattern might gr	ow?	
	j.		1919 - 1940 - 1929 - 1970 - 1970 - 1970 - 1970 - 1970 - 1970 - 1970 - 1970 - 1970 - 1970 - 1970 - 1970 - 1970 -
Function			
step 4	step 5	step 10	
		-	
units:	units:	units:	
What patterns do y	ou notice?		
Can you suggest of	her ways this pattern might gr	ow?	
Function			
step 4	step 5	step 10	

What patterns do you notice?

units: _____

Can you suggest other ways this pattern might grow?

units: _____

units:

Name -



Exploring Patterns

For each pattern, sketch steps 4 and 5. Then predict how many units would be in step 10. Describe the pattern.

Function 1. Count the toothpicks.



Function 4. Count the toothpicks.



How many would be in step 10? _____

How is the pattern changing or growing?

Function 5. Count the tiles.



How many would be in step 10? _____

How is the pattern changing or growing?

Function 6. Count the tiles.





How is the pattern changing or growing?

(. .

Find the next three numbers in each pattern. Then find step 10. Describe in words how the pattern is changing.

-

Func	Function 7.								
	step	1	2	3	4	5	6		10
	result	8	12	16					
	Describe the	pattern.						8	
Func	Function 8.								
	step	1	2	3	4	5	6	•••	10
	result	7	11	15					
	Describe the	pattern.	<u></u>		<u></u>				
Func	tion 9.								
	step	1	2	3	4	5	6	• • •	10
	result	8	13	18					
	Describe the	pattern.							
Func	tion 10.								
	step	1	2	3	4	5	6	•••	10
	result	15	23	31					
	Describe the	pattern.							
Func	tion 11.								
	step	1	2	3	4	5	6		10
	result	25	29	33					
	Describe the	pattern.							

HOMEWORK 1 (Continued)

Func	tion 12.								
	step	T	2	3	4	5	6		10
	result	57	63	69					
3	Describe the	pattern	•						
Func	Function 13.								
	step	Print	2	3	4	5	6		10
	result	101	115	129					
	Describe the	pattern	•				r.	· · · · · · · · · · · · · · · · · · ·	
Func	tion 14.								i:
	step	1	2	3	4	5	6		10
	result	68	64	60					
	Describe the	pattern	•						
Func	tion 15.								
	step	1	2	3	4	5	6		10
	result	8	10.5	13					
	Describe the	pattern							
Func	tion 16.								
	step	1	2	3	4	5	6		10
	result	2	4	8					
	Describe the	pattern.							

(**,** . .

Name _____



Graphing Functions



Name .



Graphing Functions

Construct a T-table for each of these functions from Homework 1: Exploring Patterns. Then graph each function on the grid. Determine the value of the function at step 0 and put this in the table too.

