To Develop the Provision and Standards in Maths for More Able Pupils

Our Group of Schools

Northop Hall CP School Lynne Bowen and Mel Williams	Flintshire
Penarlag CP School Claire Morris	Flintshire
Rhos Street School Andrew Davies	Denbighshire
Sychdyn CP School Cheryl Barry	Flintshire
Wepre CP School Steve Jones	Flintshire
Ysgol Heulfan Louise Ellis	Wrexham

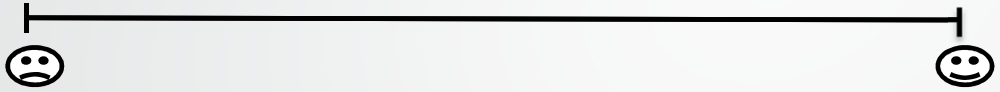
Starting Points

- Shared our current strategies and challenges for MAT maths provision
- Analysed our current school data at O6 and L5+ and looked at future targets
- Set up focus pupils and starting data tracking
- Completed pupil surveys and collated results
- Set up focused sessions to work with these small groups
- Planned to seek out expert input and research current thinking
- Planned involvement of parents

Pupil Surveys

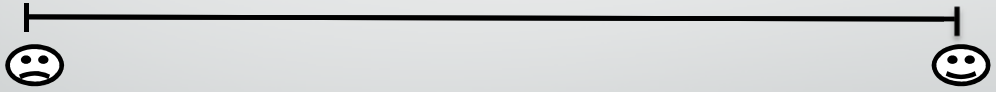
We carried out Pupil Surveys with our target groups of MAT pupils

How confident do you feel you are? (1 least to 5 most)



1	2	3	4	5
	4%	14%	57%	25%

How good do you feel you are at Maths?



1	2	3	4	5
	4%	9%	57%	29%

Pupil Surveys – KS2 (20 pupils across 4 schools)

Which areas of Maths do you think are your **strengths**?

Problem solving/ Investigating	Word problems	Number	Shape and Space	Measure	Data Handling
13	12	20	7	12	8

Which areas of Maths do you think you find **more difficult**?

Problem solving/ Investigating	Word problems	Number	Shape and Space	Measure	Data Handling
4	6	0	12	4	8

Differing views of 2 MAT pupils

Do you enjoy Maths?

What type of Maths activity do you not enjoy?

What type of Maths activity do you enjoy?

Working with Focus groups

Purpose

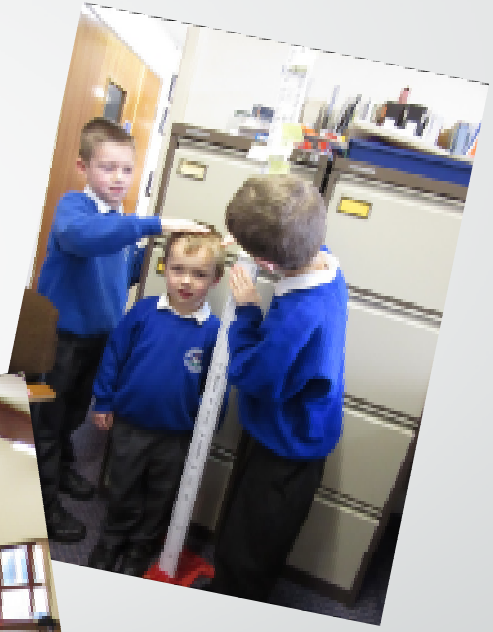
- To have an opportunity to listen and observe and learn from them
- To observe how the children changed as we progressed
- To raise standards of these children

Approach

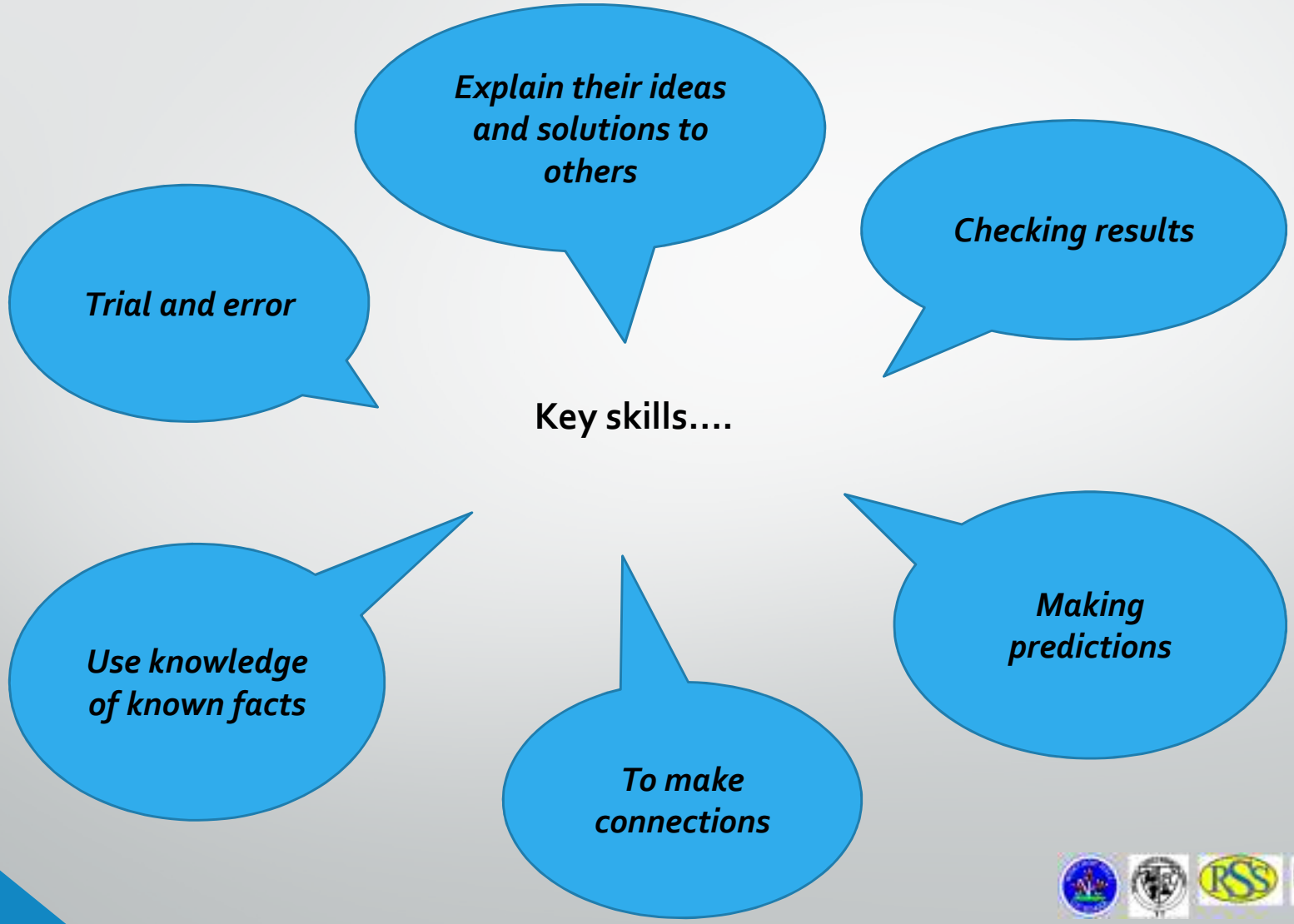
- Varied from school to school
- Specialist Maths Teacher
- Focused groups in non contact time from Maths specialist
- Release time from the project
- Within own classes

