Teaching for Mastery

Parent Meeting

National Centre
for Excellence in the
Teaching of Mathematics

MathsHUBS

What does it mean to master something?

- I know how to do it
- It becomes automatic and I don't need to think about it- for example driving a car
- I'm really good at doing it – painting a room, or a picture
- I can show someone else how to do it.

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Mastery of Mathematics is more…..

- Achievable for **all**
- **Deep** and sustainable learning
- The ability to build on something that has already been sufficiently mastered
- The ability to reason about a concept and make connections
- Conceptual and procedural fluency

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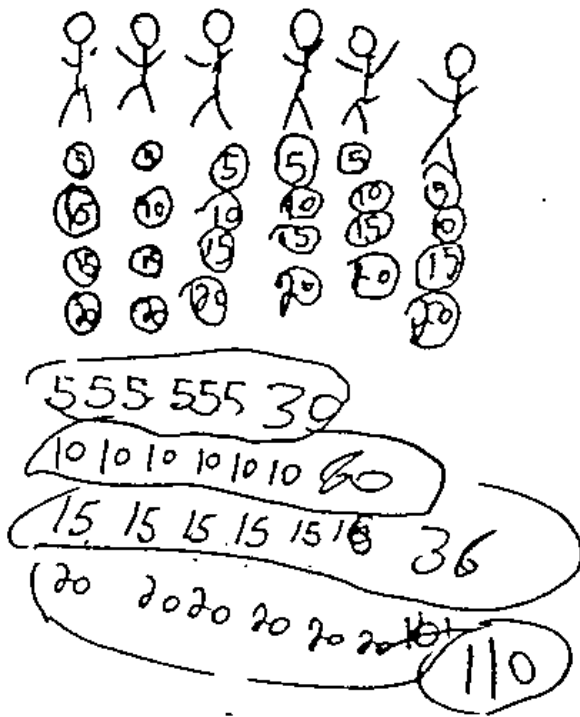Teaching of Mathematics

Teaching for Mastery

- The belief that all pupils can achieve

- Keeping the class working together so that all can access and master mathematics

