



Ollscoil Chathair
Bhaile Átha Cliath
Dublin City University

ZADIE

Functional Thinking through Patterning: Assessment of Mathematical Knowledge for Teaching Functional Thinking

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Note: This assessment is designed to be administered in hardcopy.

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1. Jenny made the following geometric pattern using black and white squares:



Figure 1

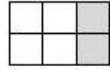


Figure 2

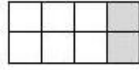


Figure 3

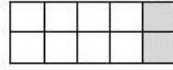


Figure 4

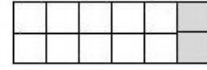


Figure 5

a) Describe Figure 50.

b) Can Jenny make a figure that fits into this pattern using 2 black tiles and 87 white tiles? Explain.

c) Give a function rule for this pattern.

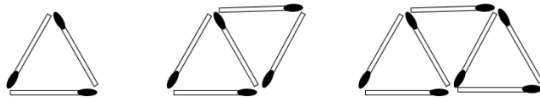
2. a) What is the difference between a linear and a non-linear pattern? Can you give an example of each?

b) How would you use linear and non-linear geometric patterns in lessons for primary school?

3. Language I would use in the teaching of patterns in primary school (please tick all that apply):

Terms		Terms		Terms		Terms	
generalising		unknown				growing pattern	
variable		y-intercept		rate of change		sequence	
tangent		rule		input/output		origin	
position number		position cards		expression		equation	
slope		difference		function		constant	

4. Which expression does not match the patterns below? And why?



- a) $1 + n \times 2$
- b) $1 + n \times (3 - 1)$
- c) $3 + 2n$
- d) $3 + 2(n - 1)$

5. a) Draw the first four figures of a geometric pattern that would match the function rule $2n + 2$.

b) When working in a classroom, are there other ways to *represent* this pattern?

6. Laura gives an answer of 22 for x in the following table:

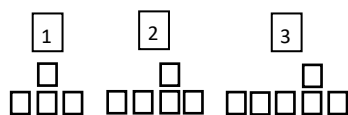
1	2	3	4	5	10	
3	5	7	9	11	...	x	

a) What is Laura thinking?

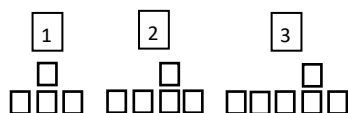
b) What type of thinking is Laura using (recursive, covariation, explicit)? Why do you think this?

7. Given equivalent function rules for this pattern, shade each of the patterns to match the function rule and explain why you did this.

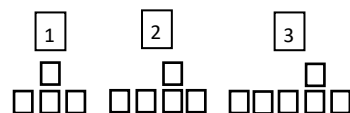
a) $4 + (n - 1)$



b) $1 + (n + 2)$



c) $n + 3$



8. Children were asked to find a rule for the following pattern. When marking the children's work, you see that Tom wrote that the answer was $n+3$, and Emily wrote that the answer was $3n+1$.

1	2	3	4	...	n
4	7	10	13	...	

For each answer:

Tom: $n+3$	Emily: $3n+1$
Explain Tom's thinking	Explain Emily's thinking
How would you plan to support Tom in developing his thinking? Include questions you might ask.	How would you plan to support Emily in developing her thinking? Include questions you might ask.
When Tom sees Emily's work, he asks where did Emily get $3n+1$. How would you respond?	

