



Embedding Problem Solving Day 2 - Thursday 24 November

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NRICH Primary Team

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Aims of the Programme

- To explore ways of integrating problem solving into the primary mathematics curriculum.
- To support teachers in nurturing confident, resourceful and enthusiastic learners of mathematics in their schools.

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Day 2 of 6

- The problem-solving process
- Reflection on key themes drawn from the priorities you identified last time
- Chance to share classroom experiences
- Mystery content

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Session 1

The Problem-solving Process Stages 1&2

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Key Problem-solving Skills

- Trial and improvement
- Working systematically
- Pattern spotting
- Working backwards
- Reasoning logically
- Visualising
- Conjecturing

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The Problem-solving Process

- Stage 1: Getting started
- Stage 2: Working on the problem
- Stage 3: Digging deeper
- Stage 4: Concluding

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Stage 1: Getting Started

try a simpler case
draw a diagram
represent with a model
act it out

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One Big Triangle (192)

One Big Triangle
Place the 9 small triangles in the big triangle so that the numbers on the touching sides add to 10.

Start again

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Stage 2: Working on the Problem

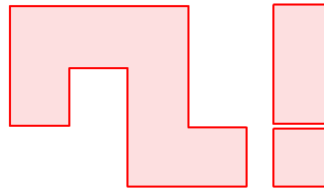
visualise work backwards
reason logically conjecture
work systematically look for a pattern
trial and improvement

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Reflecting Squarely (1840)

The three shapes below can be fitted together (edge to edge, with no overlaps) to make shapes with line symmetry.



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Overview of the Six Days

Autumn term: Problem solving
Spring term: Reasoning
Summer term: Fluency

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Overarching Themes Arising from Things Delegates Would like to Achieve

Confidence of staff and children (including subject knowledge)	Questioning	Enjoyment/Engagement
Vocabulary	"Greater depth" /Differentiation/ Challenge	Collaboration
Resources - linked to curriculum/SoW	Independence/Resilience /Learning from mistakes	Assessment/Evidence /Recording

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Session 2

The Problem-solving Process Stages 3&4

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Stage 3: Digging Deeper

generalise
verify
prove

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National Curriculum

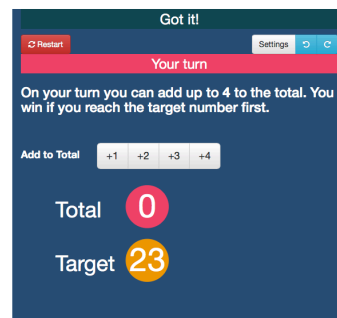
Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding....

Key Stages 1, 2 & 3

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Got It! (1272)



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Stage 4: Concluding

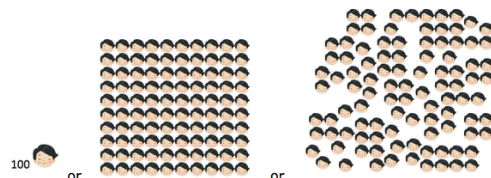
communicate findings
evaluate

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If the World Were a Village (7725)

In the village, there are 100 people:



In your opinion, which shows us the 100 people in the best way?

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If the World Were a Village cont. (7725)

Your challenge will be to decide how to represent some more of the data from the book. Here are some suggestions:

- 76 have electricity. 24 do not.
- 82 have access to a source of safe water either in their homes or within a short distance. 18 do not and must spend a large part of each day simply getting safe water. Most of the work of collecting water is done by women and girls.

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Mathematical Mindsets: Chapter 2

- Mistakes cause brain growth
- Individuals with a growth mindset have greater brain activity relating to making mistakes compared with those with a fixed mindset
- Piaget's state of 'disequilibrium' is essential to learning
- Implications for teachers: changing the messages given about mistakes; learners needing challenging work

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Further NRICH Support

Problem Solving Feature

<http://nrich.maths.org/10334>

... including the article 'Developing Excellence in Problem Solving with Young Learners'

<https://nrich.maths.org/10865>

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Reflective Journals

What would you like to develop from the morning sessions to impact back at school?

Jot down some ideas in your journal.

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Sharing Classroom Experiences

Chat to colleagues on your table about what you have tried out in your classroom since last time.

- What went well?
- Were there any surprises?
- What might you do differently next time?

Please pull out three key points on your table and record them on flipchart paper.

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Session 3

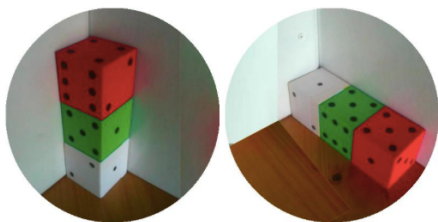
Mystery Content

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Dice in a Corner (8586)



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Communicating

Imagine you are a pair of children (or a group of three) feeding back to the rest of the class about the task everyone has been working on.

How would you communicate how you went about the task and what you have found out?

Each pair would only have a couple of minutes to give their feedback.

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Reasons for Recording

Have a look back at any recording you have done as you have worked on the NRICH tasks we have had a go at so far today.

Why did you record in each case?

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Reasons for Recording

- to help me remember what I did so that I can repeat it
- to record what doesn't work to keep a track of what I've tried
- it may enable me to see a pattern that helps me solve the problem
- it may help me see a short cut
- it helps me check I have all the solutions
- it helps me externalise my thinking
- it helps me confirm/agree my understanding with others
- it enables me to compare different ways of recording and learn to be elegant, efficient and succinct in the way I record my thinking.

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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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What is Your Role Now?

How would you as the teacher draw out the variety of recorded work and celebrate particular features?

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Further NRICH Support

Recording Feature <http://nrich.maths.org/9623>
which includes:

- the article 'Primary Children's Mathematical Recording' <http://nrich.maths.org/9871> outlining three different purposes for recording:
 - Recording in the moment
 - Recording as thinking
 - Recording for another person/time
- a selection of tasks which will help you to focus on children's own creative representations and recordings

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Reflective Journals

Jot down any reflections, reminders and/or ideas in your journal.

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Reflection

What will you take away from today that will change what you do back in school?

- in your classroom?
- as a whole school?

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Feed Forward Planning

- Talk to the colleague from your school about how each of you will implement some of today's content in your classroom
- Explore the Teachers' Resources on the NRICH site for each task you plan to use

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Teacher Takeaway

- Chapter 5 from Mathematical Mindsets
- Planning into action in your classroom
- Either use a task in a staff meeting or share notes/reflections from a particular task you have tried with a colleague for them to have a go at
- Refer to nrich.maths.org/towerhamlets

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