- Development **of deep** mathematical understanding

- Development of both factual/procedural and conceptual fluency

- Longer time on key topics, providing time to go deeper and embed learning

The Curriculum

Factual &Procedural Fluency

Conceptual Understanding

INTEGRATION
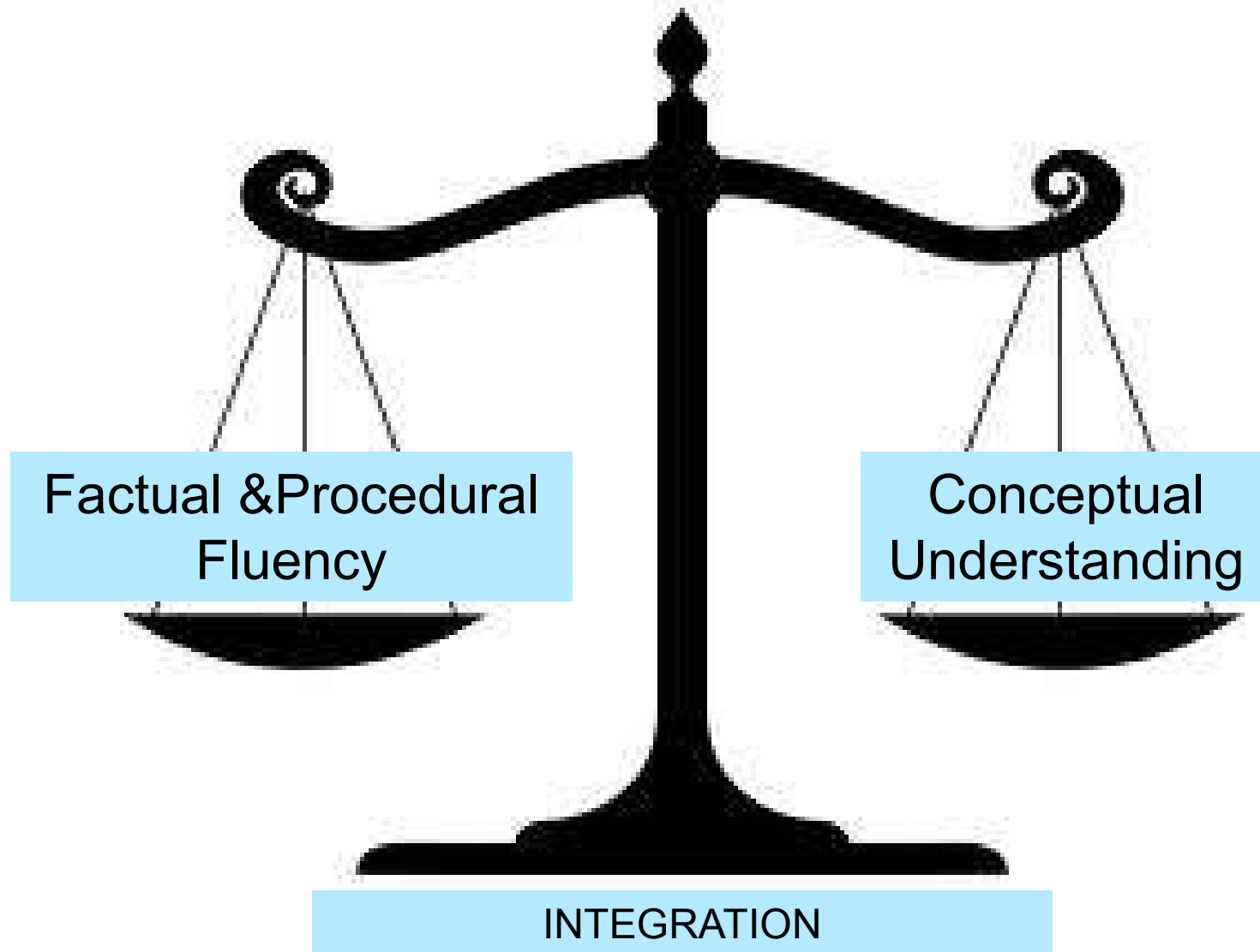
1256 apples are divided among 6 shopkeepers
How many apples will every shopkeeper get?
How many apples will be left?

Working:

Answer:....

$$30 + 60 + 36 + 110$$
$$90 \qquad 470$$

$$470$$
$$+ 90$$
$$\overline{3\ 7\ 1}$$

$$\begin{array}{r} 110 \\ + 36 \end{array}$$

555 555 30
10 10 10 10 10 10 60
15 15 15 15 15 15 36
20 20 20 20 20 20 110

$$30 + 30 + 30 + 30 + 30 + 30$$

Is there evidence of conceptual understanding?

Is there procedural fluency and efficiency?

Sally knows all her tables up to 12 x 12

When asked what is 12 x 13 she looks blank.

Does she have fluency and understanding?

Mastery

Involves the development of three forms of knowledge:

