Green Ridge Primary Academy
Maths Mastery

REAch2 ACADEMY TRUST

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What is Maths Mastery?

- Maths mastery is a teaching and learning approach that aims for pupils to develop deep understanding of maths rather than being able to memorise key procedures or resort to rote learning.
- The end goal and expectation is for all pupils (with very limited exceptions) to have acquired the fundamental facts and concepts of maths for their year or key stage such that by the end of it they have achieved mastery in the maths they have been taught. At this point they are ready to move confidently on to their next stage of maths.

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Maths Mastery

- Developing a deep understanding of maths requires careful and systematic progress through various stages within each mathematical topic.
- These are:
  - Concrete – using physical resources to help ‘feel’ the maths.
  - Pictorial – using pictures, diagrams or other representations to ‘see’ the maths.
  - Abstract – using the numerals and written methods to complete maths problems and calculations.

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Concrete resources

- Resources we use include:

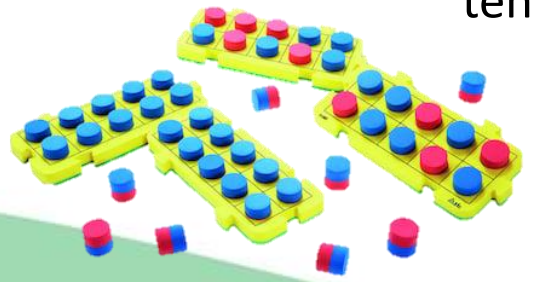
Numicon

Base 10

counters

place value counters

cubes



tens frames

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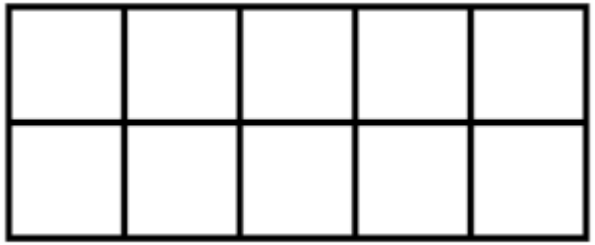
Pictorial resources



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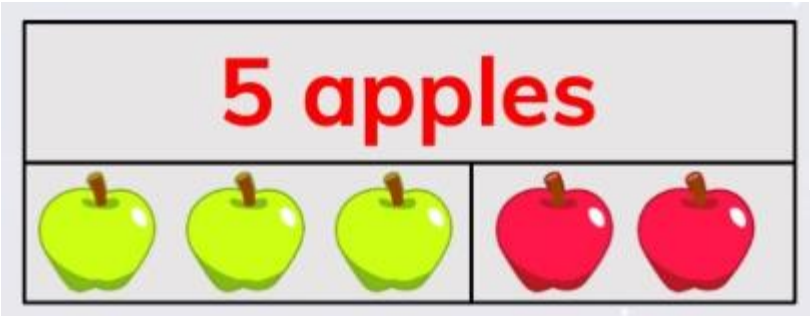
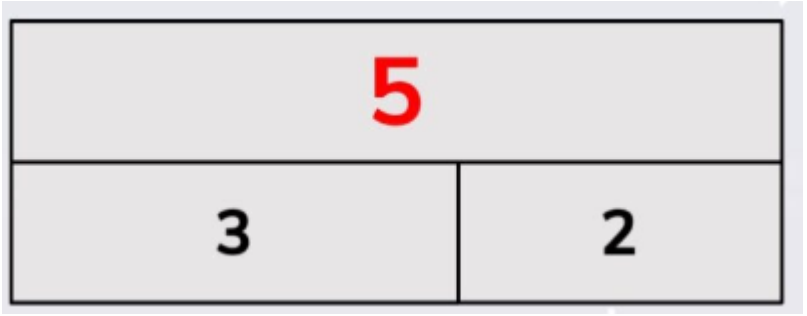
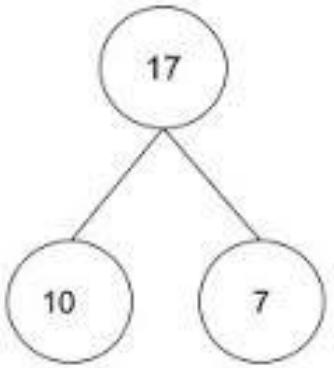
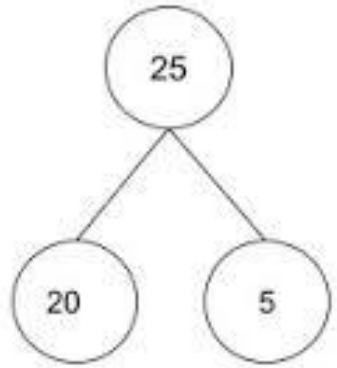


bar models







Part-whole models

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Number and place value

- Understanding of number and place value is vital for an understanding of maths.
- First steps include counting, 1-to-1 correspondence with counting physical objects, recognising more/less.
- Composition of number is important – 5 is made of 4 and 1, 2 and 3
- This moves on to recognising the numeral and matching this to the number of objects counted (up to 10)
- 10 and beyond introduces a new layer of place value understanding, place value columns can be introduced.
- Identifying that 10 ones make 1 ten, 10 tens make 1 hundred, etc.

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Addition

- Combining 2 or more parts to make a whole – starting with physical objects like cubes.
- Use of = to show equivalence between the parts and the whole,
- Partitioning – breaking numbers into their parts to allow them to be added more easily.
  - Bridging 10
  - Adding numbers larger than 10
- Finding missing parts
- Commutative

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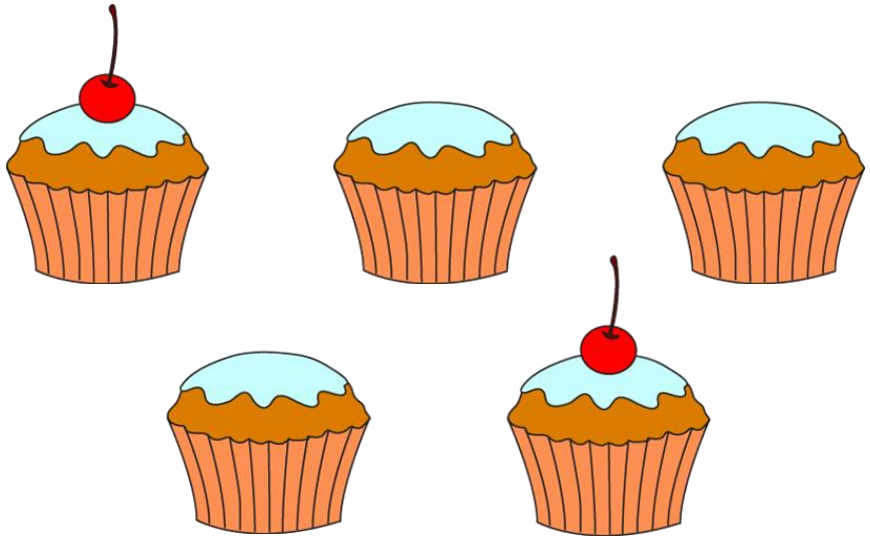

3 = 2 = 3

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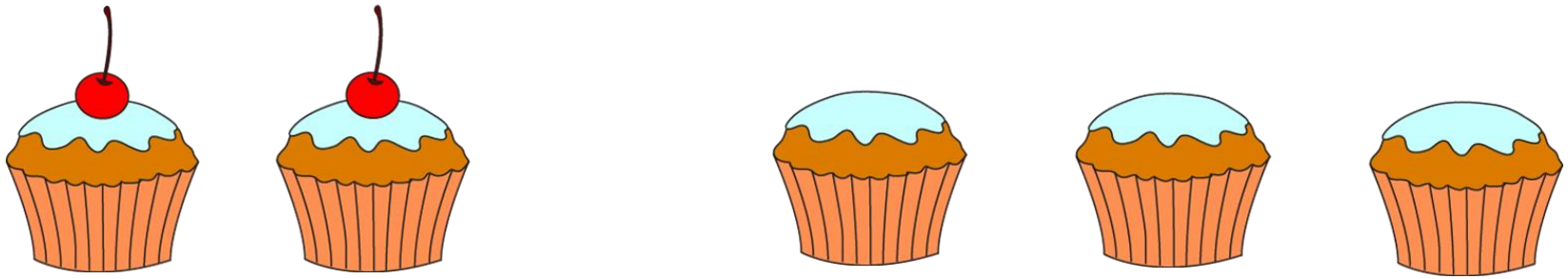

5 = 3 + 2

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$2 + 3 = 5$

$5 = 2 + 3$

$3 + 2 = 5$

$5 = 3 = 2$

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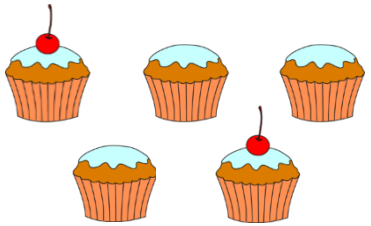

