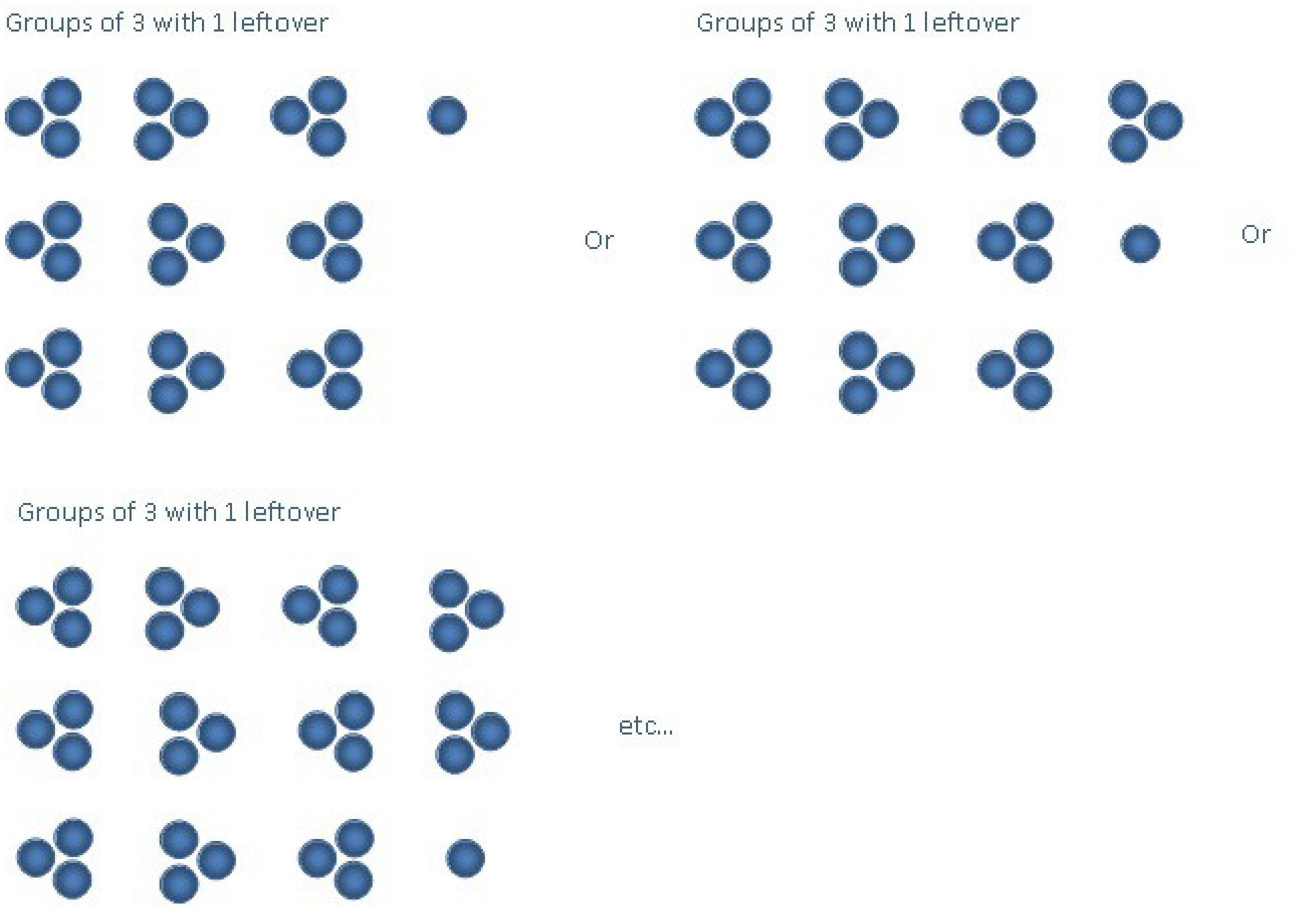
Let's continue from where we left the [last post on divisibility problems on the GMAT](). I will add another level of complexity to the last question we tackled in that post.