Working with Focus groups – Year 2

I really thought the car would be the heaviest because its made of metal

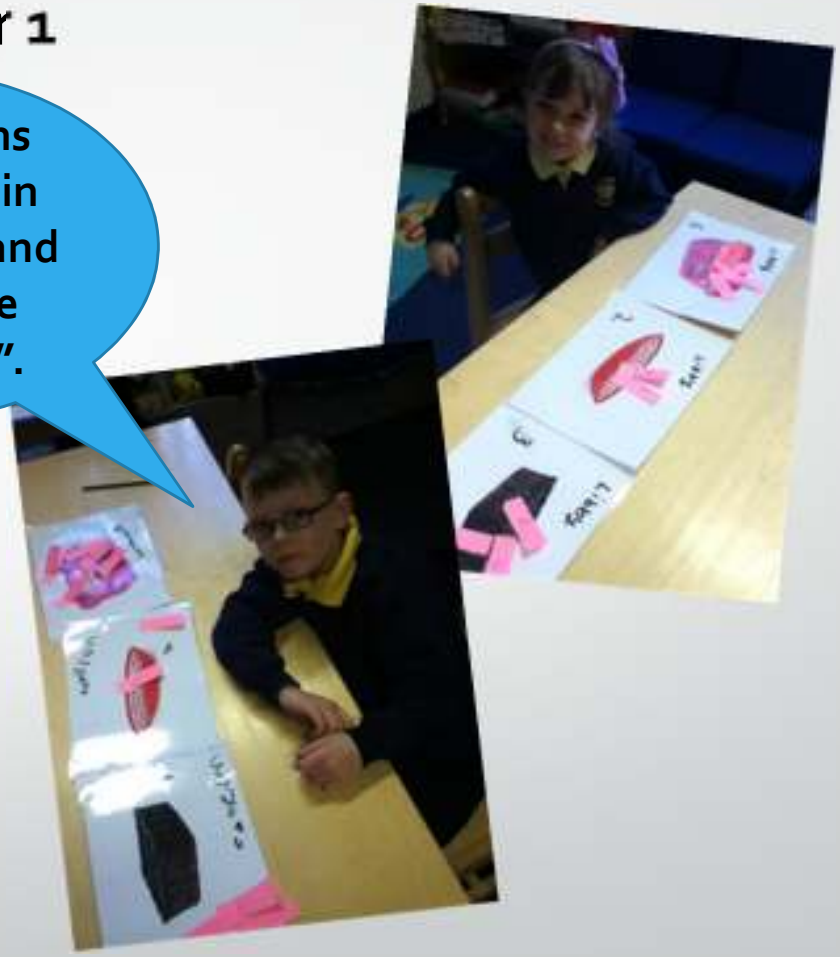


Key skills which children were encouraged to use included:



Working with Focus groups – Year 1

"That means there's two in the red one and three in the brown one".



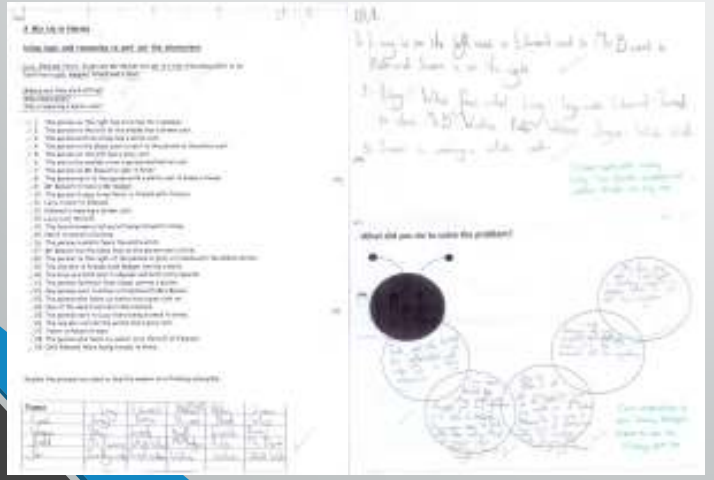
Ysgol Heulfan - Year 1

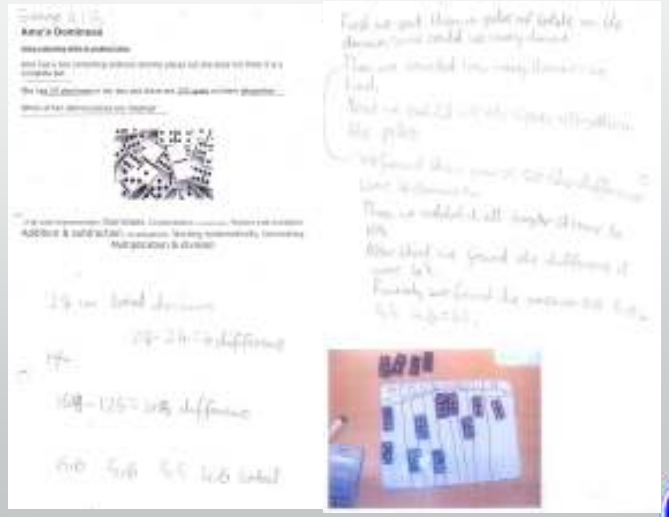
Maths problem solving linked to eggs in an Incubator in the class

