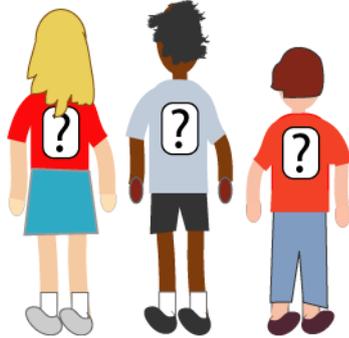# Maths Challenges

One Wasn't Square

Mrs Morgan, the class's teacher, pinned numbers onto the backs of three children: Mona, Bob and Jamie.

"Now", she said, "Those three numbers add to a special kind of number. What is it?"

Michael put his hand up.

"It's a square number", he answered.

"Correct", smiled Mrs Morgan.

"Oh!" exclaimed Mona, "The two numbers I can see also add to a square!"

"And me!" called out Bob, "The two numbers I can see add to a square too!"

"Oh dear", said Jamie disappointedly, "the two numbers I can see don't add

 to a square! It's either 5 too little or 6 too big!"

What numbers did the three children have on their backs?

TASK 3

Sticky Numbers

Look at the following row of numbers:

10   15   21   45

They are arranged so that each pair of adjacent numbers adds up to a square number:

$$10+15=25$$

$$15+21=36$$

$$21+4=25$$

4+5=9Can you arrange the numbers 1 to 17 in a row in the same way, so that each adjacent pair adds up to a square number? Can you arrange them in more than one way? If not, can you justify that your solution is unique?

Carrying Cards

These sixteen children are standing in four lines of four, one behind the other. They are each holding a card with a number on it.
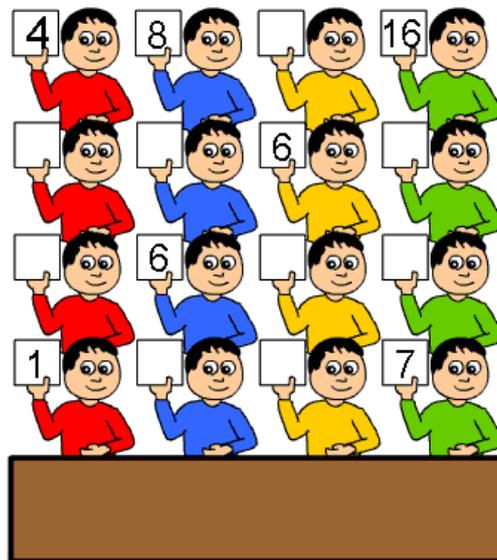
Each child in blue is holding a number which is four more than the child in the same row wearing red.

The children in yellow shirts each have a number which is double the number of the child in the same row wearing red.

Some of the numbers that the children in red, blue or yellow shirts are holding have got rubbed off. What should the numbers be?

Can you work out how the numbers that the children in green are holding have been worked out? What are the two missing numbers?

If there was another row of four children standing behind the fourth row, what numbers would they be holding?

Read the clues carefully and use them to help you. Adding 6 and 5 together will make 11. Write out all squared numbers to 100 and you will notice that the only squared numbers with a difference of 11 between them were 25 and 36. Therefore the numbers had to add up to 36. Therefore 20 + 5 and 11 which will make 36.

Answers: 17 + 16 made 33, this means the highest square number that can be made is 25. This means 17 and 16 only had one way to make a square number, so they would be at either end. After 17 it must be 8 and, after 8, 1. At this point there are two options, 3 or 15. But if 15 didn't go with 1 then it would have to go at the end which would have been impossible to complete. After this the problem became simple as from this point it becomes linear with only one option available after every point.

Answer:

5	9	10	19
4	8	8	16
3	7	6	13
2	6	4	10
1	5	2	7