



Leadership for Learning Day 2: Reasoning in the Primary Mathematics Curriculum

Michael Hall
Liz Woodham

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Aims of the Day

- To look at progression in reasoning
- To discuss ways of helping children get better at communicating reasoning
- To consider how to support colleagues in developing reasoning in their classrooms.

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Outline of the Day

9.30-9.35	Welcome
9.35-10.15	Working on a mathematical task together and following up the 'multiples of 7' task from last time
10.15-10.45	Reasoning with NRICH
10.45-11.00	Break
11.00-11.45	Feedback from work in schools
11.45-12.15	Reasoning with NRICH cont.
12.15-1.00	Lunch
1.00-1.10	Working on a short task together
1.10-1.30	Considering possible staff meetings
1.30-1.40	Short reflection
1.40-2.45	Reasoning with NRICH cont.
2.45-3.15	Curriculum development work
3.15-3.30	Plenary

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Don't forget ...

<http://nrich.maths.org/leadershipharingey>

A page on the NRICH site devoted to this project

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Largest Even (7431)

You will need nine digit cards numbered 1 to 9 and a partner.
One of you chooses a card, which becomes one of the digits of a two-digit number.
The second person then chooses a card to make the largest possible two-digit even number. You can then swap over.

Try it several times so you are sure you have a good method. Talk about your ideas with your partner so you agree together on a 'best' method.

How would your thinking change if you could use digit cards 0 to 9?

How would your strategy change if you had to make the largest two-digit odd number?

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Progression in Reasoning

- Describing
- Explaining
- Convincing
- Justifying
- Proving

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Experiences in School

- What did you/your colleagues do? (task, age group, did you work with a colleague?)
- What went well?
- Were there any surprises?
- What would you do differently next time?

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Square Subtraction (8065)

Choose any number.
Square your chosen number.
Subtract your starting number.
Is the number you're left with odd or even?

Create a model or a picture of your calculation, using your chosen number, and examine it carefully.

Can you use this model to prove that your result is always true and not just true for the particular number that you chose to start with?

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Progression in Reasoning

- Describing
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Digging into Proof

- Communicating and recording: in writing, visually or algebraically
- Five methods for proving which are useful for primary-aged children

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Five Steps to 50 (10586)

This challenge is about counting on and back in steps of 1, 10 and 100.

Roll a dice twice to establish your starting number - the first roll will give you the tens digit and the second roll will give you the units digit.

You can then make five jumps to get as close to 50 as possible.

You can jump forwards or backwards in jumps of 1 or 10 or 100.

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Five Methods for Proving

- Proof by contradiction
- Proof by counter example
- Generic proof
- Proof by exhaustion
- Proof by logical reasoning

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Five Methods for Proving

- Proof by contradiction e.g. Make 37 (1885)
- Proof by counter example e.g. Five Steps to 50 (10586)
- Generic proof e.g. Three Neighbours (8108)
- Proof by exhaustion e.g. Dicey Addition (11863)
- Proof by logical reasoning e.g. Largest Even (7431)

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Strategies That May Help Communicate Reasoning

- Modelling
- Group work
- Understanding how others work
- Personal notes and recording

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Lots of Lollies (2360)

Frances and Rishi were given a bag of lollies.

They shared them out evenly and had one left over.



Just as they had finished sharing them their friends Kishan, Hayley and Paul came along. They wanted some lollies too so the children shared them out again between all of them. This time they had two lollies left over.

How many lollies could there have been in the bag?

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Personal Notes and Recording

- How do jottings/recordings contribute to the reasoning process?
- Do we value these in the classroom?
- How do we draw attention to their use?

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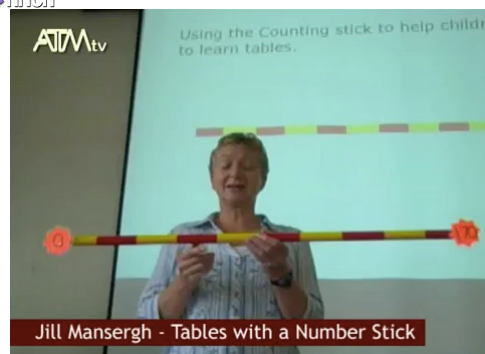


Communicating Reasoning Checklist

- How clear is the reasoning? Can I follow the argument?
- How logical is the reasoning? Does it form a chain of reasoning? Is it a complete or partial chain?
- Does the argument/explanation use reasoning language, such as 'because' ?
- How succinct is the reasoning? Are the sentences short and to the point?

See <http://nrich.maths.org/11336>

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<https://www.youtube.com/watch?v=yXdHGBfoqfw>
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NRICH Support

Reasoning Feature <http://nrich.maths.org/11018>

In two parts, each comprising an article and a selection of tasks:

- The first part offers opportunities for learners to reason for different purposes and in different ways.
- The second part offers support in helping learners become expert reasoners.

Mastering Mathematics: Developing Generalising and Proof Feature <http://nrich.maths.org/11458>

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Curriculum Mapping

Updates in January 2016 – take a look:

<http://nrich.maths.org/8935>

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Reflections

- What will you take away from today that will change what you do back at school?
- What will change
 - your own practice?
 - that of the whole school?

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Further Reading

Waring, Sue. (2008) Can you prove it? Developing concepts of proof in primary and secondary schools.

Leicester: The Mathematical Association.

ISBN 0 906588669 2nd edition

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Future Dates

Wednesday 9 March

Wednesday 25 May

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