Embedding Problem Solving
Day 5 – Thursday 8th June

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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.

Overview of the Six Days

Autumn term: Problem solving

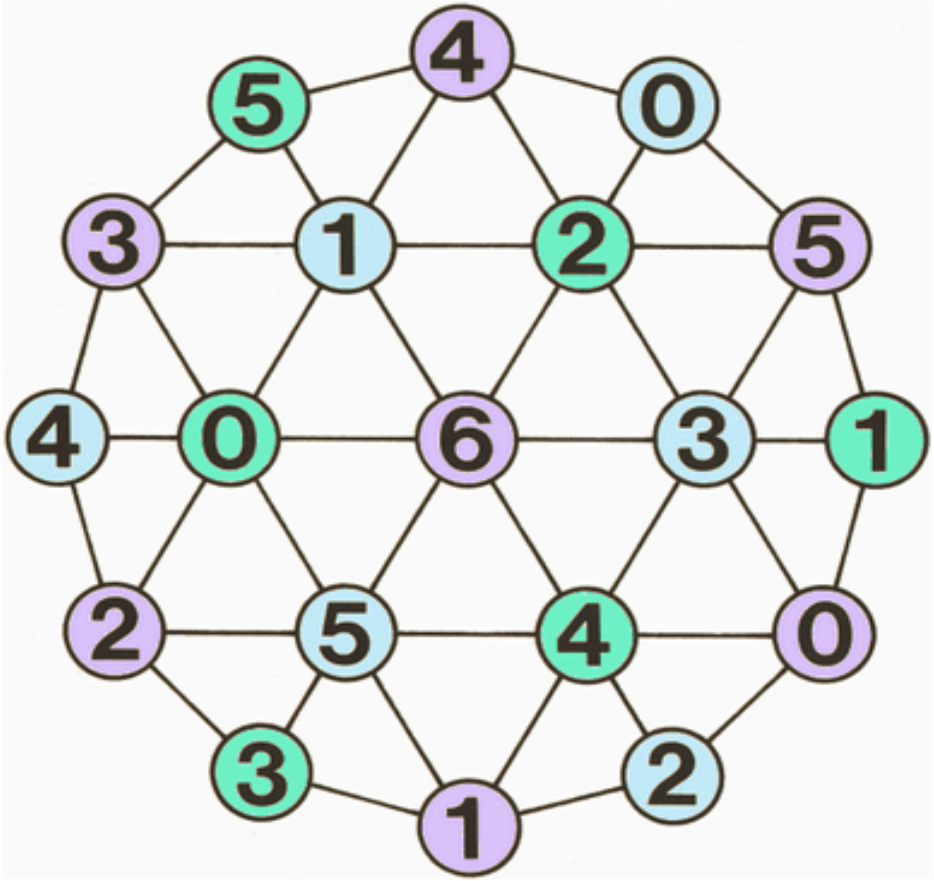
Spring term: Reasoning

Summer term: Fluency

Day 6 of 6

- Fluency in Number (contd.)
- Chance to share classroom experiences and dissemination to colleagues
- Opportunity to reflect on Chapter 3 of Mathematical Mindsets
- Feedback on whole programme and next steps
- Fluency in Statistics

Totality (1216)



Five Steps to 50 (10586)

