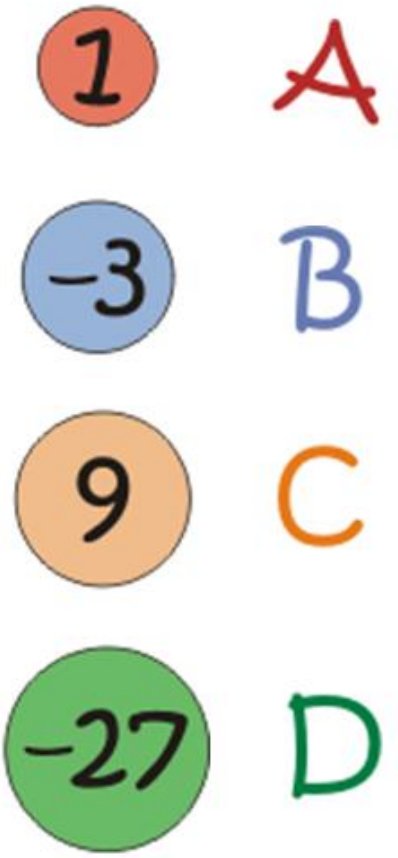
Weights

Imagine you have **two of each** of the 'weights' on the right.



Different combinations of the weights available allow you to make different totals.

For example:

B + C = 6
B + 2C = 15
A + 2B + C = 4
2A + B + 2C + D = -10

The largest total you can make is 20 (check you agree).

The smallest total you can make is - 60 (again, check you agree).

Can you make all the numbers in between?

Is there always a unique way of producing a total, or can different combinations produce the same total?

Extension:
If you are allowed just three different weights this time (E, F and G), and at least one must be a negative weight, and you are now allowed to have up to **three of each**, you could choose:

E = 1 F = -4 G = 5

You could make 7 and -10:

E + F + 2G = 7
2E + 3F = -10

Choose your three weights:

E = ____ F = ____ G = ____

Which totals can you make?

Which set of three weights (E, F, and G) allows you to make the largest range of totals with no gaps in between?