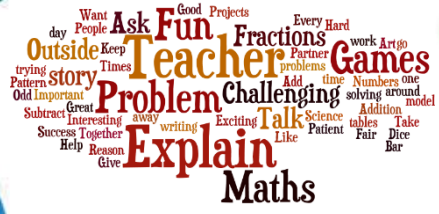


The Russell School

Maths Calculation Policy

The Russell School
Petersham

Updated: February 2016

About Our Calculation Policy

This documents is written for all adults working with our pupils; including teachers, teaching assistants, students, supply teachers and parents. It should be part of an induction package for all staff with inset as appropriate.

Our Calculation Policy has been devised to meet the requirements of the National Curriculum 2014, but most importantly the learning needs of our children at the Russell. The policy has been designed to give pupils a consistent and smooth progression of learning calculations across the school. Teachers should refer to this policy in all planning for calculations including cross curricular links.

The calculation policy is organised according to the requirements that need to be embedded in each year group of the primary curriculum as set out in the National Curriculum 2014; one set of mathematical concepts and big ideas for all. One of our fundamental mathematical Key principles; that this policy has been derived from, is the assumption that children use the language of maths correctly, so that children can develop mathematical concepts and also allows teachers to address misconceptions early and ensure that children have a firm understanding of key mathematical concepts before moving on.

It is vital that children are taught according to the 'stage' that they are working at, the transition between stages should not be hurried as not all children will be ready to move on to the next stage at the same time. Throughout this policy stages have been developed which introduces new concepts, outlines appropriate manipulatives and visual models, and what mathematical language is involved for a particular concept. Latter stages are for those children who are showing to have 'mastered' a concept, allowing them to apply their learning in a real life context further deepening their understanding. The new curriculum focuses on skills and mastery and is not about moving children on to the next method as soon as they can do the one before.

Written methods of calculations are based on mental strategies that have been taught using appropriate manipulatives and are only expected once a child has a clear understanding of the processes involved. This policy uses pictorial models that are consistent across year groups which means that skills can be taught, practised and reviewed constantly. These skills lead to more formal written methods of calculation.

Strategies for calculation need to be supported by familiar models and methods to reinforce understanding, such as the whole part model which children are exposed to throughout this policy. The written methods in this document are important but they by no means replace the superb mental methods we have developed. It is important for children to handle manipulatives to develop and reinforce understanding at all stages from Foundation to Year Six. A sound understanding of the number system and the value of a given number (place value) is essential for children to carry out calculations efficiently and accurately. Efficiency in calculation requires having a variety of mental strategies, which are carefully taught at a particular stage in a child's learning. Another key principle is the importance of 10, referred to as 'magic 10' (NCETM, 2015), which allows children to partition numbers to bridge 10, for example 9+6=9+1+5=15, which is helpful to make 10 as this makes this calculation easier.

Children need to be taught and encouraged to communicate their reasoning and thinking at all stages. Confidence in their ability in mathematics and calculations should be encouraged and supported with all children, fostering a 'can do' attitude. The long term aim is for our children to be able to select an efficient method of their own choice asking systematically:

Can I do this in my head?

Can I do this using drawings or jottings?

Do I need to use a pencil and paper procedure?

What resources could I use to help me?

A Malin

January 2016

Year One

Children in Year One will start to read and write numbers up to 100 in words and numerals and will continue to practice counting on and backwards from any number up to 100. By putting the largest number in their head and counting on the smallest number, for example 5+4= "I put five in my head and count on four".
This is supported by using a number line and practical resources such as counters, Numicon, beadstring and everyday objects, paying particular attention to encourage children to explain their methods using a concrete manipulative.

Key Vocabulary: more than, most, less than (least), least, add, plus, altogether, subtract, minus, equal to, lots of, multiply, groups of, divide, share, number bond, fact family, array, whole, part,

Key Instant Recall Facts

Autumn 2: I know number bonds to 6.
Spring 1: I know doubles and halves to 10.
Spring 2: I known number bonds to 10.
Summer 1: I can tell an O'clock and half past time.
Summer 2: I know number bonds for each number to 10.