Working with Focus groups – Year 6

- Tasks all reasoning focused
- Procedural content kept lower to allow focus on reasoning process
- Variety of tasks that needed different approaches Trial and Error, Pattern seeking, Logical reasoning, Practical etc

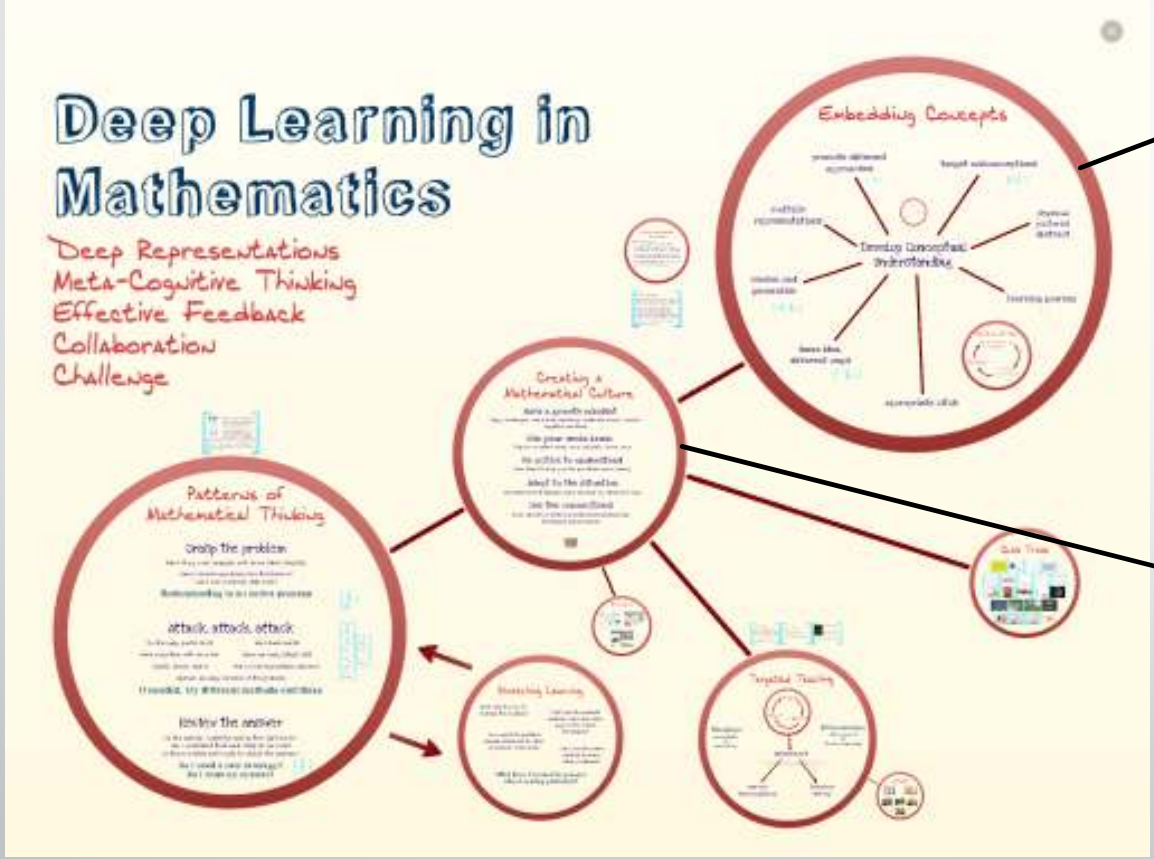
We need to be able to add lots of consecutive numbers, that'll take ages.





External Expert

MASTERY IN MATHEMATICS
DEEP LEARNING FOR THE ABLE MATHEMATICIAN
WITH GARETH METCALFE



Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content.

