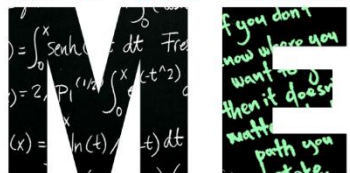


It's all about



Maths  
Campaign

Core maths



Maths Hub

Critical  
thinking  
problem  
solving



Reasoning  
pilot

MEP & CAT

Growth Mind  
Set

Whole College  
approach

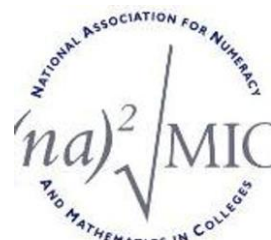
Bar modelling

Real Maths  
Fest

Great team

Bowland

Lesson study  
SOW



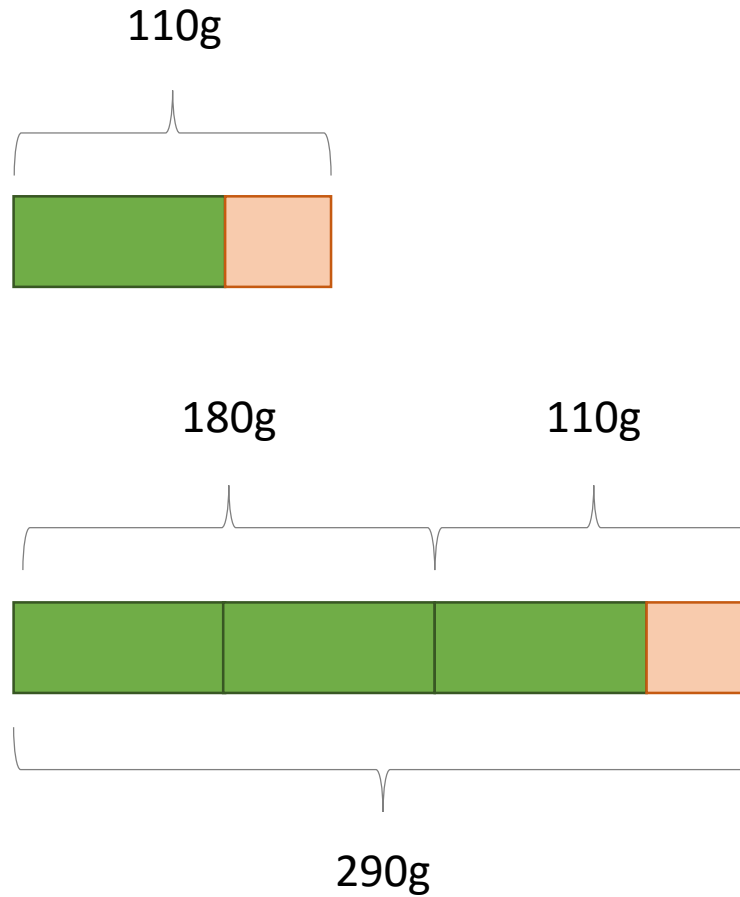
Digital  
Technologies

# Starter activity

- Alan puts some brown sugar on a dish. The total weight of the brown sugar and the dish is 110g.
- Bella puts three times the amount of brown sugar that Alan puts on an identical dish. The total weight of the brown sugar and the dish is 290g.
- Find the weight of the brown sugar that Bella puts on the dish.



# Singapore Bar Model



2 units = 180g

1 unit = 90g

3 units = 270g

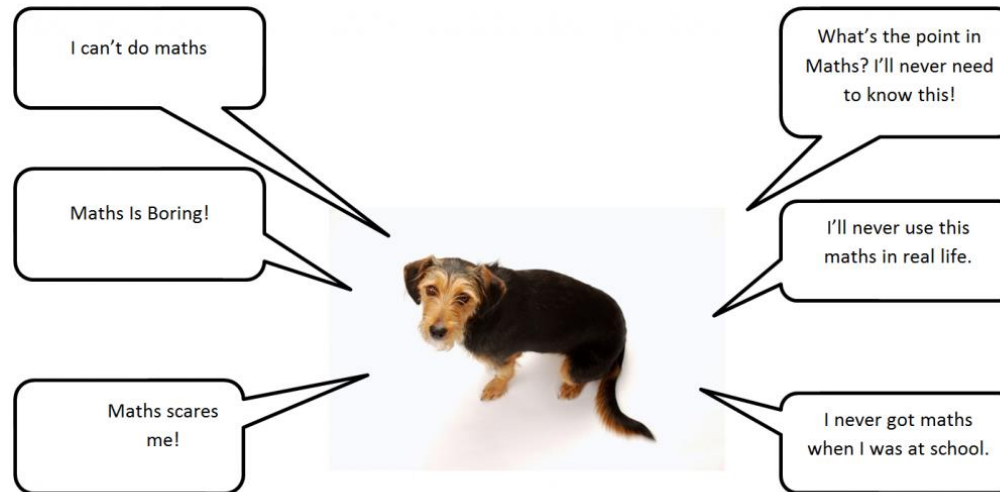
# Programme for International Student Assessment (PISA) - 2012

