Early Maths Matters:

Deepening our understanding of great mathematics teaching for our youngest learners

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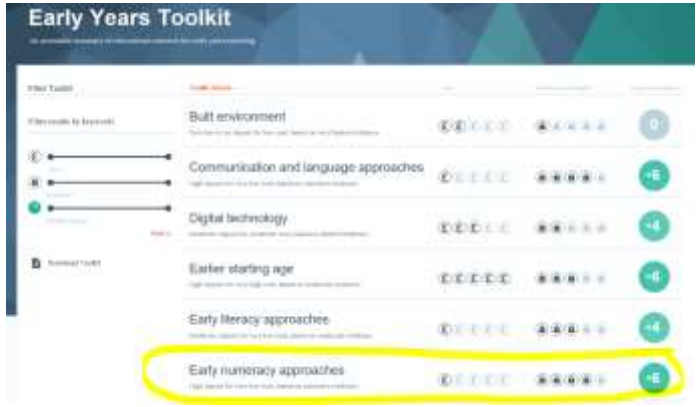

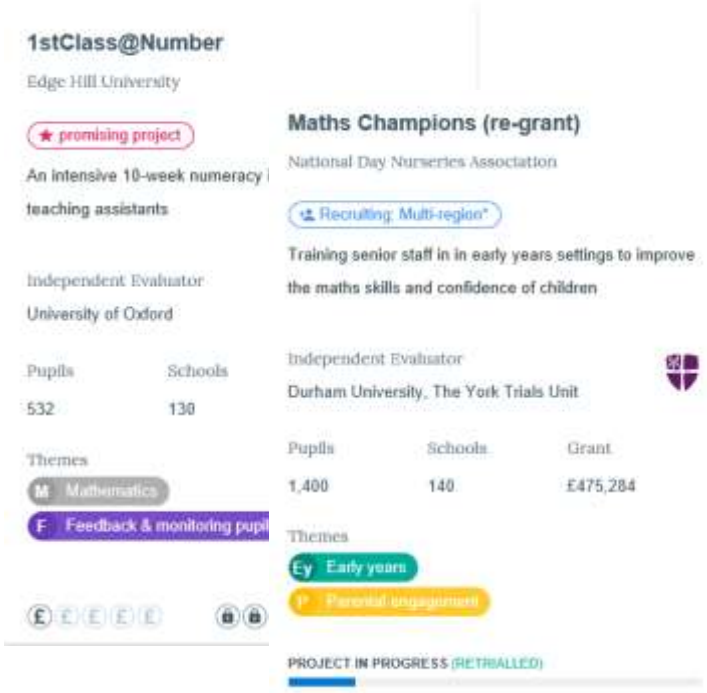

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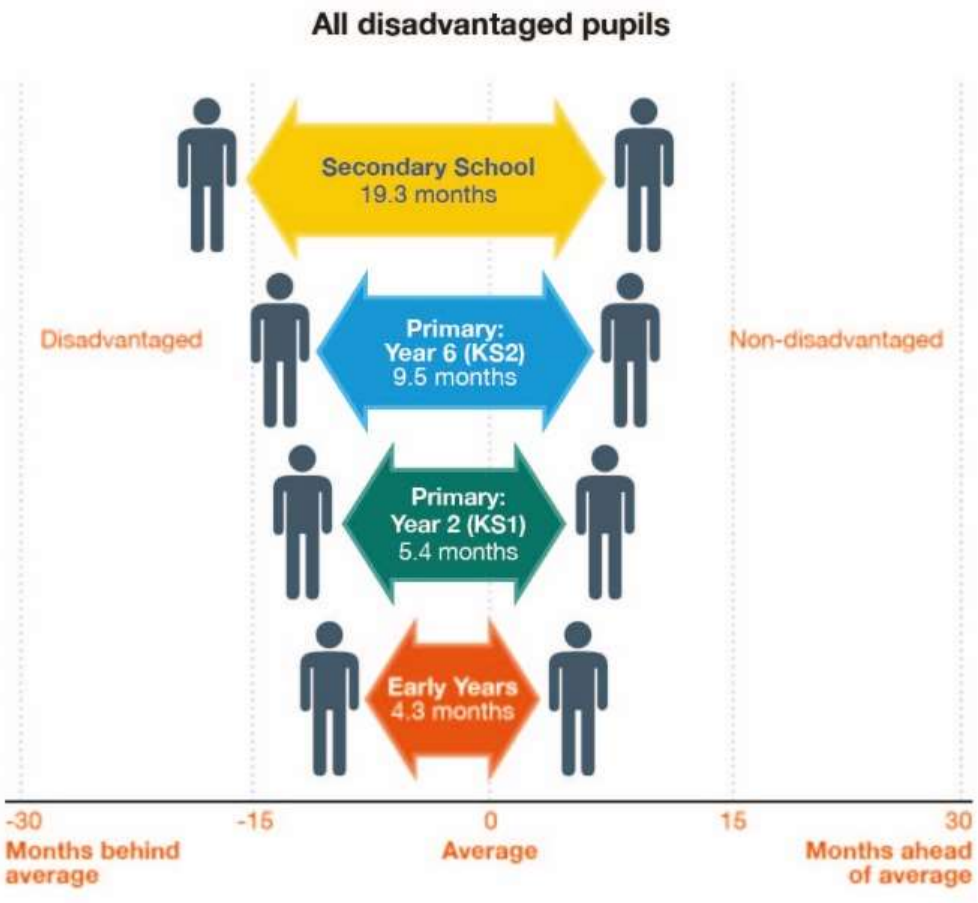
Why does Early Maths Matter?



- **Early understanding of number** predicts children's **overall achievement**

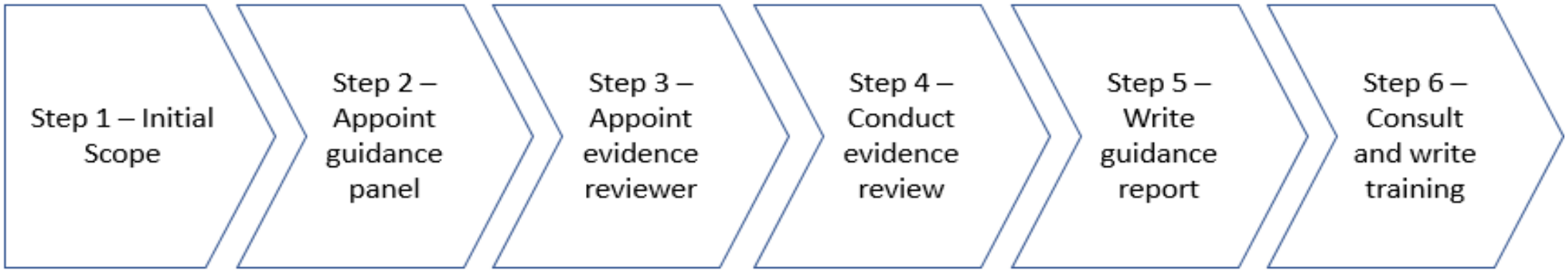
- Once children fall behind, they are unlikely to 'catch up'

Source: Education Policy Institute: Closing the Gap? (2017)

IMPROVING MATHEMATICS IN THE EARLY YEARS AND KEY STAGE 1

Guidance Report

EEF guidance report process



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1

Develop practitioners' understanding of how children learn mathematics

- Professional development should be used to raise the quality of practitioner' knowledge of mathematics, of children's mathematical development and of effective mathematical pedagogy.
- Developmental progressions show us how children typically learn mathematical concepts and can inform teaching.
- Practitioners should be aware that developing a secure grasp of early mathematical ideas takes time, and specific skills may emerge in different orders.
- The development of self-regulation and metacognitive skills are linked to successful learning in early mathematics.

2

Dedicate time for children to learn mathematics and integrate mathematics throughout the day

- Dedicate time to focus on mathematics each day.
- Explore mathematics through different contexts, including storybooks, puzzles, songs, rhymes, puppet play, and games.
- Make the most of moments throughout the day to highlight and use mathematics, for example, in daily routines, play activities, and other curriculum areas.
- Seize chances to reinforce mathematical vocabulary.
- Create opportunities for extended discussion of mathematical ideas with children.