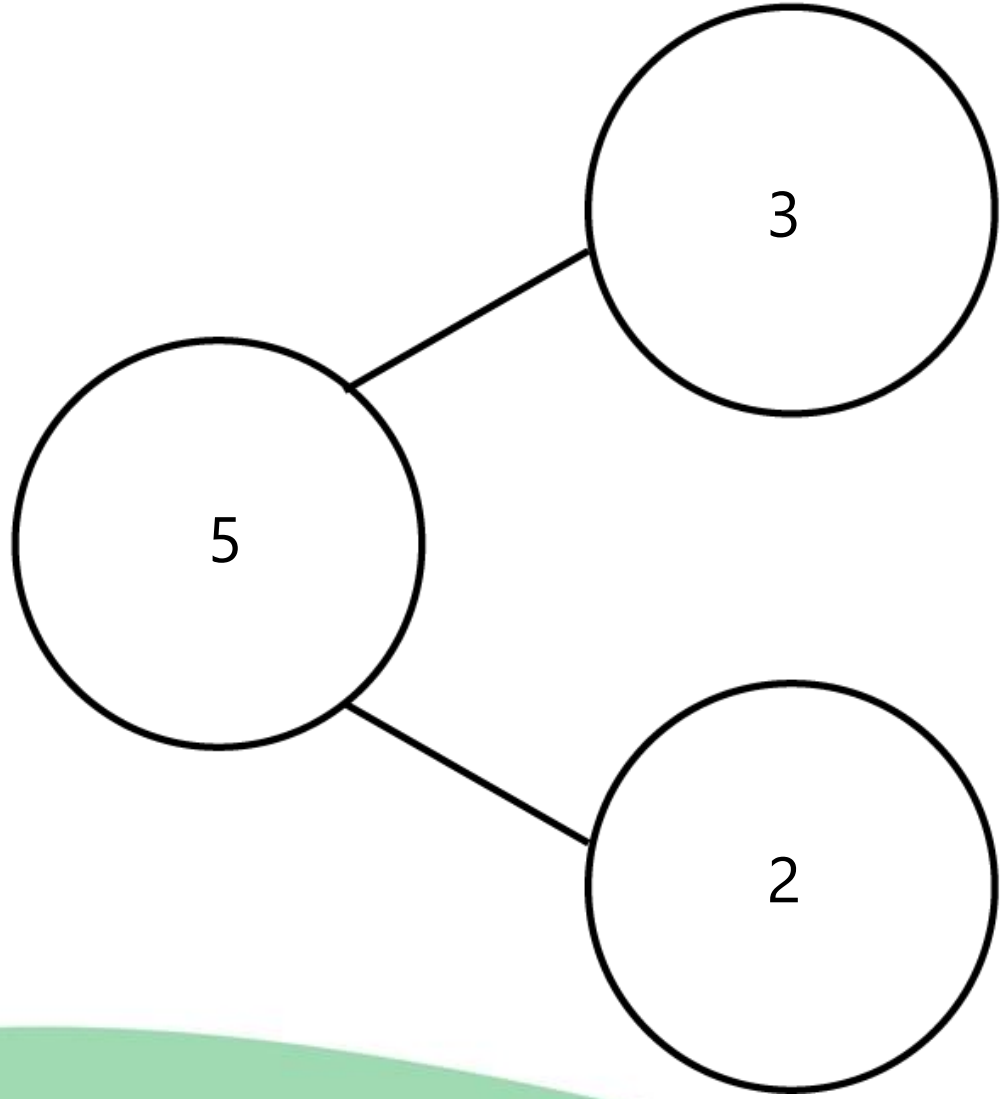

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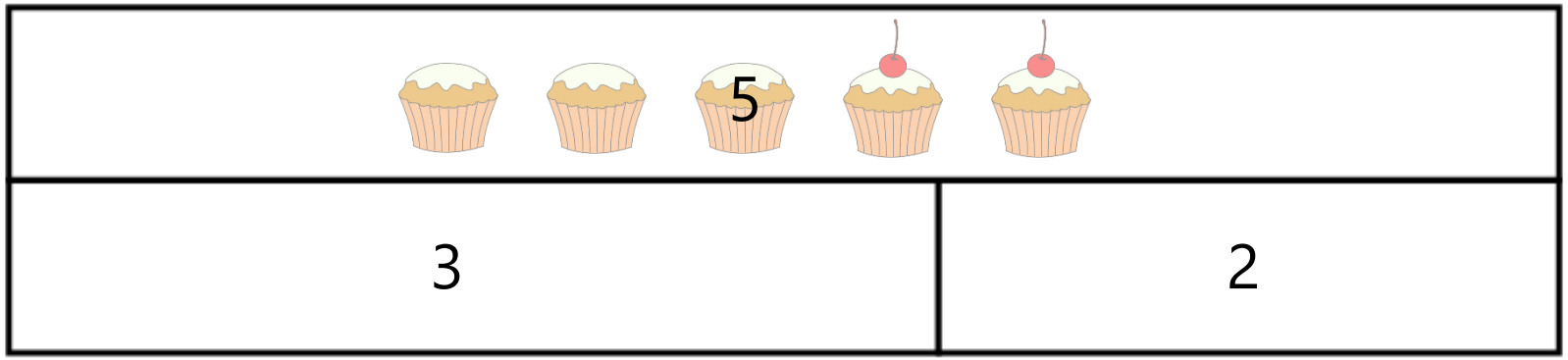

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Subtraction

- Follows the same structure as addition:
- Taking from a whole – using physical objects like cubes.
- Use of – and = to show equivalence between the parts and the whole
- Partitioning – using part-whole or bar models
  - Bridging 10
- Finding missing parts

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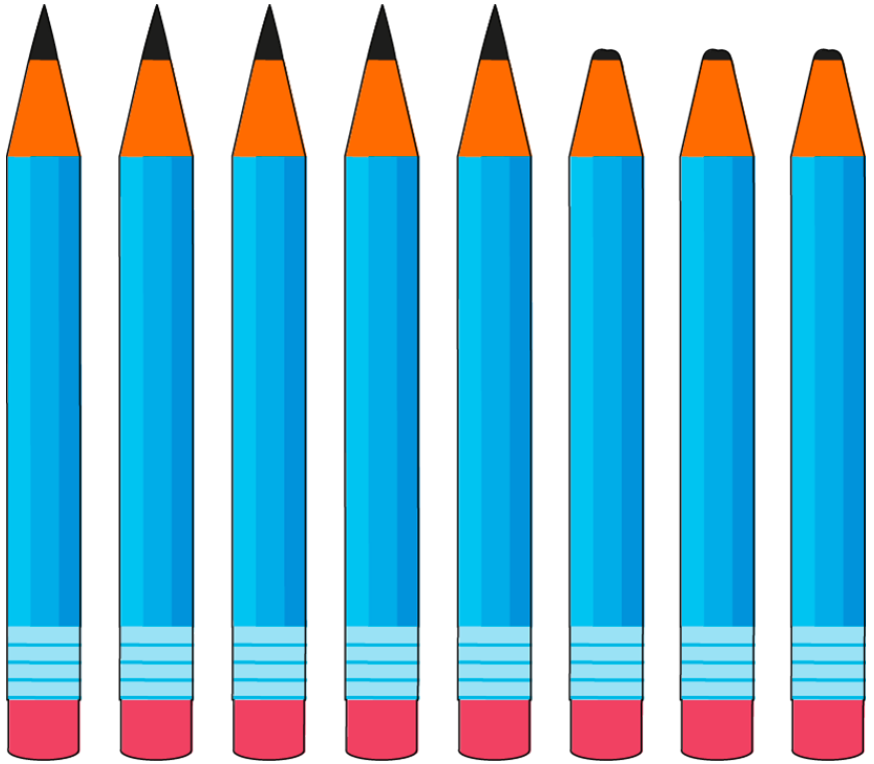

5 3

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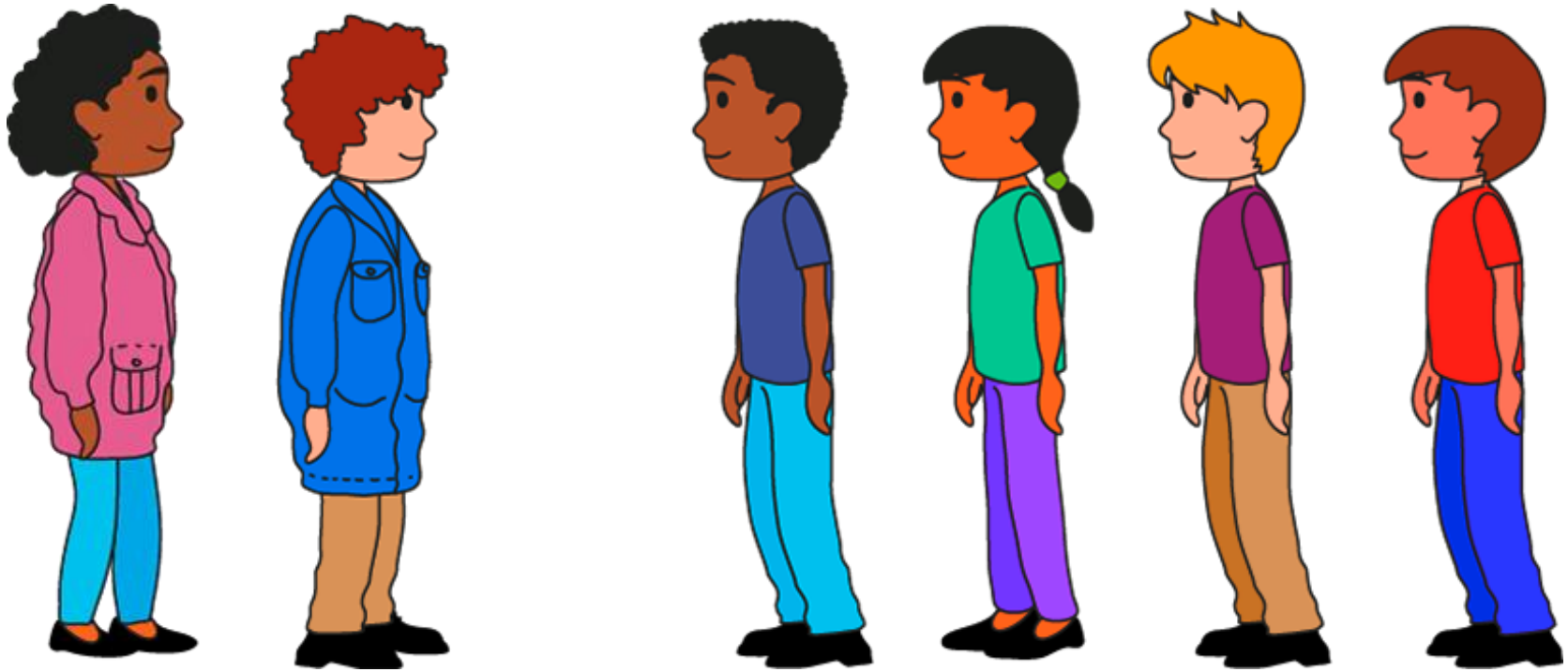

