

Stick Patterns

M006 scoring rubric

Math Domain

- Number/Quantity Shape/Space Function/Pattern
 Chance/Data Arrangement

Math Actions (possible weights: 0 through 4)

- 3 Modeling/Formulating 1 Manipulating/Transforming
 3 Inferring/Drawing Conclusions 3 Communicating

Math Big Ideas

- Scale Reference Frame Representation
 Continuity Boundedness Invariance/Symmetry
 Equivalence General/Particular Contradiction
 Use of Limits Approximation Other

Picture Number	Total number added	Total number of sticks
1		4
2	8	12
3	12	24
4	16	40
100	400	20,200
101	404	20,604

- You would need to add 404 more sticks. Most students will arrive at this by looking at the differences between the number of sticks in each successive picture, namely 8, 12, 16,, or 4 times the picture number, so picture 101 has 404 more sticks than the previous picture.
- One way to describe the pattern of the number of sticks as a function of the picture number is to say that the number of sticks can be found by doubling the picture number, and multiplying this by one more than the number: number of sticks = $2n(n+1)$.
- Using this generalized formula, there will be 20,200 sticks in picture number 100.

	partial level (1 or 2)	full level (3)
Modeling/ Formulating (weight: 3)	Student develops a limited strategy to formulate the pattern made by the stick arrays, but it is not sufficient to answer question 2.	Student has a well developed strategy to formulate the pattern made by the stick arrays, and is able to answer question 2 without calculating each case.
Transforming/ Manipulating (weight: 1)	Some of the answers to question 1 and the table are correct.	All of the answers to question 1 and the table are correct.
Inferring/ Drawing Conclusions (weight: 3)	Student shows evidence of trying to incorporate answers from questions 1 and 2, but the answer to question 3 is not correct, or Answer to question 4 is not consistent with expression generated in question 3.	The generalized expression for the pattern is valid, and is applied correctly in answering question 4.
Communicating (weight: 3)	Explanations for questions 2,3 and 4 are not totally clear or complete.	Explanation for questions 2,3 and 4 are appropriate to the question, clear, and complete.