



# Subject Knowledge for Mathematics Teaching

LKS2

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# A puzzle to get us going

0 1 2 3 4 5 6 7 8 9

Using all 10 digits each time:

- ❖ Make five multiples of 2  
or
- ❖ Make five multiples of 3  
or
- ❖ Make five multiples of 7  
or
- ❖ Make five prime numbers

# Multiples

Why might you give this task to your pupils?

What would they learn?

Where does this learning fit in the curriculum?

How does this task fit with your idea of maths in the classroom?



## What are the intended outcomes for SKTM

To develop specialist subject knowledge, pedagogic knowledge and confidence in teaching specific aspects of mathematics:

- Number sense and place value
- Addition and subtraction – models and representations
- Multiplication and division – models and representations
- Fractions

# A choice of place value tasks

There are six numbers written in five different scripts.

Can you sort out which is which?

Write 51 in each script.

900	13	66	13	=+5
٤٣	٢	٢٤	83	500
=	5+8	2	56	-5
٢٥	٨٣	٩٣	٢	58
25	٦٦	٢	٨+٣	100
58	+3	100	4٤	٢6

## vii) Doodling with Dienes

Using these nine pieces of Dienes base 10 equipment, choose any three and make all different possible amounts.

Rectangular Strip

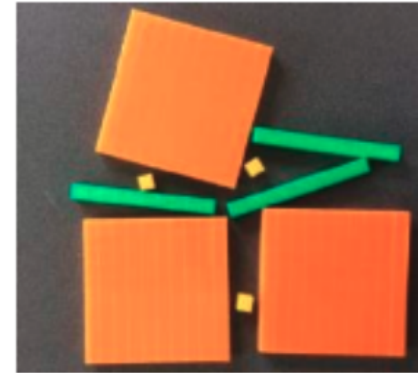
For example I can make 102

How many different amounts are there?

Write them in order from maximum to minimum.

What do you notice about consecutive differences between adjacent pairs of values once these values are placed in order?

What other questions you might ask a class to do or to make up having worked on this problem?



# What would pupils learn from these tasks?

- Key National curriculum aims
  - Fluency
    - Varied and frequent practice
  - Reasoning
    - Follow a line of enquiry
  - Problem solving
    - Persevering
- Key programmes of study practiced?
  - Recognise the place value in a three-digit number
  - Compare and order numbers up to 1000
  - Solve number problems

# Developing 'Number Sense'

How many ways ....?

$$7 \times 8 = 56$$

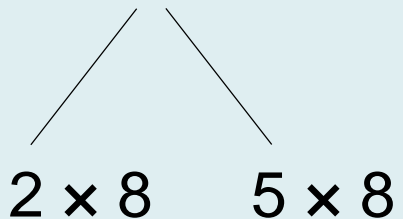


What does posing problems like this one do to enhance understanding of number?

## Distributive law – splitting numbers additively

- When we partition numbers, we use the distributive law, i.e. we distribute the numbers,

e.g.  $7 \times 8 =$



$2 \times 8$      $5 \times 8$

- The law can also be applied to combine numbers

e.g.  $7 \times 6 + 7 \times 4 = 7 \times 10 = 60$





# Y3 and Y4 – any issues?

Pupils should be taught to:

- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which  $n$  objects are connected to  $m$  objects

Pupils should be taught to:

- recall multiplication and division facts for multiplication tables up to  $12 \times 12$
- use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together 3 numbers
- recognise and use factor pairs and commutativity in mental calculations
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as  $n$  objects are connected to  $m$  objects

