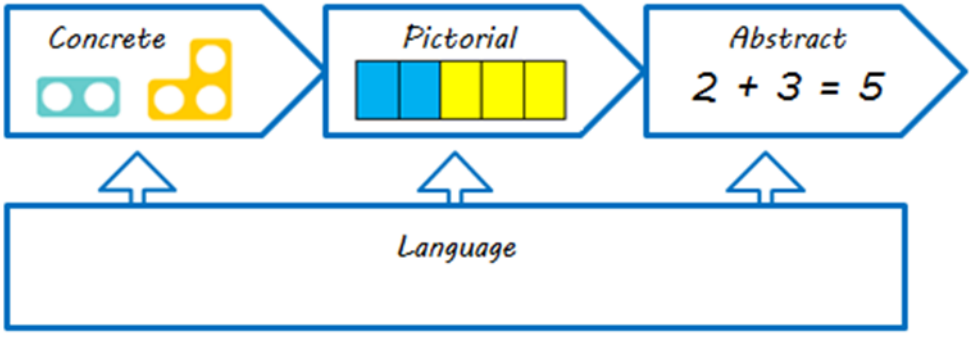
RATIONALE

ANALYSIS OF PREVIOUS LEARNING HAS INDICATED THAT A SIMPLIFIED CALCULATION STRATEGY MAY ASSIST LEARNERS IN UNDERSTANDING THE LOGIC BEHIND MATHEMATICAL CALCULATIONS. BY AVOIDING THE TEACHING OF NUMEROUS DIFFERENT STRATEGIES, WE CAN PREVENT CONFUSION WHICH, UNDER PRESSURE, CAUSES CHILDREN TO MAKE INAPPROPRIATE DECISIONS ABOUT HOW TO TACKLE A QUESTION.

IT IS EXPECTED THAT CHILDREN WILL MOVE ON TO MORE FORMAL CALCULATION METHODS WHEN THEY ARE READY TO DO SO. THE USE OF CONCRETE MANIPULATIVES, SUCH AS NUMICON AND CUISENAIRE RODS, WILL BE MAINTAINED THROUGHOUT SCHOOL LIFE, TO REINFORCE THE LINK WITH PREVIOUS LEARNING AND MAINTAIN UNDERSTANDING.



MALIN BRIDGE PRIMARY SCHOOL

CALCULATION GUIDE

MULTIPLICATION

A GUIDE FOR PARENTS AND CARERS ON THE METHODS USED IN SCHOOL.

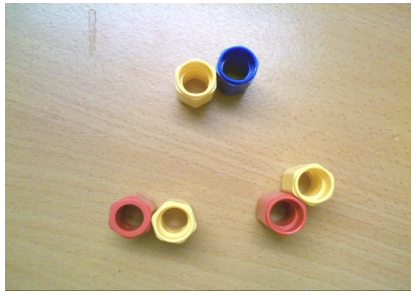
REVIEWED SEPTEMBER 2016

YEAR 1

PRACTICAL MULTIPLICATION

USE REAL OBJECTS TO DEMONSTRATE ARRAYS AND LINK TO COUNTING IN GROUPS

$$2 \times 3 = 6$$



REPEATED ADDITION

ADDING GROUPS OF COUNTERS TO UNDERSTAND NUMBER FACTS.

SKIP COUNTING IN 2s, 5s AND 10s

COUNT IN TWOS, FIVES AND TENS, FORWARDS AND BACKWARDS.

