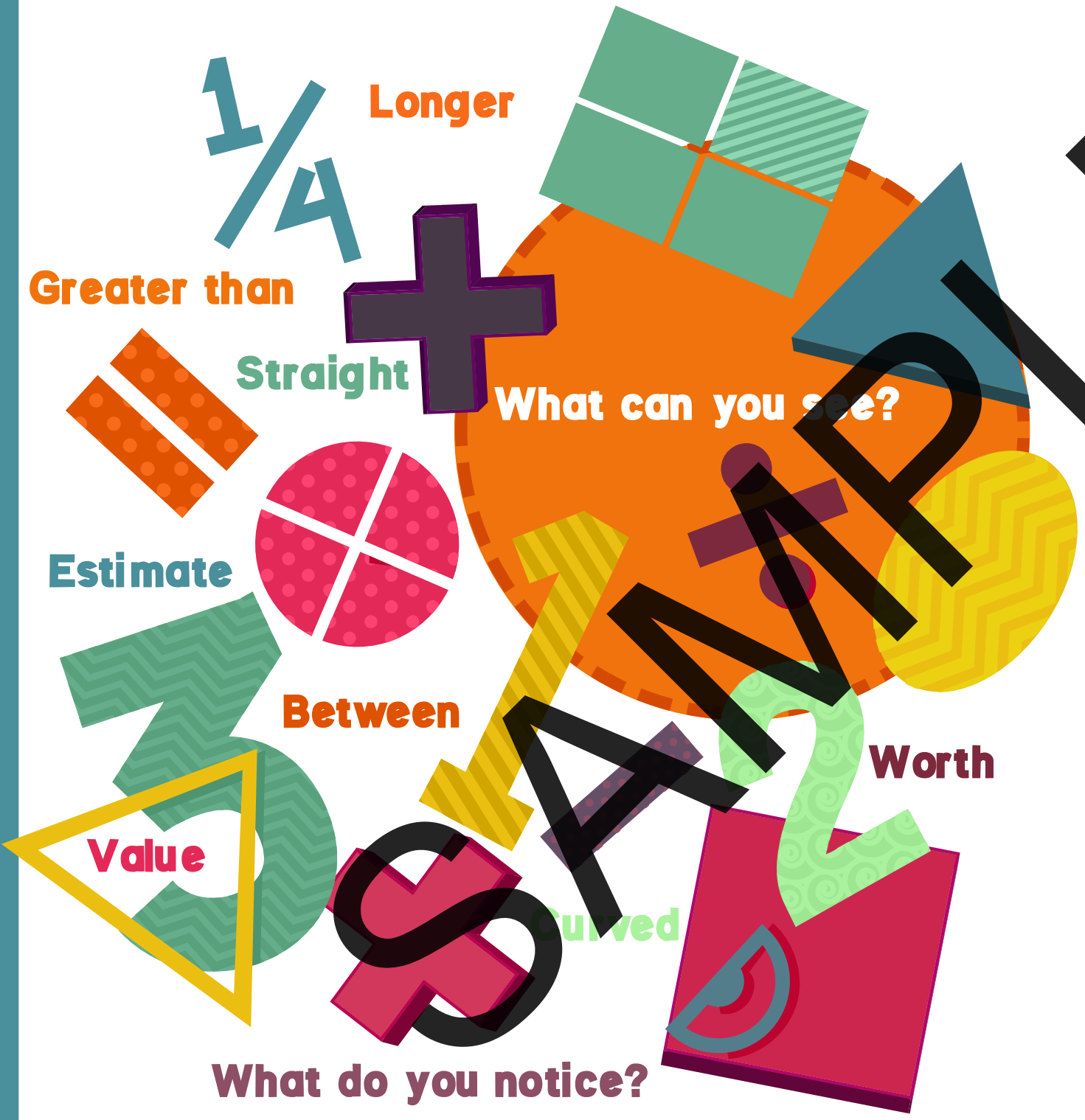

School Improvement Liverpool

Talking Maths:
Teacher Guide

Developing Speaking and Listening in the Language of Mathematics

Thanks and Acknowledgements

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Welcome to Talking Maths

Rationale
In recent years, a wide range of mathematics intervention programmes have been developed to address the needs of children who are failing to realise their potential. However, we recognise the importance of oracy skills in developing children's thinking strategies when solving mathematical problems.

'Promoting oracy in the classroom has the potential to help diversify and strengthen pedagogy and deepen learning' - Millard 2018

The barrier to understanding mathematical concepts, and gaining the necessary confidence, is often due to the unfamiliar language of mathematics and limited opportunities to use a range of vocabulary in context.

