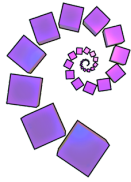


Teacher Takeaway task

You were asked on Day 4 to share the NRICH Tower Hamlets page with someone who hadn't seen it.

Please use the paper and black pens to record any interesting/helpful responses.

Use the red pens to record how **you** have been using the page.



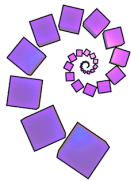
Embedding Fluency

Day 4 – Thursday 27th April

Fran Watson

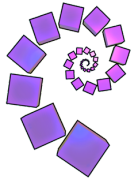
Ems Lord

NRICH Primary Team



Aims of the Programme

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

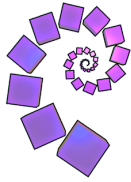


Overview of the Six Days

Autumn term: Problem solving

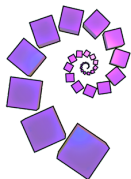
Spring term: Reasoning

Summer term: Fluency

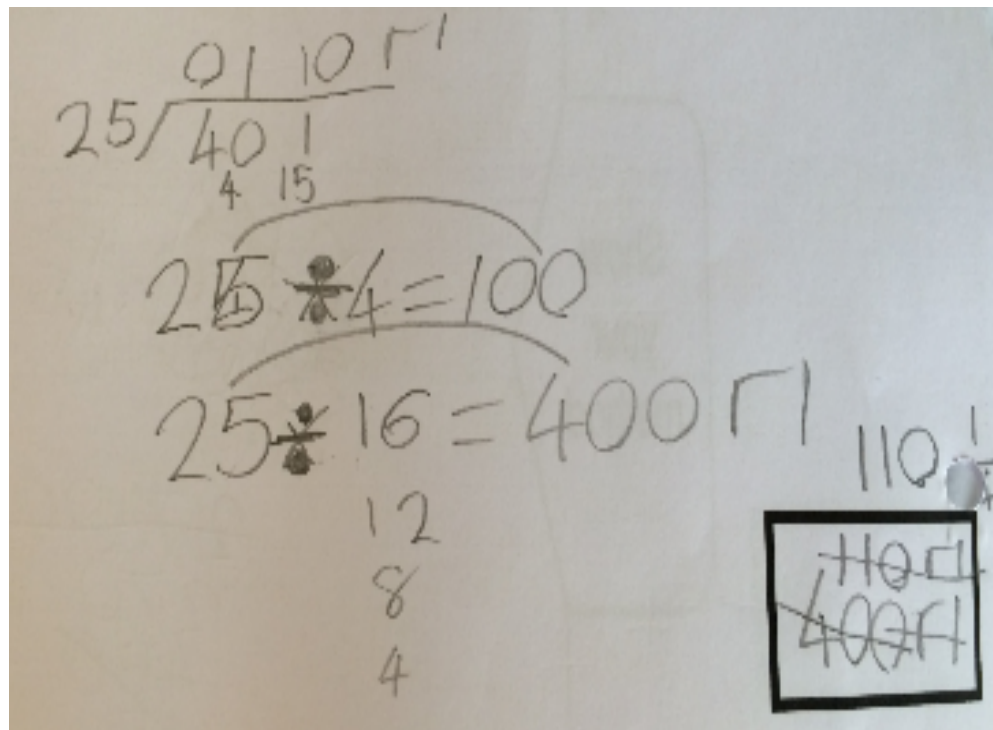


Day 5 of 6

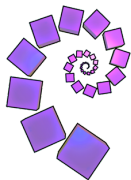
- Fluency and research
- Chance to share classroom experiences and any dissemination to colleagues
- Opportunity to reflect on Chapter 4 of Mathematical Mindsets
- Fluency in Measures and Geometry
- Planning time to embed back at school



