Reasoning Skills NCETM

Achieving the aims of the new National Curriculum:

Developing opportunities and ensuring progression in the development of reasoning skills.

The aims of the National Curriculum are to **develop fluency** and the **ability to reason mathematically and solve problems**. Reasoning is not only important in its own right but impacts on the other two aims. Reasoning about what is already known in order to work out what is unknown will improve fluency; for example if I know what 12 × 12 is, I can apply reasoning to work out 12 × 13. **The ability to reason also supports the application of mathematics and an ability to solve problems set in unfamiliar contexts.**

Research by Nunes (2009) identified the ability to reason mathematically as the most important **factor in a pupil's success in mathematics**. It is therefore crucial that opportunities to **develop mathematical reasoning skills are integrated fully into the curriculum.** Such skills support **deep and sustainable learning** and enable pupils to make **connections in mathematics**.

The intention is to offer suggestions of how to enable pupils to become more proficient at reasoning **throughout all of their mathematics learning** rather than just at the end of a particular unit or topic.

The overall aim is to support **progression in reasoning skills.** The activities also offer the opportunity for children to **demonstrate depth of understanding**, and you might choose to use them for assessment purposes as well as regular classroom activities.

The strategies embedded in the activities are **easily adaptable** and can be integrated into classroom routines.

Strategies include:

- Spot the mistake / Which is correct?
- True or false?
- What comes next?
- Do, then explain
- Make up an example / Write more statements / Create a question / Another and another
- Possible answers / Other possibilities
- What do you notice?
- Continue the pattern
- Missing numbers / Missing symbols / Missing information/Connected calculations

- Working backwards / Use the inverse / Undoing / Unpicking
- Hard and easy questions
- What else do you know? / Use a fact
- Fact families
- Convince me / Prove it / Generalising / Explain thinking
- Make an estimate / Size of an answer
- Always, sometimes, never
- Making links / Application
- Can you find?
- What's the same, what's different?
- Odd one out
- Complete the pattern / Continue the pattern
- Another and another
- Ordering
- Testing conditions
- The answer is…
- Visualising

These strategies are a very powerful way of developing pupils' reasoning skills and can be used flexibly. Many are transferable to different areas of mathematics and can be differentiated through the choice of different numbers and examples.