6 – 2 = 4

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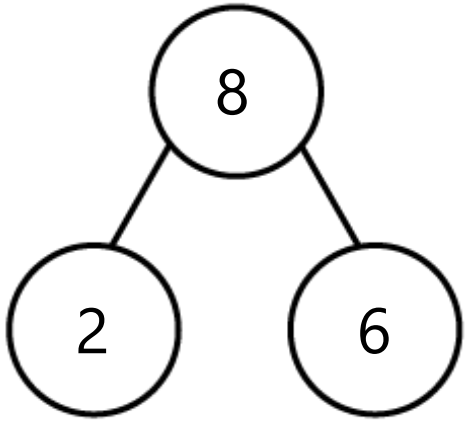

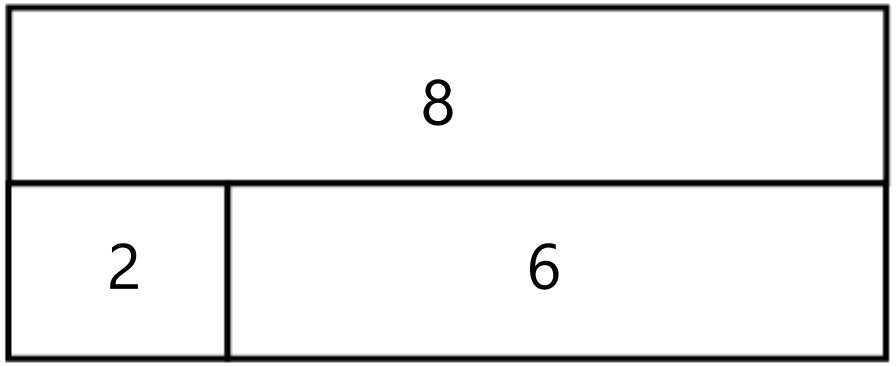

8 – 2 = 6

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Subtraction

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Multiplication

- Multiplication begins in Year 1 with being able to count in 2s. This is important when starting to understand coins have different values – 2p is worth two 1p coins.
- Developing an understanding of what is the same and what is different – multiplication is groups of the same size.
- Using equipment to make equal groups of focus times table. Counting in groups of … (unitising).
- Repeated addition

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Multiplication focus

- Year 2 – 2, 5, 10 times tables, doubling and halving.
- Year 3 – 2, 4, 8 (relationship between them), 3, 6, 9 (relationship), 7
- Year 4 – 11 and 12. Consolidation of all tables, MTC at the end of the year
- Year 5 and 6 – application of times tables, starting to use formal written methods.

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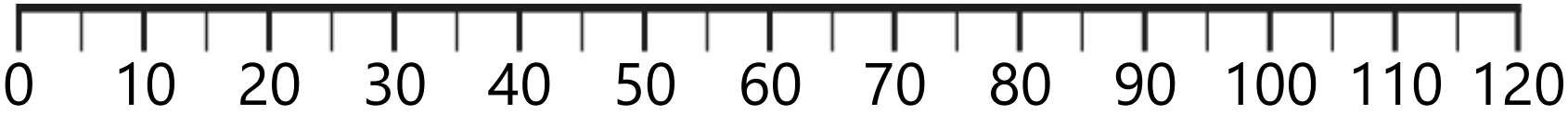

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1000	2000	3000	4000	5000	6000	7000	8000	9000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9

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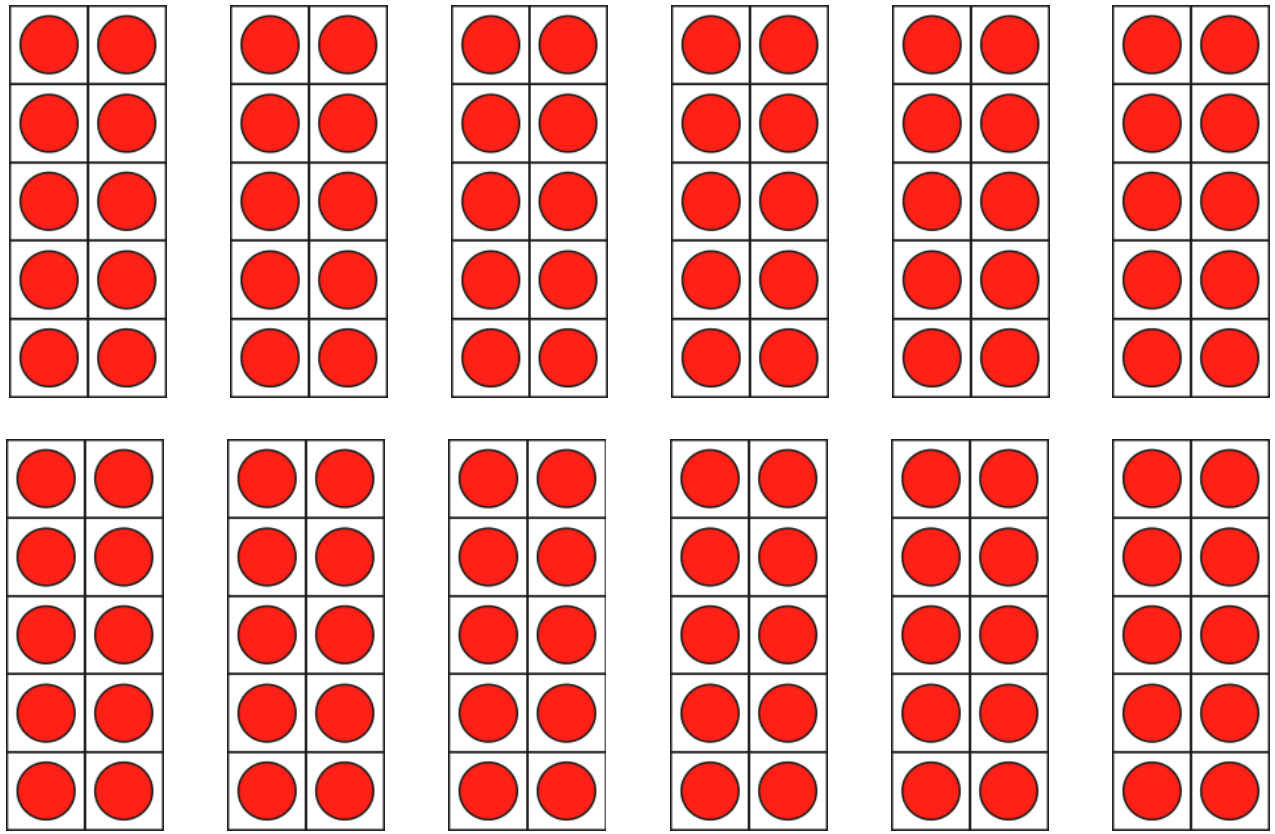

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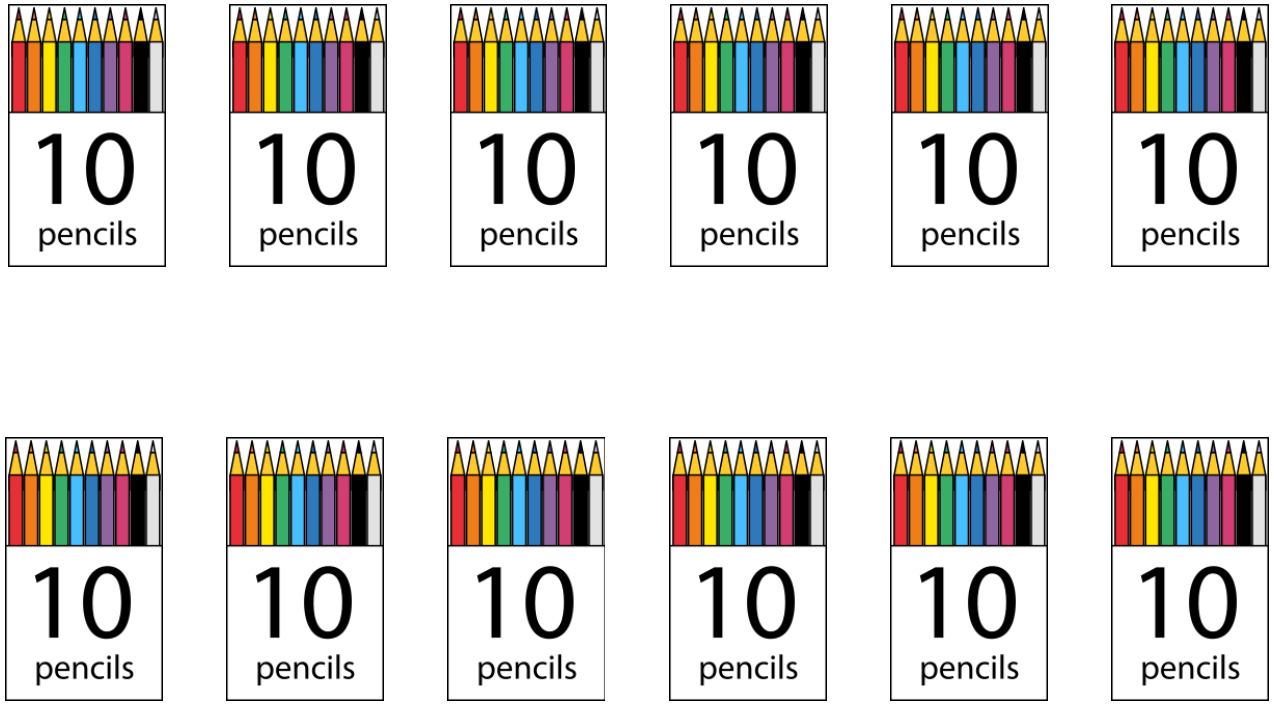