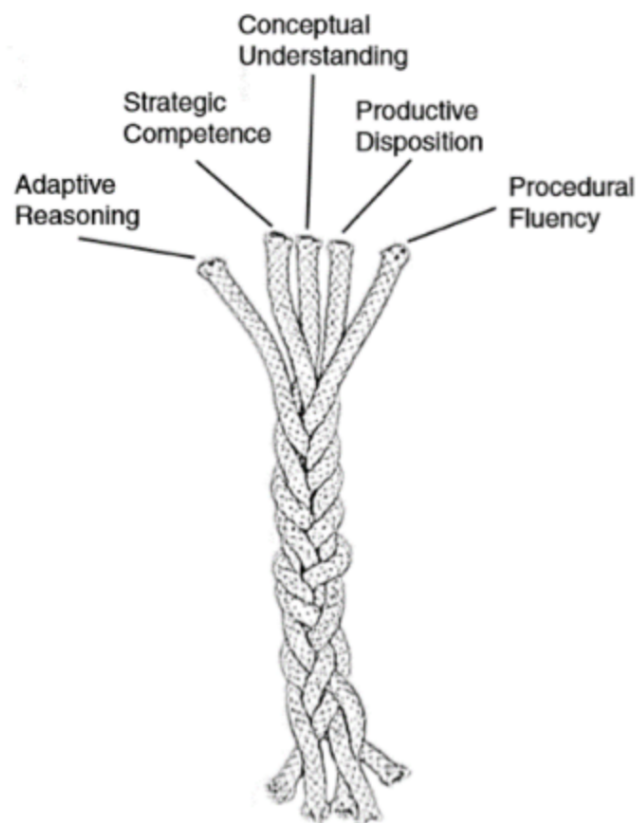
“I don’t do division” Y7 pupil



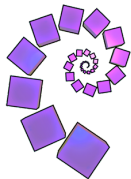
Ems Lord



NRICH: nurturing young mathematicians

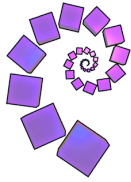


Adding it up (Kilpatrick, Swafford and Findell, 2001, p.115)



Fluent?

$$\begin{array}{r} 709. \\ - 698 \\ \hline 1397 \end{array}$$

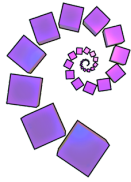


Fluency is one of our three curricular aims

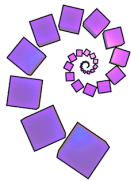
“Many schools are already interpreting this as practice, practice, practice of formal algorithms” (McClure, 2014).

Can you be fluent without knowing column methods?

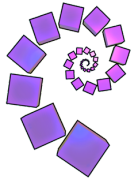
What are the benefits of knowing long division?



In *Adding It Up* (Kilpatrick, Swafford & Findell, 2001, p.116) suggested that algorithmic fluency was defined as the “skill in carrying out procedures flexibly, accurately, efficiently, and appropriately.”

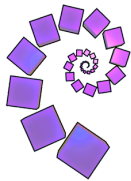


Students exhibit computational fluency when they demonstrate flexibility in the computational methods they choose, understand and can explain these methods, and produce accurate answers efficiently (NCTM, 2000)