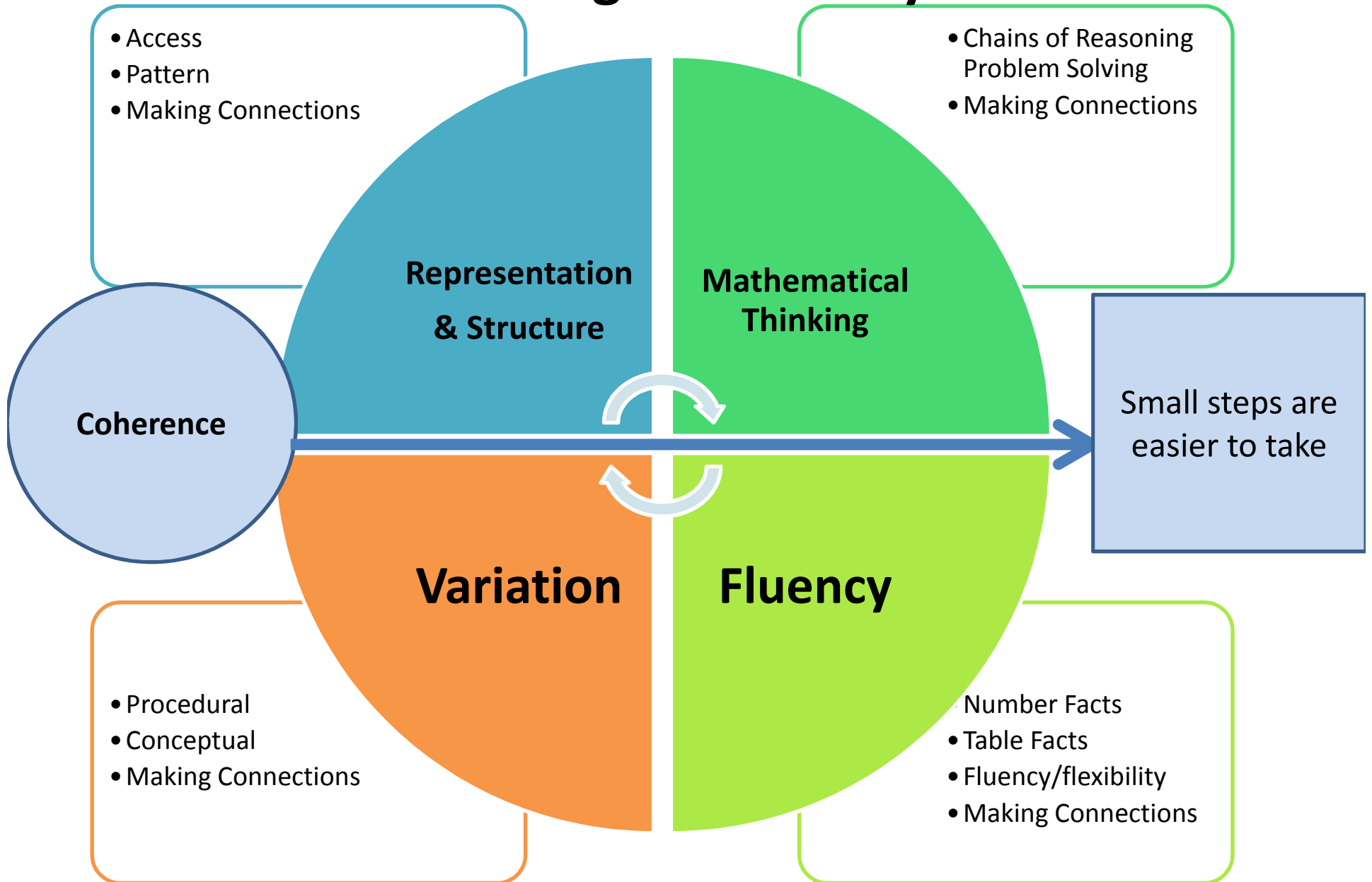Factual – I know that

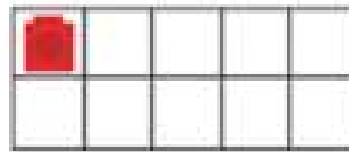Procedural – I know how

Conceptual – I know why

Solve the following
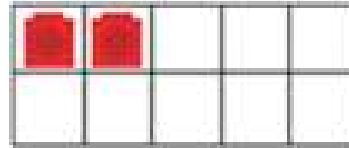
$$\square + 17 = 15 + 24$$
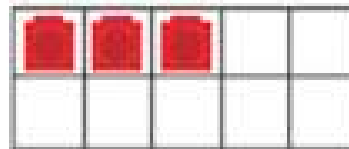
$$99 - \square = 90 - 59$$

