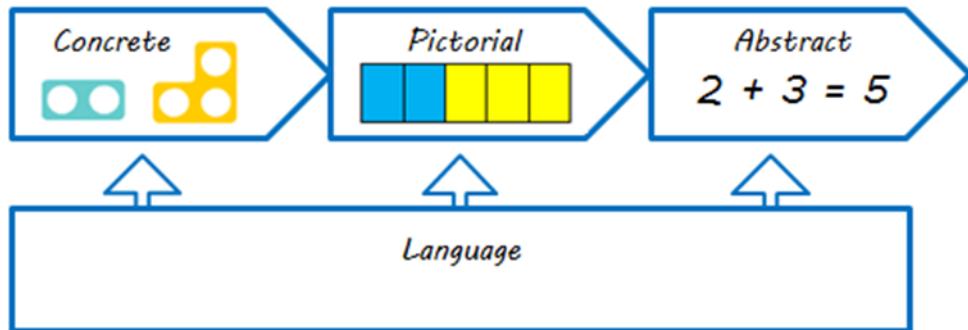


# RATIONALE

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.



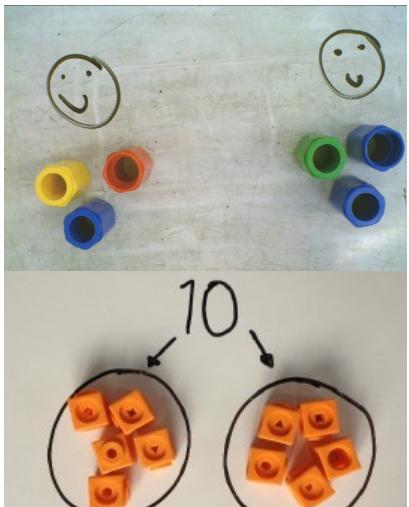
## MALIN BRIDGE PRIMARY SCHOOL

### CALCULATION GUIDE

## DIVISION

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

# YEAR 1



## PRACTICAL DIVISION

### SHARING

EG. TWO FRIENDS SHARE SIX SWEETS, HOW MANY DOES EACH GET?



### GROUPING COUNTERS

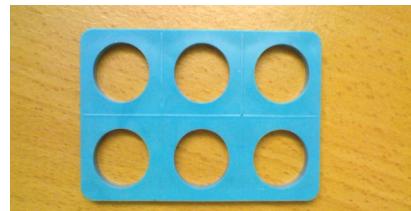
ALL THESE METHODS CAN BE USED TO SHOW THAT:

$$6 \div 2 = 3$$

$$6 \div 3 = 2$$

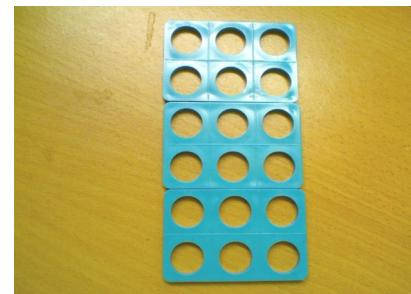


# YEAR 2



## ARRAYS

LINK PRIOR UNDERSTANDING OF ARRAYS TO NUMICON SHAPES.



$$6 \div 3 = 2$$

PRIOR UNDERSTANDING LINKS TO GREATER VALUES.

$$18 \div 6 = 3$$

BOTH AS AN ARRAY AND MULTIPLES OF NUMICON SHAPES



## REPEATED SUBTRACTION

USING COUNTING BEADS.

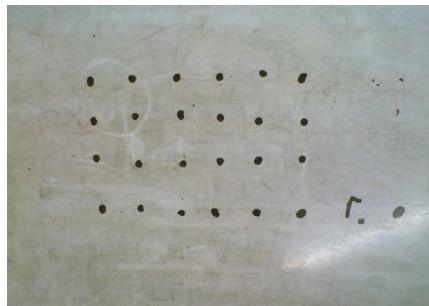
$$15 \div 3 = 5$$

## MULTIPLICATION TABLES

RELATE TABLES KNOWLEDGE BY COUNTING BACK. HOW MANY TWOS IN TWENTY?