<b>1</b>	<b>Shanghai, China</b>
<b>2</b>	<b>Singapore</b>
3	Hong Kong, China
4	Taiwan
5	South Korea
6	Macau, China
<b>7</b>	<b>Japan</b>
8	Liechtenstein
9	Switzerland
<b>10</b>	<b>Netherlands</b>
11	Estonia
12	Finland
13=	Canada
13=	Poland
15	Belgium
16	Germany
17	Vietnam
18	Austria

19	Australia
20=	Ireland
20=	Slovenia
22=	Denmark
22=	New Zealand
24	Czech Republic
25	France
<b>26</b>	<b>United Kingdom</b>
27	Iceland
28	Latvia
29	Luxembourg
30	Norway
31	Portugal
32	Italy
33	Spain
34=	Russia
34=	Slovakia
36	United States

# Singapore maths

- In the 1970s Singapore students were performing poorly in maths.
- Maths consisted of -
  - rote memorisation
  - tedious computation
  - following procedures without understanding.



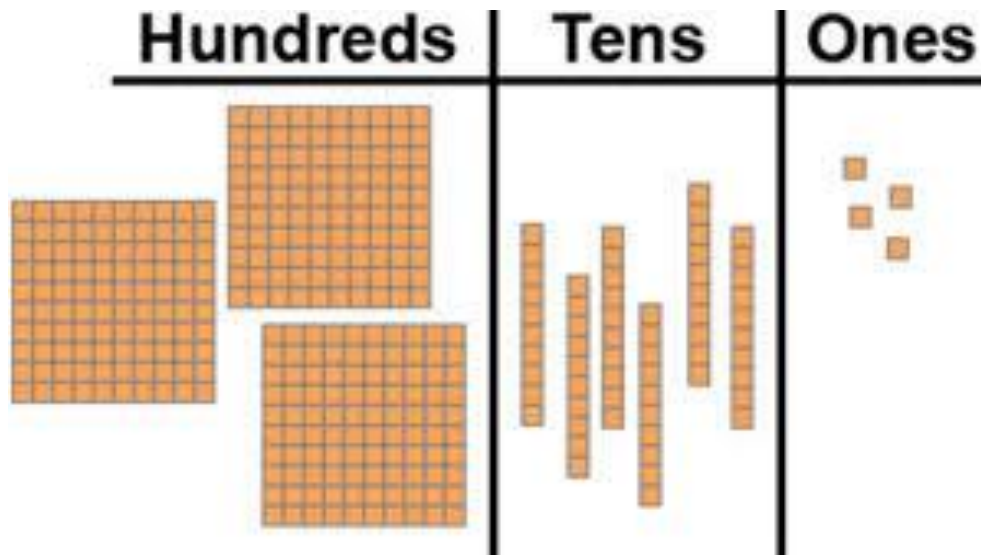
# Singapore maths (influences)

- Bruner (1966)
  - Introduced the term 'scaffolding'.
    - Learners build on the skills they have already mastered.
    - Support can be gradually reduced as learners become more independent.
  - Three modes of representation
    1. Enactive (concrete or action-based)
    2. Iconic (pictorial or image-based)
    3. Symbolic (abstract or language-based).
  - Spiral curriculum
    - Topics are revisited (at a more sophisticated level each time).

Bruner, J.S. (1966) *Toward a Theory of Instruction*. Cambridge, MA: Harvard University Press.