Teaching for Mastery

- Access
- Pattern
- Making Connections

- Chains of Reasoning Problem Solving
- Making Connections

Representation & Structure

Mathematical Thinking

Coherence

Small steps are easier to take

Variation

Fluency

- Procedural
- Conceptual
- Making Connections

- Number Facts
- Table Facts
- Fluency/flexibility
- Making Connections

Concrete Pictorial (iconic) Abstract

1
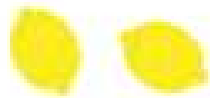
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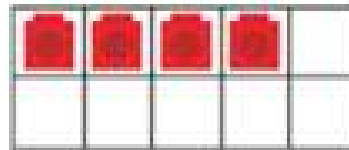
4

Amy

$$6 + \boxed{} + 4 = 13$$
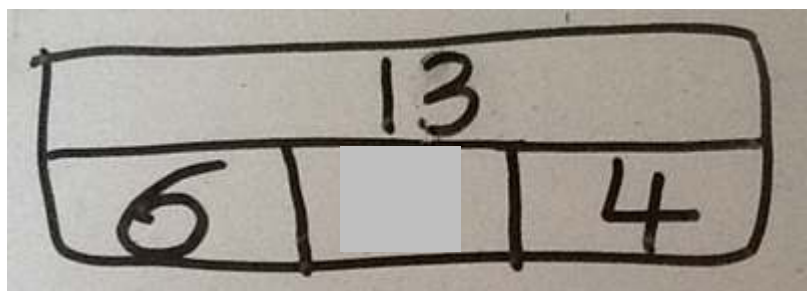
$$6 + \boxed{3} + 4 = 13$$

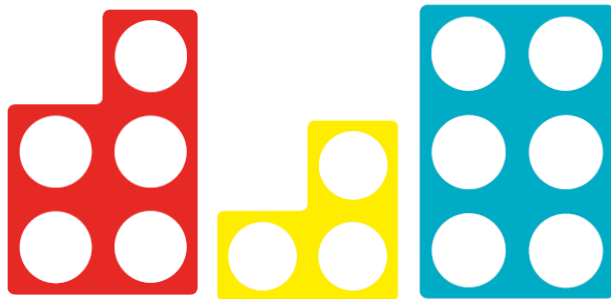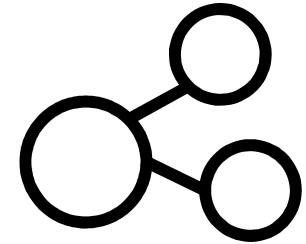23.11.15 **WALT add three 1-digit numbers**

$5 + 4 + 9 = \boxed{18}$
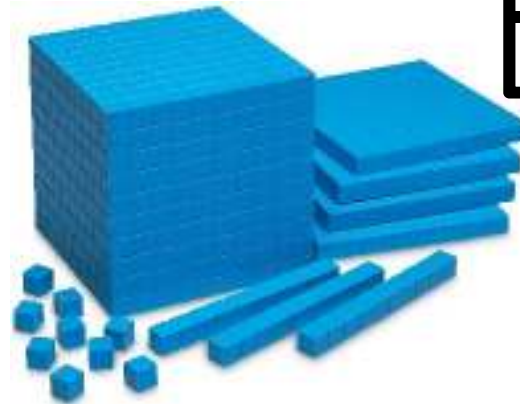
$6 + \boxed{2} + 4 = 12$