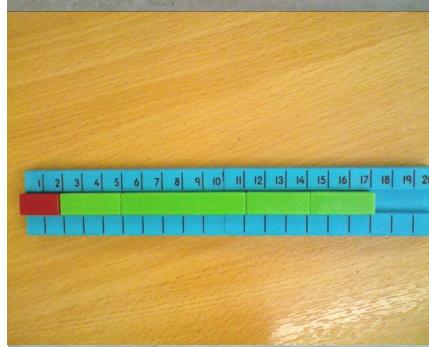
# LOWER KEY STAGE 2

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.



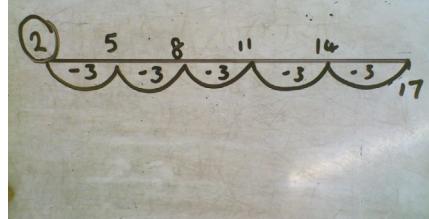
TWO DIGITS BY ONE DIGIT AS AN ARRAY

$$24 \div 4 = 6 \text{ R. } 1$$



CUISINAIRE CAN SUPPORT THE NEXT STEP.

$$17 \div 3 = 5 \text{ R. } 2$$



COUNTING BACK ON A BLANK NUMBER LINE.

## KEY VOCABULARY

DIVIDE

IS EQUAL TO

SHARE

INVERSE

DIVIDE EQUALLY

GROUPS OF

DIVISION

DIVIDEND

AVOID: EQUALS, TIMES BY,  
TIMESING

DIVISOR

QUOTIENT

DIVISIBLE BY

INTEGER

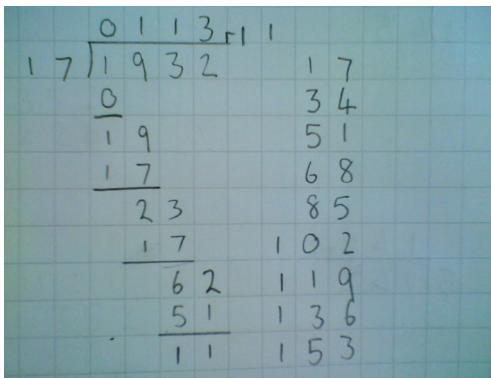
REMAINDERS

FRACTIONS

DECIMALS

# UPPER KEY STAGE

WHEN CHILDREN HAVE MASTERED SHORT DIVISION, THEY SHOULD MOVE ONTO LONG DIVISION METHODS.

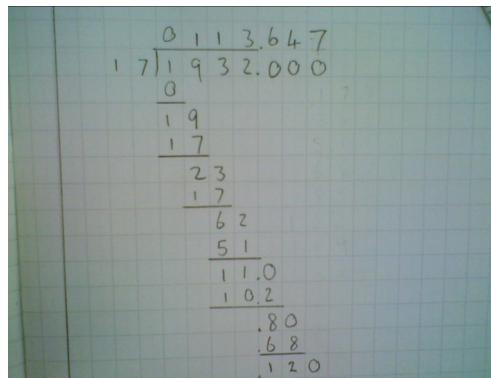


Handwritten long division of 1932 by 17. The quotient is 113 with a remainder of 11. The divisor 17 is written above the dividend 1932. The quotient 113 is written above the remainder 11. The remainders 11 and 11 are written vertically to the right of the dividend.

