Maths Workshop

11.11.24

Where only our best is enough

The first step towards a deep understanding of number and place value is having a strong sense of the numbers up to ten. From there, developing children's 'sense of ten' is essential as part of their understanding of place value and this also paves the way for mental calculation. In addition to this 'sense of ten', place value encompasses three other important ideas:

Ordering - comparing numbers with each other

Position - understanding how the place of a digit affects its value in any particular number

Amount - knowing what the digits represent

Development Matters

3 & 4-year-olds will be learning to:	Examples of how to support this:
Develop fast recognition of up to 3 objects, without having to count them individually ('subitising').	Point to small groups of two or three objects: "Look, there are two!" Occasionally ask children how many there are in a small set of two or three.
Recite numbers past 5.	Regularly say the counting sequence, in a variety of playful contexts, inside and outdoors, forwards and backwards, sometimes going to high numbers. For example: hide and seek, rocket-launch countdowns.
Say one number for each item in order: 1,2,3,4,5.	Count things and then repeat the last number. For example: "1, 2, 3 – **3 cars**". Point out the number of things whenever possible; so, rather than just

3 & 4-year-olds will be learning to:	Examples of how to support this:
Know that the last number reached when counting a small set of objects tells you how many there are in total ('cardinal principle').	'chairs', 'apples' or 'children', say 'two chairs', 'three apples', 'four children'. Ask children to get you a number of things, and emphasise the total number in your conversation with the child.
Show 'finger numbers' up to 5.	Use small numbers to manage the learning environment. Suggestions: have a pot labelled '5 pencils' or a crate for '3 trucks'. Draw children's attention to these throughout the session and especially at tidy-up time: "How many pencils should be in this pot?" or "How many have we got?" etc.
Link numerals and amounts: for example, showing the right number of objects to match the numeral, up to 5.	

Development Matters

Experiment with their own symbols and marks as well as numerals. Solve real world mathematical problems with numbers up to 5. Compare quantities using language: 'more than', 'fewer than'.	Encourage children in their own ways of recording (for example) how many balls they managed to throw through the hoop. Provide numerals nearby for reference. Suggestions: wooden numerals in a basket or a number track on the fence. Discuss mathematical ideas throughout the day, inside and outdoors. Suggestions: - "I think Adam has got more crackers…" - support children to solve problems using fingers, objects and marks: "There are four of you, but there aren't enough chairs…." - draw children's attention to differences and changes in amounts, such as those in stories like 'The Enormous Turnip'.
Talk about and explore 2D and 3D shapes (for example, circles, rectangles, triangles and cuboids) using informal and mathematical language: 'sides', 'corners'; 'straight', 'flat', 'round'.	Encourage children to play freely with blocks, shapes, shape puzzles and shape-sorters. Sensitively support and discuss questions like: "What is the same and what is different?" Encourage children to talk informally about shape properties using words like 'sharp corner', 'pointy' or 'curvy'. Talk about shapes as you play with them: "We need a piece with a straight edge."
Understand position through words alone – for example,	Discuss position in real contexts. Suggestions: how to shift the leaves **off** a path, or sweep water away **down** the drain.

Development Matters

Experiment with their own symbols and marks as well as numerals. Solve real world mathematical problems with numbers up to 5. Compare quantities using language: 'more than', 'fewer than'.	Encourage children in their own ways of recording (for example) how many balls they managed to throw through the hoop. Provide numerals nearby for reference. Suggestions: wooden numerals in a basket or a number track on the fence. Discuss mathematical ideas throughout the day, inside and outdoors. Suggestions: - "I think Adam has got more crackers…" - support children to solve problems using fingers, objects and marks: "There are four of you, but there aren't enough chairs…." - draw children's attention to differences and changes in amounts, such as those in stories like 'The Enormous Turnip'.
Talk about and explore 2D and 3D shapes (for example, circles, rectangles, triangles and cuboids) using informal and mathematical language: 'sides', 'corners'; 'straight', 'flat', 'round'.	Encourage children to play freely with blocks, shapes, shape puzzles and shape-sorters. Sensitively support and discuss questions like: "What is the same and what is different?" Encourage children to talk informally about shape properties using words like 'sharp corner', 'pointy' or 'curvy'. Talk about shapes as you play with them: "We need a piece with a straight edge."
Understand position through words alone – for example,	Discuss position in real contexts. Suggestions: how to shift the leaves **off** a path, or sweep water away **down** the drain.