3

Use manipulatives and representations to develop understanding

- Manipulatives and representations can be powerful tools for supporting young children to engage with mathematical ideas.
- Ensure that children understand the links between the manipulatives and the mathematical ideas they represent.
- Ensure that there is a clear rationale for using a particular manipulative or representation to teach a specific mathematical concept.
- Encourage children to represent problems in their own way, for example with drawings and marks.
- Use manipulatives and representations to encourage discussion about mathematics.
- Encourage children to use their fingers—an important manipulative for children.

4

Ensure that teaching builds on what children already know

- It is important to assess what children do, and do not, know in order to extend learning for all children.
- A variety of methods should be used to assess children's mathematical understanding, and practitioners should check what children know in a variety of contexts.
- Carefully listen to children's responses and consider the right questions to ask to reveal understanding.
- Information collected should be used to inform next steps for teaching. Developmental progressions can be useful in informing decisions around what a child should learn next.

5

Use high quality targeted support to help all children learn mathematics

- High quality targeted support can provide effective extra support for children.
- Small-group support is more likely to be effective when:
  a. children with the greatest needs are supported by the most experienced staff;
  b. training, support and resources are provided for staff using targeted activities;
  c. sessions are brief and regular; and
  d. explicit connections are made between targeted support and everyday activities or teaching.
- Using an approach or programme that is evidence-based and has been independently evaluated is a good starting point.

2

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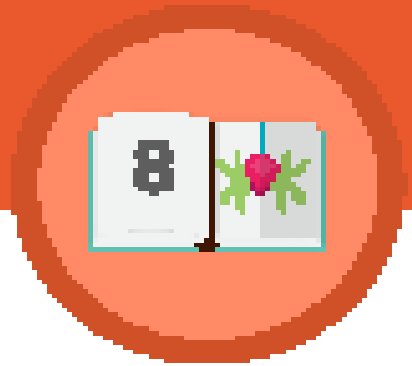
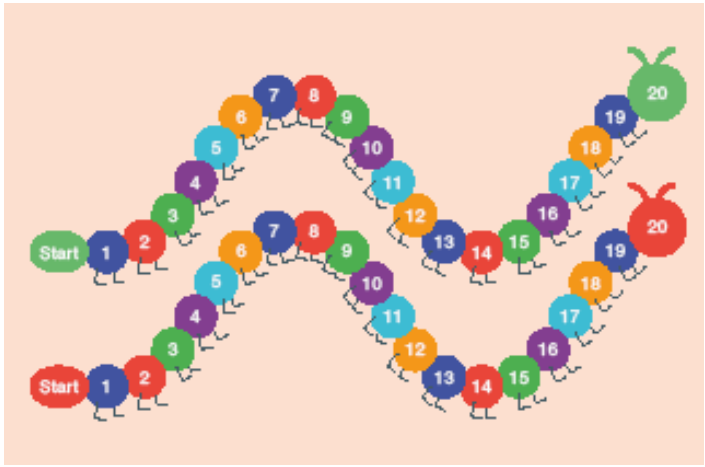


2

Dedicate time for children to learn mathematics and integrate mathematics throughout the day

- Time should be dedicated to purposeful mathematical activity
- Contexts include storybooks, games, puzzles, rhymes, puppet play, songs
- Explicit teaching and discussion is required for children to form more sophisticated mathematical ideas