## Associative law – splitting numbers multiplicatively

- Some calculations are easier if we split the numbers into their factors,

e.g.  $36 \times 5 =$

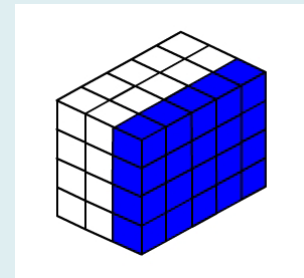
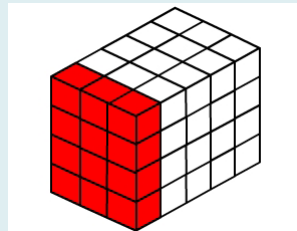
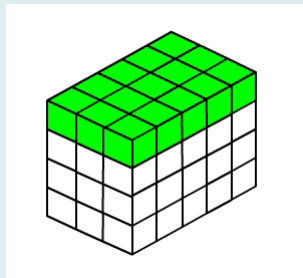
$$18 \times 2 \times 5 =$$

$$18 \times 10 =$$

# Multiplying 3 single-digit numbers

- Children commonly gave two answers to this question:
- $4 \times 6 \times 2 =$
- One answer was 36 and the other was 48
- Can you work out where they had gone wrong?
- Could this model help?

$$3 \times 5 \times 4$$



# How can children prove $4 \times 2 \times 3 = 3 \times 2 \times 4$



$$4 \times 2 = 8, 8 \times 3 = 24$$

$$3 \times 2 = 6, 6 \times 4 = 24$$

$$4 \times 3 = 12, 12 \times 2 = 24$$



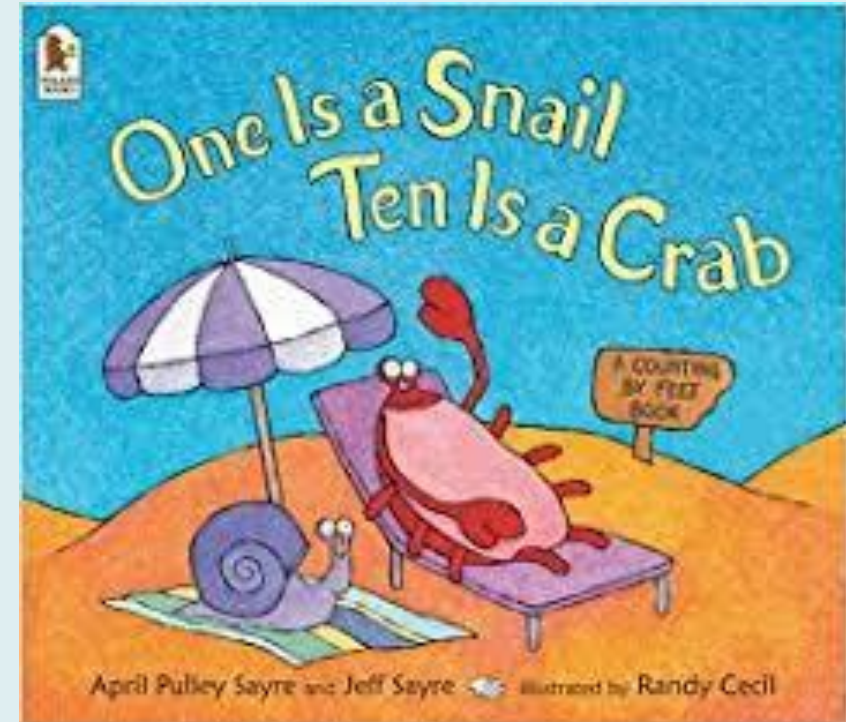
# Story Time

Children can find their own totals using the story: e.g. how many ways I make 24?

3 spiders or 4 insects  
or 6 dogs or 1 spider,  
2 insects and 2 people

...

Model using one of the resources on the table.



## The Ofsted bit...

- On pages 88 and 89 of the report, specific guidance is given regarding applying the EIF to the teaching of Mathematics. Ofsted state that inspectors will consider what steps the school has taken to ensure that:

***"all teachers of mathematics, including non-specialist teachers of mathematics, have sufficient mathematical and teaching content knowledge to deliver topics effectively".***

**Between each day, a gap task is set, such as:**

- Bring either photographs, pupil work or notes to share and discuss next time
  - Find an example of a misconception; how did you resolve it?

OR

- Try out one of the tasks that we have used today.

**Discuss with school colleagues**