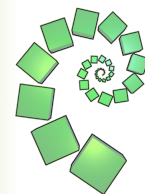
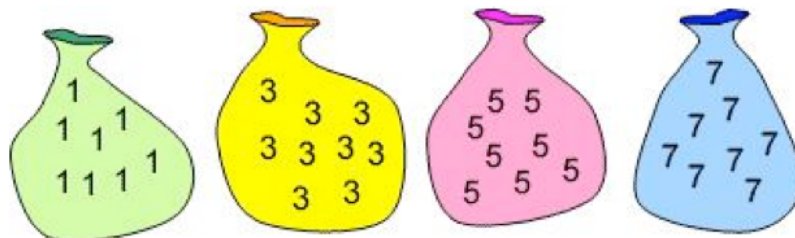


What Numbers Can We Make?



Imagine you had four bags containing a large number of 1s, 3s, 5s and 7s.

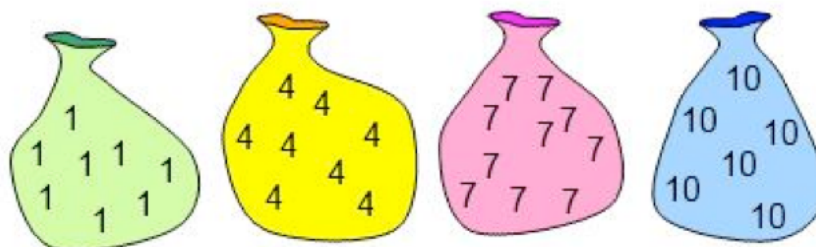


You can choose numbers from the bags and add them to make different totals. You don't have to use numbers from every bag, and there will always be as many of each number as you need.

- Can you find ways of choosing four numbers whose total is 16?
- Can you find ways of choosing six numbers whose total is 25?

Which of these two questions did you find easier to answer? Can you explain why?

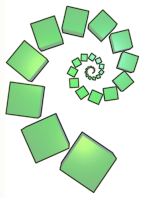
Now imagine a different set of four bags, containing 1s, 4s, 7s and 10s.



- What numbers is it possible to make if you choose three numbers and add them together?
- What if you choose four numbers?
- What if you choose five numbers, or six numbers, or ...?
- What totals do you think it would be possible to make if you choose 99 numbers? Or 100 numbers?

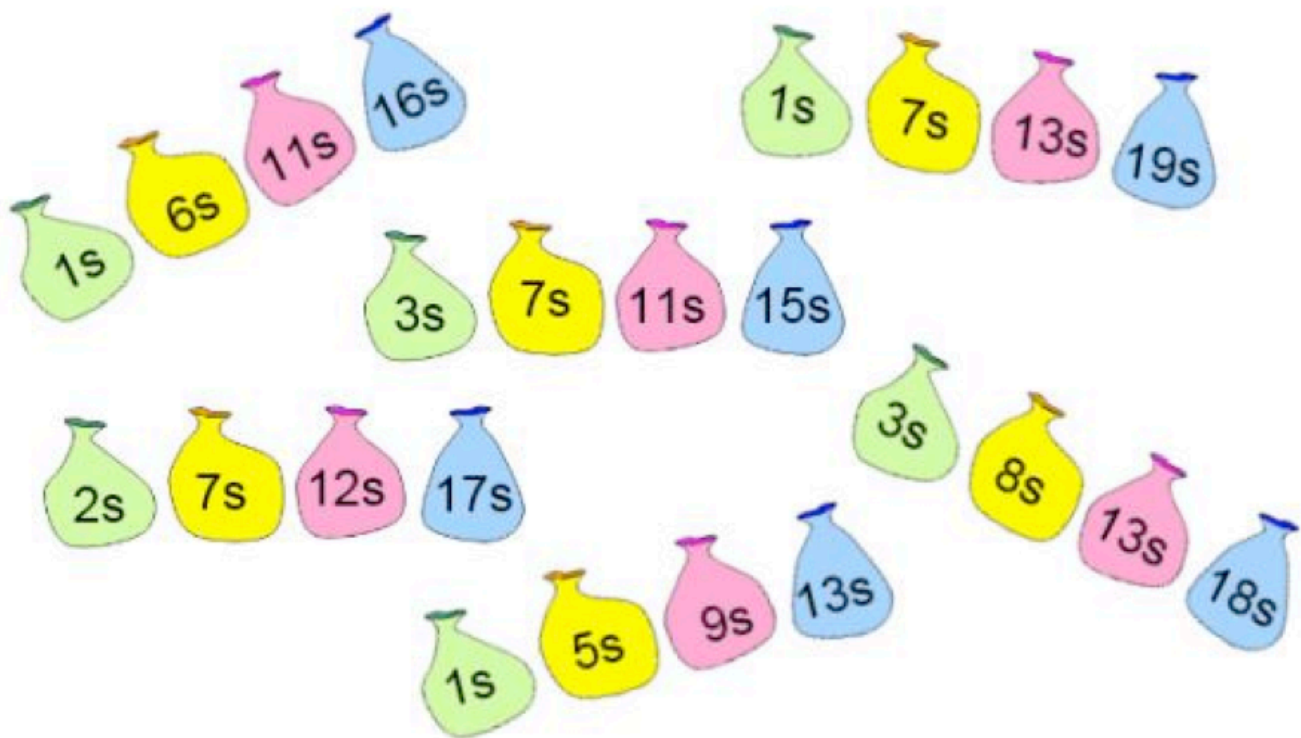
If the bags had instead contained 2s, 5s, 8s and 11s, how would your answers have been different?

What Numbers Can We Make?



Continued...

Here are some more sets of bags:



Can you predict what numbers it would be possible to make for *any* similar set of bags?

- Can you prove any of your conjectures? And finally...
- ...if the bags contained 3s, 7s, 11s and 5s, is there a quick way to check whether you can make 412 by choosing 30 numbers?