The National Curriculum 2014, highlighted the importance of developing spoken language:

'Pupils should be taught to speak clearly and convey ideas confidently using Standard English. They should learn to justify ideas with reasons; ask questions to check understanding; develop vocabulary and build knowledge; negotiate; evaluate and build on the ideas of others and select the appropriate register for effective communication. They should be taught to give well-structured descriptions and explanations and develop their understanding through speculating, hypothesising and exploring ideas. This will enable them to clarify their thinking as well as organise their ideas for writing.'

The Talking Maths programme supports the development of spoken language, as it provides opportunities for children to embed an understanding of mathematical vocabulary and use it in a range of contexts to explain their thinking.

Developing reasoning and problem solving skills are key aims of the 2014 mathematics curriculum, and an understanding of language and use of vocabulary underpin both aims. **'The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof.'** NC 2014

How to Administer the Programme

The programme is designed to run over a 10 week period. It follows a simple structure of three weekly sessions of 20 minutes, each made up of two 10 minute practical activities, with an emphasis on developing the child's use and understanding of mathematical language.

Weekly Activities:

Day 1	Day 2	Day 3
A. On The Table An activity that presents a collection of objects 'On the Table' to stimulate discussion, questioning and interaction and to provide opportunities for sharing mathematical vocabulary. ***(Page 16)***	***A. What's the Same? What's Different?*** This activity presents a variety of objects that show differences and similarities to compare and contrast. It provides opportunity for asking and answering questions, estimating, measuring and checking results. ***(Page 31)***	***A. Let's Say, Let's Play*** A chance to practise maths vocabulary through songs, rhymes, actions, pictures and games. This is a fun activity which could use resources already known to children/adult or developed by themselves. ***(Page 45)***
B. Problem Puppet In this activity, the puppet plays a central role in introducing the problems to the children. It can: • Introduce the problem • Ask the children for help • Make silly mistakes • Help generate ideas • Encourage checking strategies • Help find the right answer ***(Page 23)***	***B. Copy Cats*** Copy Cats is an opportunity to use simple barrier games to provide a purposeful context for using mathematical language. Barrier games provide children with the opportunity to give precise, clear instructions and become active listeners. ***(Page 38)***	***B. Detectives*** Be a detective... • Ask questions • Use clues • Solve problems ***(Page 52)***

Stages of Language Development

There are three stages within each activity:

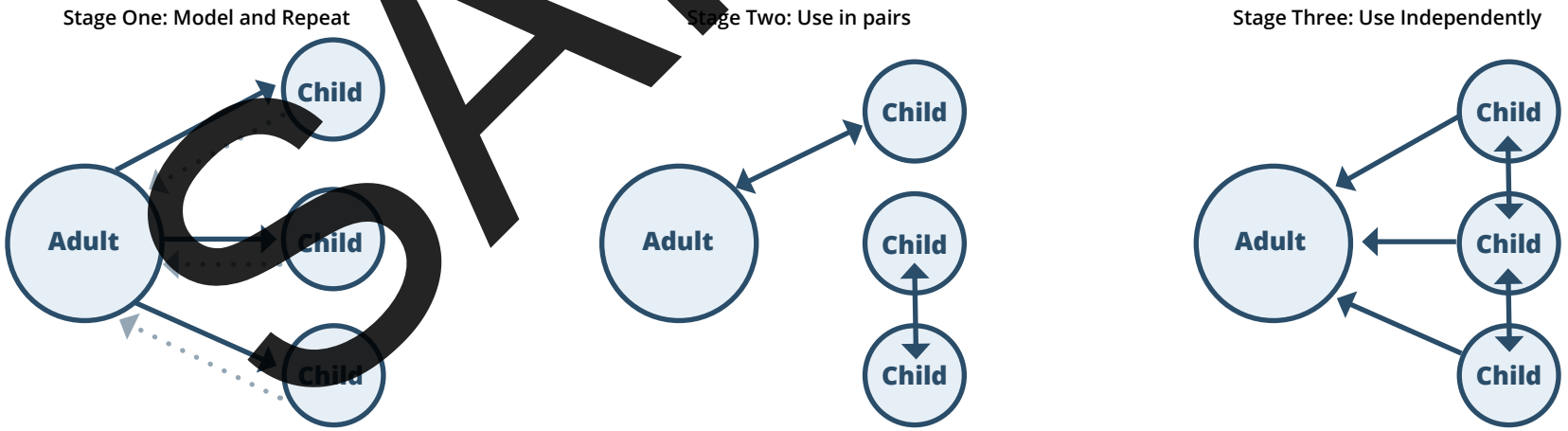
Stage One – Model and Repeat
The adult partner supports the children through modelling, demonstrating and prompting.

Stage Two – Use in Pairs
The adult extends the questioning and guides and encourages the children to use the language more readily in pairs.