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ten

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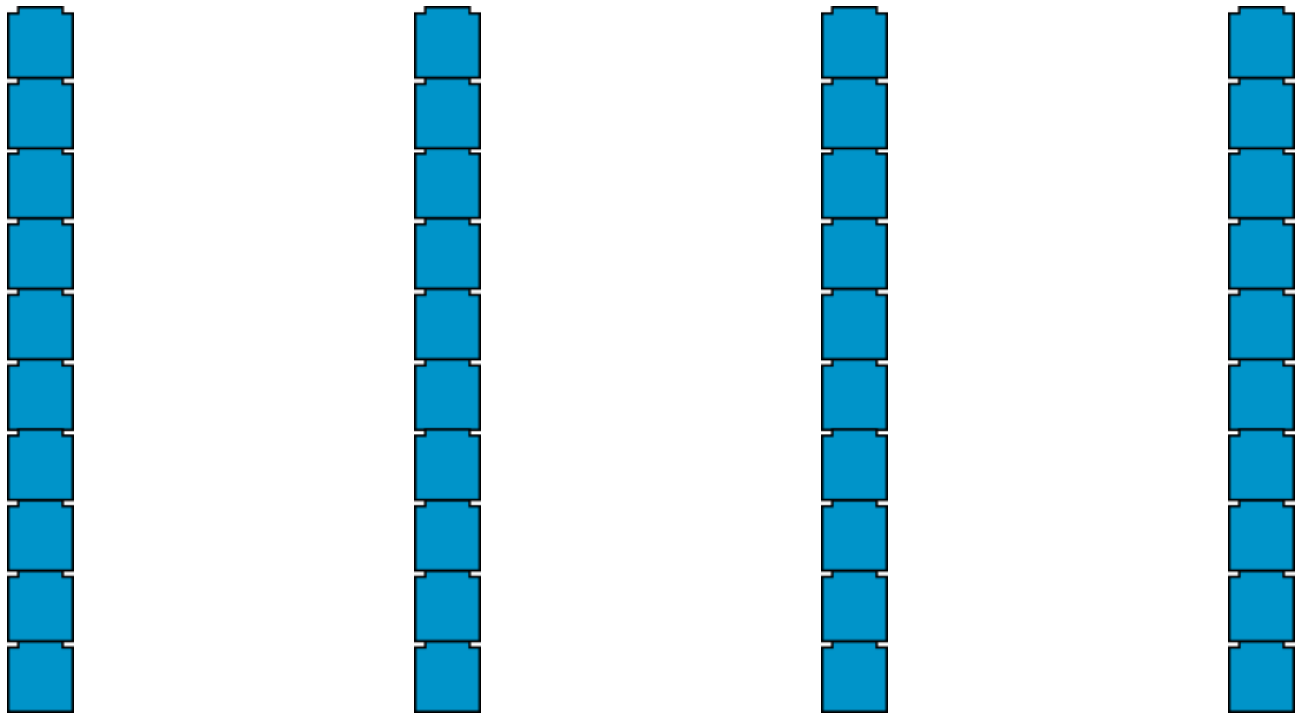

10 20 30 40

ten twenty thirty forty

$4 \times 10 = 40$

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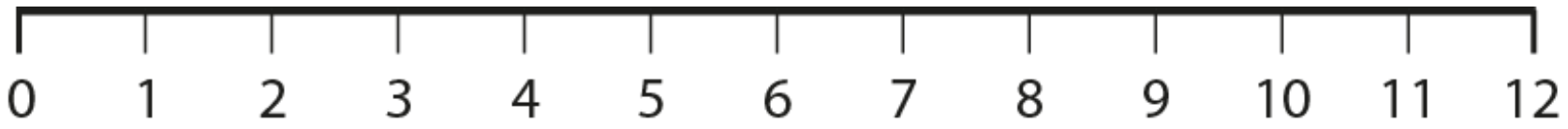

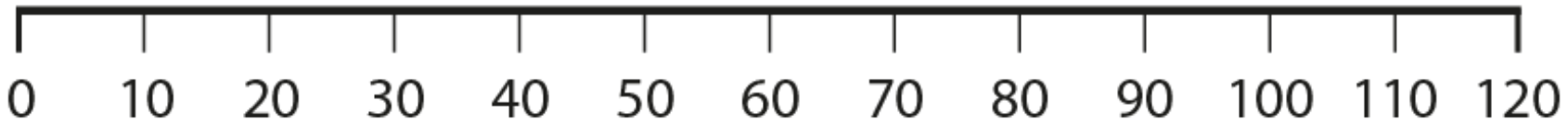

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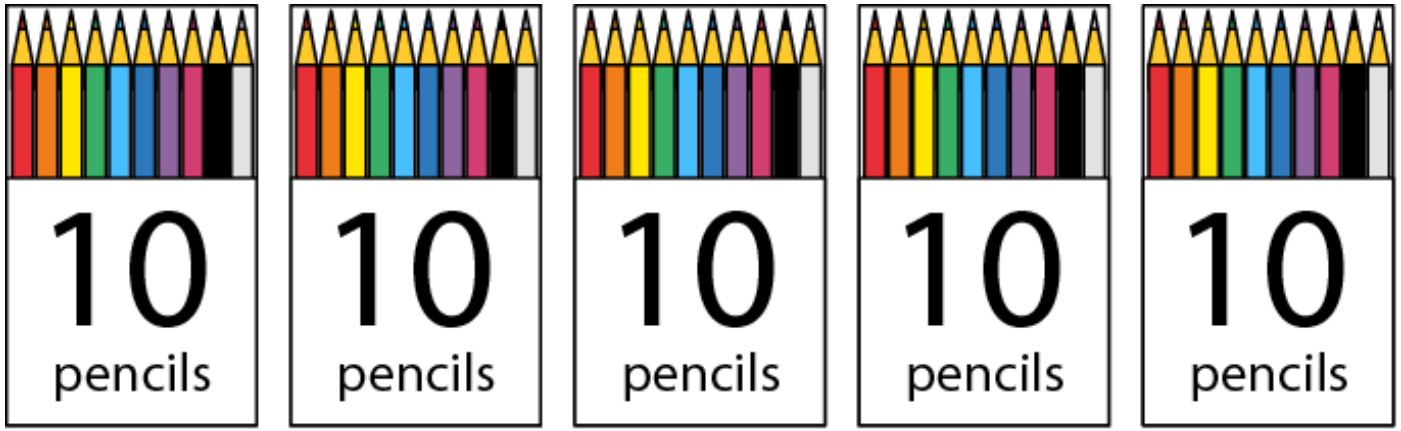

$\boxed{5} \times 10 = \boxed{50}$ $10 \times \boxed{5} = \boxed{50}$

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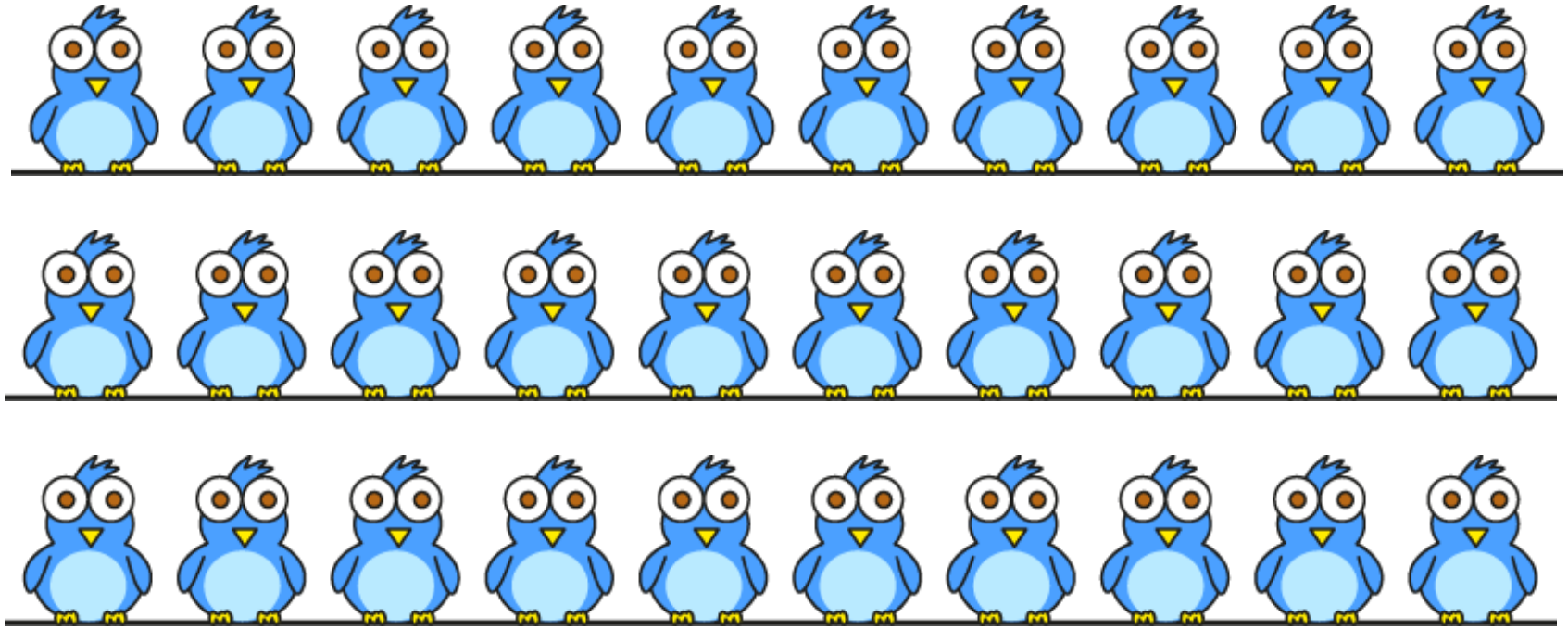
There are 10 birds on each wire.
Altogether there are 30 birds. How many wires are there?