education sciences

MDPI

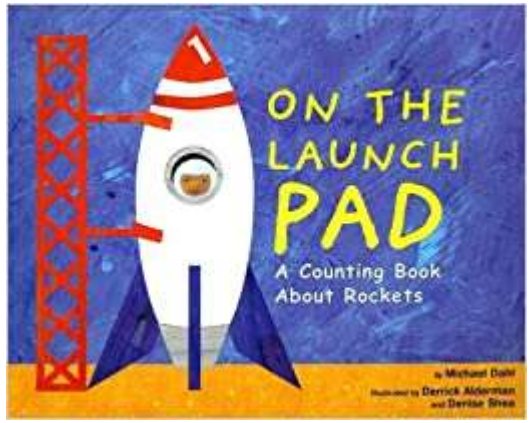
Article

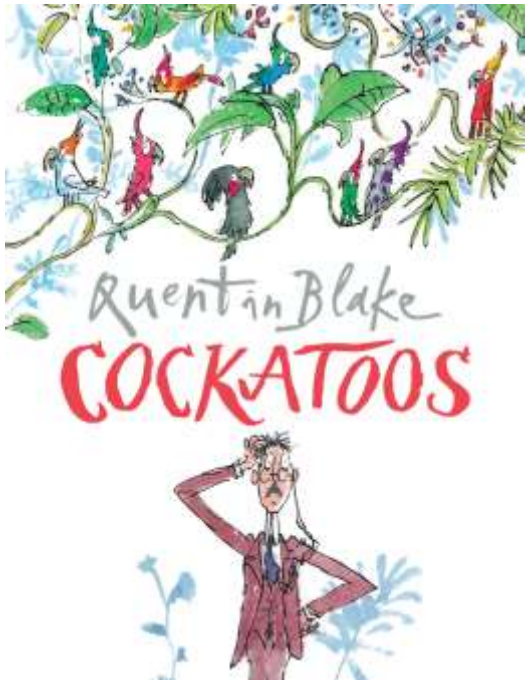
Myths of Early Math

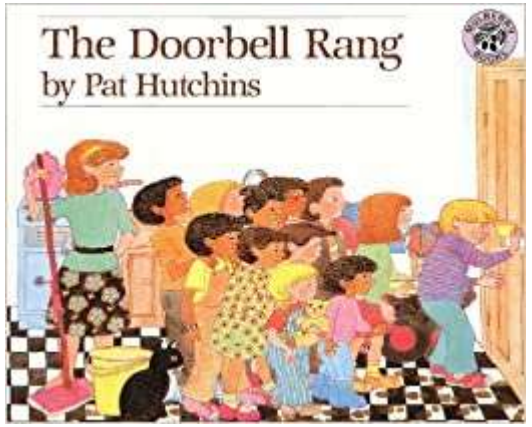
Douglas H. Clements [1,2,*] and Julie Sarama [1]

2

Dedicate time for children to learn mathematics and integrate mathematics throughout the day







- Have you chosen a story which is age-appropriate?
- Have you identified the mathematical content?
- Have you considered how this book links to the mathematics being learned?
- Has your team discussed and identified mathematical questions to ask during reading?
- Will any vocabulary require pre-teaching? How might vocabulary be developed throughout the day?
- Has your team discussed and identified appropriate mathematical follow-up activities?

2

Dedicate time for children to learn mathematics and integrate mathematics throughout the day

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- Seize chances to reinforce mathematical vocabulary.
- Create opportunities for extended discussion of mathematical ideas with children.

Extended discussion about mathematical ideas is important – sustained shared thinking, guided interaction are approaches that can be used well for maths

- How did you…?
- Why does this…?
- I really want to know more about this…
- So you think that…
- So, do you think we should…?

Reinforce mathematical vocabulary

- Consistency
- Progression from informal to formal

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Discussion groups (part one)

- Read pp12 – 14 of the guidance report

Consider the following questions:

- What does 'purposeful mathematical activity' look like in your school?
- Is time set aside in your school to support teachers in planning mathematical questions relating to story books?
- Are games specifically chosen to support the learning of current objectives?
- How could we engage parents in the findings of this recommendation in order to support learning at home?

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Discussion groups (part two)

- Read pp15 – 19 of the guidance report

Consider the following questions:

- What are the implications in your school for the evidence around mathematical vocabulary and discussion?
- Are 'mathematical moments' throughout the day used in your school? Are they planned to link to current learning objectives?
- How could we engage parents in the findings of this recommendation in order to support learning at home?