KEY VOCABULARY

MULTIPLY

MULTIPLICATION

MULTIPLE

REPEATED ADDITION

FACTOR

PRODUCT

INTEGER

PRIME NUMBER

SQUARE NUMBER

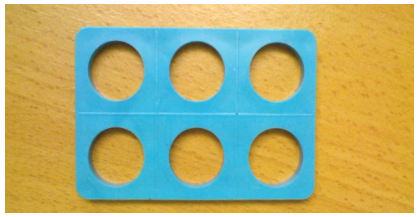
CUBE NUMBER

COMPOSITE NUMBER

IS EQUAL TO

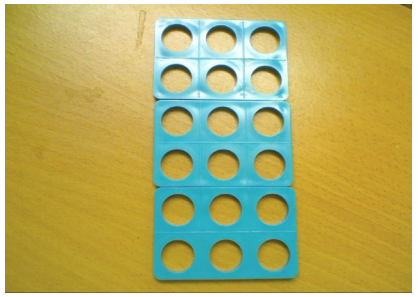
AVOID: EQUALS, TIMES BY, TIMESING

YEAR 2



ARRAYS

LINK PRIOR UNDERSTANDING OF ARRAYS TO NUMICON SHAPES. 2 X 3 = 6

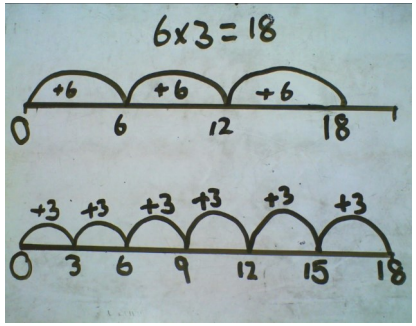


PRIOR UNDERSTANDING LINKS TO GREATER VALUES. 3 X 6 = 18

BOTH AS AN ARRAY AND MULTIPLES OF NUMICON SHAPES

NUMBER LINES

USING CUISINAIRE 3 X 6 STILL EQUALS 18!



THIS LINKS TO FILLING IN BLANK NUMBER LINES.

MULTIPLICATION TABLES

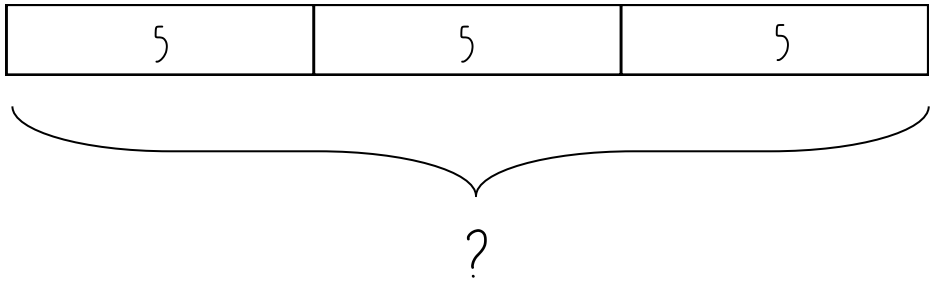
RELATE TABLES KNOWLEDGE TO DOUBLING AND HALVING

YEAR 2

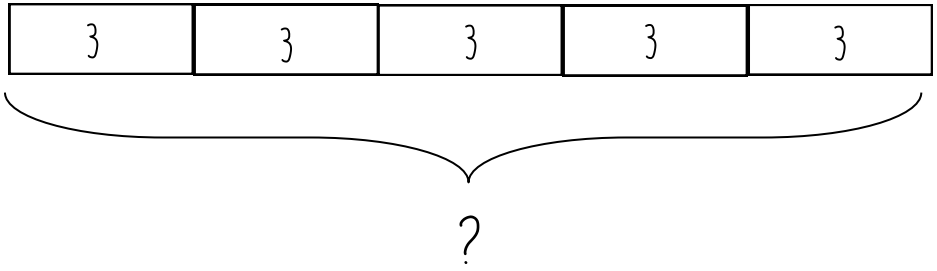
BAR MODELLING

CHILDREN ARE INTRODUCED TO MULTIPLICATION CALCULATIONS BEING REPRESENTED BY BAR MODELS. THIS SHOULD BE INTRODUCED USING A MIXTURE OF CONCRETE MANIPULATIVES, CUISENAIRE RODS, AND PICTORIAL REPRESENTATIONS.