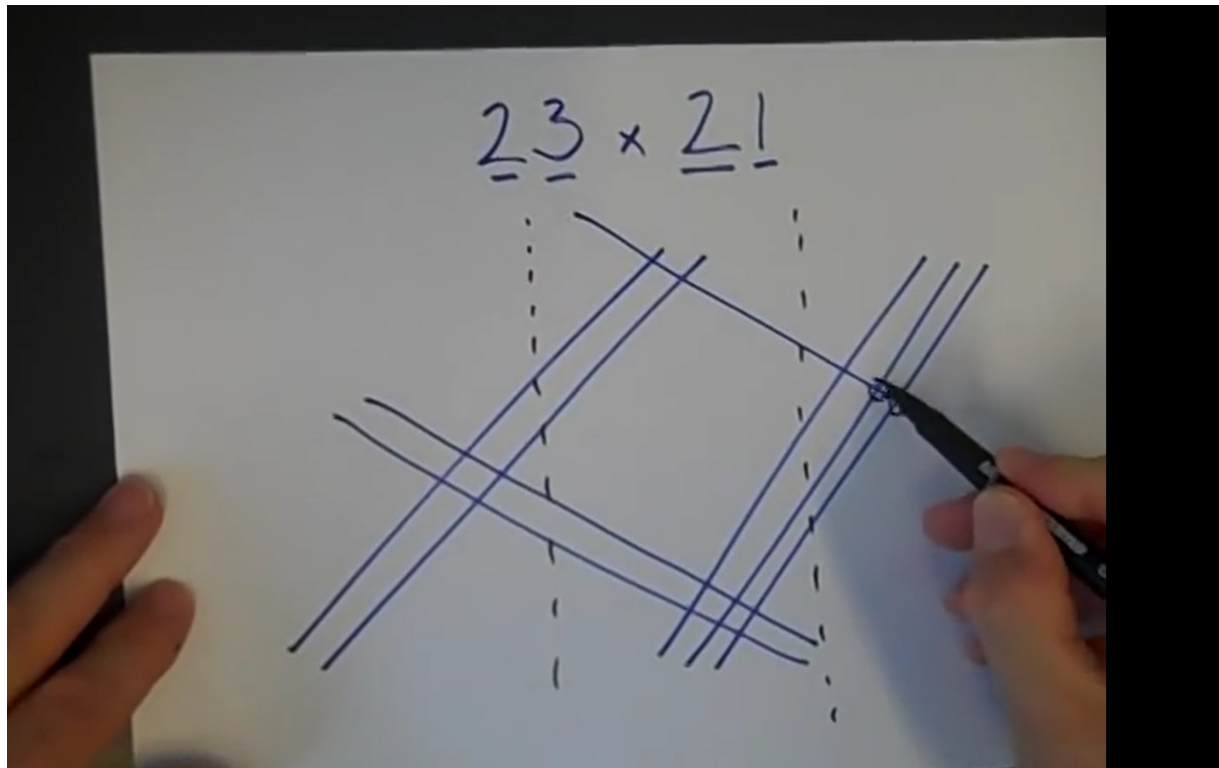


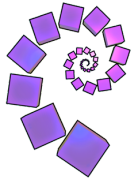
Key aspects of fluency

- Accuracy
- Efficiency
- Flexibility
- Understanding
- Reasonableness



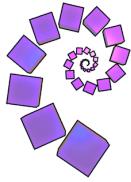
Multiplication Madness (5612)





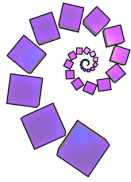
702 - 695

- How would most of your pupils calculate the answer? Why?
- What is the most accurate strategy? Why?



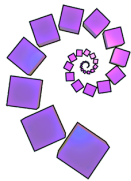
How do your pupils check their answers?

- Do they estimate first?
- When do they check their answers?
- How do they check their answers?
- Does checking their answers affect their choice of strategy?



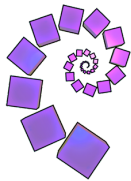
$$401 \div 25$$

- How would most of your pupils calculate the answer? Why?
- What is the most accurate strategy? Why?



How would your pupils check their answer?

- Would they estimate first?
- When would they check their answer?
- How would they check their answer?
- Does checking their answer affect their choice of strategy?

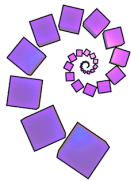


Galley Division (6276)

$$4987 \div 35$$

①

$$\begin{array}{r} 22 \\ \times 48 \text{ ⑦} \\ \hline 4987 \quad [\underline{142} \\ 3888 \\ \hline 38 \end{array}$$
$$4987 \div 35 = 142 \text{ r } 17$$



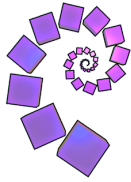
Key messages

- How flexible are your pupils?
- Why do they choose their strategies?
- How do they check their answers?
- When do they check their answers?



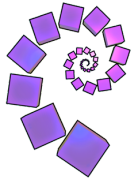
I'm 8 (55)





Fluency in Measures

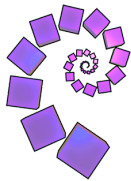
- Measures - Little Man (4789)
- Time - How Many Times? (981)
- Area - Brush Loads (4911)
- Money - Five Coins (142)



Little Man (4789)

- Can you estimate how tall he is?
- Can you think of something that you have at school or home that is approximately twice as tall as the Man?
- What about something that is about half as tall?
- How tall do you think the Man's mug might be?
- Can you estimate how many "Man mugs" of tea might fill one of our mugs?