$\boxed{3} \times 10 = 30$

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Division

- Division follows Multiplication.
- Division can be **sharing into** and **sharing between**
  - Sharing into groups of 2
  - Sharing between 2 groups
- Division can include a remainder – this is when the groups are made equal, but some pieces cannot be included.
- Dividing practically can lead to and support written methods.
- Understanding of partitioning and place value are incredibly important for division.

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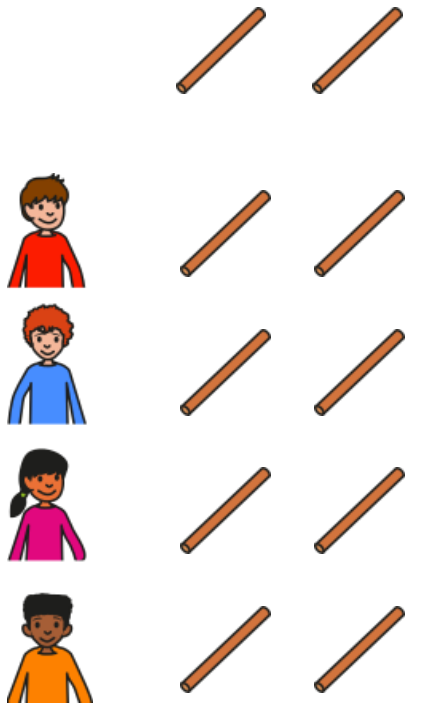
8 sticks shared equally between 4 children.
How many sticks each?



4 4

4 4

8 ÷ 4 = 2

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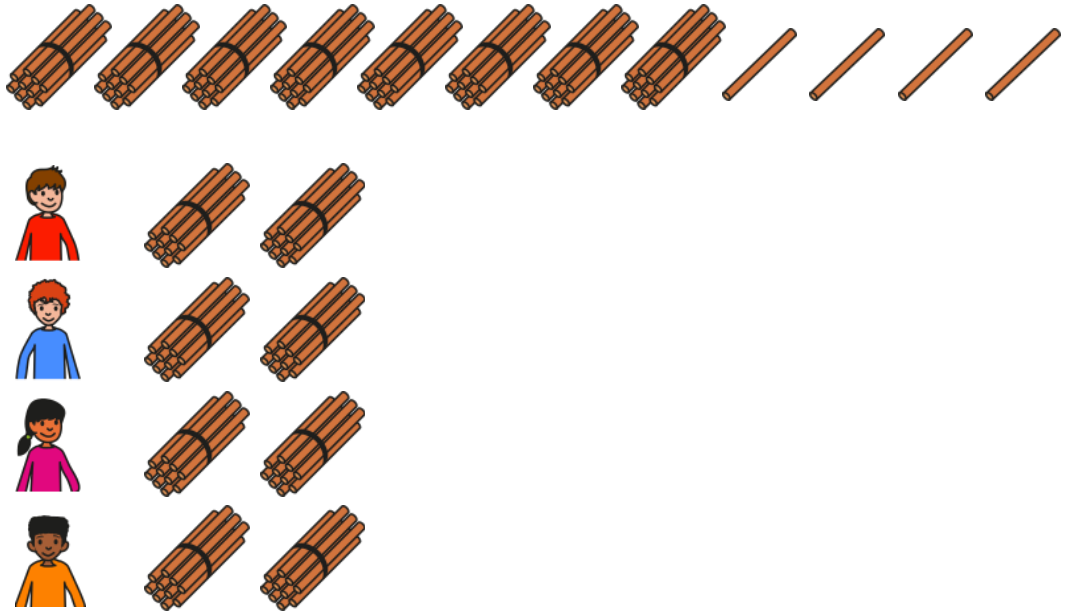
84 sticks shared equally between 4 children. How many sticks each?

$84 \div 4 = \square$



8 tens ÷ 4 = 2 tens

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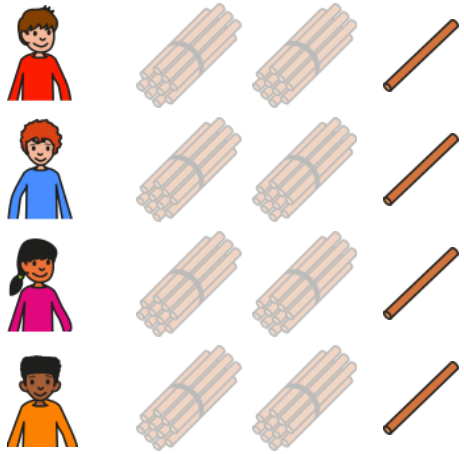
84 sticks shared equally between 4 children. How many sticks each?

$84 \div 4 = \square$



8 tens ÷ 4 = 2 tens

4 ones ÷ 4 = 1 one

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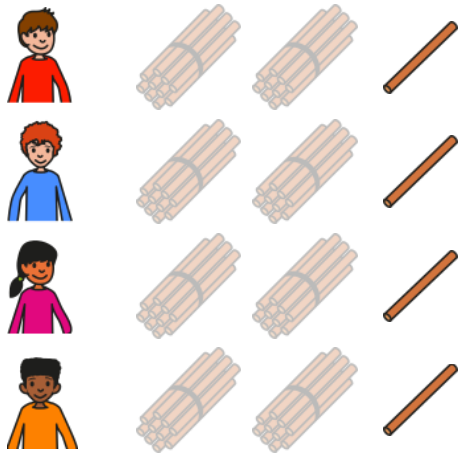
84 sticks shared equally between 4 children. How many sticks each?

$$84 \div 4 = \boxed{21}$$



8 tens ÷ 4 = 2 tens

4 ones ÷ 4 = 1 one

84 ÷ 4 = 21

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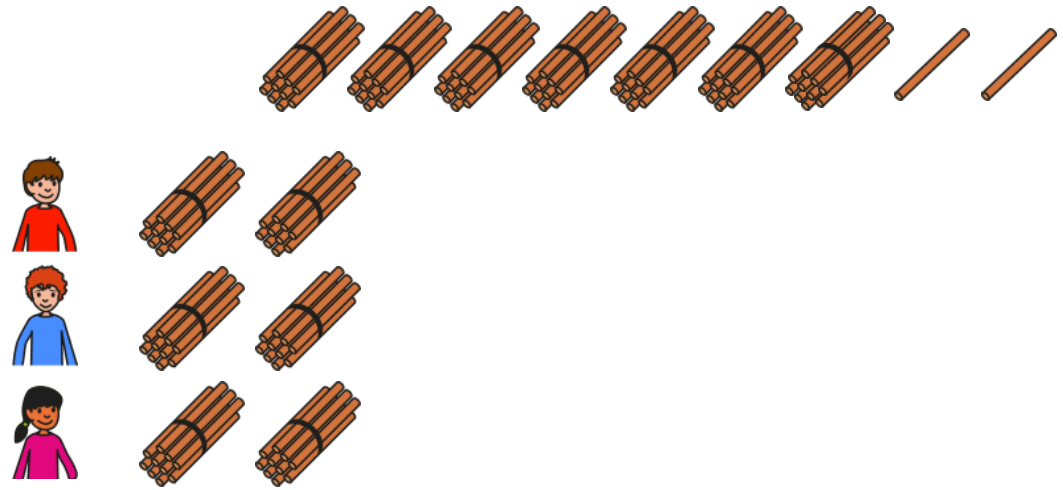
72 sticks shared equally between 3 children. How many sticks each?

$$72 \div 3 = \square$$



7 tens ÷ 3 = 2 tens r 1 ten

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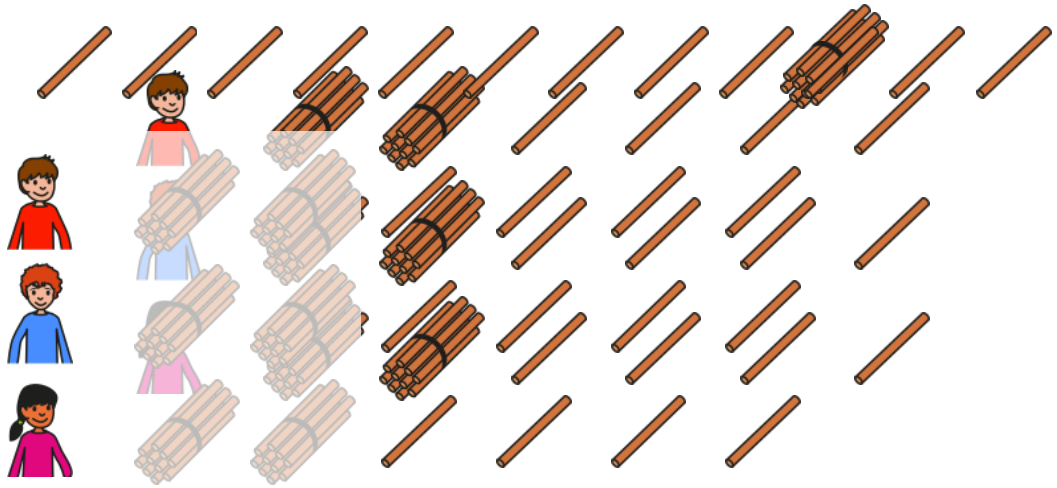
72 sticks shared equally between 3 children. How many sticks each?

$$72 \div 3 = \square$$



7 tens ÷ 3 = 2 tens r 1 ten

12 ones ÷ 3 = 4 ones

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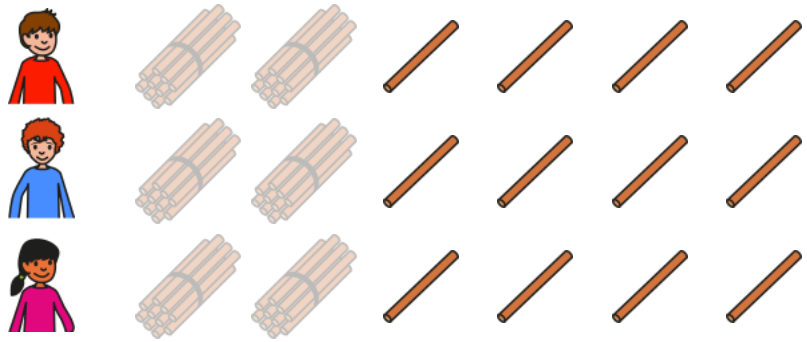
72 sticks shared equally between 3 children. How many sticks each?