Func	tion 1 Fund	tion 2 Fund	tion 3
n	<i>f</i> (<i>n</i>) <i>n</i>	<i>f</i> (<i>n</i>) <i>n</i>	f(n)
1	1	1	
2	2	2	
3	3	3	5(
4	4	4	$\uparrow (n)$
5	5	5	20
•	;	:	
10	. 10	10	
:	:	•	
17	17	. 17	
11	11	17	
11	1 11	11	
			10
Fund	ction 4 Fund	tion 5 Fund	tion 6
Fund n	$f(n) = \frac{f(n)}{n}$	tion 5 Func <u>f(n)</u> n	$\begin{array}{c} 10 \\ f(n) \end{array}$
Func n	tion 4 Fund <i>f(n) n</i>	tion 5 Fund <u>f(n) n</u>	f(n) = 10
Fund 1	tion 4 Fund <i>f(n) n</i> 1	tion 5 Fund <u>f(n)</u> <u>n</u> 1	$\begin{array}{c} 10 \\ f(n) \\ 5 \\ \hline \end{array}$
Fund 	tion 4 Function 4 f(n) n 1 2	tion 5 Function 6 f(n) n 1 2	$\begin{array}{c} 10 \\ f(n) \\ 5 \\ \hline \end{array}$
Fund <u>n</u> 1 2 3	tion 4 Function 4 f(n) n 1 2 3	tion 5 Function 6 f(n) n 1 2 3	10 $f(n)$ 5 $-$
Fund <u>n</u> 1 2 3 4	tion 4 Function 4 f(n) n 1 2 3 4	tion 5 Function 6 f(n) n 1 2 3 4	tion 6 f(n) 5 0 12 3 4 5 0 1 10 10 10 10 10
Fund 1 2 3 4 5	tion 4 Function 4 $f(n)$ n 1 2 3 4 5	tion 5 Function 6 f(n) n 1 2 3 4 5	$\begin{array}{c c} 10 \\ \hline f(n) \\ \hline \\ 0 \\ \hline \\ 12 \\ 34 \\ 56 \\ \hline \\ 0 \\ \hline \\ 12 \\ 34 \\ 56 \\ \hline \\ \\ 12 \\ 34 \\ 56 \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $
Fund 1 2 3 4 5 :	tion 4 Function (1) $f(n)$ n 1 2 3 4 5 :	tion 5 Function 6 $f(n)$ n 1 2 3 4 5 :	$\begin{array}{c c} 10 \\ \hline f(n) \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $
Fund n 1 2 3 4 5 : 10	tion 4 Function (1) $f(n)$ n 1 2 3 4 5 . . . 10 .	$\begin{array}{c c} f(n) & f(n) \\ \hline f(n) & n \\ \hline 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ \vdots \\ 10 \\ \end{array}$	$\begin{array}{c c} 10 \\ \hline f(n) \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $
Fund 1 2 3 4 5 10	tion 4 Function 4 $f(n)$ n 1 2 3 4 5 . 10 .	$\begin{array}{c c} f(n) & f(n) \\ \hline f(n) & n \\ \hline 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ \vdots \\ 10 \\ . \end{array}$	$\begin{array}{c c} 10 \\ \hline f(n) \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $
Func 1 2 3 4 5 10 .	tion 4 Function (1) $f(n)$ n 1 2 3 4 5 . 10 .	tion 5 Function 6 $f(n)$ n 1 2 3 4 5 10	$\begin{array}{c c} 10 & 10 & 10 & 10 & 10 & 10 & 10 & 10 $
n 1 2 3 4 5 10 17	tion 4 Function (1) $f(n)$ n 1 2 3 4 5 . 10 . 17	tion 5 Function 6 $f(n)$ n 1 2 3 4 5 . 10 . . 17	$\begin{array}{c c} 10 & 10 & 10 & 10 & 10 & 10 & 10 & 10 $

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Construct a T-table for each of these functions from Homework 1: Exploring Patterns. Then graph each function on the grid. Determine the value of the function at step 0 and put this in the table too.