Number - Number and place value

Given a number, identify one more and one less.

What is **one more** than 6?

What is **one more** than 6?

Complete 18, □ , 16, 15, □ , □

I can see using the Numicon that 7 is **one more than** 6.

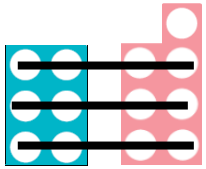
I started at 6 and **added one more**. That **equals** 7.

Stage 1

I had 6 toys and I **added one more**. Now there are

Record using pictures or objects to develop understanding of mathematical language.

Stage 2



Use Numicon alongside beadstring to support mathematical process.

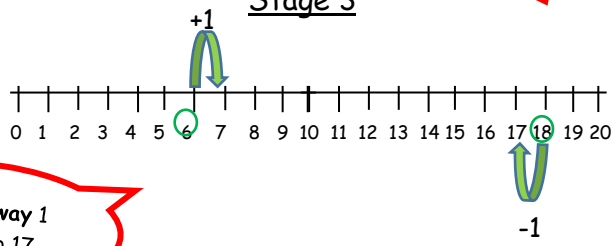
Record as process:

59 → is 1 less than → □

I started with 6 beads, I added **one more**, now I have 7 beads.

18 **take away** 1 is **equal** to 17.

Stage 3



Use number lines to support mathematical reasoning.

Record as process:

□ → is 1 less than → □

□ → is 1 more than → □

Number Addition and subtraction

Represent and use number bonds and related subtraction facts within 20.

Stage 1

What is 8 **plus** 2?

8 toys **add** 2 **more equals** 10.

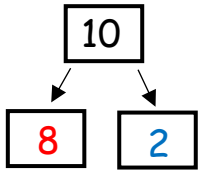
Record using pictures or objects to develop understanding of mathematical language.

Stage 2

0+10 1+9 2+8 3+7 4+6 5+5 6+4 7+3 8+2 9+1 10+0

Use Numicon alongside a beadstring to support mathematical process.

Record using whole part model:

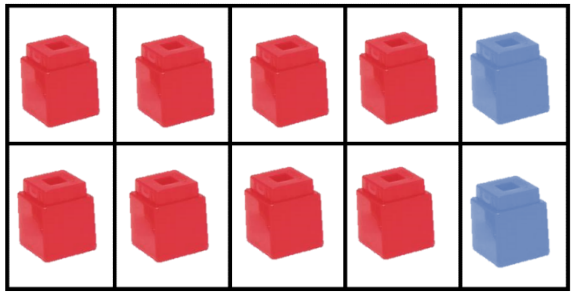


8 beads **add** 2 **more** beads **equals** 10 beads.

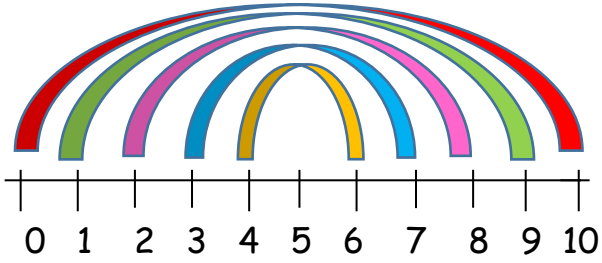
The **whole** is 10. The **parts** are 8 and 2.

Stage 3

I have noticed that 8 red cubes and 2 blue cubes **equals** 10 that is the same as 2 blue cubes and 8 red cubes **equals** 10.



I have noticed that 8 **add** 2 is **equal** to 10 and 2 **add** 8 is **equal** to 10.



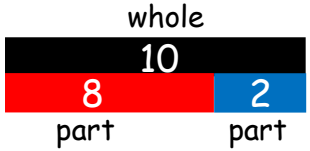
Use a ten frame alongside a number line to support mathematical reasoning.

I am thinking of a number. I've subtracted 2 and the answer is 8. What number was I thinking of?