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

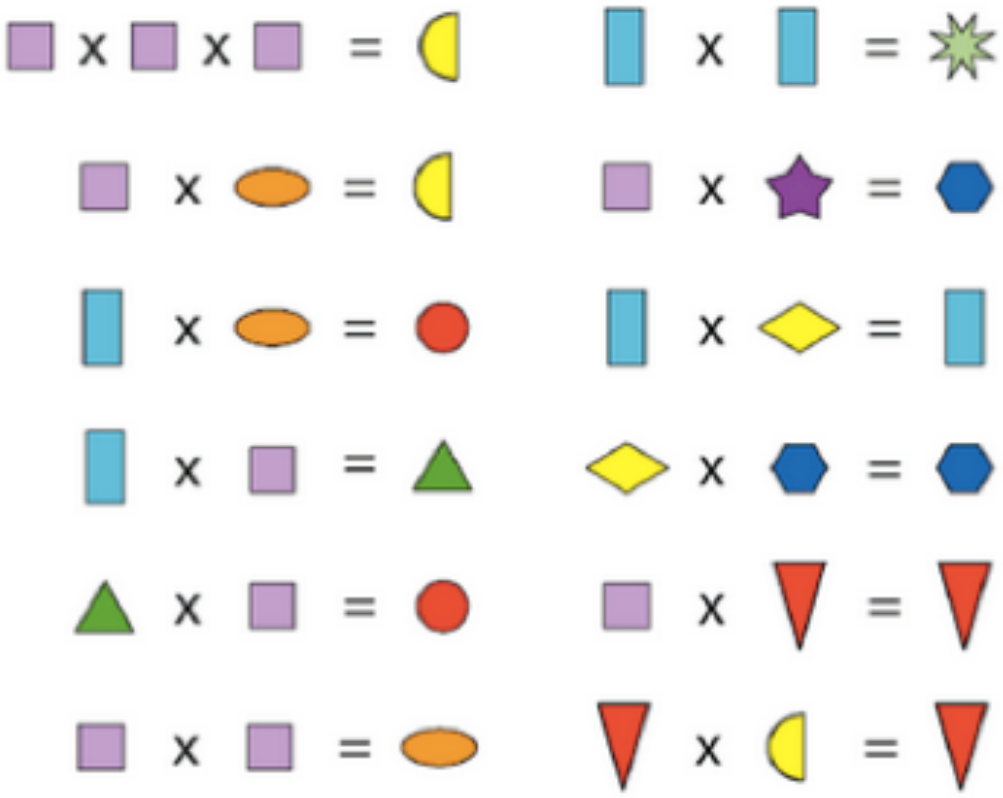
Roll a dice twice to establish your starting number - the first roll will give you the tens digit and the second roll will give you the units digit.

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.

Shape Times Shape (5714)

The coloured shapes stand for eleven of the numbers from 0 to 12. Each shape is a different number.

Can you work out what they are from the multiplications below?



Mystery Matrix (1070)

x	2	3	4	5
2	4	6	8	10
6	12	18	24	30
7	14	21	28	35
9	18	27	36	45

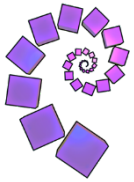
x						
	32			40		
					49	
			22			
		15				27
			24			
					42	

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

Planning for next steps

Please record your thoughts in your journal (to reflect on personally) and write on post-its to contribute to the group feedback

- Your next steps in school after Day 6
- 3 ideas/suggestions for next year's programme



"If you want to build a ship, don't drum up people to collect wood and don't assign them tasks and work, but rather teach them to long for the immensity of the sea"

Antoine de Saint-Exupery

In the same way that inspiring a love of music doesn't usually begin with an introduction to scales, instilling a love of problem solving in learners involves inviting curiosity, developing thoughtfulness, encouraging collaboration and valuing determination − whether in mathematics or the wider world.

Mathematical Mindsets – Chapter 3

The Creativity and Beauty in Mathematics

Wolfram (2010) proposes that working on mathematics has four stages:

1. Posing a question
2. Going from the real world to a mathematical world
3. Performing a calculation
4. Going from the model back to the real world to see if the original question was answered

