IDEA 36

100 SQUARE 3

The ideas here focus on developing students' algebraic thinking and require the 'extended' 100 square to be projected onto a screen/board. The first idea is based upon the concept that any linear sequence can be determined by knowing the base set of multiples upon which the sequence is formed.

On an OHT/PowerPoint image, and using the extended 100 square, circle the first few multiples of two, i.e. 2, 4, 6, 8, 10, then consider the following procedure:

- Establish that these values can be described as 2x or $2n$ numbers.
- Now shift the OHT one place to the **Left** so the numbers 1, 3, 5, 7, 9 become circled.
- Having previously established a shift of one place to the **Left** is the same as -1, then this new sequence of numbers can be described, algebraically, as $2n - 1$.

Returning each time to the circled numbers 2, 4, 6, 8, 10, different shifts can now be made, e.g. 2 places to the **Left** creates the sequence $2n - 2$. Three places to the **Right** creates $2n + 3$. One place **Up** creates $2n + 10$.

Supplying each student with a 100 square and some tracing paper (to serve the same purpose as an OHT), they can create sequences themselves based upon other sets of multiples followed by shifts on the grid.

Each time a new sequence is created and its algebraic description is determined, these can be displayed, particularly if students have access to felt pens and strips of sugar paper. In no time at all dozens of linear sequences and their algebraic descriptions can emerge and be used as a resource for future lessons.

IDEA 37

TAKE TWO NUMBERS

This problem involves adding together any amount of two different numbers and exploring the highest total value that *cannot* be made.

For example, if the two numbers are 3 and 11 these are the values I can and cannot make:

1 – cannot be made
2 – cannot be made
3 = 3
4 – cannot be made
5 – cannot be made
6 = 3 + 3
7 – cannot be made
8 – cannot be made
9 = 3 + 3 + 3
10 – cannot be made
11 = 11
12 = 3 + 3 + 3 + 3
13 – cannot be made
14 = 3 + 11
15 = 3 + 3 + 3 + 3 + 3
16 – cannot be made
17 = 3 + 3 + 11
18 = 3 + 3 + 3 + 3 + 3 + 3
19 – cannot be made
20 = 3 + 3 + 3 + 11
21 = 3 + 3 + 3 + 3 + 3 + 3 + 3
22 = 11 + 11

It is now possible to make every other value because:
23 = 20 (which can be made) + 3
24 = 21 (which can be made) + 3
25 = 22 (which can be made) + 3, etc.

The highest value I cannot make, therefore, using lots of 3s and 11s is 19.

What is the highest value I cannot make for other pairs of numbers?

Students might be encouraged to draw a two-way table. Can a generalization be formed for (lots of) a and b?