Landbeach Bell Ringers Worksheet 3 - More called changes

Call some changes yourself

Last week's worksheet showed you one way to get between Rounds and Queens by swapping pairs of adjacent bells:

Rounds: 1 2 3 4 5 6 7 8

2 to 3, 4 to 5, 6 to 7; 2 to 5, 4 to 7; 2 to 7

Queens (Waterfall): 1 3 5 7 2 4 6 8

Have you thought of another way? The person who tells the others which bells have to swap is called the "caller". They "call" the changes. Have a go at calling your sequence of changes.

Question

Does it matter what order you call the changes in? We will discuss this next week.

Bell number *versus* place in the row

The bells have numbers: 1, 2, … 8. At first, bell 1 rings in first place and so on. That is what is we mean by Rounds. But, once we call a change, some bells move out of their home positions. For example:

Rounds: 1 2 3 4 5 6 7 8

Change: 1 to 2

Row: 2 1 3 4 5 6 7 8

Now bell 2 is ringing in first place and bell 1 is ringing in second place.

So the number of a bell must mean something different from the place in the row where it rings. The number doesn't change, but the place does. You need to remember both what number bell you are ringing and what place in the row it is currently ringing in. This sounds obvious, but is ever so useful.

Question

Take the piece of paper on which you wrote out your sequence of changes. The calls you wrote down say which bell numbers swap. Now draw lines showing which pairs of bells have swapped. Do the lines show which bell numbers have swapped or which places have swapped? Is there a pattern?

Here's the answer to last week's question: Rounds – Tittums – Queens

Rounds: 1 2 3 4 5 6 7 8

4 to 5

Row: 1 2 3 5 4 6 7 8

3 to 5; 4 to 6

Row: 1 2 5 3 6 4 7 8

2 to 5; 3 to 6; 4 to 7

Tittums: 1 5 2 6 3 7 4 8

6 to 3

Row: 1 5 2 3 6 7 4 8

2 to 3; 6 to 7

Row: 1 5 3 2 7 6 4 8

5 to 3; 2 to 7; 6 to 4

Queens': 1 3 5 7 2 4 6 8

Question

Draw in the arrows that show which places swap each time. Can you describe the pattern?