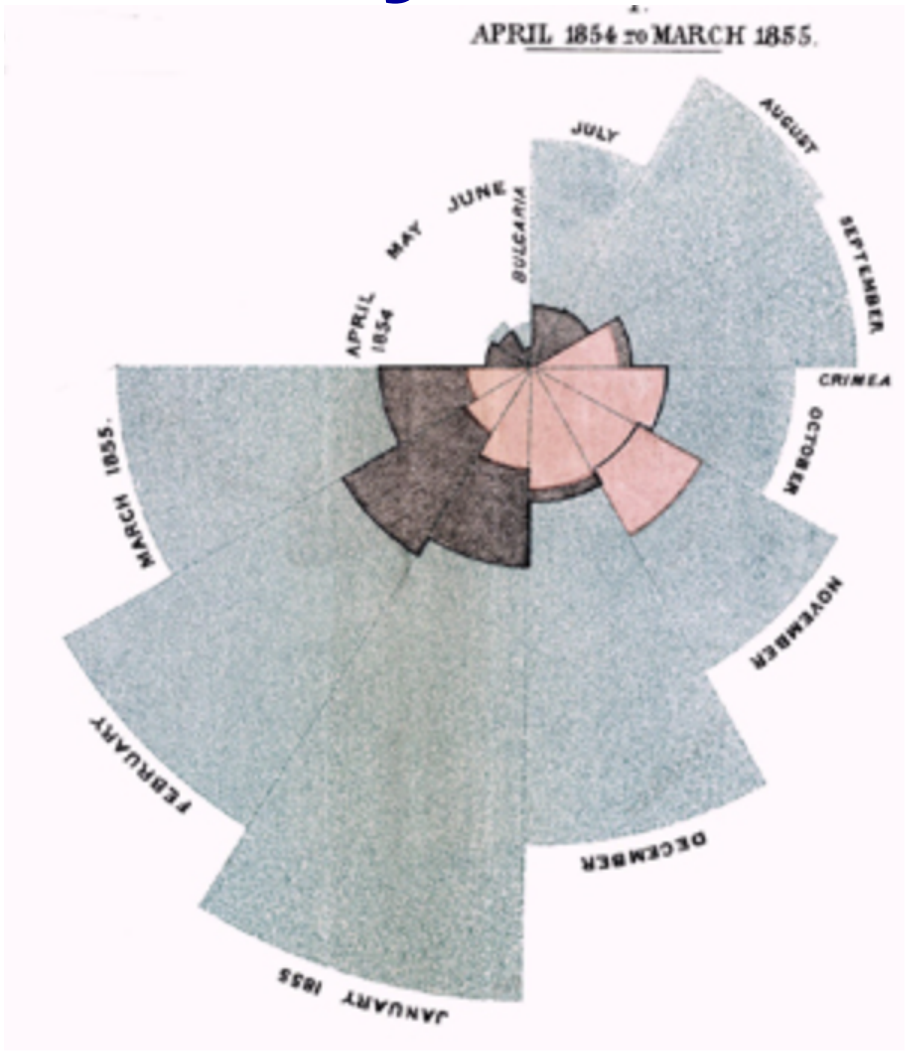
Impactful reading

- What were the most useful aspects/ chapters of Mathematical Mindsets?
- Where else do you look for reading that informs/supports your teaching and leading of mathematics?
- What foci would you value in supporting next year's programme?

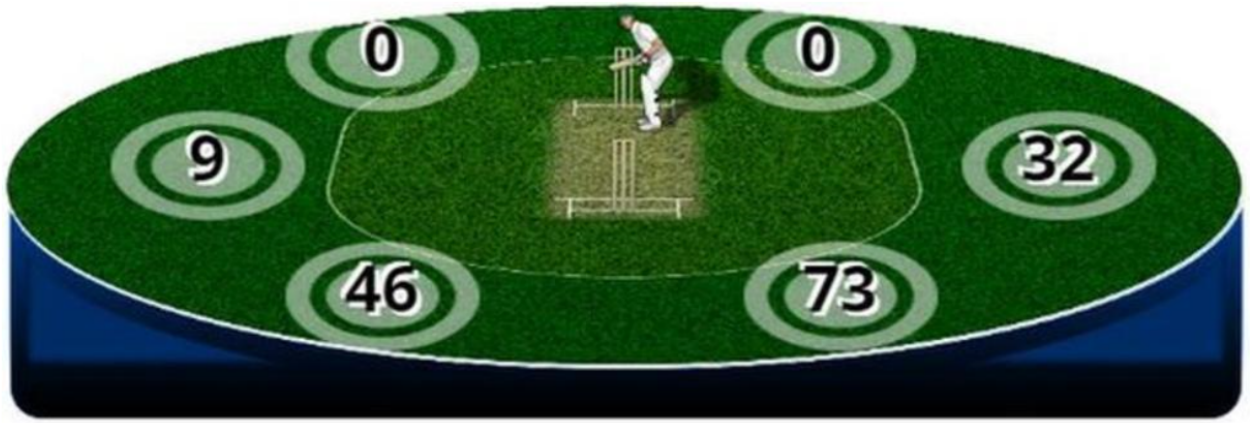
Evaluations

- Please complete the NRICH self-assessment survey (we will compare these with your responses from the autumn term)
- Please complete a feedback form for the content of the programme

What do you notice?