3 X 5 = ?

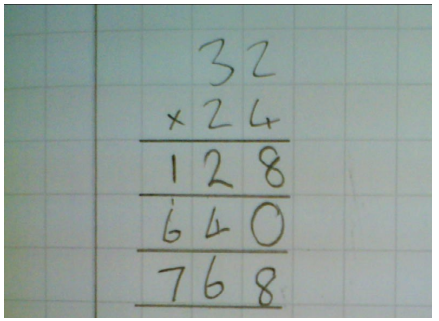


5 X 3 = ?

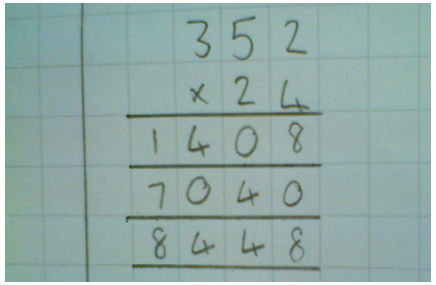


UPPER KEY STAGE

WHEN CHILDREN HAVE MASTERED SHORT MULTIPLICATION, THEY SHOULD MOVE ONTO LONG MULTIPLICATION METHODS. ONCE AGAIN, VISUAL IMAGES AND CONCRETE APPARATUS SHOULD BE USED TO SUPPORT UNDERSTANDING AS REQUIRED.



FORMAL LONG MULTIPLICATION METHOD



MOVING ONTO GREATER VALUES

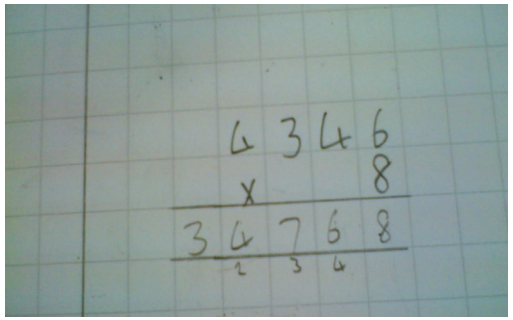
ONCE THESE TECHNIQUES HAVE BEEN MASTERED CHILDREN WILL APPLY THEIR UNDERSTANDING IN A RANGE OF PROBLEM SOLVING CONTEXTS, INCLUDING MASTERY QUESTIONS WITH PROMOTE HIGHER ORDER THINKING SKILLS.

MULTIPLICATION TABLES

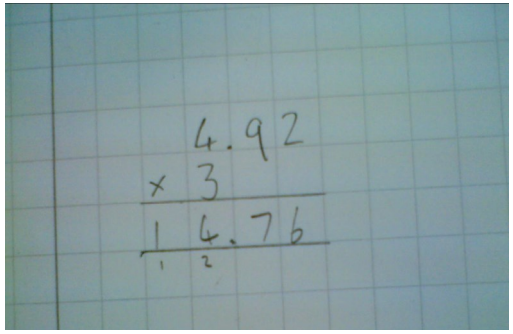
WORK ON ALL TABLES MUST CONTINUE THROUGHOUT, REGULARLY, TO SUPPORT UNDERSTANDING OF THESE METHODS.

UPPER KEY STAGE

SHORT MULTIPLICATION WILL BE CONSOLIDATED ALONGSIDE THE USE OF VISUAL APPARATUS TO SUPPORT UNDERSTANDING.



LARGER VALUES

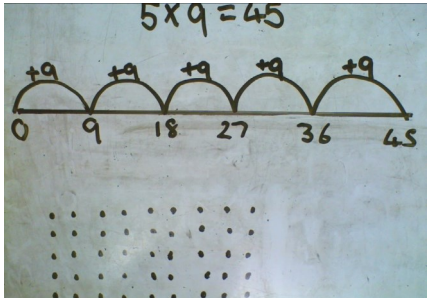


DECIMALS, WITH AN EMPHASIS ON MONEY.

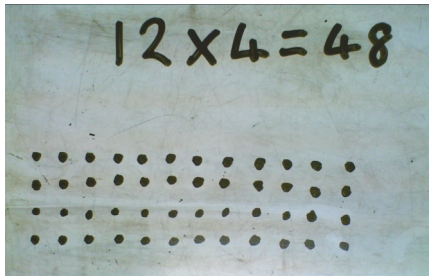
ONCE THESE TECHNIQUES HAVE BEEN MASTERED CHILDREN WILL APPLY THEIR UNDERSTANDING IN A RANGE OF PROBLEM SOLVING CONTEXTS, INCLUDING MASTERY QUESTIONS WITH PROMOTE HIGHER ORDER THINKING SKILLS.