Fund	ction 11 Fun	ction 12 Fund	ction 13	
11	f(n) n	f(n) n	f(n)	
1	1	1		
2	2	2		
3	3	3		
4	4	4	f(n)	
5	5	5		
÷	:	:	100	
10	10	10	90	
:		:		
		. 17	80	
17	17	17	70	
n	n n	n n	60	
243 				
Fund	ction 14 Fun	ction 15 Fund	ction 16 50 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
Fund 11	$\begin{array}{c c} \textbf{ction 14} & \textbf{Fun} \\ \hline f(n) & n \end{array}$	ction 15 Fund f(n) n	$\begin{array}{c c} \textbf{ction 16} \\ f(n) \end{array} \qquad 50 \end{array}$	
Fund 	$\begin{array}{c c} \textbf{ction 14} & \textbf{Fun} \\ \hline f(n) & \underline{n} \\ \hline \end{array}$	$\begin{array}{c c} \textbf{ction 15} & \textbf{Func} \\ \hline f(n) & n \\ \hline \end{array}$	ction 16 50 $f(n)$ 40	
Fund 1	ction 14 Fun f(n) n 1	ction 15 Fund f(n) n 1	$\begin{array}{c c} \textbf{ction 16} \\ \hline f(n) \\ \hline 30 \\ \hline \end{array}$	
Fund 1 2	ction 14 Fun f(n) n 1 2	ction 15 Fund f(n) n 1 2	$\begin{array}{c c} \textbf{ction 16} \\ \hline f(n) \\ \hline 30 \\ \hline 20 \end{array}$	
Fund 1 2 3	ction 14 Fun f(n) n 1 2 3 3	ction 15 Fund f(n) n 1 2 3	f(n) 50 40 30 20	
<u>1</u> 2 3 4	ction 14 Fun f(n) n 1 2 3 4	ction 15 Fund f(n) n 1 2 3 4	f(n) 50 40 30 20 10	
Fund 1 2 3 4 5	ction 14 Fun f(n) n 1 2 3 4 5	ction 15 Fund f(n) n 1 2 3 4 5	f(n) 50 40 30 20 10 0 2 10	1
Fund 1 2 3 4 5 :	ction 14Fun $f(n)$ n 12345:	ction 15 Fund $f(n)$ n 1 2 3 4 5 .	f(n) 50 40 30 20 10 0 2 4 6 8 10	1
n 1 2 3 4 5 10	ction 14 Fundamental Fundamenta	ction 15 Fund $f(n)$ n 1 2 3 4 5 10 10	f(n) 50 40 30 20 10 0 2 4 6 8 10	1
n 1 2 3 4 5 10	ction 14 Fun $f(n)$ n 1 2 3 4 5 . 10 .	ction 15 Fund $f(n)$ n 1 2 3 4 5 10	f(n) 50 10 10 10 0 2 2 4 6 8 10 10	1
II 1 2 3 4 5 10 .	ction 14 Fundamental Fundamenta	ction 15 Fund $f(n)$ n 1 2 3 4 5 10	$f(n)$ 50 10^{-1} 10^{-1} 10^{-1} 0 2 2 4 6 8 10^{-1}	7
n 1 2 3 4 5 10 1 17	ction 14 Fundamental Fundamenta	ction 15 Fund $f(n)$ n 1 2 3 4 5 . 10 . 17	$f(n)$ 50 10^{-1} 10^{-1} 10^{-1} 0 2 2 4 6 8 10^{-1}	7

į..

TRANSPARENCY MASTER 3 Graphing Overlay 1 f(n)



Name -



Working Backward

Below are ten functions and six pictures. Below each pictorial representation, write the letter of the matching function. On the back of this sheet, design a pictorial representation for the four functions that are not pictured. Label them with their functions.



Name .



Working Backward

Below are nine functions. For each one, design a pictorial representation and show three steps. Use polygons, lines, toothpicks, dots, or other shapes. Be creative.

1. $f(n) = 2n + 1$	2. $f(n) = 2n$	3. $f(n) = 4n + 2$
2 · · · ·		
4. $f(n) = 4n$	5. $f(n) = 4n + 4$	6. $f(n) = 5n + 3$
	×	
7. $f(n) = 2n + 3$	8. $f(n) = 3n + 2$	9. $f(n) = 2n - 1$
4	3	
		ж. С

6 ...

TRANSPARENCY MASTER 5 Graphing Overlay 2





37

n



Name -

Advanced Functions



Name

Advanced Functions

Fill in a T-table for each function below. Then graph the function. Write the function's expression in the bottom of the table.

HOMEWORK .



•

39

Fill in a T-table for each function below. Then graph the function. Write the function's expression in the bottom of the table.



f(n)

⊳n

Fill in a T-table for each function below. Then graph the function. Write the function's expression in the bottom of the table.





- 1. Randy already has \$70 in his savings account. He will add \$40 per month. How much money will he have?
 - A) How much money will he have after the first five months?
 - **B)** How much money will he have after the tenth month?
 - c) How much money will he have after the eighteenth month?
- 2. Angela already has \$310 in her savings account. She will add \$35 per month. How many months will it take before she and Randy have the same amount of money in their accounts? How much will each of them have?
- **3.** Randy wants to know when he will have at least \$1,000. Find a way to determine this for him.
- **4.** Angela finds she has exactly \$1,220. How many months has she been saving?