Record as a number equation:

$8+2=10$

Stage 4



The **parts** are 8 and 2. The **whole** is 10.

Use a bar model to apply knowledge of related addition and subtraction facts.

Record as number equations:

$8+2=10$, $2+8=10$, $10-2=8$ and $10-8=2$

Begins to record number equations using addition (+), subtraction signs (-) and equals sign (=).

Addition (The process of finding the total of two or more sets)

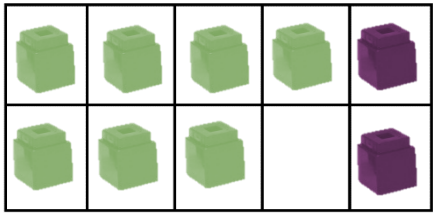
Stage 1

What is 7 **plus** 2?

I have 7 green toys, I **added** 2 **more** pink toys. There are 9 toys **altogether**.

Record using pictures or objects to develop understanding of mathematical language.

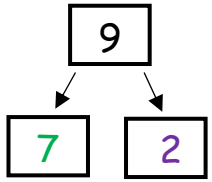
Stage 2



The **whole** is 9, there are 9 cubes **altogether**. The **parts** are 7 and 2. I had 7 green cubes and 2 purple cubes.

Use a ten frame alongside Numicon to support mathematical process.

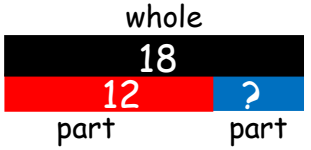
Record using whole part model:



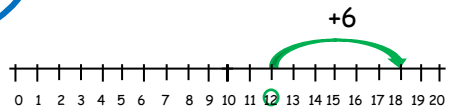
Can you find the missing **part** for this equation 12 +□ = 18

I know that the **whole** is 18 so 18-12= 6. 6 is the missing **part**.

Stage 3



Use a bar model alongside a number line to develop mathematical reasoning.



Record as a number equation:

$12+6=18$

Subtraction- calculating the difference (The process of taking away and counting how many are left)

Stage 1

What is 6 **take away** 2?

I have 6 green toys, I **took away** 2 toys. There are 4 toys **left**.

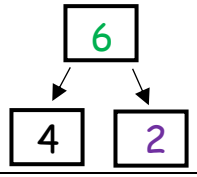
Record using pictures or objects to develop understanding of mathematical language.

Stage 2

6 **subtract** 2 is **equal** to 4.

Use Numicon alongside a ten frame to support mathematical process.

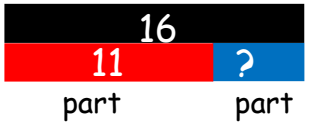
Record using whole part model:



The **whole** is 6, there are 6 holes **altogether** on the Numicon tile. The **parts** are 4 and 2. 4 **add** 2 is **equal** to 6. So 6 **subtract** is **equal** to 4.

Stage 3

Together Adam and David have 16 cars. David has 11 cars. How many cars does Adam have?



Use a bar model alongside a beadstring to develop mathematical reasoning.

Record as a number equation:

$16-11=5$

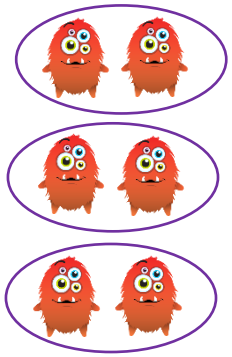
Number – Multiplication and division

Count in multiples of twos, fives and tens.

There are 3 toy boxes with 2 toys in each, how many toys are there **altogether**?

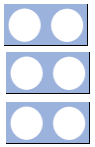
I grouped the toys in 3 **groups of 2**. There are.. **2.4.6** toys.