Creating a Mathematical Culture

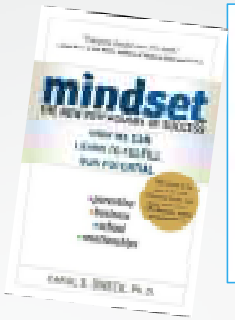
1. Have a Growth Mindset

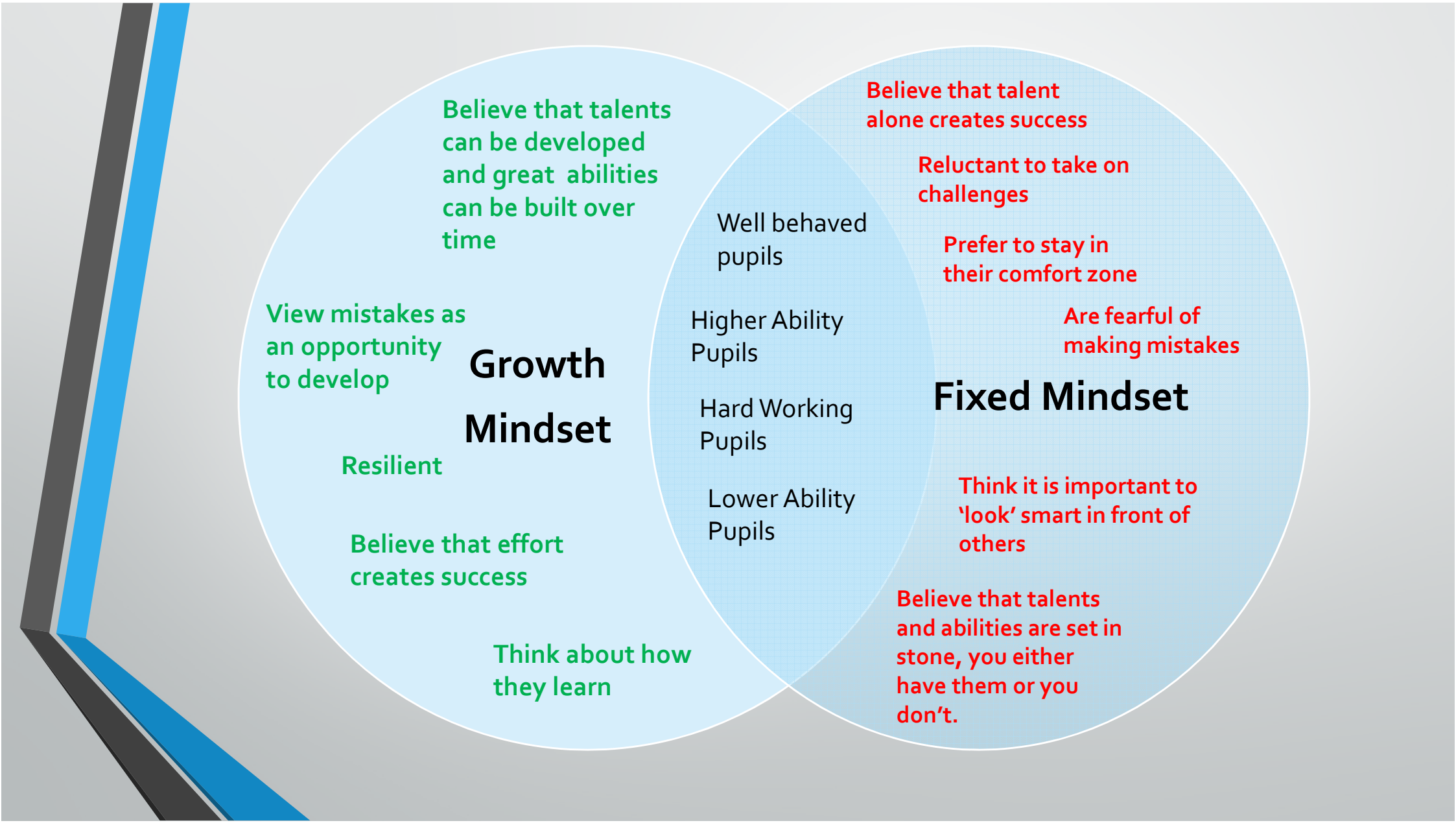
https://garethmetcalfe.wordpress.com/

Research Experts

Professor Carol Dweck- Stanford University

Introduced the idea of Mindset and carried out large amount of research over many years to support her ideas.

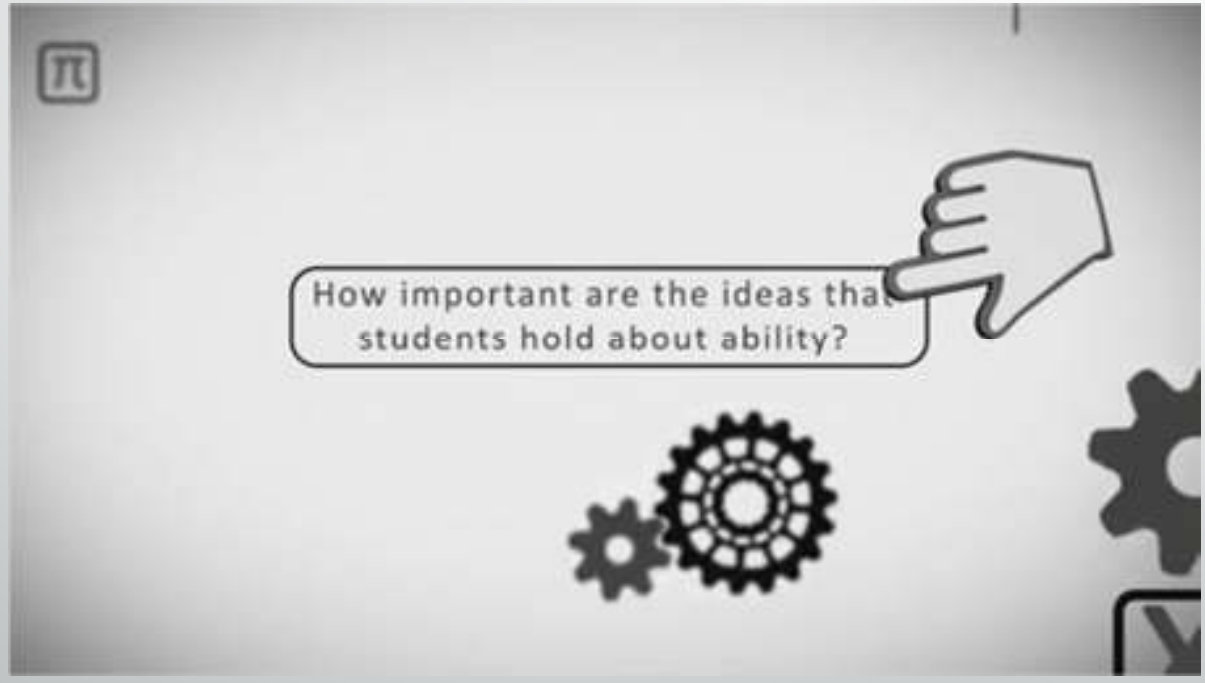


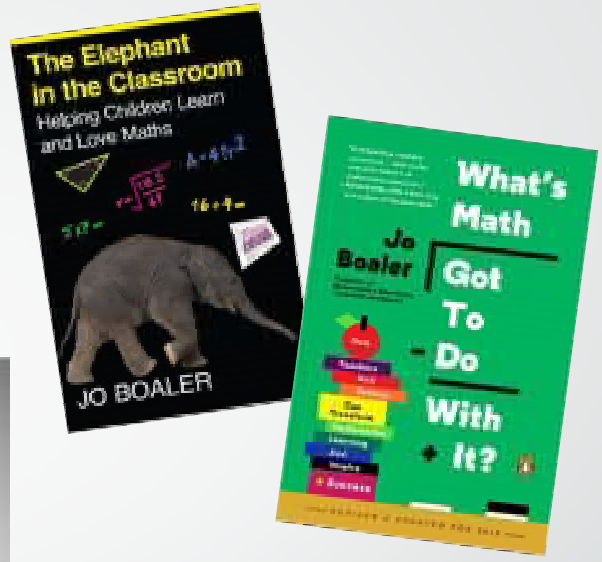

Growth Mindset
Believe that talents can be developed and great abilities can be built over time
View mistakes as an opportunity to develop
Resilient
Believe that effort creates success
Think about how they learn
Well behaved pupils
Higher Ability Pupils
Hard Working Pupils
Lower Ability Pupils
Fixed Mindset
Believe that talent alone creates success
Reluctant to take on challenges
Prefer to stay in their comfort zone
Are fearful of making mistakes
Think it is important to 'look' smart in front of others
Believe that talents and abilities are set in stone, you either have them or you don't.