Development Matters

3 & 4-year-olds will be learning to:	Examples of how to support this:
"The bag is under the table," – with no pointing. Describe a familiar route. Discuss routes and locations, using words like 'in front of' and 'behind'.	Use spatial words in play, including 'in', 'on', 'under', 'up', 'down', 'besides' and 'between'. Suggestion: "Let's put the troll under the bridge and the billy goat beside the stream." Take children out to shops or the park: recall the route and the order of things seen on the way. Set up obstacle courses, interesting pathways and hiding places for children to play with freely. When appropriate, ask children to describe their route and give directions to each other. Provide complex train tracks, with loops and bridges, or water-flowing challenges with guttering that direct the flow to a water tray, for children to play freely with. Read stories about journeys, such as 'Rosie's Walk'.
Make comparisons between objects relating to size, length, weight and capacity.	Provide experiences of size changes. Suggestions: "Can you make a puddle larger?", "When you squeeze a sponge, does it stay small?", "What happens when you stretch dough, or elastic?" Talk with children about their everyday ways of comparing size, length, weight and capacity. Model more specific techniques, such as lining up ends of lengths and straightening ribbons, discussing accuracy: "Is it **exactly**…?"
Select shapes appropriately: flat surfaces for building, a triangular prism for a roof etc. Combine shapes to make new ones - an arch, a bigger triangle etc.	Provide a variety of construction materials like blocks and interlocking bricks. Provide den-making materials. Allow children to play freely with these materials, outdoors and inside. When appropriate, talk about the shapes and how their properties suit the purpose. Provide shapes that combine to make other shapes, such as pattern blocks and interlocking shapes, for children to play freely with. When appropriate, discuss the different designs that children make.

Development Matters

3 & 4-year-olds will be learning to:	Examples of how to support this:
	Occasionally suggest challenges, so that children build increasingly more complex constructions. Use tidy-up time to match blocks to silhouettes or fit things in containers, describing and naming shapes. Suggestion: "Where does this triangular one /cylinder /cuboid go?"
Talk about and identify the patterns around them. For example: stripes on clothes, designs on rugs and wallpaper. Use informal language like 'pointy', 'spotty', 'blobs' etc. Extend and create ABAB patterns – stick, leaf, stick, leaf. Notice and correct an error in a repeating pattern. Begin to describe a sequence of events, real or fictional, using words such as 'first', 'then...'	Provide patterns from different cultures, such as fabrics. Provide a range of natural and everyday objects and materials, as well as blocks and shapes, for children to play with freely and to make patterns with. When appropriate, encourage children to continue patterns and spot mistakes. Engage children in following and inventing movement and music patterns, such as clap, clap, stamp. Talk about patterns of events, in cooking or getting dressed. Suggestions: - 'First', 'then', 'after', 'before' - "Every day we…" - "Every evening we…" Talk about the sequence of events in stories. Use vocabulary like 'morning', 'afternoon', 'evening' and 'night-time', 'earlier', 'later', 'too late', 'too soon', 'in a minute'. Count down to forthcoming events on the calendar in terms of number of days or sleeps. Refer to the days of the week, and the day before or day after, 'yesterday' and 'tomorrow'.

Development Matters

Children in reception will be learning to:	Examples of how to support this:
Count objects, actions and sounds.	Develop the key skills of counting objects including saying the numbers in order and matching one number name to each item. Say how many there are after counting - for example, "…6, 7, 8. There are **8 balls**" - to help children appreciate that the last number of the count indicates the total number of the group. This is the cardinal counting principle. Say how many there might be before you count to give a purpose to counting: "I think there are about 8. Shall we count to see?" Count out a smaller number from a larger group: "Give me seven…" Knowing when to stop shows that children understand the cardinal principle. Build counting into everyday routines such as register time, tidying up, lining up or counting out pieces of fruit at snack time. Sing counting songs and number rhymes, and read stories that involve counting. Play games which involve counting. Identify children who have had less prior experience of counting, and provide additional opportunities for counting practice.
	counting practice.
Subitise.	Show small quantities in familiar patterns (for example, dice) and random arrangements. Play games which involve quickly revealing and hiding numbers of objects. Put objects into five frames and then ten frames to begin to familiarise children with the tens structure of the number system. Prompt children to subitise first when enumerating groups of up to 4 or 5 objects: "I don't think we need to count those. They are in a square shape so there must be 4." Count to check.

Development Matters

Children in reception will be learning to:	Examples of how to support this:
	Encourage children to show a number of fingers 'all at once', without counting.
Link the number symbol (numeral) with its cardinal number value.	Display numerals in order alongside dot quantities or tens frame arrangements. Play card games such as snap or matching pairs with cards where some have numerals and some have dot arrangements. Discuss the different ways children might record quantities (for example, scores in games), such as tallies, dots and using numeral cards.
Count beyond ten.	Count verbally beyond 20, pausing at each multiple of 10 to draw out the structure, for instance when playing hide and seek, or to time children getting ready. Provide images such as number tracks, calendars and hundred squares indoors and out, including painted on the ground, so children become familiar with two-digit numbers and can start to spot patterns within them.
Compare numbers.	Provide collections to compare, starting with a very different number of things. Include more small things and fewer large things, spread them out and bunch them up, to draw attention to the number not the size of things or the space they take up. Include groups where the number of items is the same. Use vocabulary: 'more than', 'less than', 'fewer', 'the same as', 'equal to'. Encourage children to use these words as well. Distribute items evenly, for example: "Put 3 in each bag," or give the same number of pieces of fruit to each child. Make deliberate mistakes to provoke discussion. Tell a story about a character distributing snacks unfairly and invite children to make sure everyone has the same.
Understand the 'one more than/one less than' relationship between consecutive numbers.	Make predictions about what the outcome will be in stories, rhymes and songs if one is added, or if one is taken away.