$72 \div 3 = \boxed{24}$



6 tens 7 tens ÷ 3 = 2 tens r 1 ten 2 tens

12 ones 12 ones ÷ 3 = 4 ones 4 ones

72	÷	3	=	24

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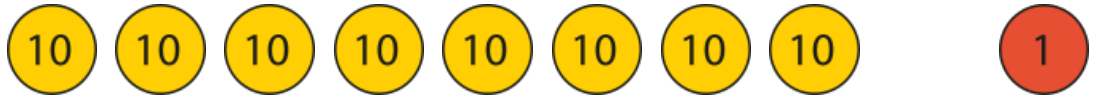
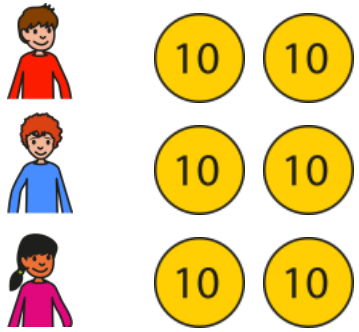
81 marbles shared equally between 3 children. How many marbles each?

$$81 \div 3 = \square$$





8 tens ÷ 3 = 2 tens r 2 tens

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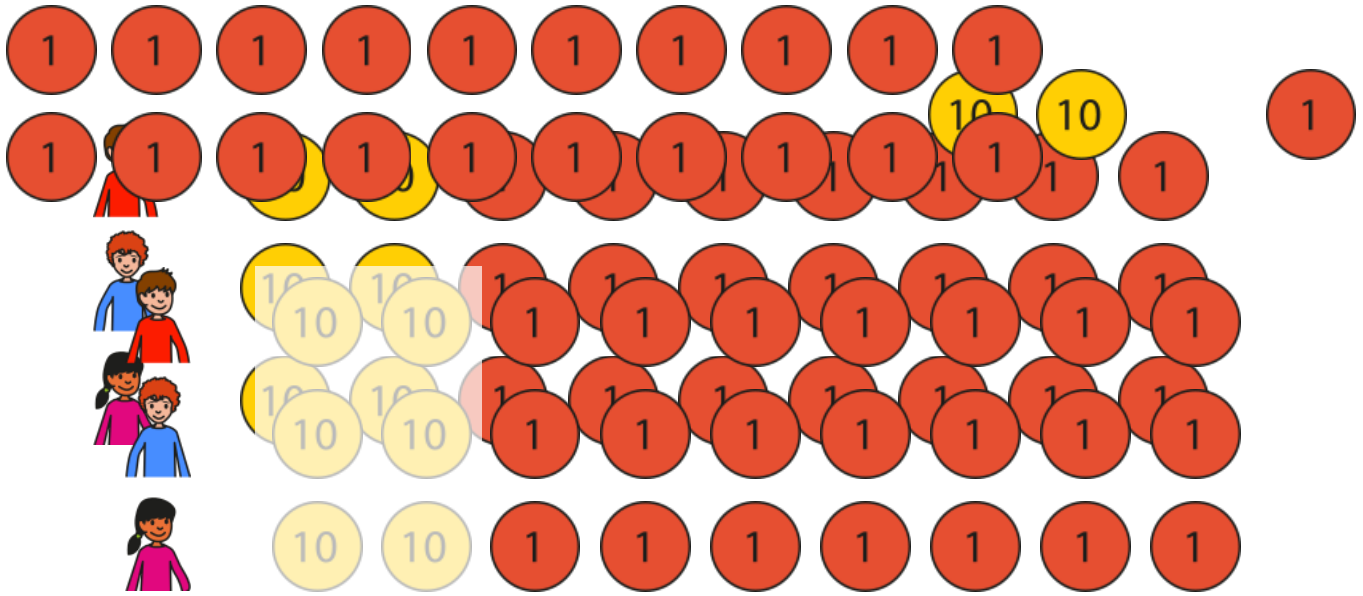
81 marbles shared equally between 3 children. How many marbles each?

$$81 \div 3 = \square$$



8 tens ÷ 3 = 2 tens r 2 tens

21 ones ÷ 3 = 7 ones

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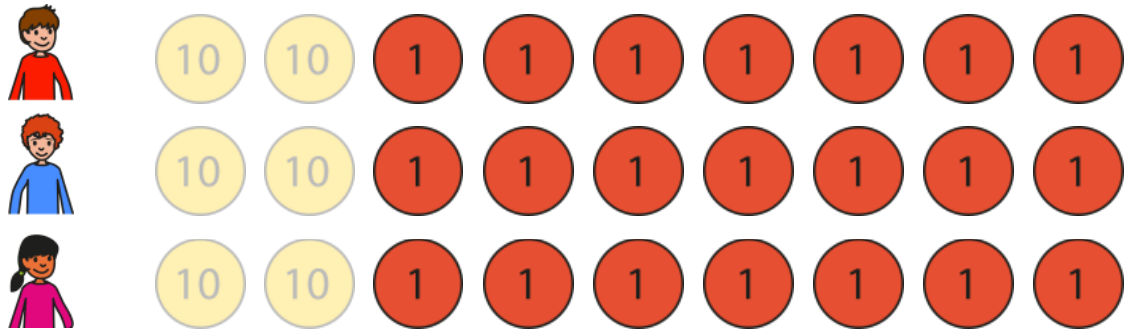
81 marbles shared equally between 3 children. How many marbles each?

$$81 \div 3 = \boxed{27}$$



6 tens 8 tens ÷ 3 = 2 tens r 2 tens 2 tens

21 ones 21 ones ÷ 3 = 7 ones 7 ones

81 ÷ 3 = 27

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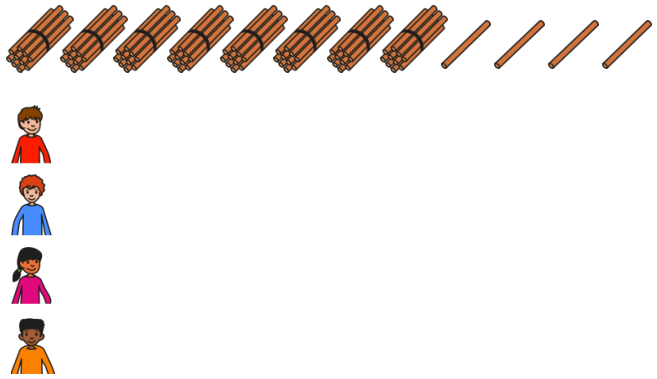
84 sticks shared equally between 4 children. How many sticks each?

$$84 \div 4 = \square$$

Step 1 – write the divisor and dividend:



10s 1s

$$4\overline{)\,8\quad 4}$$

84 divided by 4.

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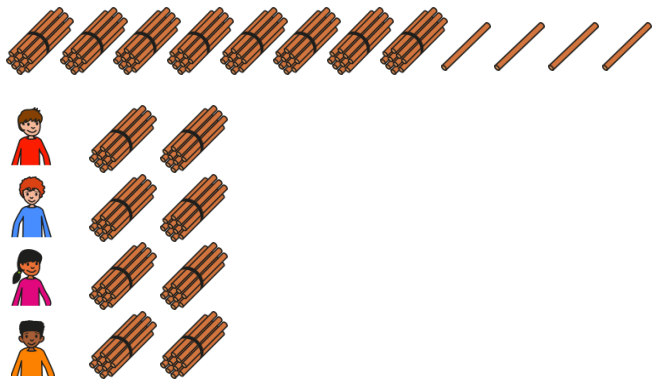
84 sticks shared equally between 4 children. How many sticks each?

$$84 \div 4 = \square$$

Step 1 – Start with the dividend:

Step 2 – Share the 10s



10s 1s

8 tens ÷ 4 = 2 tens

$$4\overline{)\ 8\quad 4}$$

84 divided by 4

8 tens divided by 4 is equal to 2 tens.

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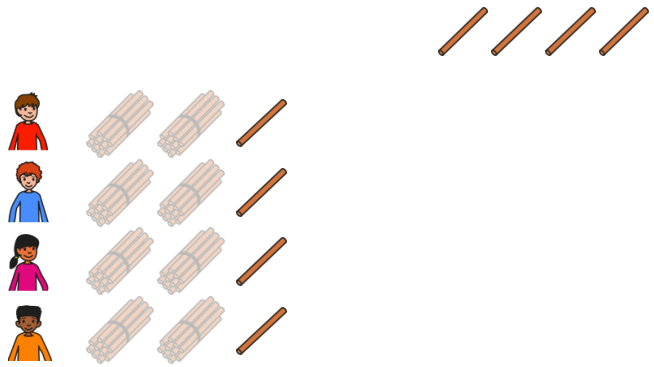
84 sticks shared equally between 4 children. How many sticks each?

$$84 \div 4 = \square$$

Step 2—share the 10s:



10s	1s
2	
8	4

8 tens ÷ 4 = 2 tens

4 ones ÷ 4 = 1 one

8 tens divided by 4 is equal to 2 tens.