Research Experts

Jo Boaler - Professor of Maths Learning at Stanford University

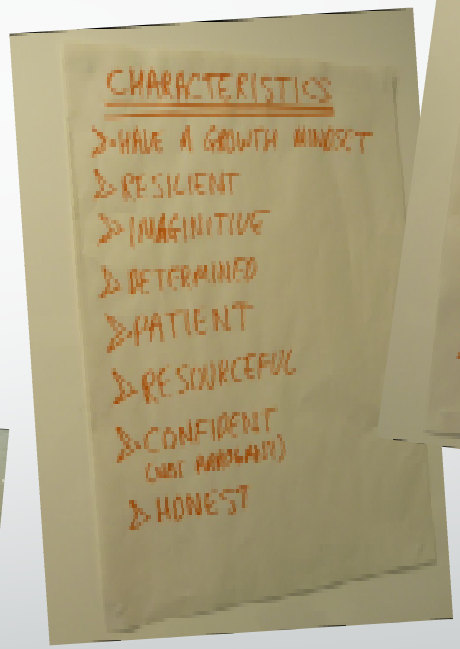
https://www.youcubed.org/

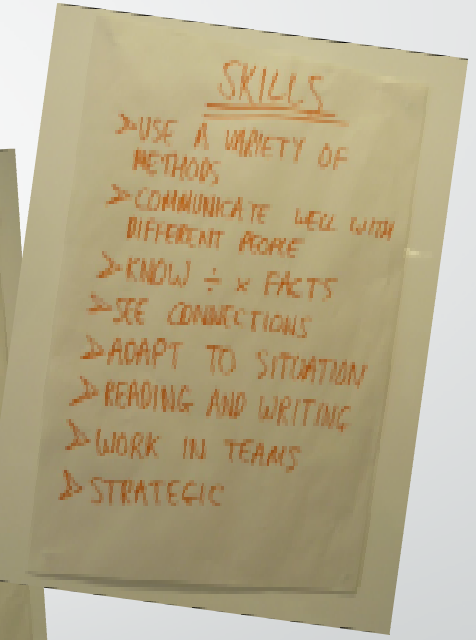




Visit to Gareth Metcalfe's School: Bradshaw Hall - Cheadle Hulme, Stockport

- 5 years into changing their Maths Culture
- Changed perceptions and attitude to maths throughout their school
- Staff development
- Parental involvement
- Vocabulary of Maths





Visit to Gareth Metcalfe's School: Bradshaw Hall - Cheadle Hulme, Stockport

Yesterday:

- *Logic and trial & error: friends not enemies*
- *First step or last step?*

A snail has fallen to the bottom of a 26m well. It is able to climb 5m up the wall in the day, but as it sleeps it slips back by 2m.

How many days will it take for the snail to get to the top of the well?

Visit to Gareth Metcalfe's School: Bradshaw Hall - Cheadle Hulme, Stockport

What does Mr Metcalfe mean when he talks about 'being active'?

….try to use a variety of ideas, think about what we've done before to use.

..keeping focused on the work, what we can do.

….being aware of possible answers…

Draw it out, try ideas, step by step…

Using our imagination, trying stuff…

….making links with things we already know.

Visit to Gareth Metcalfe's School: Bradshaw Hall - Cheadle Hulme, Stockport

Parental Attitudes: Techniquest Kit

- Had Techniquest Practical Maths Kit on Loan
- Staff INSET provided
- Used in Curriculum time
- Invited groups of MAT pupils from each year group and their parents to explore the challenges together and observed and discussed with pupils and parents

That won't work!

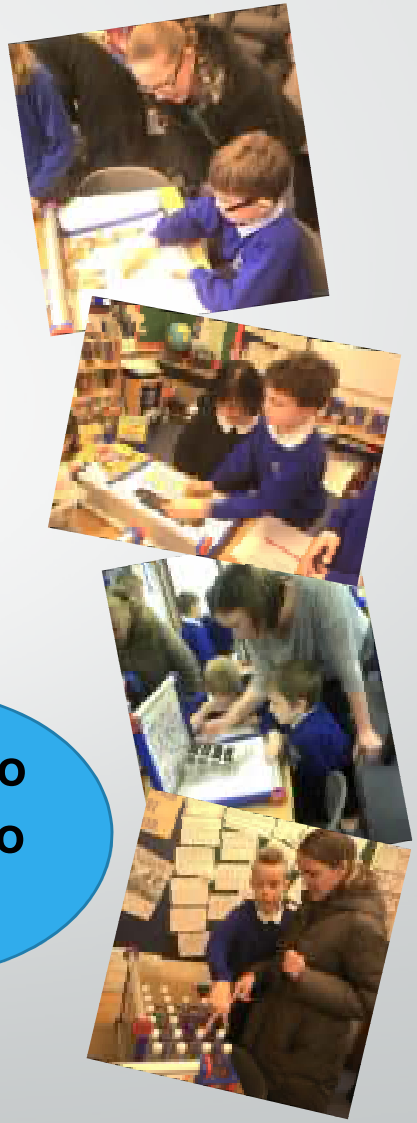
Look further along, you haven't got it right.

Why don't you move that one there and that one there and see if it works.

MUM

I can't do it, you do it!