How many times? (981)

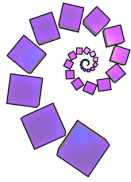
On a digital 24 hour clock, at certain times, all the digits are consecutive (in counting order). You can count forwards or backwards.

For example, 1:23 or 5:43.

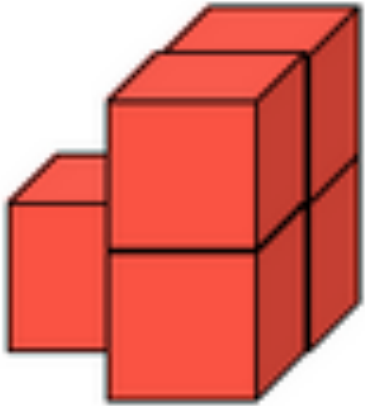
How many times like this are there between midnight and 7:00?

How many are there between 7:00 and midday?

How many are there between midday and midnight?

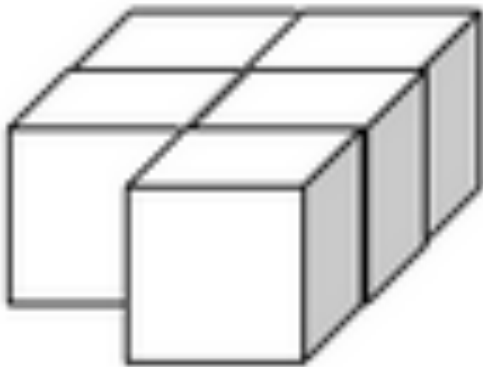
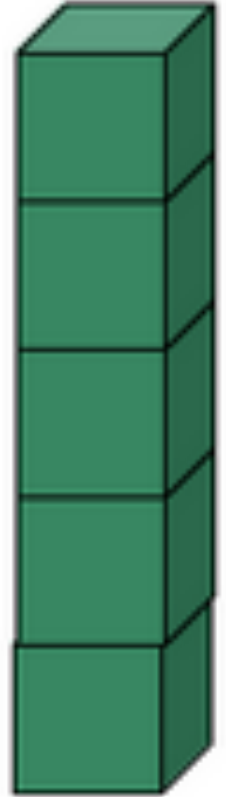


Brush Loads (4911)

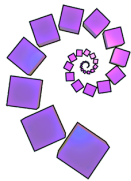


I have five cubes. In any arrangement, complete faces must touch and the arrangement must not topple over.

One Brush Load (BL) of paint covers one square face of a cube.



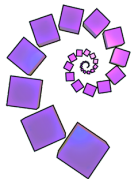
How would you arrange these five cubes to use the smallest number of BLs? The largest number of BLs?



Brush Loads (4911)

Digging deeper

1. Can you find arrangements for 5 cubes that use BLs for all the numbers between your lowest and highest number of BLs? Do you think it is possible?
2. What happens if you use 6 cubes? Can you predict the arrangements?
3. What happens for 7, 8 or 9 cubes?

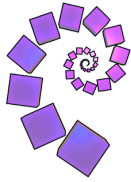


Five Coins (142)



Ben has five coins in his pocket.

How much money might he have?

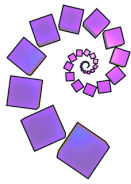


Fluency in Geometry

- Shape Draw (10368)
- Nine-pin Triangles (2852)
- Stringy Quads (2913)
- Inside Triangles (5648)

Planning intermission

- Poly Plug Rectangles (7511)
- Cops and Robbers (6288)



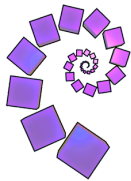
Shape Draw (10365)

Can you use your card to draw a shape that is being described?

What about if two cards are considered together?