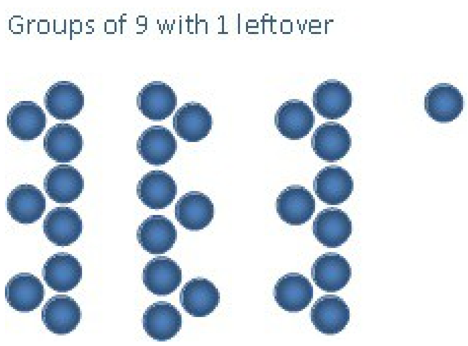
Question: A number when divided by 3 gives a remainder of 1. How many distinct values can the remainder take when the same number is divided by 9?

Now imagine that there are lots of groups of 3 and 1 ball is leftover. We don't know exactly how many groups of 3 there are. There could be zero and there could be a 100 but let's assume that there are many. It would look something like this:



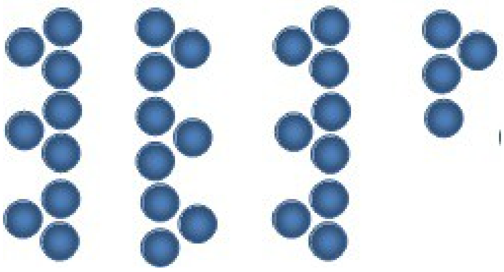
Now, we have to make groups of 9 out of these so we start combining three groups of 3s to make a group of 9. Let's see what the possibilities at the end are.

1. All groups of 3s get used to make groups of 9 and the 1 ball from before is again leftover.



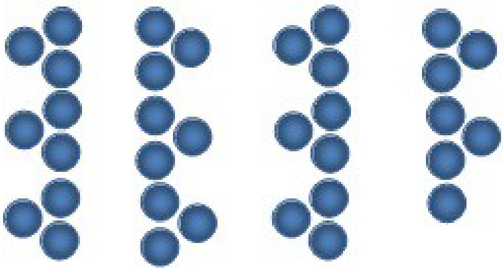
2. One group of 3 and the 1 ball from before, giving you a total of 4 balls, are leftover.

Groups of 9 with 4 leftover



3. Two groups of 3 and the 1 ball from before, giving you a total of 7 balls, are leftover.

Groups of 9 with 7 leftover



(Three or more groups of 3 cannot be leftover because then, we will be able to make another group of 9 out of them. This is the reason why the remainder will never be 9 or greater than 9.)

Therefore, you can have the remainder in three distinct ways: 1, 4 and 7.

Now, let's apply what we have learned to a GMAT Data Sufficiency question.

Question: What is the remainder when n is divided by 26, given that n divided by13 gives "a" as the quotient and "b" as the remainder? (a, b and n are positive integers)

(1) a is odd
(2) b = 3

This means that out of "n" balls, if we make groups of 13, we will be able to make "a" groups and will have "b" balls leftover.

What happens when we try to combine two groups of 13 to make a group of 26? There are two possibilities: all groups of 13 will be used to make groups of 26 and "b" balls will be leftover (as before) or one group of 13 and "b" balls will be leftover.

What will decide whether a group of 13 will be leftover? If "a" is 2 i.e. we have two groups of 13, we will be able to make one group of 26 and no group of 13 will be leftover. If "a" is 3 i.e. we have three groups of 13, we will be able to make one group of 26 and one group of 13 will be leftover. If "a" is 4 i.e. we have four groups of 13, we will be able to make two groups of 26 and no group of 13 will be leftover. What do you conclude from these examples? If "a" is even, we will have no group of 13 leftover. If "a" is odd, we will have one group of 13 leftover. So the remainder when n is divided by 26 will depend on whether a is odd or even and the value of "b." Let us look at the statements now:

Statement 1: a is odd.

If “a” is odd, then a group of 13 will be leftover. So the remainder will be 13 + b. But we do not know the value of “b.” So this statement alone is not sufficient.

Statement 2: b = 3

We now know that b = 3 but from this statement alone, we do not know whether a is odd or even. So this statement alone is not sufficient.

Taking both statements together, we know that remainder is 13+3 = 16. Hence both statements together are sufficient.

Answer (C).

I do hope that this concept is quite clear to you now. We will look at some other remainder concepts in future blog posts!