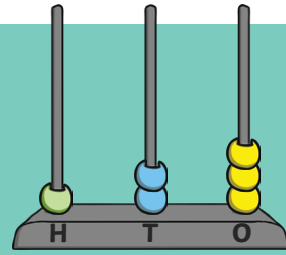


# Abacus Investigation

Here is an abacus showing hundreds, tens and ones.

6 beads are used to make the number **123**.



How many **different** 3-digit numbers can be made with **3** beads? Use the Abacus Working-Out sheets to help you, and write your numbers in the spaces below.

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

How many **different** 3-digit numbers can be made with **4** beads? Use the Abacus Working-Out sheets to help you, and write your numbers in the spaces below.

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

How many **different** 3-digit numbers can be made with **5** beads? Use the Abacus Working-Out sheets to help you, and write your numbers in the spaces below.

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

### Challenge

Look at the numbers you have made. How do you know you have found **all** of the 3-digit numbers you can make? Explain your method below:

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Isabelle says 'You will always be able to make more even numbers than odd numbers.'  
Is she correct?

Yes / No

Explain your answer below:

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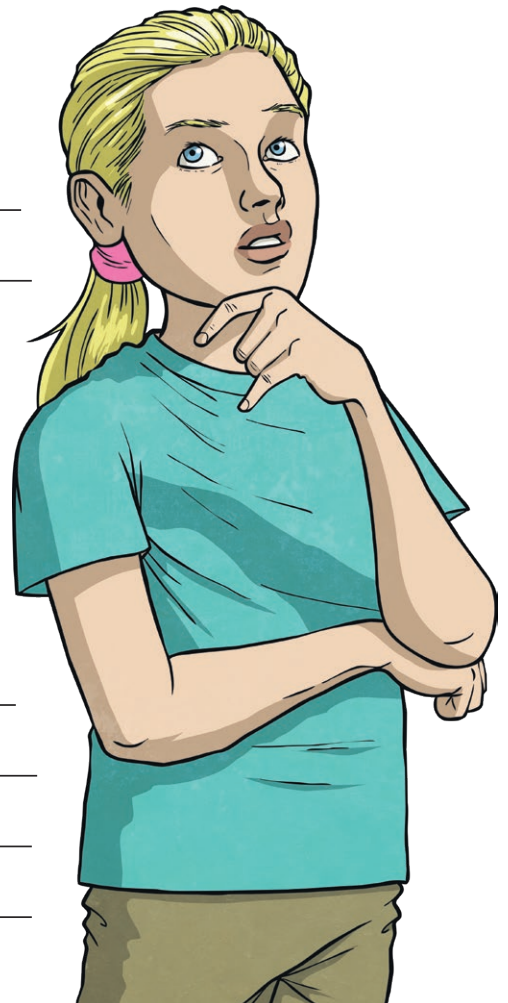
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# Abacus Investigation Answers

3 beads: (6 numbers) 300, 201, 210, 120, 102, 111.

4 beads: (10 numbers) 400, 310, 301, 220, 202, 211, 121, 112, 103, 130.

5 beads: (15 numbers) 500, 410, 401, 302, 320, 311, 221, 212, 230, 203, 122, 131, 113, 104, 140.

## Challenge

Look at the numbers you have made. How do you know you have found all of the 3-digit numbers you can make? Explain your method below:

**Answers will vary, but accept answers that suggest a method of working systematically. E.g. 'First I made 300 by putting all three beads in the hundreds column. Then I moved one of the beads from the hundreds column to the tens column, and then to the ones column, to make 210 and 201. I knew I had found all of the possible '200' numbers I could make so then looked at the 100 numbers.'**

Isabelle says 'You will always be able to make more even numbers than odd numbers.' Is she correct?

Yes / No

**Explanations will vary, but should suggest that whatever number of beads they have, an odd number will only occur when the number in the ones column is odd. Therefore, any round hundred numbers, or numbers made using beads in just the hundreds and tens columns, will be even.**

**In addition, children may use their answers to the previous questions to prove that Isabelle is correct, e.g. 'When I used 3 beads I found 4 even numbers and 2 odd numbers, and when I used 4 beads I found 6 even numbers and 4 odd numbers.'**