## List of Mathematical Behaviours

### Doing things to help you have an idea

* Generating data — calculating
* Organising the data
* “Playing” around with the data, getting to know it
* Discussing it with someone
* Looking for patterns or connections
* Establishing a notation
* Deciding on a definition
* Trying a different notation
* Changing a definition
* Asking a question
* …

### Having an idea

* Observing something
* Thinking of a new way to write something
* Making an association between two things (often one being present in the data, but also a *fact, concept, process or association* that comes to mind)
* Noticing/sensing a pattern
* Making a prediction
* …

### Doing something with that idea

* Testing it against new data
* Sharing it with someone
* Extending it
* Discarding it
* Convincing someone of its validity
* Recognising gaps in logic
* Cleaning up the idea (working towards a precise statement)
* Forming an argument (working towards becoming sure, beyond all doubt)
* Writing a proof
* …

### Creating a new problem

* Looking before/within/beyond for other things of interest
* Changing, adding, or removing a rule
* Asking a new question
* Pondering other problems known to you and considering links
* …

This list is not a recipe to be followed.

It is collection of observable behaviours that are employed by research mathematicians (and young learners) when the stimulus of the work dictates. Mathematical adventures are not linear (see Mathematical Behaviours, page 8), and it is possible that some behaviours will not be called upon during a given adventure.

These behaviours become more effective with experience and a feel for what is required. Such experience can be gained by working with other people and picking up on what they do. It is rarely gained by following a recipe.

This list of behaviours, if applied in a formulaic or mechanical manner, may not work. They are a set of guidelines, not rules, and in the words of Ian Stewart (in his foreword to *How to solve it*, George Pólya, 2nd ed, 1990):

*“It is inherent in the nature of guidelines that they don’t work if you take them too literally.”*