Wagon Wheels



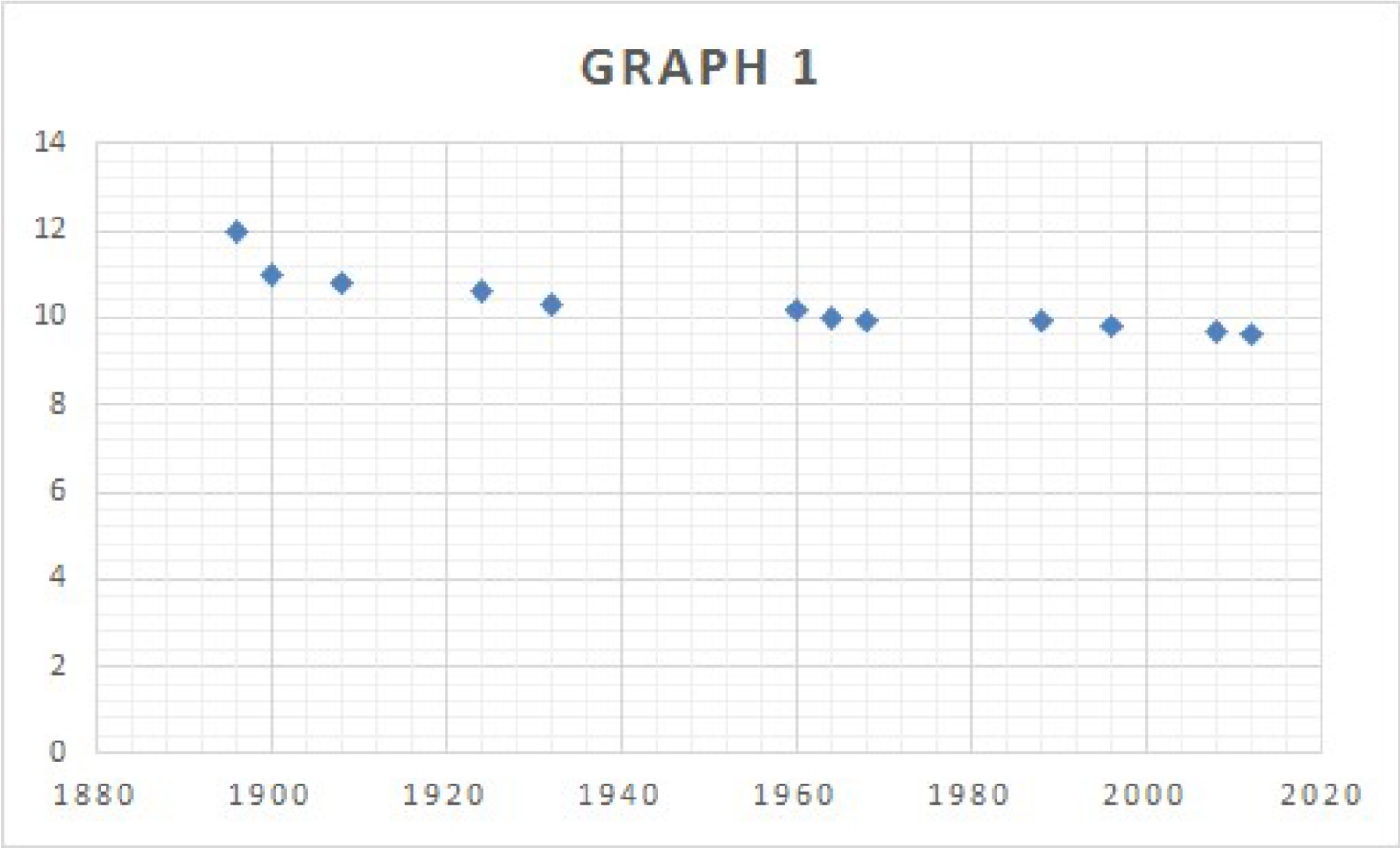
R	B	4s	6s	SR
160	86	18	12	186

O	M	R	W	E

Source: BBC Sport

What do you notice?

Olympic Records (7489)



Pupils' solutions

"Looking at the graphs, we were straight away able to tell that decreasing records have to do with track events and increasing have to do with field events."

"This is because in all of the running events, the person with the quickest, i.e. the smallest time wins. Therefore the records will be getting quicker and quicker, so the graph is decreasing. In throwing and jumping events, the person who gets the greatest distance or height wins i.e. the biggest so the records will get bigger and the graph will increase."