SON



Next steps in the Action Plan following Techniquest workshop, course and school visit

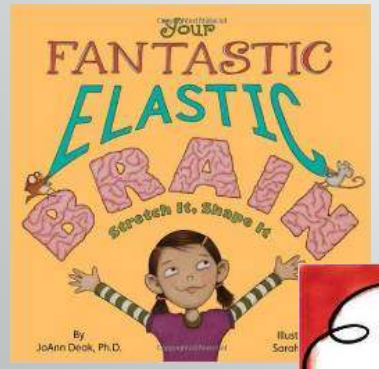
We identified a need to change the whole Maths Culture in our School

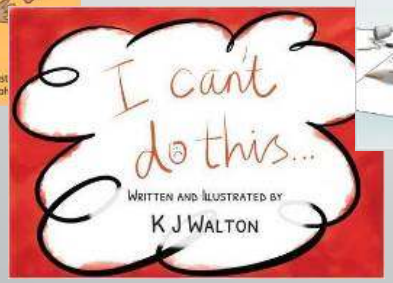
- **Develop the Mindset of children**
- **Involve parents and develop Mindset of parents**
- **Improve understanding and skills of staff**
- **Continue to collaborate with other schools**
- **Work with other institutions/businesses - Techniquest/ Chester University/ Local business**

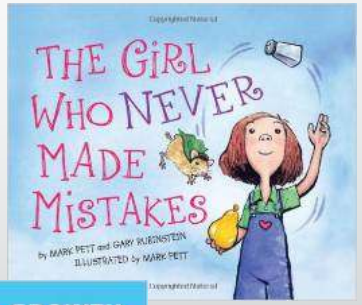
Changing the Mindset of Pupils

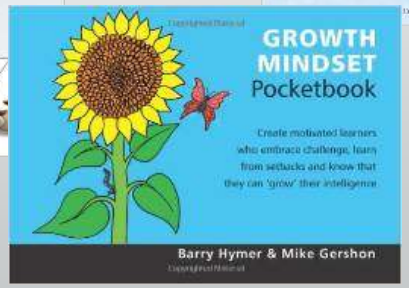
- Introduce the language of Mindset and that mistakes help your brain grow
- Use positive vocabulary to encourage effort and perseverance
- Praise hard work, the process, not the ability

- Use of assemblies, stories and books to support this









Introduced a Maths Culture in school and to develop the children's understanding and approach to maths.

Creating a Maths Culture at Northop Hall CP School

Have a growth mindset

Work hard and learn from mistakes. Celebrate effort, enjoy challenges and reflect on learning.

Use your whole brain

Explore creative ideas, work logically, check work, control negative emotions.

Be active to understand

Take steps to see a problem more clearly.

Adapt to the situation

Use different strategies, make choices, try different ways.

See the connections

Think about how different mathematical ideas and strategies can be linked.

Creating Maths Magicians at Northop Hall CP School

Have a go

Work hard and learn from mistakes, praise effort, think about what I've learnt, enjoy challenges.

Thinking time

Does my method make sense? Working step by step. Are my answers sensible?

Use what I already know

What equipment could I use? Can you draw I picture to help me? Will number facts help me?

Try different ways

Show your working. Explain what you did. Don't give up.

Have I done anything like this before?

If I have, can I use it to solve this problem? What is the same? What is different?

Views about hard work and attitude to Maths from Year 6

Can everyone be good at maths?

Views about hard work and attitude to Maths from Year 6

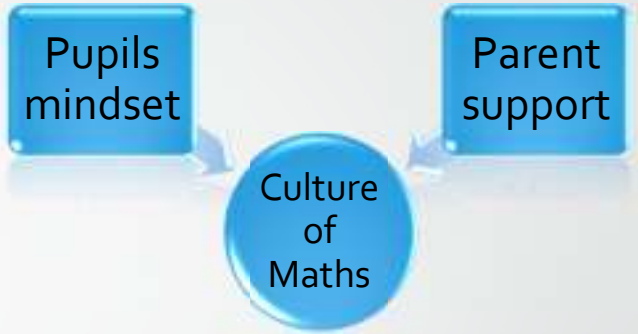
Why do you think hard work makes a difference?

Views about hard work and attitude to Maths from Year 6

How has your thinking about maths changed?

Parental Support

- Parents evening
- Key points from Jo Boaler, Carol Dweck and our new Maths Culture
- The power of positive praise of process not skill
- That we can get to an answer in many different ways
- Developing Number sense
- Same messages at home and school
- Positive attitude…never express own negativity about maths