$\boxed{6} + 3 + 2 = 11$

$\boxed{3} + \boxed{2} + \boxed{5} = 10$
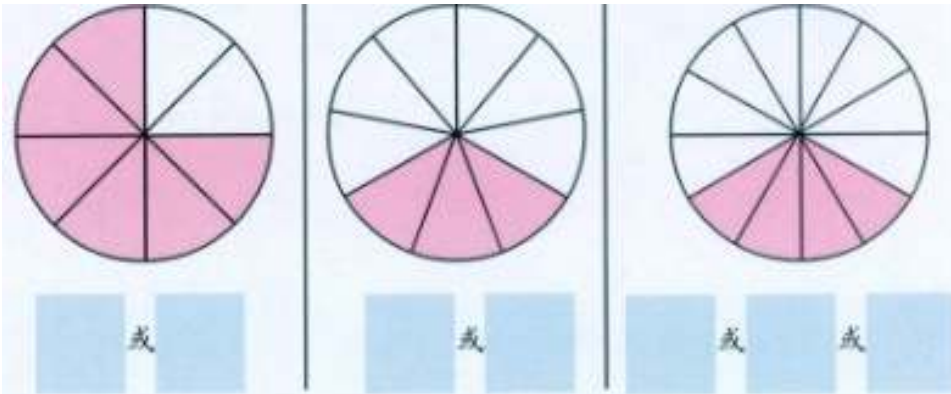
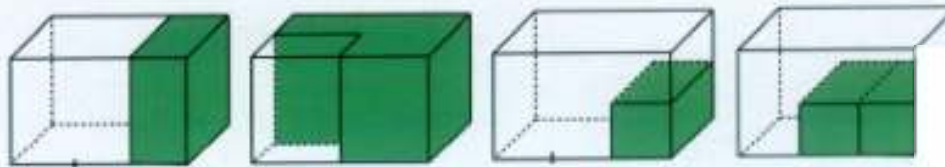# Resources and Representations of Mathematics

Resources to help build concepts

1000	2000	3000	4000	5000	6000	7000	8000	9000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009

Ofsted 2013
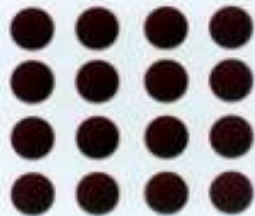
14

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Conceptual Variation

2. 绿色部分是长方体的几分之几? 用分数表示.

或

他们得到的巧克力一样多吗?

我得到下面一堆巧克力的 $\frac{1}{2}$.

我也得到下面一堆巧克力的 $\frac{1}{2}$.

A. Use fractions to express the coloured parts.

( )
( )
( )
( )
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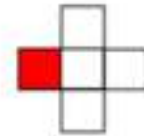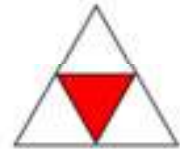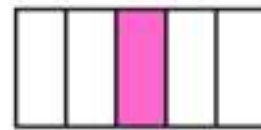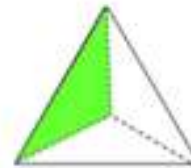( )
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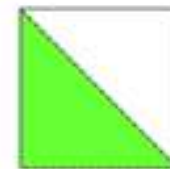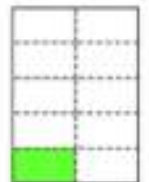( )
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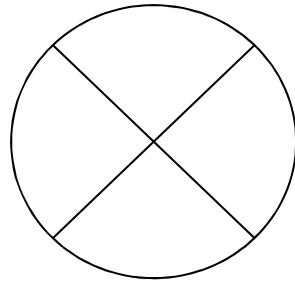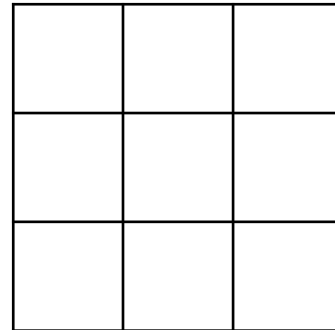
Variation to develop depth

$$\frac{2}{3}$$

$$\frac{1}{4}$$

$$\frac{4}{9}$$
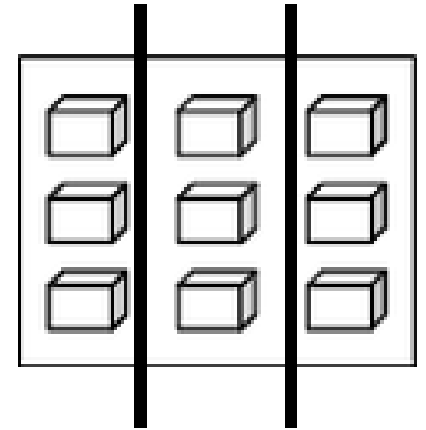
$$\frac{2}{3}$$

Procedural variation leading to Intelligent Practice

$2 \times 3 =$	$6 \times 7 =$	$9 \times 8 =$
$2 \times 30 =$	$6 \times 70 =$	$9 \times 80 =$
$2 \times 300 =$	$6 \times 700 =$	$9 \times 800 =$
$20 \times 3 =$	$60 \times 7 =$	$90 \times 8 =$
$200 \times 3 =$	$600 \times 7 =$	$900 \times 8 =$