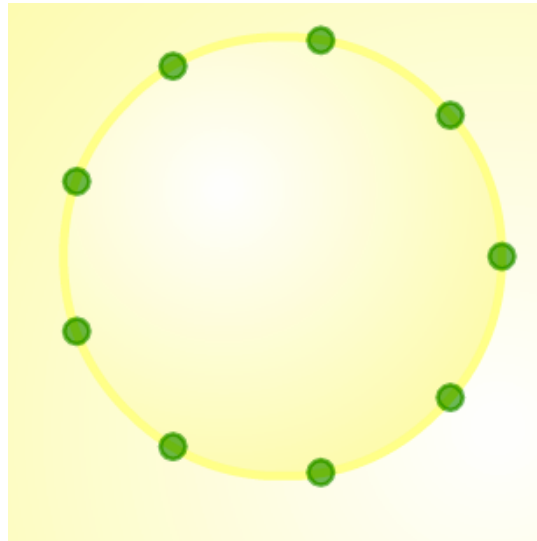
Take it in turns to share your card with the table and see if you can each draw something that satisfies all the properties.

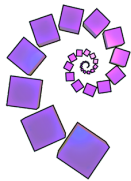
Did you need all the information? Why/why not? Did the order help or hinder?



Nine-pin Triangles (2852)

How many different triangles can you make on a circular pegboard that has nine pegs?





Stringy Quads (2913)

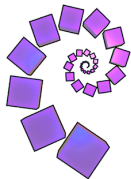


Try to make a quadrilateral which has exactly one line of symmetry.
Is it possible?

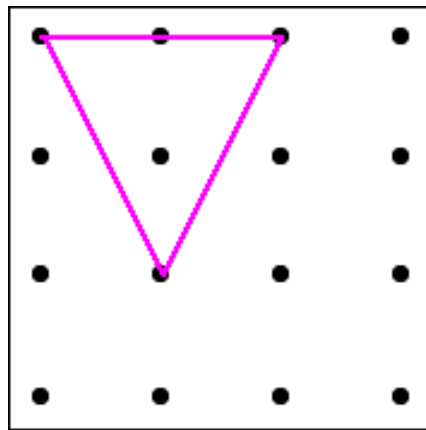
How could you convince someone else that your shape has just one line of symmetry?

Can you make any other quadrilaterals with just one line of symmetry?

Try again, but this time answer the same questions for a quadrilateral with exactly two lines of symmetry ... exactly three lines of symmetry ... exactly four lines of symmetry.

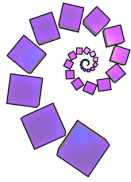


Inside Triangles (5648)



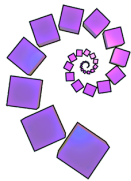
How many different triangles with one dot in the middle can you draw on a four by four dotty grid?

How do you know have found them all?



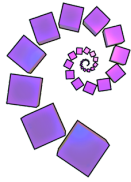
Planning intermission

- Talk about You Cubed's Paper "Fluency without fear" (including How Close to 100?)
- Could you introduce some Homework Reflection Questions P48 Chapter 4
- Planning for Concept compression
- Games (apps/electronic/non)

