NRICH MATHS CHALLENGE – Sticky Numbers
Rohan - Wilson's School

I experimented by arranging the printable cards.

I knew that if you arranged the two largest numbers (16 and 17) next to each other then you get a sum of 33, so you are unable to have 36 as a square number. You also can't get a square number of 1 since it needs to be created by summing two adjacent numbers from 1 to 17, not including zero. Therefore the only square numbers it is possible to get by adding pairs of numbers is:

4 9 16 25

I created a table of different combinations of pairs of numbers that would give a square number.

Square number	Pairs of numbers
4	1+3
9	1+8, 2+7, 3+6, 4+5
16	1+15, 2+14, 3+13, 4+12, 5+11, 6+10, 7+9
25	8+17, 9+16, 10+15, 11+14, 12+13

The table allowed me to quickly identify that the largest values of 16 and 17 could only be summed to give a square number of 25 and to achieve this they can only be paired with 9 and 8 respectively. This meant that 16 and 17 had to be placed at the ends of the row.

We can also see from the table that 9 can only be paired with 7 and 16 and 8 can only paired 1 and 17. So far these are the numbers that have been positioned:

17 8 1 ---------- 7 9 16

Next we can see that 7 can only be paired with 2 or 9. The table also shows that 1 can be paired with 3, 8 or 15. For the purposes of solving the problem I decided to try with 15 to start with. The numbers that have been positioned are:

17 8 1 15 ---------- 2 7 9 16

Next we can see that 15 can only be paired with 1 or 10 and 2 can only be paired with 7 and 14. The numbers that have been positioned are:

17 8 1 15 10 ---------- 14 2 7 9 16

Next we can see that 10 can only be paired with 6 or 15 and 14 can only be paired with 2 and 11. The numbers that have been positioned are:

17 8 1 15 10 6 ----------11 14 2 7 9 16

Next we can see that 6 can only be paired with 3 or 10 and 11 can only be paired with 5 and 14. The numbers that have been positioned are:

17 8 1 15 10 6 3 ----------5 11 14 2 7 9 16

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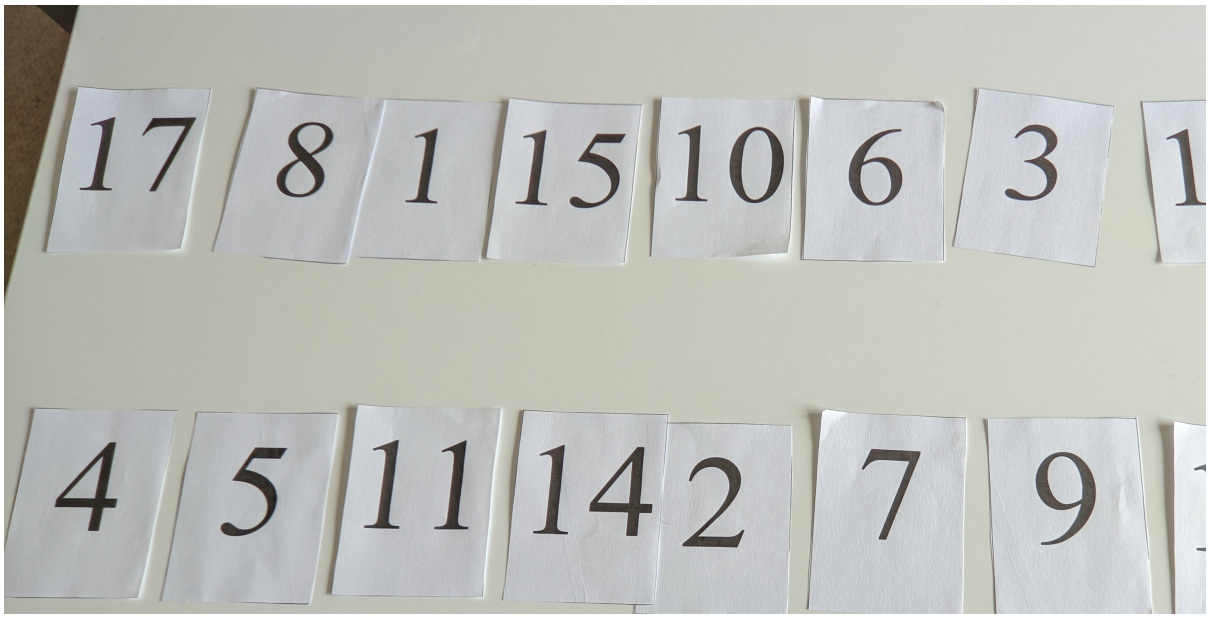
From the table we can see that 3 can be paired with the values 1, 6 and 13. However we are unable to pair with 1 as this has already been used in the line. Therefore we can only place 13 in the line. Also the table shows that 5 can be paired with 4 and 11. The numbers that have been positioned are:

17 8 1 15 10 6 3 13 ---------- 4 5 11 14 2 7 9 16

Next we can see that 13 can only be paired with 3 or 12 and 4 can only be paired with 5 and 12. The numbers that have been positioned are:

17 8 1 15 10 6 3 13 12 4 5 11 14 2 7 9 16



The photo shows the final arrangement I made. The line arrangement can be reversed so that the line starts with 16, 9, 7 etc but I found that the overall order could not be changed.

My solution was based on choosing not to pair 1 with 3. From the table you will recall that this was the only way to make the square number 4. In my solution 1 was paired with 8 and 15 and 3 was paired with 6 and 13.

I did try testing with different pairings based on 1 being potentially paired with 3 and 8 or 3 and 15. However I realised that the pairings with 1 always had to include 8 due to the fixed pairings between 17 and 8.

Therefore I concluded that this is a unique solution.