Shanghai Practice Book

Jo has counted the toy cars and said:

There are 3 cars

Explain the mistake she could have made.

Katie is counting 9, 8, 7

Is she counting forwards or backwards?

How do you know?

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How many two digit numbers can you make?

| 7 | 0 | 2 |

What is the largest number?
Prove it using concrete resources
What is the smallest number?
Prove it using concrete resources.
Why can't the 0 be used as a tens number

Bill has written a list of two digit numbers
The digits of each number add up to 5
None of the digits are 0
Can you find all of the numbers Bill could have written?
Write the numbers in order from smallest to largest

Sid is counting in 3's. Luke is counting in 2's.
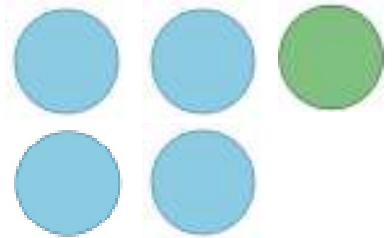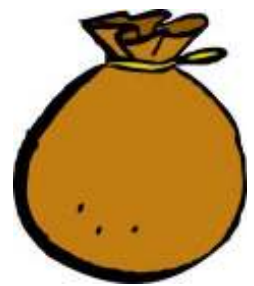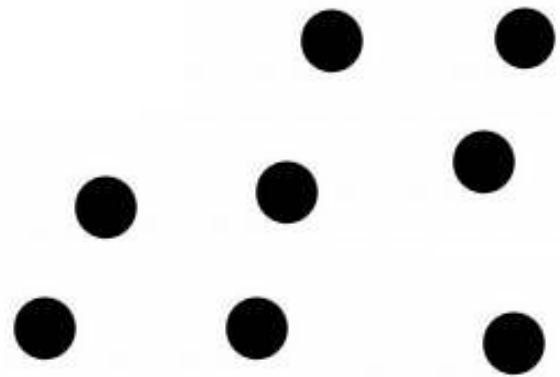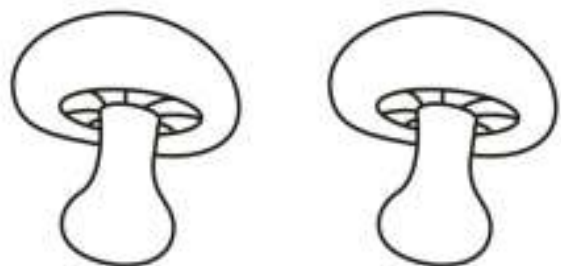Sid says if we add our numbers together as we count we get a new pattern.
What pattern do they make?
What happens if Sid and Luke both count in 5's?

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All the dots have fallen off 2 toadstools how many different ways can you put them back?

There are no more than 10 counters in total .
How many counters could be in the bag?
Why can't it be six?

Two numbers have a difference of 4
The larger number is less than 10
What could the two numbers be?

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Sam says "I am thinking of a two digit number,
          if I add ones to it,
              I will only need to change the ones digit."

Is he right?

Explain your answer

What digits could go in the boxes?

☐2 + ☐5 = 8☐

Complete the pattern

15 + 85 = 100
20 + 80 = 100
25 + 75 = 100
30 + ___ = 100
___ + ___ = 100

Can you explain the pattern?