Further reading

Blogs

- Story books – Rob Newton – Huntington Research School
- Mathematical vocabulary – Mari Palmer – NYC Research School

Websites

- Mathematical story books for discussion

mathlearningcenter.org/resources/lessons/pre-k-story-collections

- DREME parents' support guide

https://dreme.stanford.edu/news/10-tips-reading-math-picture-books-young-children

Further tools – October / November 2020

Book planning tool

Questions to consider

- Is the book mathematically suitable for the children?
  For example, are there mathematical ideas in the story which are too advanced for the children? Is the mathematical content too simple for the children?
- What mathematical ideas are contained within the story?
  Does the story support number, calculation, shape and space, or a combination of these?
- Does the mathematical content link to the mathematics being explicitly taught?
  For example, if your teaching focus is counting up to 20 and the book only features numbers up to 10, it may not be suitable.
- Is the book likely to hold the children's interest?
  It is best to choose books which are likely to engage the children's attention – this can be just as important as the appropriate mathematical content.
- What mathematical questions and prompts might be useful for practitioners?
  These should be planned as a staff team where possible.
  - *Read through the whole book together first*
  - *Then consider the book page-by-page and jot down mathematical discussion prompts*
  - *When the whole book has been reviewed, edit your questions as a group*
  - *Once you have decided on your questions, record these (for example – you could use the record sheet provided, prompt cards, or post-it notes on the book pages)*
- Is there any unfamiliar vocabulary (mathematical or otherwise) which will need pre-teaching, or mathematical vocabulary which requires clarification (for example – 'tall' instead of 'big')?
  Consider when this could be introduced, and if there might be opportunities throughout the day to reinforce this.

Further tools – October / November 2020

Mathematical discussion prompts

	Suggested prompts *These question stems could be used to extend discussion about mathematical ideas with children*	Example *This is based upon the nRich task 'Shapes in the bag' which can be found here: nrich.maths.org/10387*
Tune in and use encouragement *Listen carefully, show genuine interest and give the child your full attention using positive body language, eye contact, smiling and nodding. Use encouragement and praise to keep the child engaged.*	• Really? Please tell me more! • I'm excited to hear about… • I really want to know more about… • I know you really like…	I know how much you enjoy finding out about shapes, so I'm sure you're going to love this activity! You're really good at recognising shapes, so I'm sure you're going to be very successful in this activity
Ask open-ended questions	• Why did you…? • How did you…? • Why does…? • What if…? • What might happen next? • What do you think? • What patterns can you see? • What have you discovered?	Can you tell me about the shape you have found? Why do you think it is a triangle? Is there another shape it could be?
Encourage elaboration	• Can you give me an example of…? • Can you explain why that happened? • What else could we find out about…? • How did you find…? • Did that surprise you? Why? • I wonder what would happen if…?	Can you explain why you thought it was a rectangle and not a square? Can you give me an example of something in this room that is shaped like a rectangle? When we go outside to play, could you let me know if you see any squares? Maybe carry the square with you so you can compare it to shapes outside?

Further tools – October / November 2020

Audit tool

RECOMMENDATION 2 - *Dedicate time for children to learn mathematics and integrate mathematics throughout the day*

Ineffective	Improving	Exemplary
Time is not set aside specifically for purposeful mathematical activity, or purposeful mathematics is not integrated carefully into continuous provision (e.g. there is a mathematics 'area' but mathematics is not integrated into other activities)	Whilst time is often dedicated to mathematics and there is some integration across the provision, this does not routinely happen every day	Practitioners dedicate time every day for purposeful mathematical activity, support children to develop specific mathematical ideas and skills, and find ways of making appropriate spontaneous links to practice or reinforce mathematical understanding
Mathematics is delivered through specific activities, but opportunities are missed to deliver mathematics through contexts more associated with other domains of learning such as books, puzzles, songs, rhymes, and games	Limited opportunities are taken to explore mathematics through different contexts: for example these opportunities are only occasionally taken, or this is done more regularly but not in a variety of different ways – for example, daily counting of the children in attendance takes place but the approach is not adapted to become more challenging as the children's skills progress	Mathematics is explored through different contexts - including books, puzzles, songs, rhymes, puppet play and games - and regularly timetabled activities are adapted to ensure they offer challenge

Thank you

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