Croeso i Flwyddyn 5 a 6

Mathematics and Numeracy workshop

Four Operations
Concrete–Pictorial–Abstract Approach for Parents

Why Concrete Methods Matter

Concrete methods involve using **physical objects** (like counters, blocks, coins) to represent numbers and operations. This stage is crucial because:

1. Builds Real Understanding

Children see what numbers *mean* rather than memorizing rules. For example, adding 3 + 2 with counters shows that addition combines quantities.

2. Links Maths to the Real World

Objects make maths tangible and relatable. Children understand that numbers represent actual things.
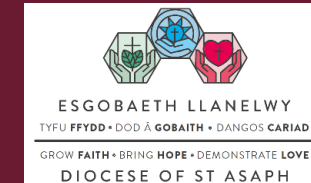
3. Supports Cognitive Development

Young learners often think in a **visual and tactile way**. Manipulatives match their developmental stage, reducing abstract overload.

4. Prevents Misconceptions

Abstract algorithms (like column addition) can feel like magic if children don't know *why* they work. Concrete models show the logic behind regrouping, borrowing, or carrying.

Transition to Abstract

• After concrete, children move to **pictorial representations** (drawings, diagrams), which bridge the gap to abstract symbols.

• Finally, they use **abstract methods** (numbers and symbols) with confidence because they understand the underlying concept.

Four Operations
Concrete–Pictorial–Abstract Approach for Parents

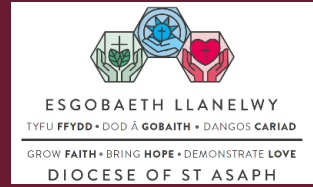| OPERATION	CONCRETE	PICTORIAL	ABSTRACT
Addition	Counters or base-ten blocks	Number line, part-whole model	Column addition
Subtraction	Take away counters, regroup blocks	Bar model, number line	Column subtraction
Multiplication	Arrays with counters	Draw arrays or area model	Multiplication facts
Division	Share counters into groups	Draw groups or bar model	Division algorithm

Addition

Concrete: Use counters or base-ten blocks to add

Pictorial: Draw a number line or part-whole model.

Abstract: Column addition:

```
   27              62356
+  15           +   3469
_____          _____
```
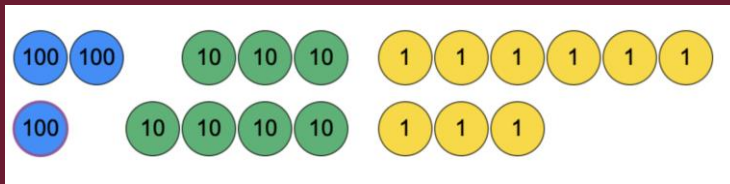
Addition

Concrete

Use base-ten blocks to model or pace value counters to make:

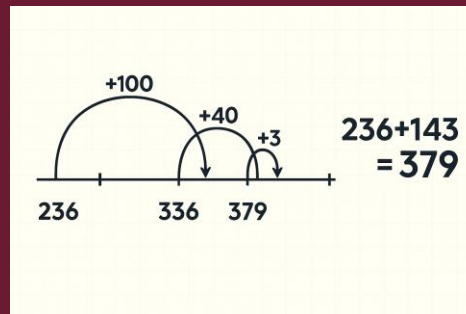Example: 236 + 143

Now try another question of your own making.

Pictorial

Draw a number line or part-whole model:

236 + 143

Number line jumps:

236 → +100 → +40 → +3

Abstract

Column addition with a carry over

$$\begin{array}{r} 236 \\ +\ 143 \\ \hline \end{array}$$

Now try some larger digits

Subtraction

Concrete: Take away counters or blocks.

Pictorial: Draw a bar model or number line.

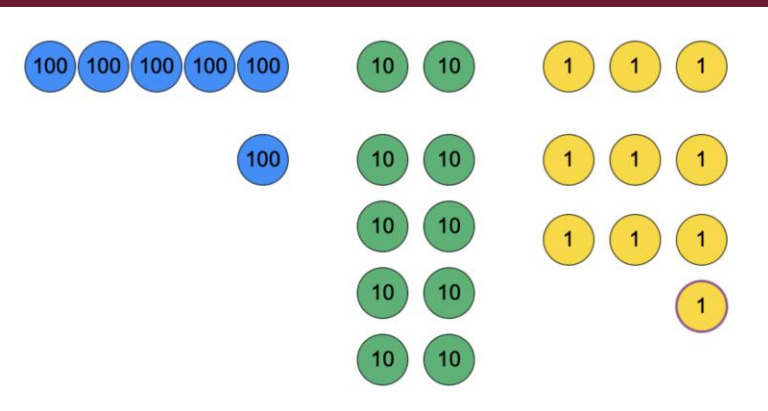**Abstract: Column subtraction with regrouping.**

Subtraction

Concrete

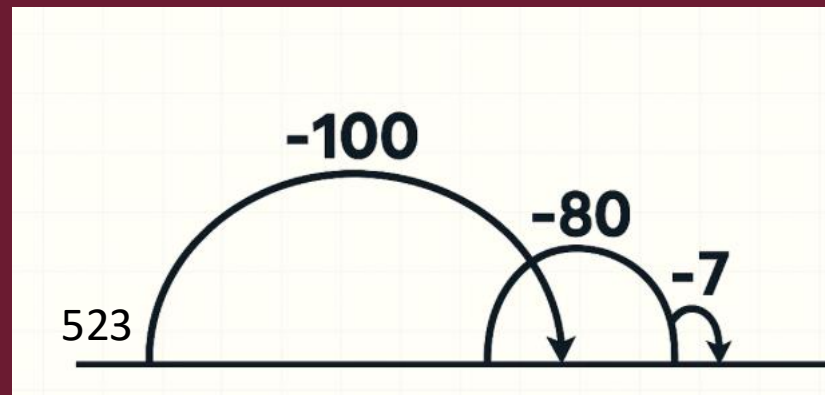Use base-ten blocks or place value discs to make
523 - 187.