Stage 1

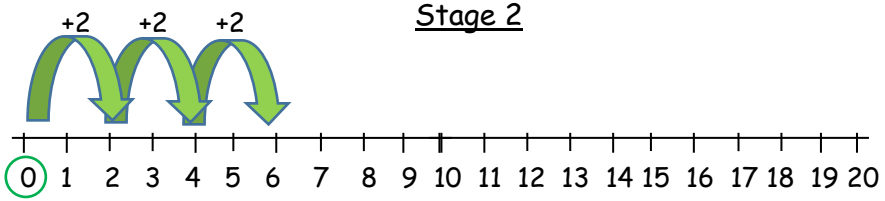


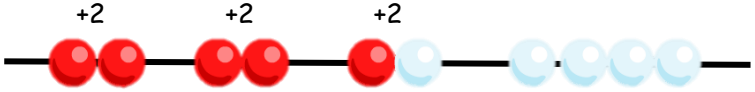
Grouping objects into sets and recording using pictures to develop understanding of mathematical language.

3 **lots of** 2 **equals** 6.

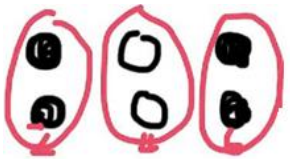


Stage 2





Use a number line alongside a beadstring and Numicon to count on using repeated addition/subtraction developing mathematical process.



Stage 3

Use hundred squares to investigate place value and number patterns.

Counting on in 2s

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Counting on in 5s

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Counting on in 10s

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

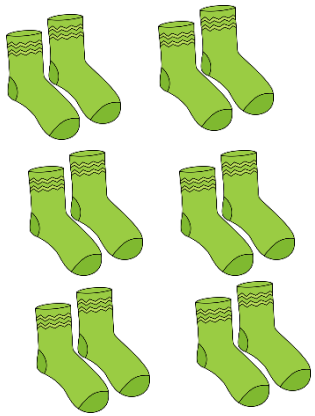
I have noticed that when I counted on in 2s the **ones digit** stays the same and the **tens digit** increases **ten more** each time.

Solve one-step problems involving multiplication and division using equal groups.

Multiplication

There are 6 pairs of socks, how many socks are there **altogether**?

Stage 1

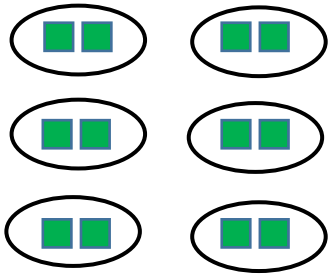


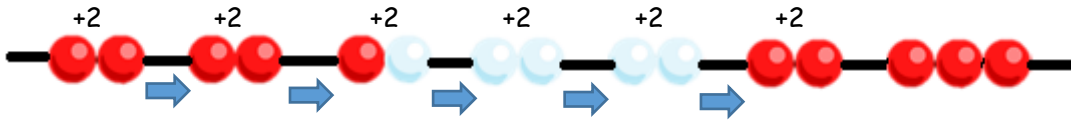
2,4,6,8,10,12. There are 12 socks **altogether**.

Record using pictures and objects grouped into equal sets to develop understanding of mathematical language.

Stage 2

6 **lots of** 2 is **equal** to 12.





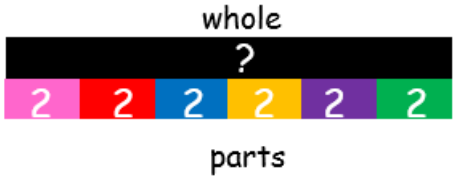
Use an array alongside a beadstring modelling repeated addition or number line to support mathematical process.

Record as a repeated addition equation:

$2+2+2+2+2+2=12$

Stage 3

Each part is 2. So 2,4,6,8,10,12. There are 12 socks **altogether**.



I know that there are 6 pairs of socks so each **part** is 2. I need 6 lots of 2 **altogether**.

Use a bar model alongside a beadstring to develop mathematical reasoning.