Development Matters

Understand the 'one more than/one less than' relationship between consecutive numbers.	Make predictions about what the outcome will be in stories, rhymes and songs if one is added, or if one is taken away.

Children in reception will be learning to:	**Examples of how to support this:**
	Provide 'staircase' patterns which show that the next counting number includes the previous number plus one.
Explore the composition of numbers to 10.	Focus on composition of 2, 3, 4 and 5 before moving onto larger numbers Provide a range of visual models of numbers: for example, six as double three on dice, or the fingers on one hand and one more, or as four and two with ten frame images. Model conceptual subitising: "Well, there are three here and three here, so there must be six." Emphasise the parts within the whole: "There were 8 eggs in the incubator. Two have hatched and 6 haven't yet hatched." Plan games which involve partitioning and recombining sets. For example, throw 5 beanbags, aiming for a hoop. How many go in and how many don't?
Automatically recall number bonds for numbers 0–10.	Have a sustained focus on each number to 10. Make visual and practical displays in the classroom showing the different ways of making numbers to 10 so that children can refer to these. Play hiding games with a number of objects in a box, under a cloth, in a tent, in a cave, etc.: "Seven went in the tent and 2 came out. I wonder how many are still in there?" Intentionally give children the wrong number of things. For example: ask each child to plant 4 seeds then give them 1, 2 or 3. "I've only got 1 seed, I need 3 more." Spot and use opportunities for children to apply number bonds: "There are 6 of us but only 2 clipboards. How many more do we need?" Place objects into a five frame and talk about how many spaces are filled and unfilled.

Development Matters

Children in reception will be learning to:	Examples of how to support this:
Select, rotate and manipulate shapes in order to develop spatial reasoning skills.	Provide high-quality pattern and building sets, including pattern blocks, tangrams, building blocks and magnetic construction tiles, as well as found materials. Challenge children to copy increasingly complex 2D pictures and patterns with these 3D resources, guided by knowledge of learning trajectories: "I bet you can't add an arch to that," or "Maybe tomorrow someone will build a staircase." Teach children to solve a range of jigsaws of increasing challenge.
Compose and decompose shapes so that children recognise a shape can have other shapes *within* it, just as numbers can.	Investigate how shapes can be combined to make new shapes: for example, two triangles can be put together to make a square. Encourage children to predict what shapes they will make when paper is folded. Wonder aloud how many different ways there are to make a hexagon with pattern blocks. Find 2D shapes within 3D shapes, including through printing or shadow play.
Continue, copy and create repeating patterns.	Make patterns with varying rules (including AB, ABB and ABBC) and objects and invite children to continue the pattern. Make a deliberate mistake and discuss how to fix it.
Compare length, weight and capacity.	Model comparative language using 'than' and encourage children to use this vocabulary. For example: "This is heavier than that." Ask children to make and test predictions. "What if we pour the jugful into the teapot? Which holds more?"

Early Number Sense

1. An awareness of the relationship between number and quantity
2. An understanding of number symbols, vocabulary and meaning
3. The ability to engage in systematic counting
4. An understanding of different representations of number
5. Competence with simple mathematical operations
6. An awareness of number patterns including recognising missing numbers

- One of the ways in which we can help children develop their sense of number is by offering a range of different representations of numbers
- ***NUMBER OF THE WEEK/NUMBERLAND***
- E.g. A whole range of representations of six are shared with learners in the lesson, for example the pattern of six on a die, the finger pattern of six, collections of six objects, collections of actions, Cuisenaire rods to make six, dominoes with six spots, Roman numerals to represent six, the symbol '6', six on a number line, six o'clock on an analogue clock face and coins worth six.
- Once children have developed a sense of the numbers up to ten, the next step is for them to have a strong 'sense of ten'.