Show regrouping by exchanging tens for ones.

Pictorial

Draw a number line or bar model to represent subtraction.

E.g., start at 523 and count back 187.

Abstract

Abstract:
Column subtraction with exchange

```
  523
- 187
```

Now try some larger digits.

Multiplication

Concrete: Make arrays with counters (3 rows of 4 = 12).

Pictorial: Draw the array or an area model.

Abstract: 3 × 4 = 12.

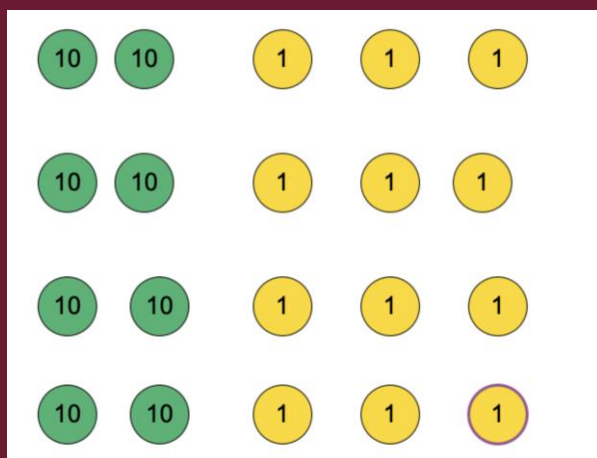$$\begin{array}{r} 78 \\ \times\ \ 4 \\ \hline \end{array}$$

Multiplication

Concrete:
Use arrays or base-ten blocks

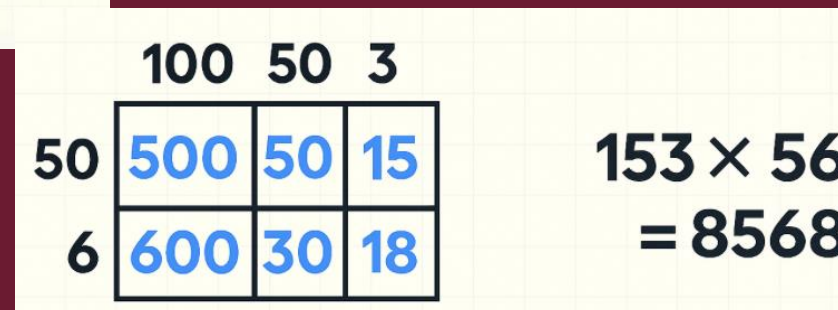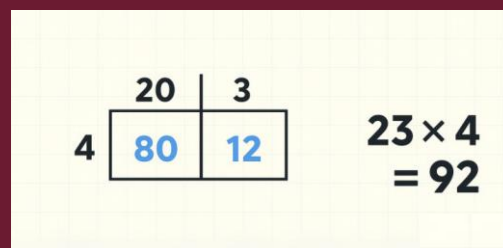Example: 23 × 4
Represent with counters in rows and columns

Pictorial:
Draw an area model or grid

Example: Split 23 into 20 and 3, multiply by 4

Try more difficult numbers:
153 x 56 =

	20	3
4	80	12

$23 \times 4 = 92$

	100	50	3
50	500	50	15
6	600	30	18

$153 \times 56 = 8568$

Abstract:
Column multiplication (short method)
Example:

```
   23            316
×   4          x   19
```

Division

Concrete: Share counters into equal groups or use grouping with base-ten blocks.

Pictorial: Draw groups or use bar models.

Abstract: Show division algorithm and link to grouping.
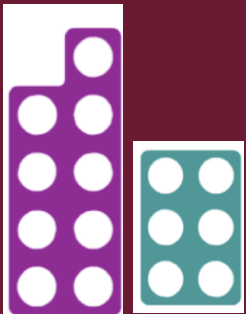
36 ÷ 6 =   9) 108

Division

Concrete:

Use counters or base-ten blocks to share or group (e.g., 96 ÷ 4).

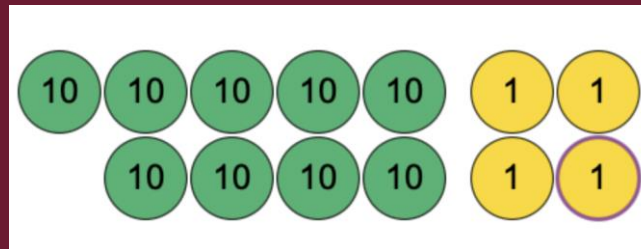Example: Make 4 equal groups with 96 counters.

Or use numicon.

Pictorial:

Draw a bar model or grouping diagram to represent division.

Example: Show 96 split into 4 sections on a bar model.

Abstract:

Use short division method (with remainder if needed).

Example: 96 ÷ 4 = 24 using short division layout.

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