$$\begin{array}{r} 0\ 1\ 1\ 3\ r1\ 1 \\ 17\overline{)1\ 9\ 3\ 2} \quad 1\ 7 \\ 0 \\ \hline 1\ 9 \\ 1\ 7 \\ \hline 2\ 3 \\ 1\ 7 \\ \hline 6\ 2 \\ 5\ 1 \\ \hline 1\ 1 \end{array}$$
$$\begin{array}{r} 1\ 9\ 3\ 2 \\ 1\ 7 \\ \hline 2\ 3 \\ 1\ 7 \\ \hline 6\ 2 \\ 5\ 1 \\ \hline 1\ 1 \end{array}$$
$$\begin{array}{r} 1\ 9\ 3\ 2 \\ 1\ 7 \\ \hline 2\ 3 \\ 1\ 7 \\ \hline 6\ 2 \\ 5\ 1 \\ \hline 1\ 1 \end{array}$$

FORMAL LONG DIVISION.

COPY OUT THE MULTIPLES OF THE DIVISOR FIRST, TO HELP PREVENT MISTAKES.



Handwritten long division of 1932 by 17. The quotient is 113.647 with a remainder of 120. The divisor 17 is written above the dividend 1932.000. The quotient 113.647 is written above the remainder 120. The remainders 120 and 120 are written vertically to the right of the dividend.

$$\begin{array}{r} 0\ 1\ 1\ 3.647 \\ 17\overline{)1\ 9\ 3\ 2.000} \quad 1\ 7 \\ 0 \\ \hline 1\ 9 \\ 1\ 7 \\ \hline 2\ 3 \\ 1\ 7 \\ \hline 6\ 2 \\ 5\ 1 \\ \hline 1\ 1.0 \\ 1\ 0.2 \\ \hline .80 \\ .68 \\ \hline 1\ 20 \end{array}$$
$$\begin{array}{r} 1\ 9\ 3\ 2.000 \\ 1\ 7 \\ \hline 2\ 3 \\ 1\ 7 \\ \hline 6\ 2 \\ 5\ 1 \\ \hline 1\ 1.0 \\ 1\ 0.2 \\ \hline .80 \\ .68 \\ \hline 1\ 20 \end{array}$$
$$\begin{array}{r} 1\ 9\ 3\ 2.000 \\ 1\ 7 \\ \hline 2\ 3 \\ 1\ 7 \\ \hline 6\ 2 \\ 5\ 1 \\ \hline 1\ 1.0 \\ 1\ 0.2 \\ \hline .80 \\ .68 \\ \hline 1\ 20 \end{array}$$

ONCE AGAIN, REMAINDERS CAN BE EXPRESSED AS FRACTIONS OR DECIMALS.

## MULTIPLICATION TABLES

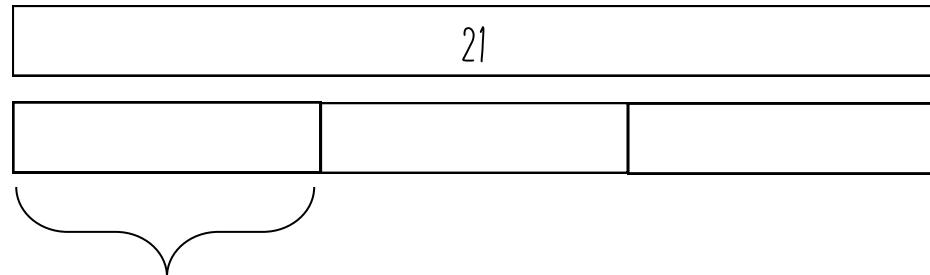
WORK ON ALL TABLES MUST CONTINUE REGULARLY THROUGHOUT, TO SUPPORT UNDERSTANDING OF THESE METHODS.

