Answer to P91 Three Monkeys +

There are 12 possibilities:

1, 3, 23	1, 9, 17	3, 5, 19	5, 7, 15
1, 5, 21	1, 11, 15	3, 7, 17	5, 9, 13
1, 7, 19		3, 9, 15	7, 9, 11
		3, 11, 13	

Notes

Whilst it is possible for pupils to find some answers to this problem using a fairly unstructured approach, there is no doubt that the best opportunity of finding all the solutions will be created by working systematically.

In this case, systematic working may involve starting with the two smallest possible numbers (1 and 3, not 1 and 1 as the monkeys each have a different number of nuts). The third monkey must then have the number of nuts that makes the total 27 (1 + 3 + 23 = 27).

Keeping the first number the same (ie 1), assume that the second monkey has the next smallest possible number of nuts that meets the criteria: it must be odd and it can't be 1 (the monkeys each have a different number) or 3 (we have done that one).

When all the possible combinations beginning with '1' have been found, try the combinations starting with the first monkey having 3 nuts. The second monkey must have more than 3 nuts as, if the second monkey is allowed to have 1 nut, we end up repeating an earlier solution but in a different order (3, 1, 23) and, in this problem, the order is not important as the monkeys don't have a particular position (it says 'the monkeys don't sit still').

NOTE: If the monkeys were assumed to be in a row (as in the picture in the question) there are a lot more answers:

For example: 1, 3, 21 could be considered different to 1, 21, 3 and 21, 3, 1 and 21, 1, 3 and 3, 1, 21 and 3, 21, 1

So each solution above could have six different orders, making 12 x 6 = 72 solutions altogether.

The resource below may help pupils to find solutions.

P25 Three Monkeys is a simpler version of this problem involving 25 nuts and therefore fewer solutions. A simpler version of the problem is also provided with P25