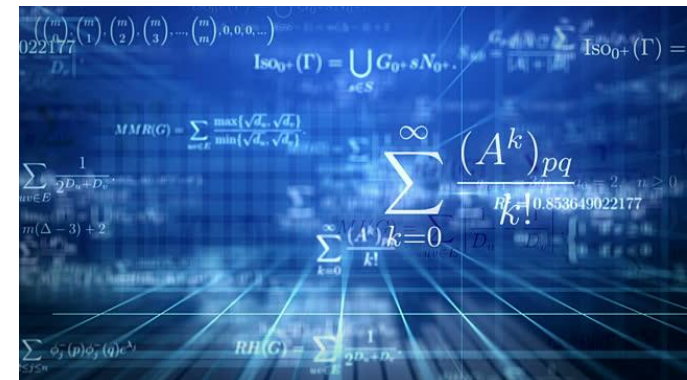
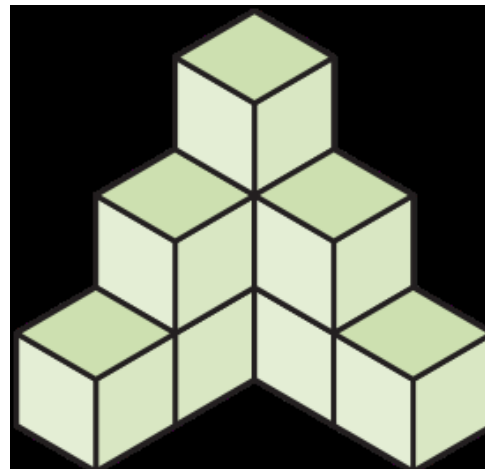
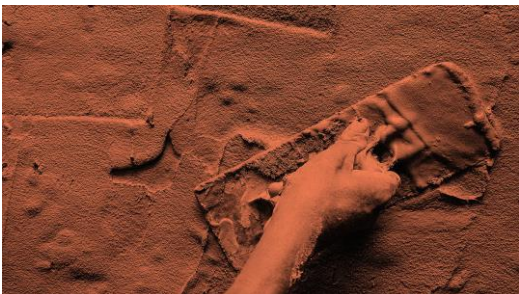
# Singapore maths (influences)

- Dienes (1960)
  - Multiple embodiment (use different ways to represent the same concept).
  - Dienes blocks.



# Concrete -> Pictorial -> Abstract

- Model the concepts at each stage.
- Use a variety of representations.
- Don't rush through the stages.
- Learners will gain an understanding of the underlying concepts through hands-on learning activities that lay a foundation for abstract thinking.





# Bar modelling



- **Have a go at these, using multilink cubes.**
- Sam buys a shirt that is labelled £27 RRP, with a  $\frac{1}{3}$  off in the sale, how much does he pay?
- Haleema's Mum buys her some new shoes; she paid £36 in the sale after a reduction of  $\frac{1}{3}$ . Mum can't remember what the original price was, how much were the shoes before the sale?
- The ratio of the number of boys to girls in a class is 2:3. After 6 boys join the class, the ratio becomes 5:6. How many boys were in the class at first?

# Bar modelling

- John's age is a  $\frac{1}{4}$  of his father's age when his father is 48 years old. In how many years time will John's age be a  $\frac{1}{3}$  of his fathers age?
- Use multilink cubes to model the above problem.



# Bar modelling

- Sophie made some cakes for the school fair. She sold  $\frac{3}{5}$  of them in the morning and  $\frac{1}{4}$  of what was left in the afternoon.
- If she sold 200 more cakes in the morning than in the afternoon, how many cakes did she make?

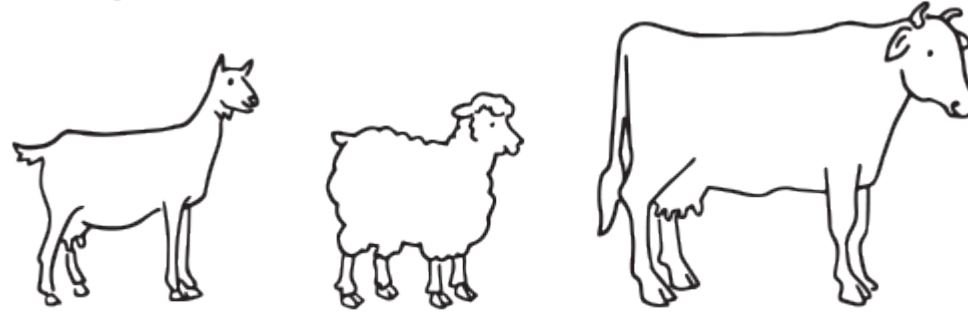


# Bar modelling

- In a field there are some goats and chickens.
- There are 168 legs and 48 heads.
- How many goats and how many chickens?
- Use manipulatives or bar modelling to solve this.



# Bar modelling



goat. sheep. cow.

- In a field there are some goats, sheep and cows. Each time the farmer counts the animals he only manages to count 2 types of animals at a time. The number of goats and sheep is 31, goats and cows is 40 and sheep and cows is 21.
- How many of each type of animal?

# Bar modelling review

- Discuss what you thought of the bar modelling activities?
- How could you use manipulatives?
- What are the key ideas that you will take from this session?
- Could you use any of the ideas from the Stoke team?
- What else?
- What will you do?