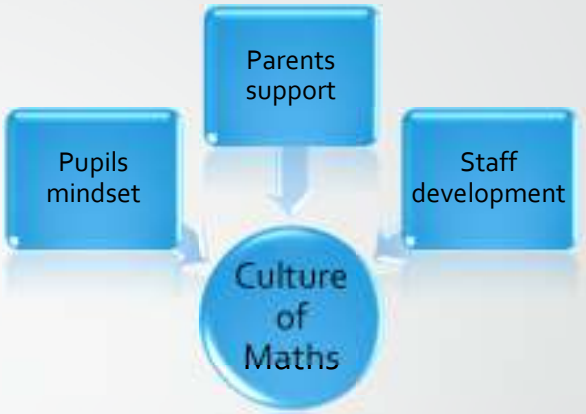


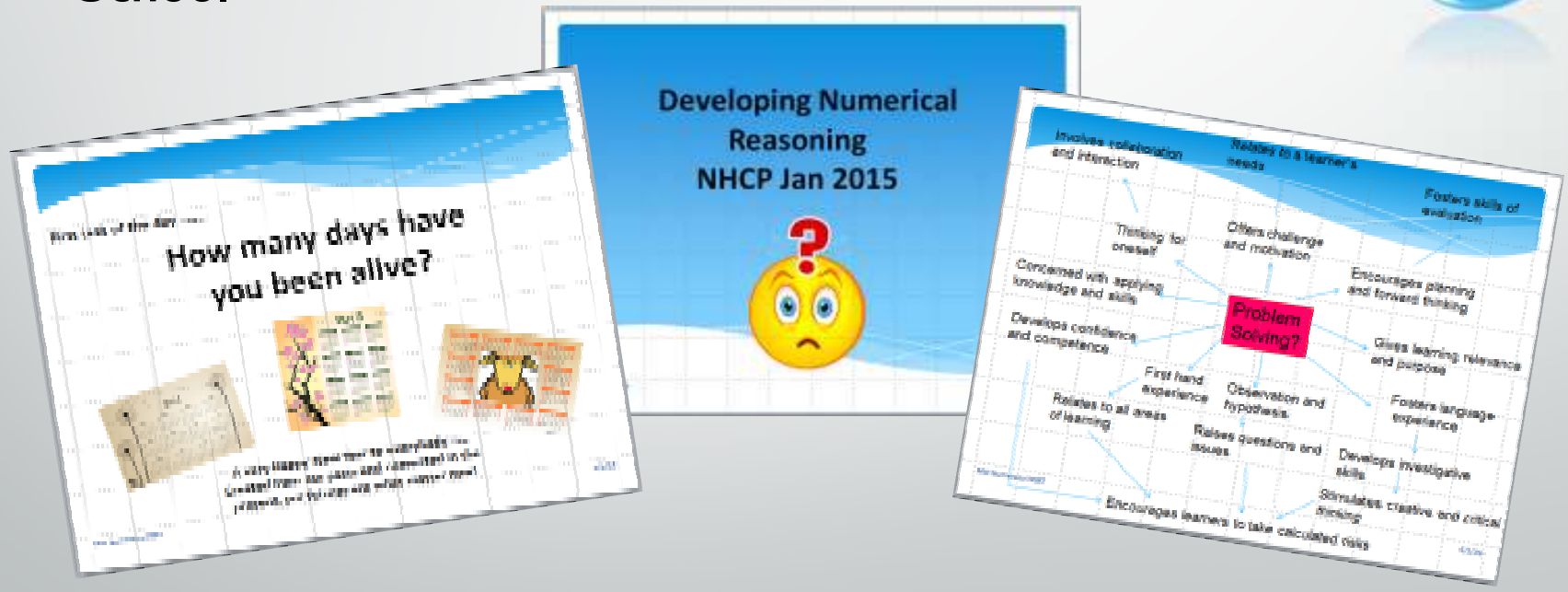
Encourage Number Sense

- What separates high and low achievers in primary school is number sense.
- Having an idea of the size of numbers and being able to separate and put numbers together flexibly.
- Not just apply a rule/method/standard algorithm
- Working with numbers flexibly eg to find 29+56 do 30+55

Staff Development

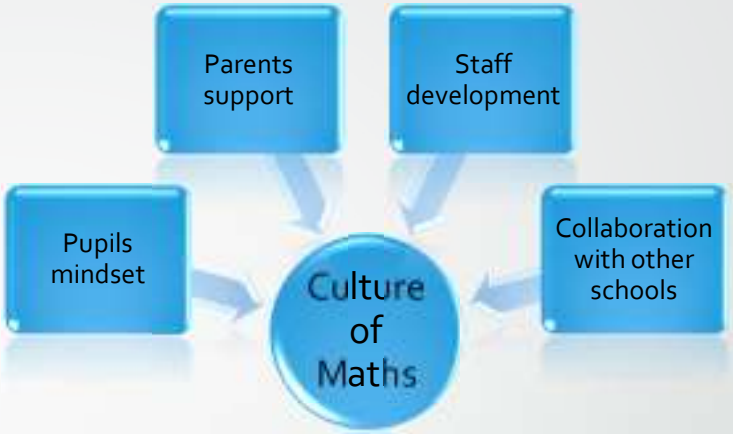
- Staff Inset about Numerical reasoning
- Teacher Inset about Mindset
- Staff input into developing Maths Culture in School





Working with other schools

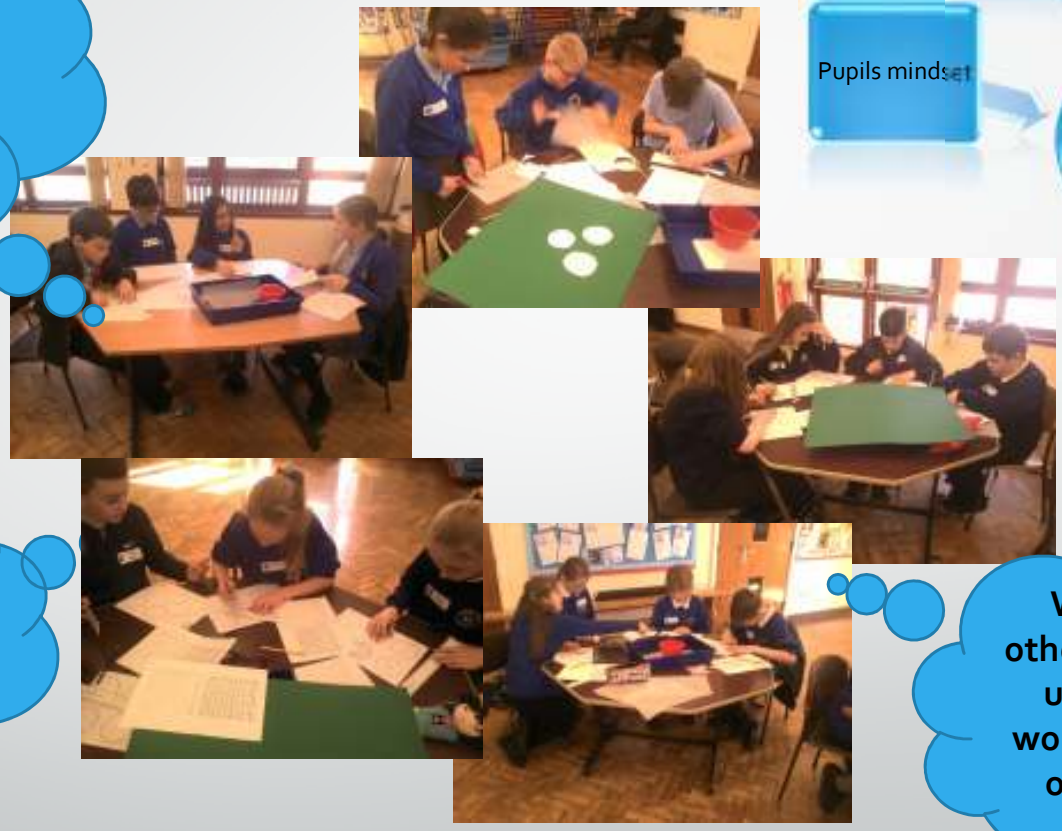
- As a school, it gives wider perspective and new ideas
- Growth in confidence
- Moved out of our own/school comfort zone
- Have our own Growth mindset

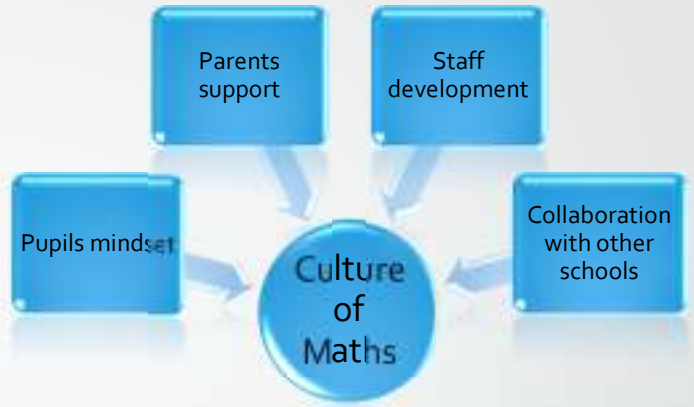


- For Pupils it helps them see other ways to do things
- Requires them to communicate their Maths clearly
- Puts them out of their comfort zone a bit more
- Provides challenge
- Opportunity to respond to different teachers

Working with other schools

We learned about digital roots, Vedic patterns and Vedic worms. We explored number patterns which made shape patterns.