Stage Three – Use Independently
The adult promotes independent interaction. As the children gain confidence and develop their language, they are encouraged to use it with increasing independence and begin to ask their own questions.

There is no expectation that children will progress through the stages within a specified number of sessions, the aim is for them to move towards using mathematical language in context within each activity with increasing independence over the course of the programme.

The programme can be administered by a teacher or a learning support assistant working with a group of three children.



On the Table

On the Table is an opportunity to promote mathematical discussion and can be linked with any area of mathematics that the children may be covering and provides context to use the vocabulary needed. This activity opens the week.

Selections of items are presented to the children 'on the table'. For example, if the children have been learning about time, they could be presented with a selection of clock faces, stopwatches, timers, relevant pictures and calendars.

A variety of containers and measuring equipment would stimulate discussion about capacity or shape.

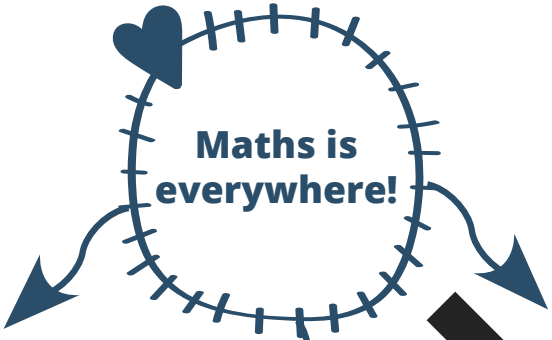
Use everyday items or mathematical equipment that can easily be found in school.

Problem Puppet

In this activity, the puppet plays a central role in introducing the problems to the children.

The idea is to use one or two puppets each time and create a 'personality' that the children can become familiar with.

The puppet can:
- Read/explain the problem initially to the children and ask for their help
- Generate ideas and make silly mistakes the children must correct
- Model strategies and encourage checking



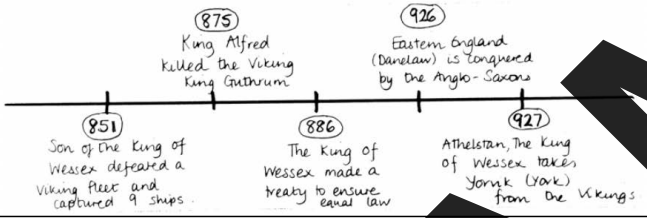
Cross Curricular Links

There are many links to maths in other areas of the curriculum. You could use problems linked to these areas while maintaining a mathematical focus.

For example:

Timeline:

1. Discuss timelines and scales in history
2. Look at this timeline what went wrong?



Maths Through Stories

Use books to stimulate discussion around key concepts.

For example:

The Great Pet Sale

1. Choose two animals and add up the cost
2. Choose two pets and say which costs more/less
3. Which pet costs the most?
4. Which pet costs the least?

This book can be used to support the teaching of money and addition and subtraction.

Real Life Maths

Where possible seek to make links within real life contexts.

For example:

The puppet will ask you the following:

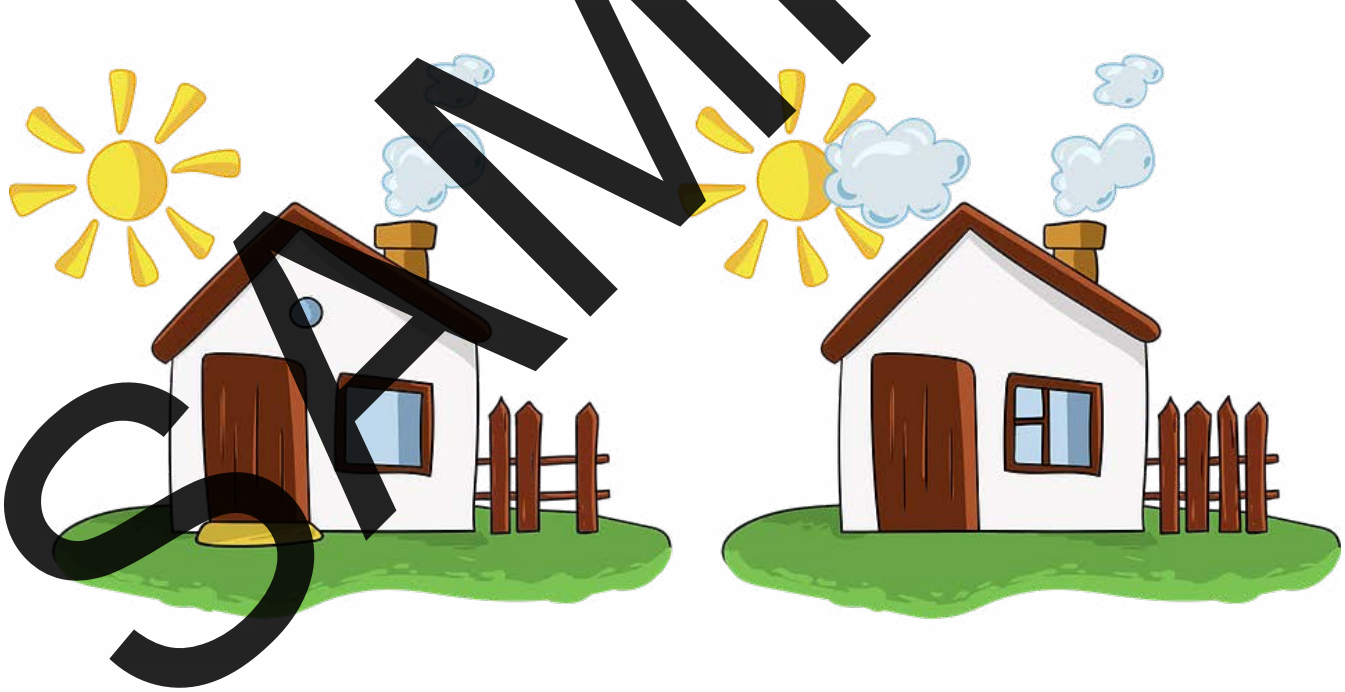
1. A toy animal costs 3p. Which coins could I use to buy it?
2. A different toy cost 7p. How much more is it?
3. What would the cost be to buy both?