Record as a multiplication equation:

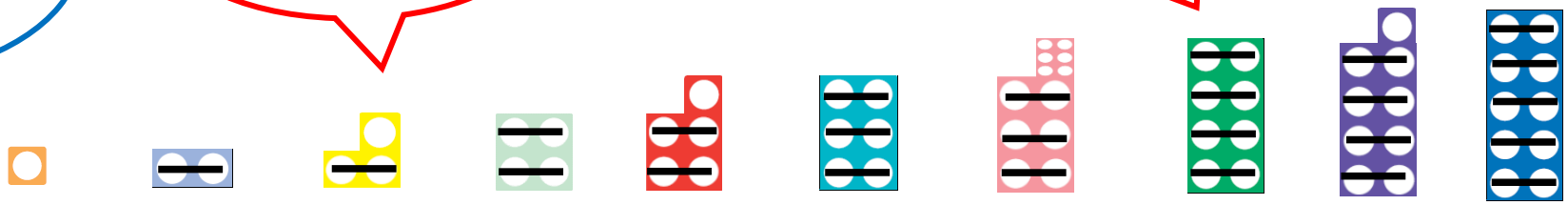
$6 \times 2 = 12$ and $2 \times 6 = 12$

Recognise odd and even numbers.

Which numbers are **odd** numbers?

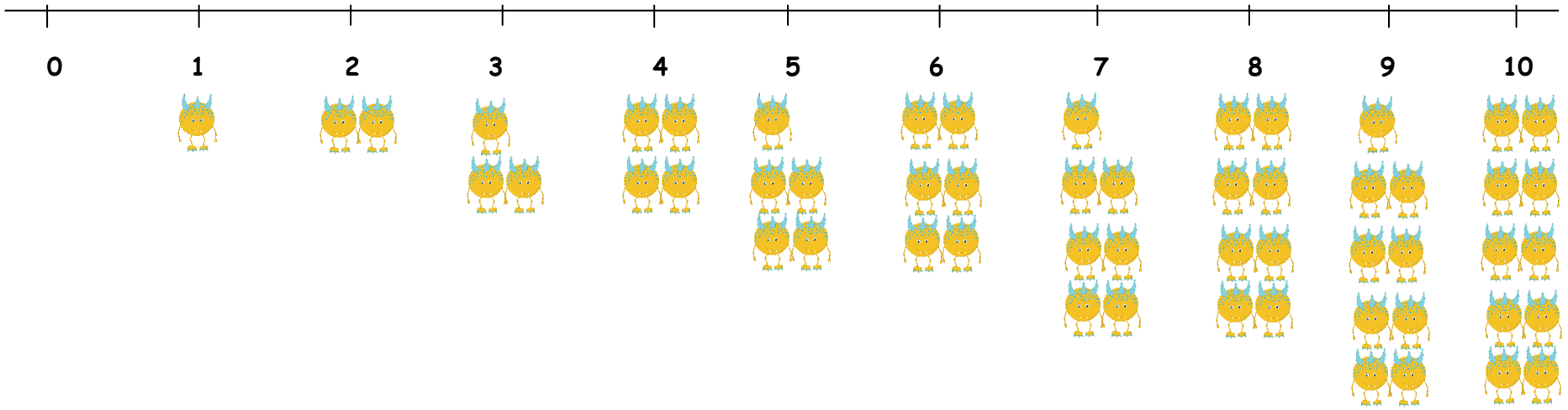
I know that 3 is an **odd** number because it has a **pointy roof**.

I know that 8 is an **even** number because it has a **flat roof**.



Use Numicon alongside a number line to develop understanding of mathematical language and reasoning.

Do all **odd** numbers have a flat roof?

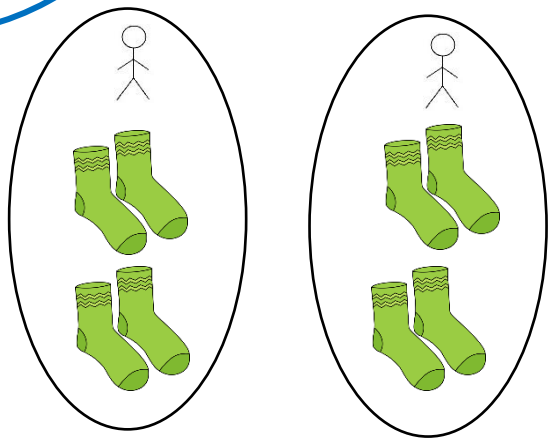


Division

Share 8 socks between 2 people. How many socks will each person get?