# LOWER KEY STAGE 2

## BAR MODELLING

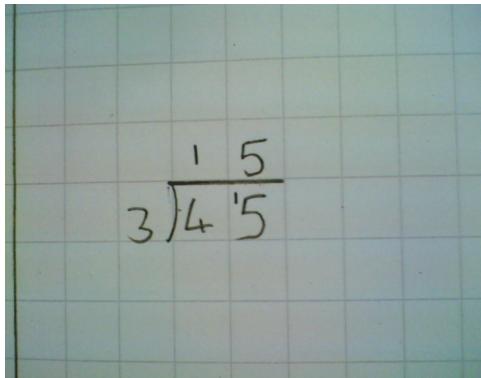
CHILDREN ARE INTRODUCED TO DIVISION CALCULATIONS BEING REPRESENTED BY BAR MODELS. THIS SHOULD BE INTRODUCED USING A MIXTURE OF CONCRETE MANIPULATIVES, CUISENAIRE RODS, AND PICTORIAL REPRESENTATIONS.

$$21 \div 3 = ?$$



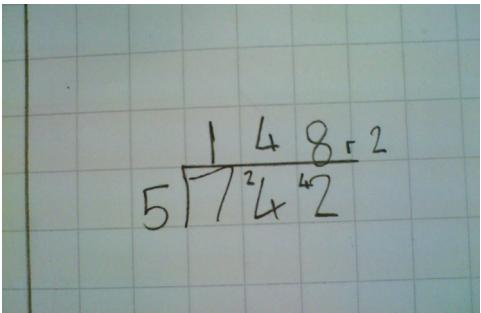
# LOWER KEY STAGE 2

NUMBER LINES AND ARRAYS SHOULD BE USED UNTIL CHILDREN ARE CONFIDENT WITH THE CONCEPT. ONLY THEN SHOULD THEY BE INTRODUCED TO SHORT DIVISION.



Handwritten short division for 45 ÷ 3. The divisor 3 is written above the dividend 45. The quotient 15 is written above the division bar. The remainder 0 is not explicitly shown.

TWO DIGITS BY ONE DIGIT



Handwritten short division for 42 ÷ 5. The divisor 5 is written above the dividend 42. The quotient 14 is written above the division bar. The remainder 2 is written to the right of the division bar.

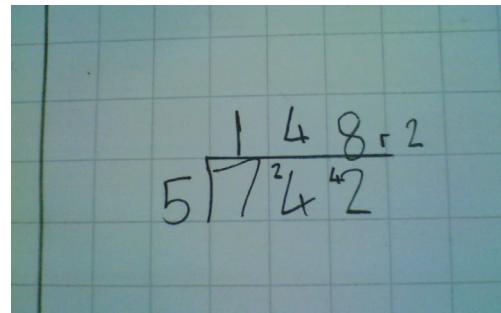
THREE DIGITS BY ONE DIGIT WITH REMAINDERS.

## MULTIPLICATION TABLES

TABLES FACTS NEED CONSTANT PRACTICE TO ENABLE SUCCESS IN THESE METHODS.

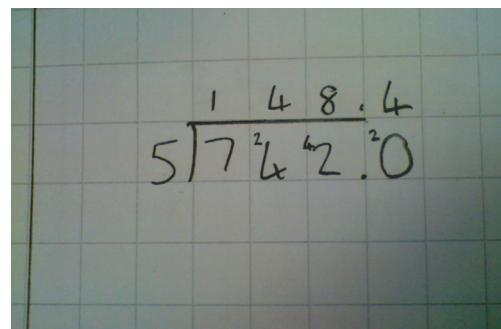
# UPPER KEY STAGE

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



Handwritten short division for 42 ÷ 5. The divisor 5 is written above the dividend 42. The quotient 14 is written above the division bar. The remainder 2 is written to the right of the division bar, with a fraction line and 'r' written above it, indicating the remainder is 2/5.

EXPRESSING REMAINDERS AS FRACTIONS.



Handwritten short division for 42 ÷ 5. The divisor 5 is written above the dividend 42. The quotient 14 is written above the division bar. The remainder 2 is written to the right of the division bar, with a decimal point and '0' written below it, indicating the remainder is 0.4.

EXPRESSING REMAINDERS AS DECIMALS.

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