What's the Same? What's Different?

This activity provides opportunities to use mathematical language to compare and contrast.

The children will be discussing how things are different, describing, grouping items together and explaining their choices. Children will be asking and answering questions.

Depending on the items used in the activity and the stage the children are at, the teacher should encourage the children to estimate, measure and check.



Copy Cats

Copy Cats is an opportunity to use simple barrier games to provide a purposeful context for using mathematical language. Barrier games provide children with the opportunity to give precise, clear instructions and become active listeners.

A barrier game is a simple fun activity where one partner gives clear instructions to complete a task for the other to follow.
- Set up a barrier between the children
- One partner gives clear instructions to the other on how to execute given task
- The listener questions and clarifies to complete the task
- Remove the barrier and exploit further opportunities for discussion and comparison

Let's Say,
Let's Play

Stage Three – Use Independently, Evaluation and Explanation

'Warm up' with a familiar song/rhyme.

Encourage the children to take turns to choose their own favourite and lead the song/action.

- Choose from a range of quick number games played against a musical time limit. See 'page 43 for ideas and suggestions.

Discuss the game with the children and encourage evaluation and explanation.

- What did you enjoy about the game?
- What was difficult?
- What were you good at?
- How did you sort the numbers quickly?
- How did you help each other?
- Why did you put that number there?
- Can you explain to me how you did that?
- Can you tell me why?

Language Focus

An opportunity to practise a range of mathematical vocabulary through songs, rhymes, actions, pictures and games.
Logical thinking:

- Which is the most efficient strategy?
- How could I win next time?
- If.....then.....

Mathematical Focus	Progression of suggested activities
Number	**Songs:** • Ten green bottles, ten blue saris • One, two, three, four, five, once I caught a fish alive • 5 little speckled frogs • 10 fat sausages • Extend to writing and performing raps to help remember key facts or properties of number Alternative words could be used to fit into well known tunes, e.g. Five currant buns in a baker's shop – Five fortune cookies on the table so wide... • Mnemonics – make up own poems to help them to remember facts • Posters – make mind maps/ thought showers/visual aids to help them to remember facts • Counting games, e.g. starting from 0, children take turns to count on either 1, 2 or 3 and the person who says the target number, e.g. 21 is the winner. • Count forwards or backwards or chant multiplication tables to rhythms, e.g. clap, clap, clap...click click: '1 times 5..is 5, 2 times 5..is 10, 3 times 5...15, etc. • Make dances/ movements/actions to help remember properties of number **Games:** • Play commercial games, e.g. dominoes, cards, snakes and ladders, countdown, hopscotch.. • Give out number cards between 0 and 10, children say their number name and while the music is playing, they order themselves smallest to largest, which numbers are missing? • While a piece of music is playing, children take turns to identify numbers from clues, e.g. a number greater than 10, a number that is 5 more than....double....half, etc. and choose number on a target board, or write on a whiteboard • 'Pass the Dice' – pass a 1-6, 0-9, 1-20 dice, when the music stops, ask questions, e.g. what is the number before/after? '3 less? double/half? Etc. • 'Musical Switch' – count round in ones/twos, etc. and at the beat of a drum, change direction and count back. Start at different numbers and use multiples for variation.

SAMPLE

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