When I **shared** 8 socks between 2 people, each person got 4 socks each. Each person got the same amount each.

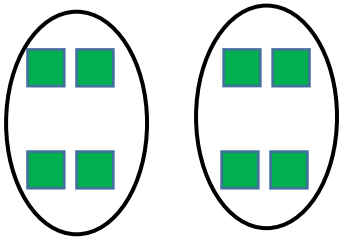
Stage 1



Record using pictures and objects shared evenly into groups to develop understanding of mathematical language.

Stage 2

There are 2 **equal groups of** 4. **Half** of 8 is 4



Use an array alongside a beadstring modelling repeated subtraction or bar model to support mathematical process.

Record as an array.

Record as a repeated subtraction equation:

$8 - 4 - 4 = 0$

Stage 3

Use a bar model alongside an array to develop mathematical reasoning.

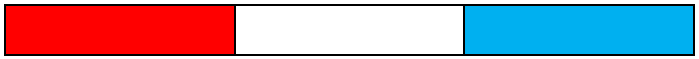
Record as a division equation:

$8 \div 2 = 4$ and $8 \div 4 = 2$

Can you **divide** this bar model into 2 **equal parts**?

If you **divide** this bar into **2 equal parts**, each part will be one and a half.

Stage 4



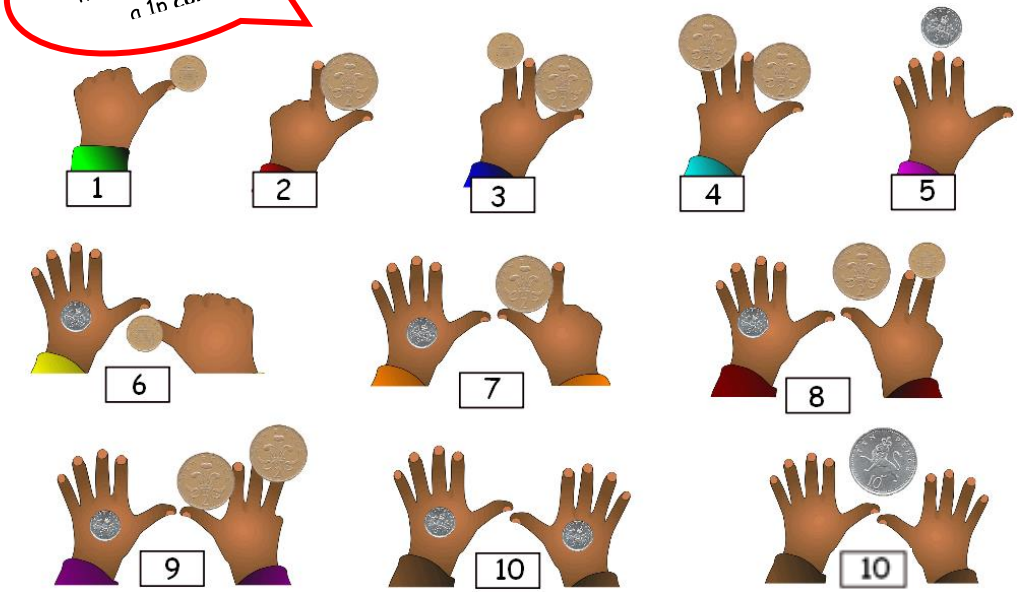
Use a bar model to develop mathematical reasoning.

Measurement

Recognise and know the value of different denominations of coins and notes.