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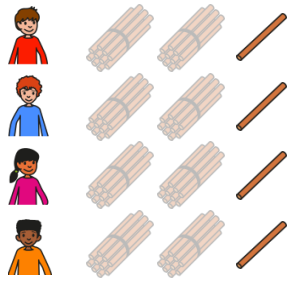
84 sticks shared equally between 4 children. How many sticks each?

$84 \div 4 = \square$

Step 3: Summary

Share the 1s:



10s	1s
2	1
4) 8	4

8 tens ÷ 4 = 2 tens

4 ones ÷ 4 = 1 one

Each child gets 21 sticks.

4 ones divided by 4 is equal to 1 one.

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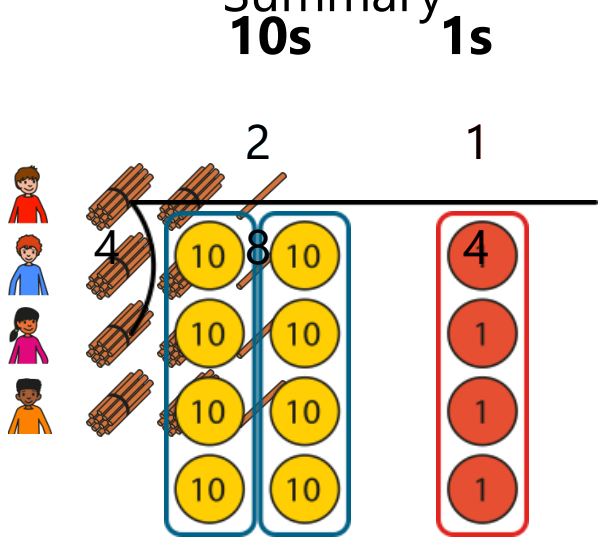
84 sticks shared equally between 4 children. How many sticks each?

$$84 \div 4 = \boxed{21}$$

Summary



$$\begin{array}{r} 2\ 1 \\ 4\overline{)\ 8\ 4} \end{array}$$

8 tens ÷ 4 = 2 tens

4 ones ÷ 4 = 1 one

Each child gets 21 sticks.

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84 ÷ 4 = 21	$4\overline{)\,8\;\;4}$ (2 1)
dividend ÷ divisor = quotient	$\text{divisor}\overline{)\text{dividend}}$ (quotient)

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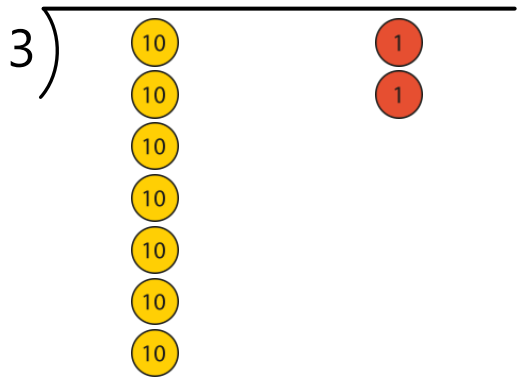
72 sticks shared equally between 3 children. How many sticks each?

$$72 \div 3 = \square$$

Step 1 – write the divisor and the dividend:

$$3\overline{)\,7\quad 2}$$



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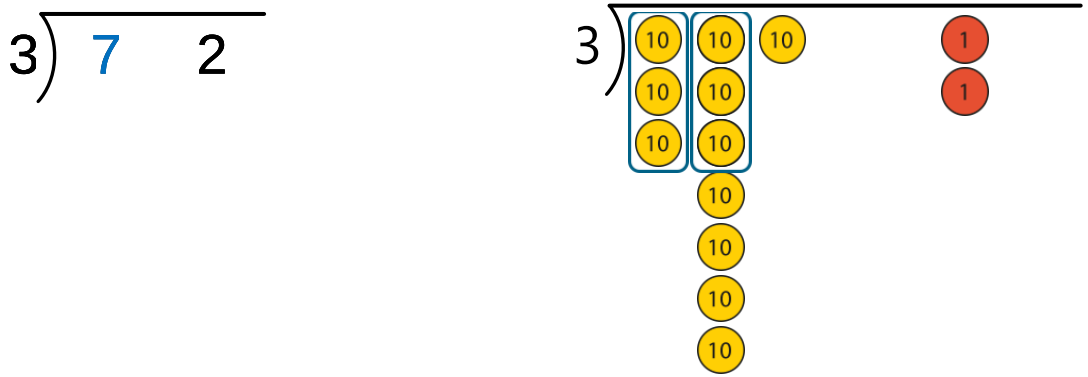
72 sticks shared equally between 3 children. How many sticks each?

$$72 \div 3 = \square$$

Step 1 – write the dividend:

Step 2 – share the tens

Step 3 – share the ones



7 tens ÷ 3 = 2 tens r 1 ten

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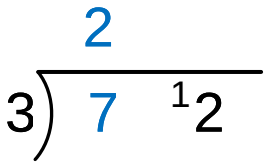
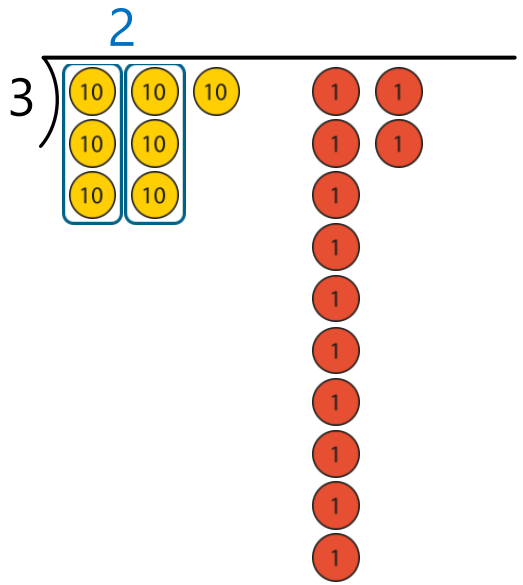
72 sticks shared equally between 3 children. How many sticks each?

$72 \div 3 = \square$

Step 2 – share the 10s:

Step 3 – exchange:





7 tens ÷ 3 = 2 tens r 1 ten

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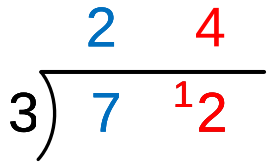
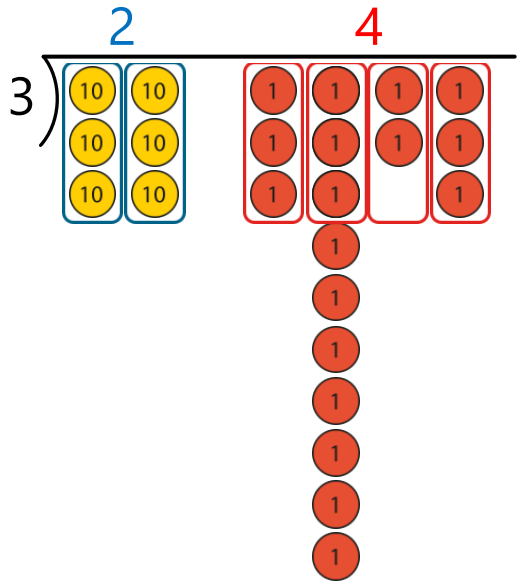
72 sticks shared equally between 3 children. How many sticks each?

$$72 \div 3 = \boxed{24}$$

Step 3 – exchange 1:

Step 4 – share the 1:





7 tens ÷ 3 = 2 tens r 1 ten

12 ones ÷ 3 = 4 ones

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73 sticks shared equally between 3 children. How many sticks each?

$$73 \div 3 = \square$$

Step 1 – write the divisor and the dividend:

$$3\overline{)\,7\;3}$$

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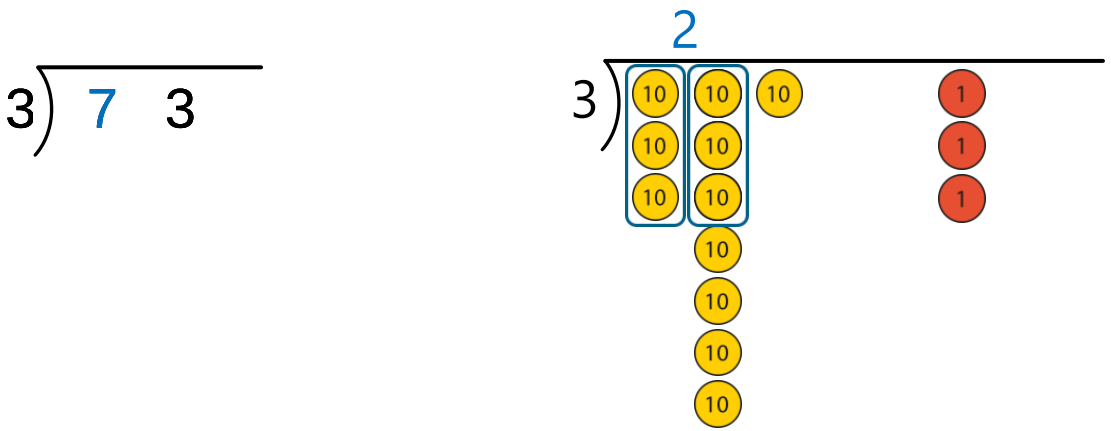
73 sticks shared equally between 3 children. How many sticks each?

