

Key Questioning for Numeracy Lessons

LEVELS OF THINKING	GUIDE QUESTIONS
1. Memory: recalls or memorises information	What have we been working on that might help with this problem?
2. Translation: changes information into another form	How could you write/draw what you are doing? Is there a way to record what you've found that might help us see that?
3. Interpretation: discovers relationships	What do you notice? What's the same? What's different? Can you group these in some way? Can you see a pattern?
4. Application: solves a problem - use of appropriate generalisations and skills	How can this ____ help you find an answer? What do think comes next? Why?
5. Analysis: solves a problem - conscious knowledge of the thinking	What have you discovered? How did you find that out? Why do you think that? What made you decide to do it that way?
6. Synthesis: solves a problem that requires original, creative thinking	Who has a different solution? Are everybody's results the same? Why/why not? What would happen if ...?
7. Evaluation: makes a value judgement	Have we found all the possibilities? How do we know? Have you thought of another way this could be done? Do you think we have found the best solution?

Key Questioning

1. *Probing questions*

These take the form of open-ended questions which focus the children's thinking in a general direction and give them a starting point.

Examples:

How could you sort these.....?
How many ways can you find to ?
What happens when we ?
What can be made from....?
How many different can be found?

2. *Questions to stimulate mathematical thinking*

These questions assist children to **focus** on particular strategies and help them to see **patterns** and **relationships**. This aids the formation of a strong conceptual network.

Examples:

What is the same?
What is different?
Can you group these in some way?
Can you see a pattern?
What do you notice?
How can this help you find an answer?
What do think comes next? Why?
Is there a way to record what you've found out that might help us?
What would happen if....?

3. *Explanation Questions*

Questions such as these ask children to explain what they are doing or how they arrived at a solution. They allow the teacher to see how the children are thinking, what they understand and what level they are operating at. Obviously they are best asked after the children have had time to make progress with the problem, to record some findings and perhaps achieved at least one solution.

Examples:

What have you discovered?
How did you find that out?
Why do you think that?
What made you decide to do it that way?

4. *Comparison Questions*

These questions draw together the efforts of the class and prompt **sharing** and **comparison** of strategies and solutions. This is a vital phase in the mathematical thinking processes. It provides further opportunity for **reflection** and **realisation** of mathematical ideas and relationships. It encourages children to **evaluate** their work.

Examples:

Who has the same answer/ pattern/ grouping as this?

Who has a different solution?

Are everybody's results the same?

Why/why not?

Do you agree/disagree?

Have we found all the possibilities?

How do we know?

Have you thought of another way this could be done?

Do you think we have found the best solution or strategy?

Is it always, sometimes or never true that...?