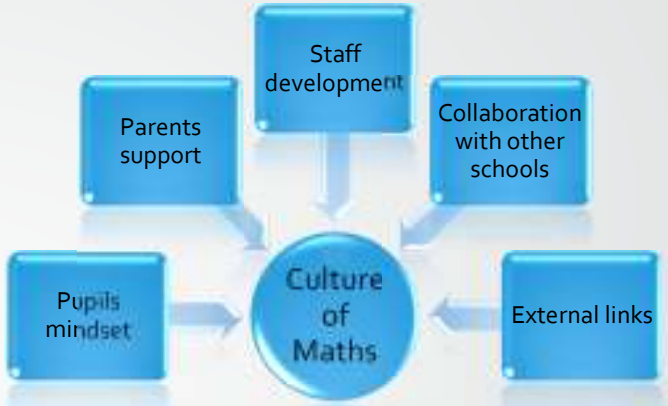


We like visiting new schools and meeting other children.

Working with other schools helps us see how we work compared to other schools.

Working with outside groups/business/ educational establishments

Northop Hall with Chester University Robotics Project



Ysgol Heulfan visit Tesco

Next Steps for our Schools

- Continue with focus groups
- Focused reasoning and problem solving sessions
- Use more Maths Games, including electronic media
- Continue to work together to develop further
- Analyse National Test and end of Key Stage data for our tracked pupils
- Collaborative projects for pupils from across the group
- Develop a Maths Culture across the school
- Staff development, understanding and improving skills including Mindset
- More peer observations, support for TA development
- More Workshops with parents
- Extend what we've learned to impact on all children
- Visit to Bradshaw Hall for more staff

Impact of our Project

Early indications show that:

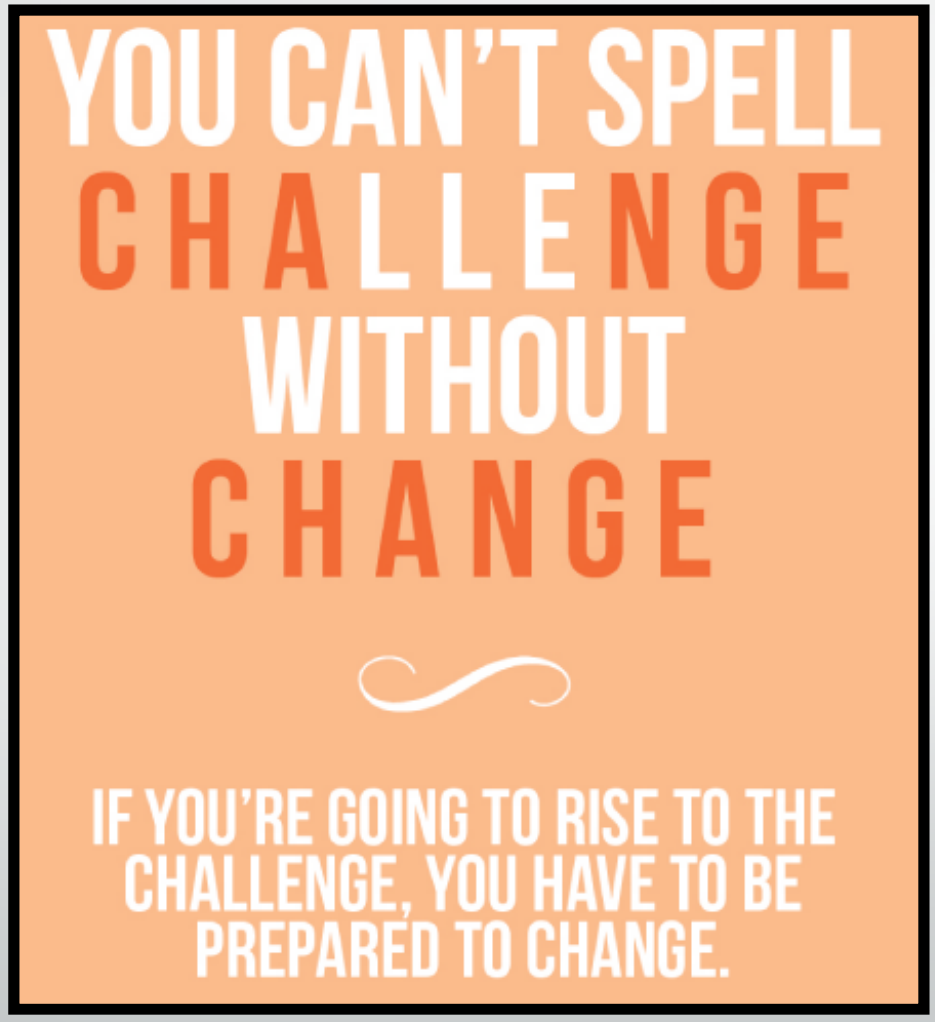
- Targets for KS2 Level 5+ have been met or exceeded
- Targets for FP Outcome 6 have been met or exceeded

National Test Data:

- Raw data indicates that the focus children have performed well in the Procedural and Reasoning tests

Overall:

- Changing the Culture and Mindset of staff, pupils and parents
- Children are enjoying maths more
- Profile has been raised
- Improved relationships with parents
- Schools have been motivated by working together and developing new, positive links beyond our usual consortia of schools


YOU CAN'T SPELL
CHALLENGE
WITHOUT
CHANGE
IF YOU'RE GOING TO RISE TO THE
CHALLENGE, YOU HAVE TO BE
PREPARED TO CHANGE.

Thank you for coming along.

Does anyone have any questions?