LOWER KEY STAGE 2

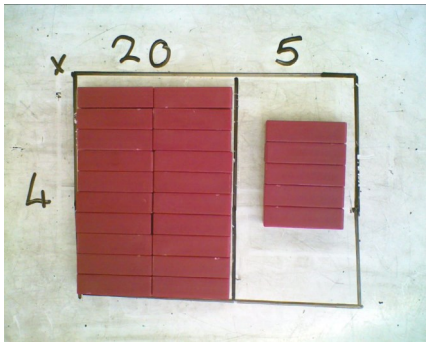
NUMBER LINES AND ARRAYS BUILD ON PREVIOUS LEARNING, HELPING WITH THE TRANSITION TO MORE FORMAL RECORDING. BAR MODELLING METHODS AND OTHER PICTORIAL REPRESENTATIONS SUPPORT DEEPER MATHEMATICAL UNDERSTANDING THROUGHOUT LKS2.



ONE DIGIT BY ONE DIGIT, BOTH AS AN ARRAY AND A NUMBER LINE.



TWO DIGITS BY ONE DIGIT AS AN ARRAY



REINFORCE THROUGH USE OF A GRID. THIS IS NOT A PARTICULARLY QUICK CALCULATION METHOD, BUT IS A USEFUL MODEL FOR UNDERSTANDING MORE FORMAL METHODS

LOWER KEY STAGE 2

USE OF GRIDS TO DEMONSTRATE MULTIPLICATION MAY BE OF USE. IT IS NOT A QUICK OR EFFICIENT METHOD, HOWEVER IT CAN BE BENEFICIAL IN HELPING CHILDREN TO CONCEPTUALISE MULTIPLICATION OF LARGER NUMBERS.

×	10	4
3	30	12

×	10	4
3	30	12

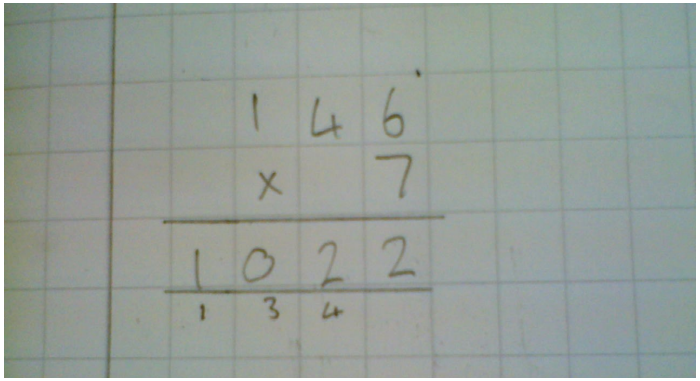
14 × 3 = 42

×	40	5
3		

USING CONCRETE MANIPULATIVES AND LATER MOVING TO USING IMAGES THAT REPRESENT THEM, SUPPORTS PUPILS' EARLY UNDERSTANDING, LEADING TOWARDS FORMAL WRITTEN METHODS IN YEAR 4. THIS IS A MENTAL STRATEGY, WHICH THEY MAY CHOOSE TO SUPPORT WITH INFORMAL JOTTINGS, INCLUDING A FULL GRID, AS EXEMPLIFIED HERE.

LOWER KEY STAGE 2

CHILDREN SHOULD BE MOVED ONTO SHORT MULTIPLICATION AS SOON AS POSSIBLE.



<u>MULTIPLICATION TABLES</u>

3,4 AND 8 TIMES TABLES MODELLED USING ARRAYS AND DOUBLING KNOWN FACTS WITH EMPHASIS ON RAPID RECALL.

6, 12, 9, 11 AND 7 FOLLOW THROUGH ARRAYS, RHYME AND SONG.