$$73 \div 3 = \boxed{}$$

Step 1 – write the divisor and the dividend:

Step 2 – share the 10s



7 tens ÷ 3 = 2 tens r 1 ten

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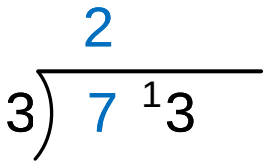
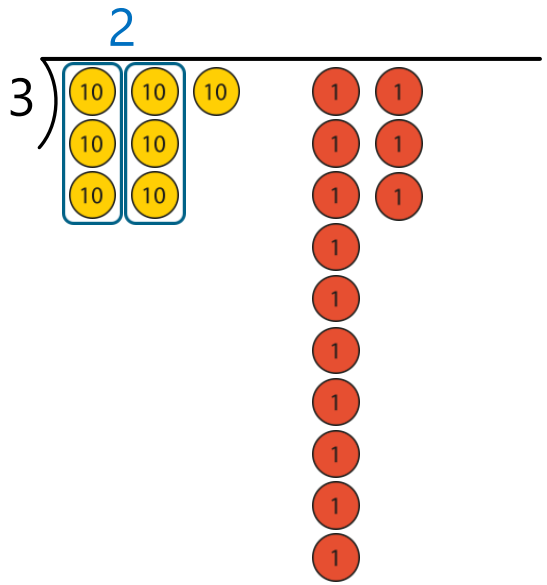
73 sticks shared equally between 3 children. How many sticks each?

$$73 \div 3 = \boxed{}$$

Step 2 – share the 10s:

Step 3 – exchange:





7 tens ÷ 3 = 2 tens r 1 ten

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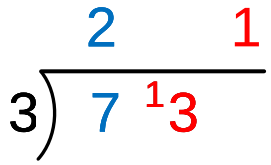
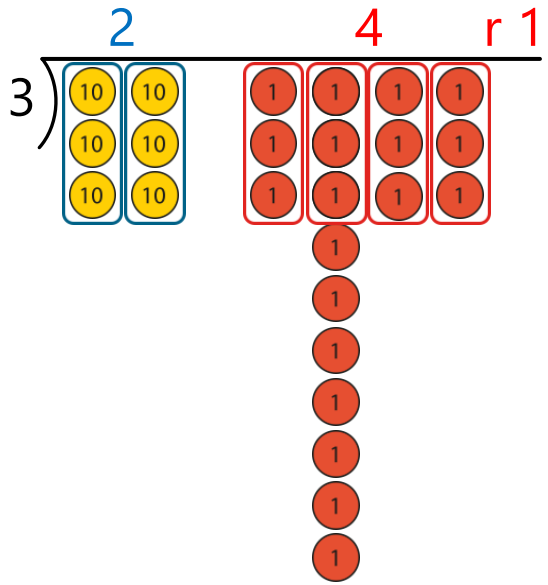
73 sticks shared equally between 3 children. How many sticks each?

$$73 \div 3 = \boxed{24 \text{ r } 1}$$

Step 1 – share the 10s:

Step 2 – exchange:





7 tens ÷ 3 = 2 tens r 1 ten

13 ones ÷ 3 = 4 ones r 1 one

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Fractions

- Importance of fractions being equal parts.
- KS1 – recognise and name common fractions of shapes, objects or quantities. ½, ¼, 1/3, 2/4, ¾
- KS2:
  - equivalent fractions (2/4 = ½)
  - Unit and non-unit fractions
  - Adding and subtracting fractions (starting with same denominator)
  - Proper fractions (3/4), improper fractions (7/4), mixed numbers (1 ¾)
  - Multiplying fractions by whole numbers
  - Multiplying fractions by fractions
  - Dividing fractions by whole numbers

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$$\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8}$$

$$4 \times \frac{1}{8}$$

$$\frac{1}{8} \times 4$$

$$\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = 4 \times \frac{1}{8} = \frac{1}{8} \times 4$$

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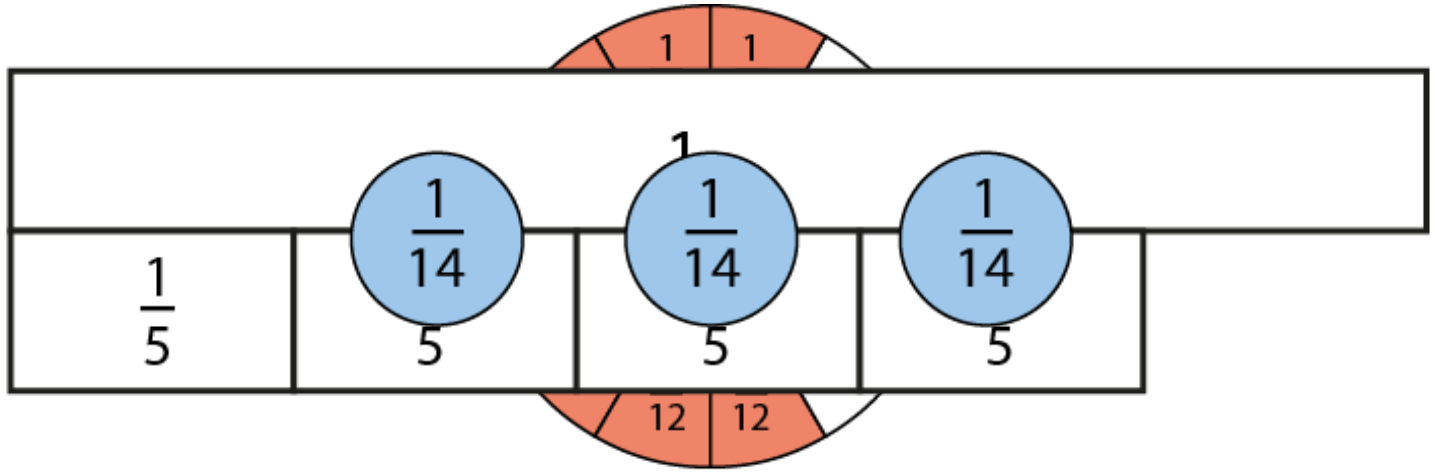

$$\frac{1}{12} + \frac{1}{12} + \frac{1}{12} = \frac{1}{12} \times 8$$

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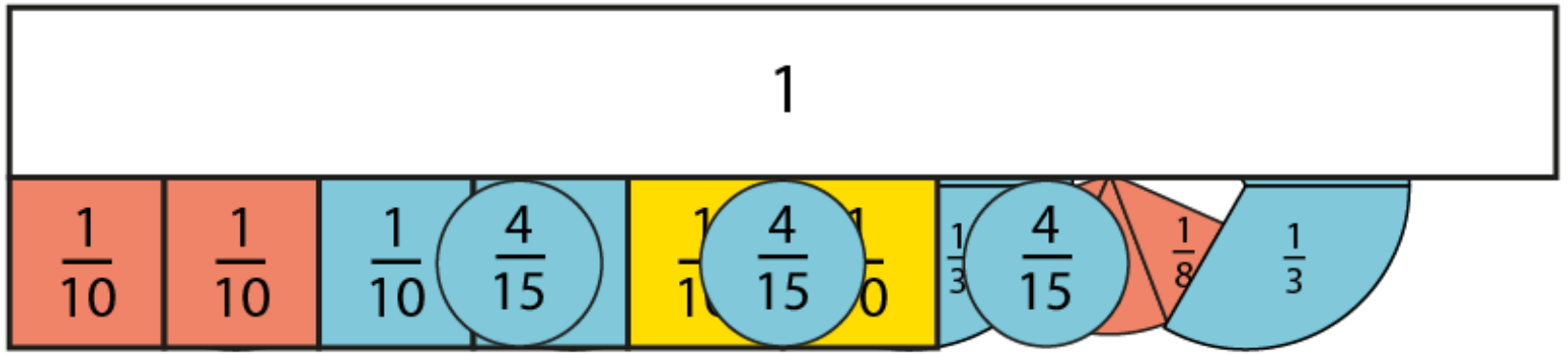

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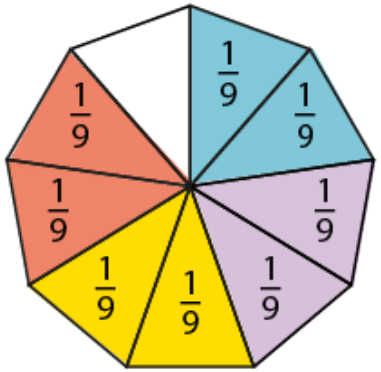

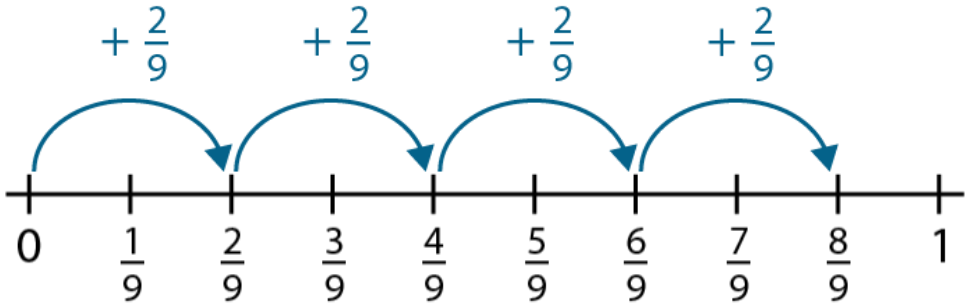

$$\frac{2}{9} + \frac{2}{9} + \frac{2}{9} + \frac{2}{9} = \frac{8}{9}$$

$$4 \times \frac{2}{9} = \frac{8}{9}$$

$$\frac{2}{9} \times 4 = \frac{8}{9}$$

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Any Questions?

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