KS2 Arithmetic Paper
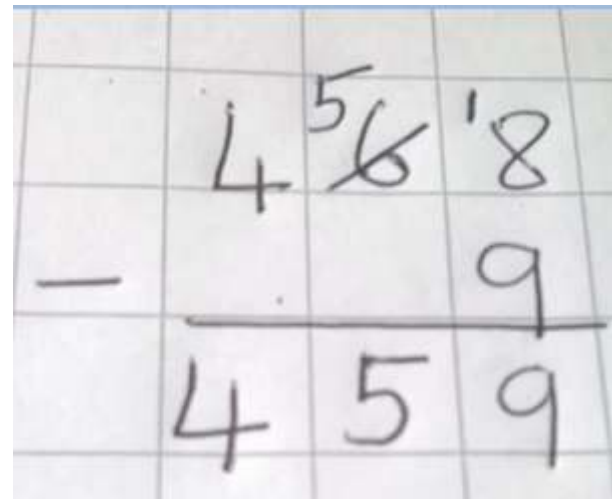
$$326 \div 1 =$$
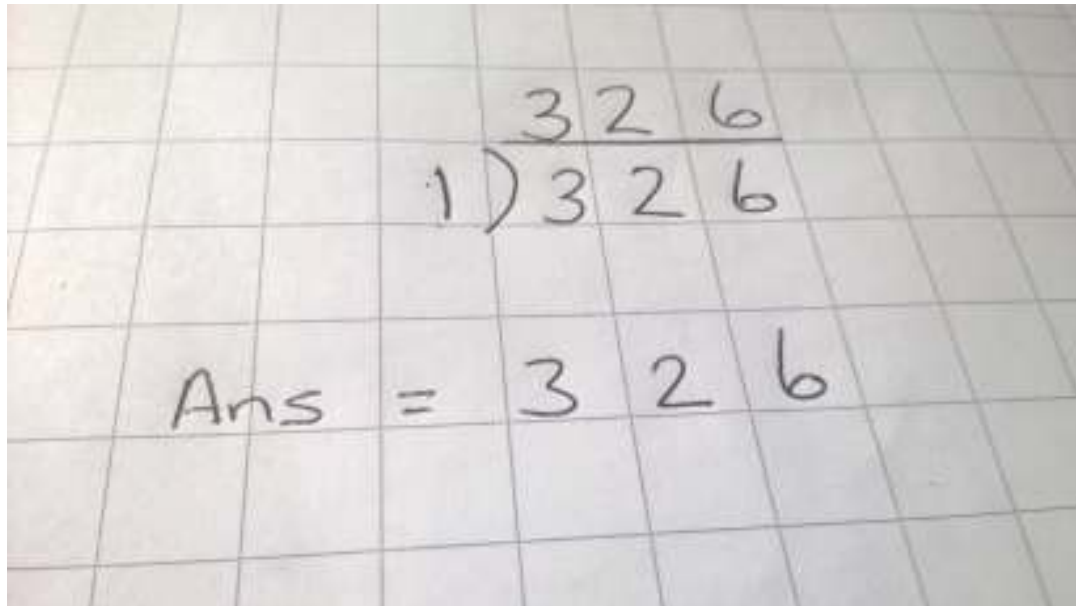
Does this demonstrate mastery?

KS2 Arithmetic Paper

4   468 − 9 =

Thinking about relationships

21 $5{,}542 \div 17 = 326$

Explain how you can use this fact to find the answer to **18 × 326**

17 x 326 = 5,542
18 x 326 = 5,542 + 326

How might children respond to this question?
What is the best response?

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How can you help at home?

➤ Discuss home learning activities set with your child- ask them to talk about what they have been learning.

➤ Look out for and spot numerals which are all around us: road signs, in shops, in books, door numbers.

➤ Number rhymes.

➤ Play games which involve counting: snakes and ladders, shut the box, ludo, junior monopoly, Uno, card games

➤ Count objects, count larger groups of objects in 2's, 10's 5's.

➤ Cooking, weighing and counting

➤ Time: look at analogue clock faces and digital time. Time activities using stopwatch.

Thank you for coming

Hope I have answered some of your questions!

Any other questions?