

Ideas for Numeracy

Memory

- Share the big picture - link mathematics to familiar and relevant contexts (LTiD)
- At the start of each activity the Learning Intention should be shared so that children know what they are learning and why (LTiD)
- Link/associate new information with known facts (LTiD)
- Reduce demands on working memory - write down calculations/jot down answers
- Allow children to use visual representations such as empty number lines, class number square and times tables square to allow them to learn without experiencing a discouraging memory overload

Language

- Allow more time for those with slow processing
- Develop and use mathematical language to help understanding of number concepts
- Key vocabulary should be highlighted, explained, modelled and understanding checked
- Display maths terms and symbols - colour coding may be helpful
- Consider how word problems are constructed and provide support by encouraging children to use pictures and diagrams
- Provide opportunities for children to practise changing problems with symbols into word problems so that they can learn how these are composed

Spatial Processing

- Support accurate recording by providing squared paper/prepared formats
- As far as possible ensure that the layout of the worksheet or text book page is:
 - uncluttered
 - examples are not too close together
 - the font is clear
- Consider how to present information to a pupil:
 - emphasis on visual rather than verbal
 - correctly solved problems/diagrams to work from
- Provide practice in subitizing by including games and activities using dice and dot card activities such as deal and copy and memory match

Problem solving/Knowledge and application of rules and strategies

- Find out strengths and areas for development, and investigate particular misconceptions and incorrect strategies
- Thinking aloud/verbalise the process - "How did I/do I work that out?" This process is initially modelled by the teacher. (Asking the pupil to verbalise their thinking/show you what they did, allows you to identify strengths and areas for development)
- Understanding - "Learning how to learn" - encourage children to demonstrate, discuss, explain, talk through their thinking and the process involved in what they have done
- Encourage modelling the problem using graphic organisers such as drawing diagrams and pictures
- Encourage pupils to discuss procedures and if necessary write them down
- Encourage them to make choices about methods used
- Provide opportunities for real life problem solving that includes estimating and reasoning
- Use peer tutoring - a child can often explain in terms more readily accessible
- Modification of some classroom tasks or use of technological resources to enable successful completion of tasks
- Feedback/errors - discuss what went wrong and how it can be put right and allow them time to correct

Attitude and Expectations

Growth Mindset

- Encourage the use of new strategies
- Help children picture the new connections being made in their brain (new connections grow with practise and effort)
- Remind children that marks or grades do not show their potential, as they only indicate how they are doing right now
- Be curious and playful about children's learning potential
- Provide praise for effort, focus, challenge and resilience, as opposed to intelligence

Supporting Confidence (Maths Anxiety)

- Create a learning environment which fosters positive attitudes to maths
- Help children to see that making mistakes is not a bad thing but a helpful step in their learning journey, as mistakes provide learning opportunities
- Create a context where pupils are given the opportunity to engage in real life maths so that they can see the value in processes such as problem

solving, creating ideas and representations, exploring puzzles and engaging in 'number talks'(Boaler) where the emphasis is on discussing methods and the many different ways of working out a problem rather than solely focusing on getting a right answer

- Include class discussion where mistakes are used as learning opportunities
- Ensure teachers have sufficient subject knowledge in order to feel confident to find creative and innovative ways of achieving depth of learning which in turn helps to develop higher order understanding
- Demonstrate relaxation techniques
- Focus on their success
- Give regular positive feedback
- Set realistic goals
- Establish routines at the beginning and end of lessons

Motivation

- Create a learning environment which communicates the idea that everyone can be good at maths (see also 'mindset' section)
- Ensure that learners have an understanding of the patterns, sequences and processes in maths and at the same time, enable them to see the purpose and use of what they are learning (e.g. share the big picture, make the learning intention and success criteria explicit)
- Consider whether lessons provide sufficient challenge for every pupil (see zone of proximal development note)
- Provide opportunities for children to problem-solve, create ideas and representations, explore puzzles and discuss methods and many different ways of working
- Encourage children to be actively engaged in the learning process. By posing and extending problems of interest to children, they can enjoy maths more, feel more ownership of their work and ultimately they will learn more
- Give careful consideration to how children are grouped for learning, bearing in mind that children who, at an early age are led to believe they are a low achiever at maths, will develop a very negative view of the subject and will be less motivated to engage and therefore less likely to succeed in the future (see also 'mindset' section)
- Provide opportunities for children to experience a range of ways of working and help them to develop number flexibility

Gender

- Encourage the development of growth rather than fixed mind sets (see 'mindset') to avoid influence of negative gender stereotyping

- Create a context where pupils are given the opportunity to ask **WHY** methods work, **WHERE** they came from, and **HOW** they are connected
- Help females to understand that past underachievement has its roots in environmental rather than genetic factors and can be overcome by enhanced support from their educational environment and by personal commitment to learning

Flexible Thinking Style

The curriculum needs to:

- Actively encourage flexibility
- Adopt an ethos of exploration in the classroom
- Offer opportunities for learners to share and discuss different methods
- Encourage risk-taking although teachers need to make sure that the consequences of taking a risk are not negative

Development

- Use a consistent visual representation, either linear or as a pattern, to support the development of a sense of number and how numbers inter-relate
- Use a variety of objects, images, models, materials and equipment (e.g. cubes, number line, table square, base ten materials etc)
- Children learn skills and knowledge through practical experiences therefore provide lots of opportunities for hands on activities using concrete materials
- Use lots of practical activities and concrete examples before moving on to abstract operations
- Use small numbers to introduce new concepts
- Teach concepts, problem solving strategies and the use of concrete materials that are then applied in a number of contexts
- Teach for understanding by focusing on mathematical concepts rather than drill and rote learning

Zone of Proximal Development (ZPD)

Taking account of ZPD, the role of the teacher will be to provide:

- Purposeful, explicit instruction
- Modelling and demonstration of the process or skill, physically and verbally
- Opportunities for varied experiences
- Mediation of activities and opportunity to actively practise
- Opportunities to discuss what they are learning with peers and the teacher
- Questions which extend the pupils' thinking and opportunities to

articulate and reflect on their thoughts

- Simplification of complex information while building on prior knowledge through scaffolding

Scaffolding

- Relating the problem to an activity that is familiar to the pupils
- Reviewing skills needed to solve the problem
- Providing tools for pupils to work with and offering support

In maths setting, scaffolds might include:

- Concrete materials, e.g. counters and cubes
- Games
- Models
- Cues
- Prompts
- Hints
- Partial solutions
- 'Think aloud' modelling
- Contextual problems based on the pupils' interests

Brain Development

- Play together, including counting games/rhymes using fingers
- Sing songs/rhymes
- Play with numbers in everyday activities
- Play games with counting, guessing, listening to and making music (rhythm and pitch) using body and simple utensils, board games, e.g. snakes and ladders
- Include children in experiences that allow them to explore mathematical concepts, e.g. cooking and food preparation, navigating space on play equipment, jigsaw puzzles and block building, domestic tasks, clothes sorting, table setting, unpacking/shelving shopping, talking about time, counting steps, board games with numbered squares, etc.
- Draw children's attention to play with pattern making and relationships between objects and ideas
- Play guessing/prediction games, talk about what's happening and ask questions to help children think about what's happening, what might happen and how things happen