Olympic Measures (8318)

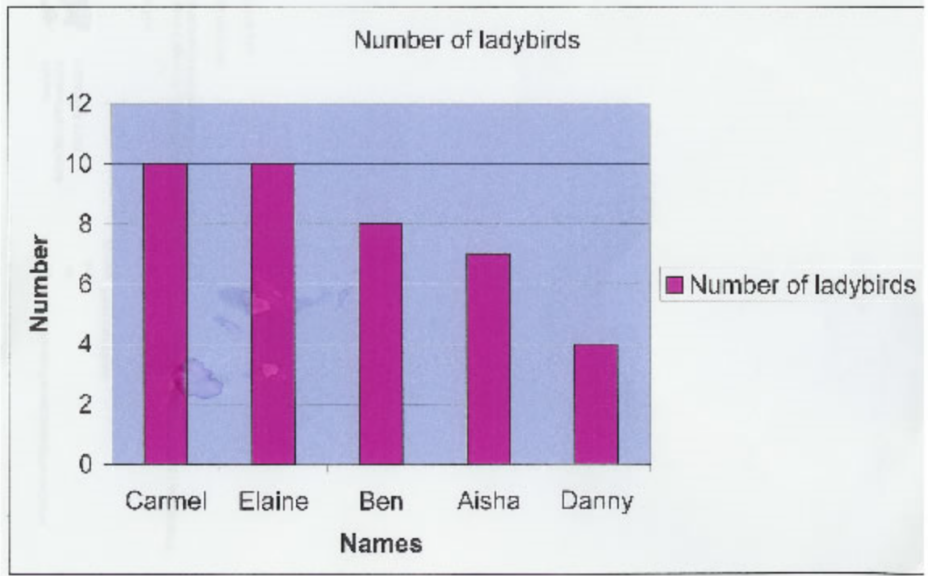
Usain Bolt's 100 metres World Record	40	km
Mass of Women's Discus	02:15:25	mph
Women's Discus World Record	1500	km

One school's solution

"We tried to work out the problem. We knew we needed to make sensible estimates. To work out Usain Bolt's record, for example, we ran the distance ourselves and found out what times we scored. We thought that he'd be able to do it a little bit faster than us, so that helped make our guesses. Two groups guessed really well with 10 seconds. So we were using what we already know to help us solve a problem".

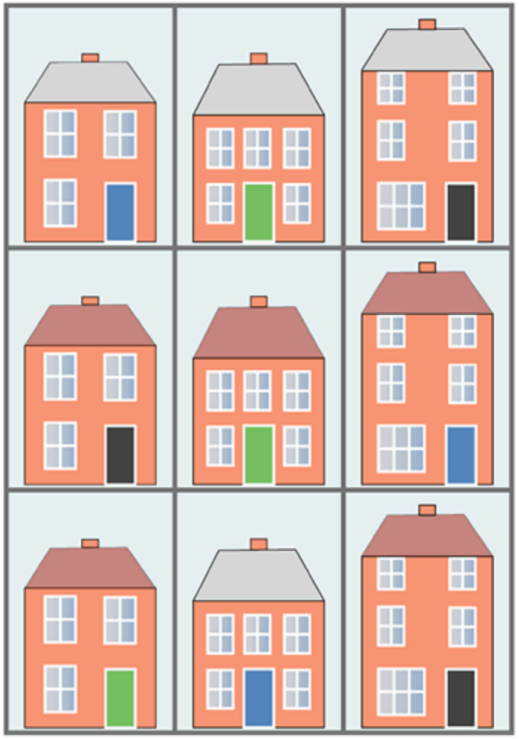
Representing data

- How many different ways can we visually represent data in our classrooms?



Ladybird Count (2341)

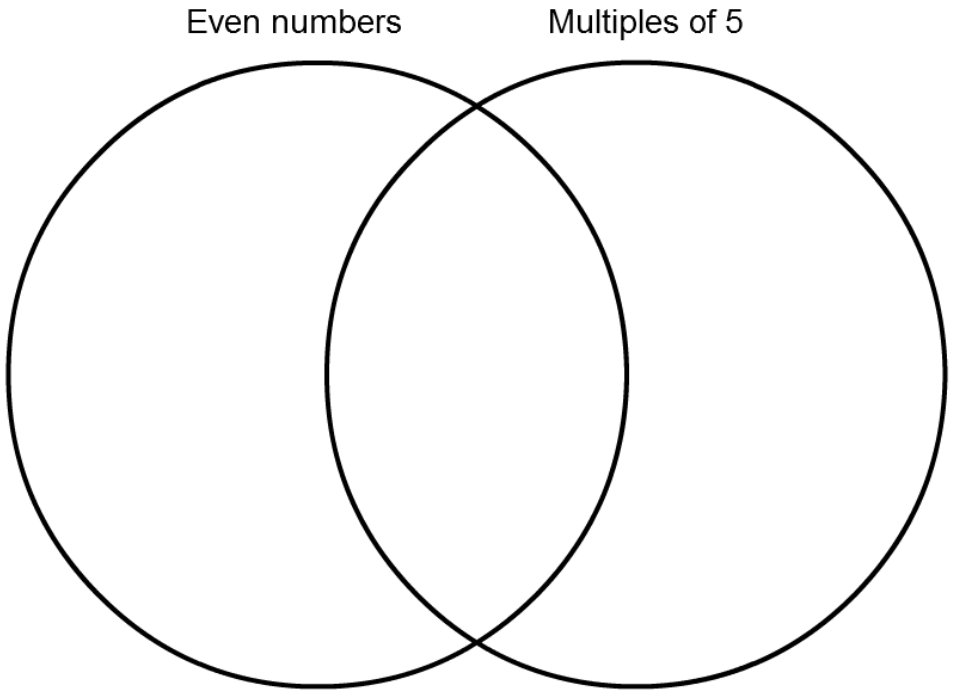
Sort the Street (5157)