To make 3p you need a 2p **coin** and a 1p **coin**

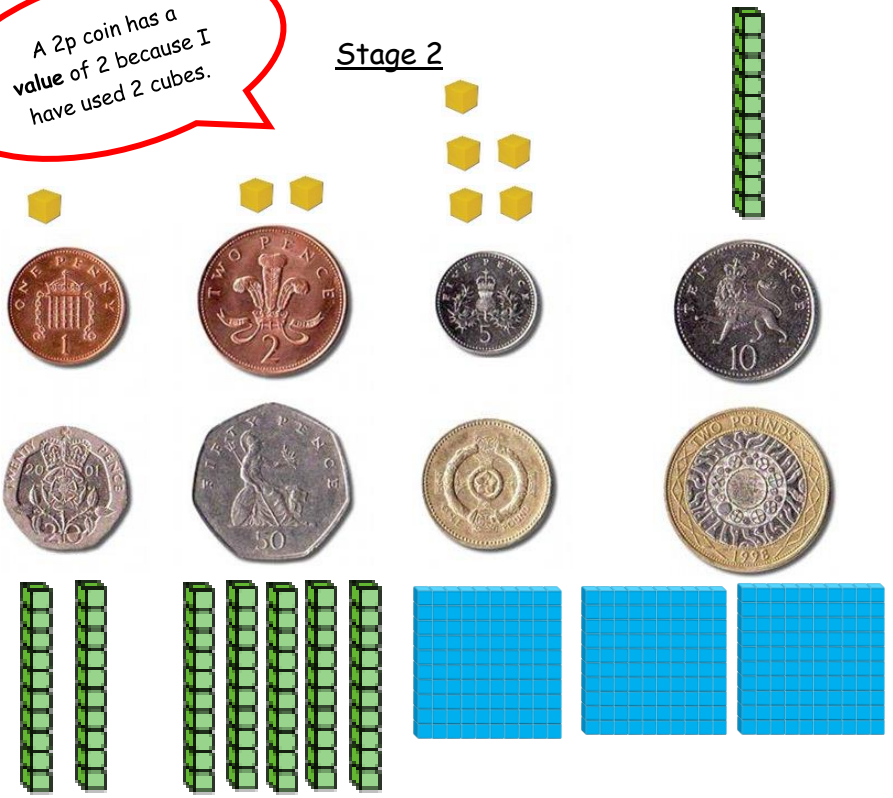
Stage 1



Introducing coins up to 10p using hands visual.
Developing coin recognition.

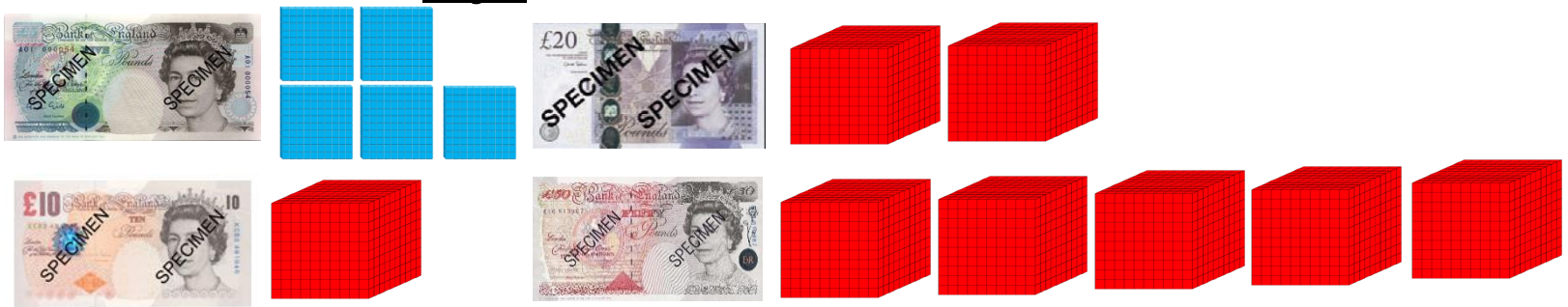
A 2p coin has a **value** of 2 because I have used 2 cubes.

Stage 2



Introducing base 10 to develop understanding monetary value and equivalence.

Stage 3



Introducing notes alongside base 10 to develop understanding of monetary value and equivalence.

£5 has a **value** of **5 lots of 100** that is 500.

A £5 note has the same **value** of 5 £1 coins because a £1 coin has a value of 100.