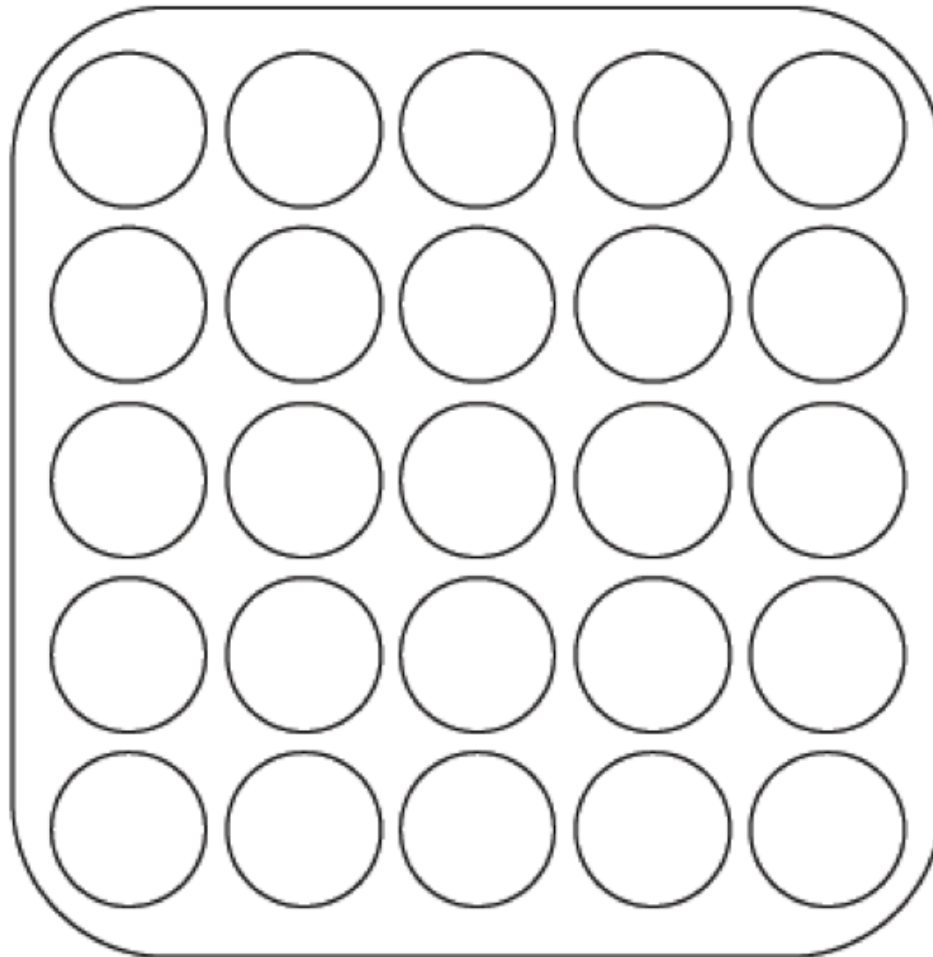


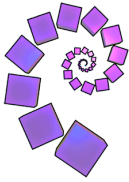
Teacher Takeaway

- Read chapter 8 from Mathematical Mindsets (1, 3, 6, 7)
- Try a task from today with your class
- Ask a colleague to do likewise and then discuss the outcomes
- Share the nrich.maths.org/towerhamlets page with someone who hasn't seen it before and have a conversation about it

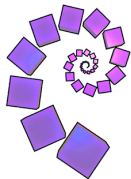


Poly Plug Rectangles (7511)





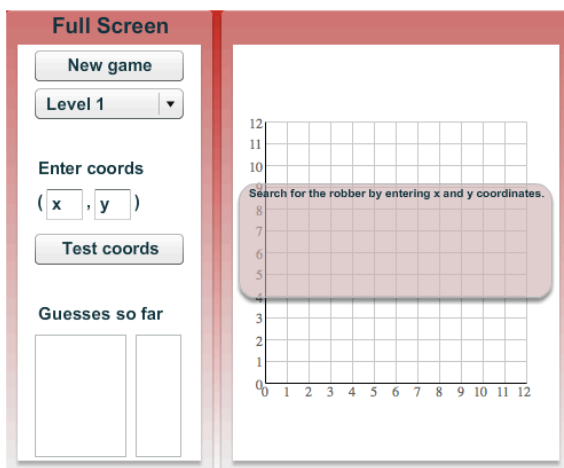
- How would you support the children to generalise their thinking?
- What would you be expecting? How might you develop their thinking?
- How would you expect them to communicate their thinking? Verbally? In writing?



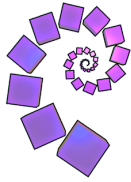
Cops and Robbers (6288)

Can you help the police locate the robber?

The robber is hiding in a modern city, where the roads are all at right angles and equally spaced. Imagine the grid lines represent roads. The robber is hiding at a crossroads.

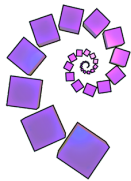


Can you find a reliable strategy for choosing coordinates that will locate the robber in the minimum number of guesses?



Day 6...

- Fluency in Number and Statistics
- Reflection on your 'aims journey' so far...
- And your planned next steps...
- Feedback on the 6 day programme
- Other support that NRICH could provide



Teacher Takeaway

- Read chapter 8 from Mathematical Mindsets (1, 3, 6, 7)
- Try a task from today with your class
- Ask a colleague to do likewise and then discuss the outcomes
- Share the nrich.maths.org/towerhamlets page with someone who hasn't seen it before and have a conversation about it