Venn Diagrams (6290)

Reset

Venn diagram



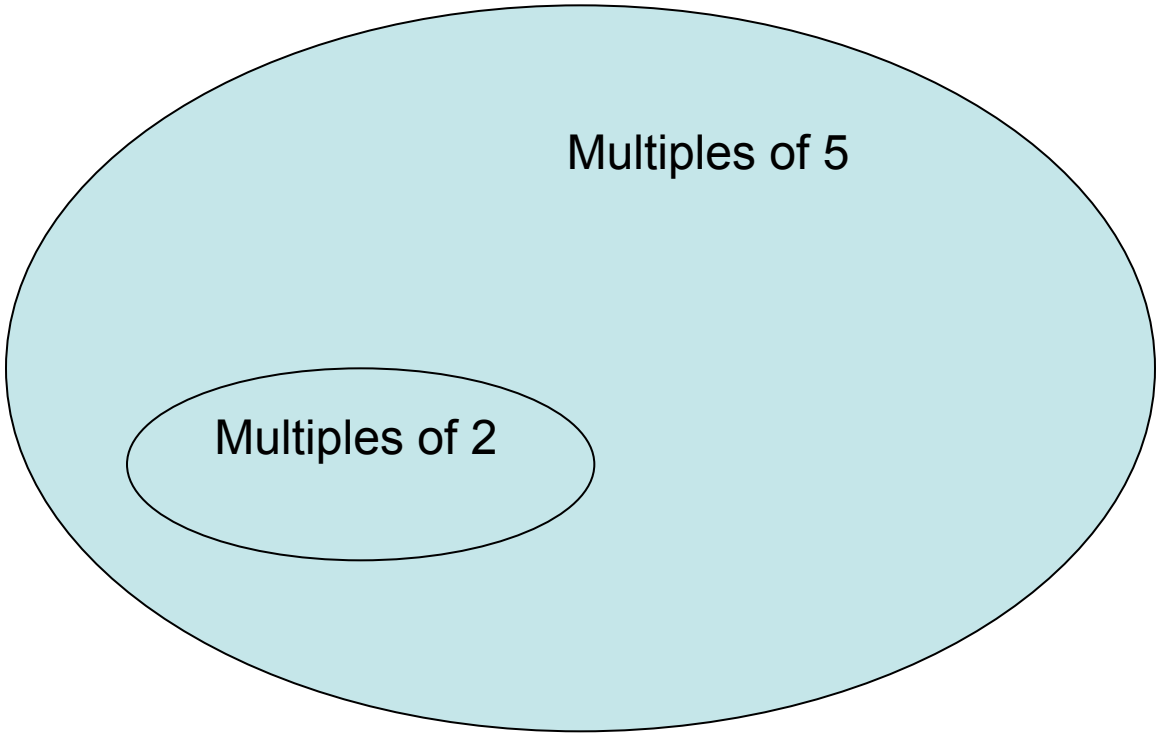
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40

A pupil's solution

"As you can tell not every number between 1-40 is included on my Venn diagram because the numbers 1, 3, 7, 9, 11, 13, 17, 19, 21, 23, 27, 29, 31, 33, 37 and 39 all have some similarities including: they are all odd numbers and none of them are in the 5 times table.

Something that made it easier for me to work out what 5 times tables are odd is any number with unit digit of 5 is odd because if you halve 5 it goes into decimals."

Venn diagrams continued…



Thank you

1. A fantastic longitudinal PD experience
2. An exchange
3. Improving and evaluating pupil outcomes
4. Underpinned by evidence and expertise
5. Collaboration and expert challenge
6. Sustained over time

All underpinned by and requires that

1. PD is prioritised by school leadership