Name

Banking on Algebra

 Derek has \$75 in his savings account. He will add \$25 every month. Use this T-table to show how Derek's account will grow. Write an expression or formula and make a graph below.

HOMEWORK

 Rosa has \$306 in her savings account. She will add \$14 every month. Use this T-table to show how Rosa's account will grow. Write an expression or formula and make a graph below.

Derek's Account				Rosa's	Account	
month	principal			month	principal	
0				0		
1				1		
2			ę	2		
3	4.			3		
4				4		
5				5		
т				m		

3. When will Derek have \$ 700?

- 4. When will Rosa and Derek have the same amount of money?
- 5. How much money will they each have then? ____



What scale has been used for the horizontal axis? One unit = _____.

What scale has been used for the vertical axis? One unit = _____.

Principal

- 6. San wants to buy a bicycle for \$295. He currently has \$72 in his account. If he adds \$27 each month, when will he have enough money for the bike? _____
- 7. Keisha wants the same bike that San wants. If she already has \$115 in her account, and she adds \$16 per month, can she buy her bike before San can buy his?

San's A	Account	Keisha's	Account
month	principal	month	principal
0		0	
1		1	
2		2	e
3		3	
4		4	
5		5	
т		m	

Graph the function for problems 6 and 7 on this grid. Choose a scale that allows the data to fit. Label each function on the graph with its formula.



m

Months

e data to fit. Label each function on t

8. Chris has \$39 in the bank. He adds \$32 to it each month. He wants to buy a bike that costs \$435. Every month the bike's price is reduced by \$10. How many months will it take for Chris to afford the bike?

Chris's Account		Bike Sale			
month	principal		month	bike price	
0			0	\$435	
1			1	\$425	
2			2		
3			3		
4			4		
5			5		
m			m		

Graph the function for problem 8 on this grid. Choose a scale that allows the data to fit. Label each function on the graph with its formula.



Months

TRANSPARENCY MASTER 8 Schedule of Rates

Schedule of Rates



	Day		Evening		🗀 Night	
From: Redding	1st min.	add'l. min.	1st min.	add'l. min.	1st min.	add'l. min.
То:						
Alturas	\$0.11	\$0.07	\$0.09	\$0.06	\$0.07	\$0.04
Challenge	0.12	0.10	0.10	0.07	0.08	0.05
Millville	0.13	0.11	0.11	0.09	0.08	0.06
Oroville	0.14	0.12	0.13	0.10	0.09	0.07
Red Bluff	0.15	0.13	0.13	0.11	0.10	0.07

.



Name

The Long-Distance Connection

Schedule of Rates



	Day		Evening		🗌 Night	
From: Redding	1st min.	add'l. min.	1st min.	add'l. min.	1st min.	add'l. min.
To:					******	
Alturas	\$0.11	\$0.07	\$0.09	\$0.06	\$0.07	\$0.04
Challenge	0.12	0.10	0.10	0.07	0.08	0.05
Millville	0.13	0.11	0.11	0.09	0.08	0.06
Oroville	0.14	0.12	0.13	0.10	0.09	0.07
Red Bluff	0.15	0.13	0.13	0.11	0.10	0.07

1. Fill in the T-tables to compare the phone rates of calls from Redding to Oroville.

Da	ay	Eve	ning	Nig	ght
min.	price	min.	price	min.	price
0		0		0	
1		1		1	
2		2		2	
3		3		3	
:		:		:	
13		13		13	
т		m		m	

2. Fill in the T-tables to compare the phone rates of calls from Redding to Red Bluff.

Da	ay	Eve	ning	Nig	ght
min.	price	min.	price	min.	price
0		0		0	
1		1		1	
2		2		2	
3		3		3	
		:		•	
13		13		13	
т	2	т		m	

3. Fill in the T-tables to compare the phone rates of calls from Redding to Challenge.

Da	ay	Ever	ning	Nig	ght
min.	price	min.	price r	nin.	price
0		0	· · ·	0	,
1		1		1	
2		2		2	
3		3		3	
÷		:		:	
13		13		13	
m		m		m	