

## Counter place value

*Children place counters on a PV grid to make three-digit numbers and then use logic to ensure they have made all combinations. Y3 make whole numbers; Y4 make numbers with one decimal place.*

## Skills practised:

- Y3: Using knowledge of place value in whole 3-digit numbers
- Y4: Using knowledge of place value in 3-digit numbers with one decimal place

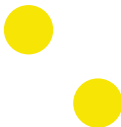
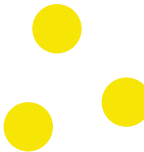

**Conjecture:** *It is possible to demonstrate that all possibilities in this context have been found.*

### What to do:

*Children work individually or in pairs.*

#### Year 3

1. Draw a large 100s, 10s and 1s place value grid.
2. Take six counters and place them in the grid to show a 3-digit number. This arrangement makes the number 231.

100s	10s	1s
		
2	3	1

3. What is the biggest number you can make using six counters?  
What is the biggest number you can make where there is at least one counter in every space?  
What is the smallest 3-digit number you can make using all six counters?  
What is the smallest number you can make where there is at least one counter in every space?  
How can you be sure that you have found all the possible numbers?
4. Work to find out how many 3-digit numbers it is possible to make using all six counters.

**HINT:** Place all of the counters in the 100s column, then move one to the 10s column. What number have you made now? Where else can this counter go? Now keep four counters in the first column and think where to put the two other counters to make different numbers.

What might you do next?

Make sure that you remember to keep a list of all the numbers you make!

Think of other challenges to set one another, e.g. what is the closest number to 300 that you can make?

#### Year 4

1. Draw a large 10s, 1s and 0.1s place value grid.
2. Take six counters and place them in the grid to show a 3-digit number with one decimal place. This arrangement makes the number 23.1.

10s	1s	0.1s
●  ●	●  ● ●	●
2	3	1

3. What is the biggest number you can make using six counters?  
 What is the biggest number you can make where there is at least one counter in every space?  
 What is the smallest 3-digit number you can make using all six counters?  
 What is the smallest number you can make where there is at least one counter in every space?  
 How can you be sure that you have found all the possible numbers?
4. Work to find out how many 3-digit numbers with one decimal place it is possible to make using all six counters.

**HINT:** Place all of the counters in the 10s column, then move one to the 0.1s column.

What number have you made? Now keep four counters in the 10s column and think where to put the two other counters to make different numbers. What might you do next?

Make sure that you remember to keep a list of all the numbers you make!

Think of other challenges to set one another, e.g. what is the closest number to 30 that you can make?

NB Y4 will make fewer numbers than Y3. Children could discuss why this is the case.

(They can't have no counters in the 0.1s place or the number won't be a 3-digit number with one decimal place.)

**Aims:**

- To make all the possible three-digit numbers where the digits have a total of 6 (Y3: make whole numbers; Y4: make numbers with one decimal place)
- To use a system to help find all possibilities

**Minimum number of calculations expected**

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