Nursery

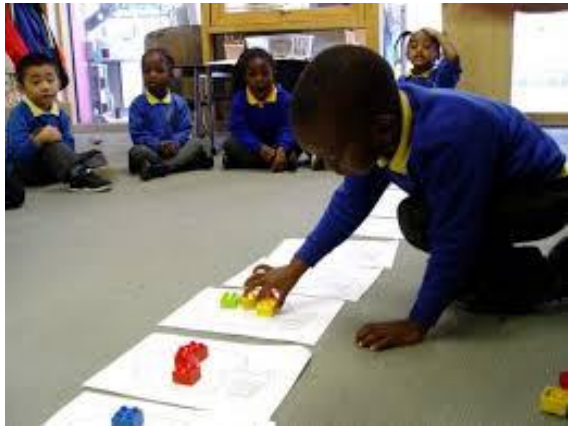
Lots of opportunities to **practice counting** independently and in focused activities.

This helps children developing counting and 1:1 correspondence skills. It helps develop number sense/place value as they see *number* as ***concrete*** (object/thing) not something abstract (random counting).

Know that numbers identify how many objects are in a set
Realises anything can be counted

Opportunities to **<u>count TO a given number</u>**.

Again, this helps children see numbers as ***concrete,***
but also develop number awareness skills
– They must STOP when they get to the correct number.
This helps develop sequencing skills and knowledge of the position of a number in the numberline (i.e./ it's place value)



Begin to represent numbers

Board games are great for number sense – rolling a dice and moving to that number (knowing to STOP when they've reached that number).

Great for 1:1 correspondence
Brilliant for reinforcing counting (to 6)
Turn taking….

And…. Great fun ☺

Ordering

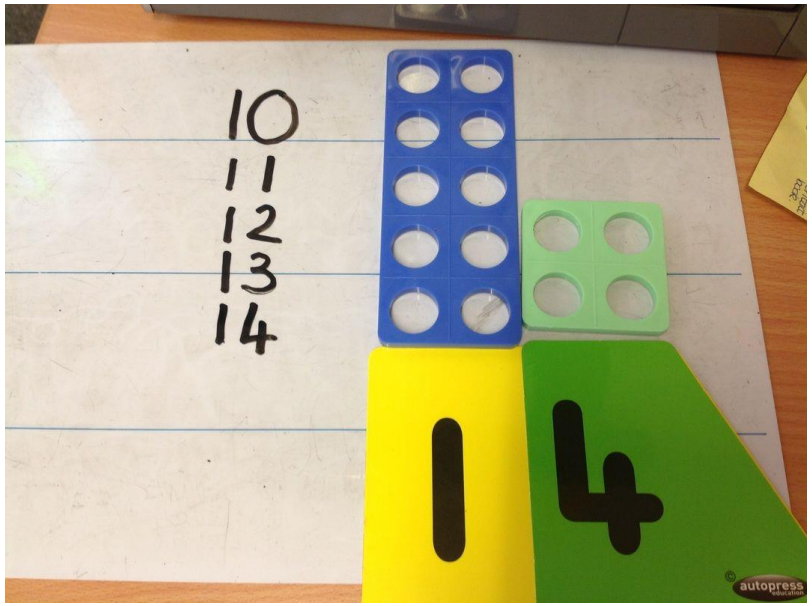
- Numbers and amounts

E.g. Domino sequence: This will involve comparing the dominoes already in the sequence and identifying what is the same and what is different about them, before deciding on the missing dominoes.

Ordering numbers using moveable number tiles, threading numbers, ordering ourselves at line up time, writing numbers on a number line, filling in the missing numbers in a sequence etc.

Position

One of the fundamental ideas associated with place value is that the position of a digit in a number affects its value. So, for example in the number 126, the 6 is worth six ones, whereas in the number 164, the 6 is worth six tens.



Place Value

Hundreds 100	Tens 10	Ones 1

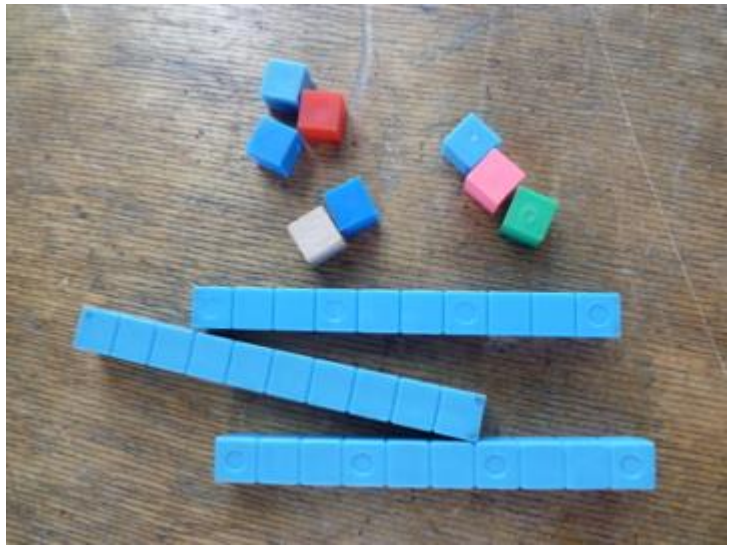
29

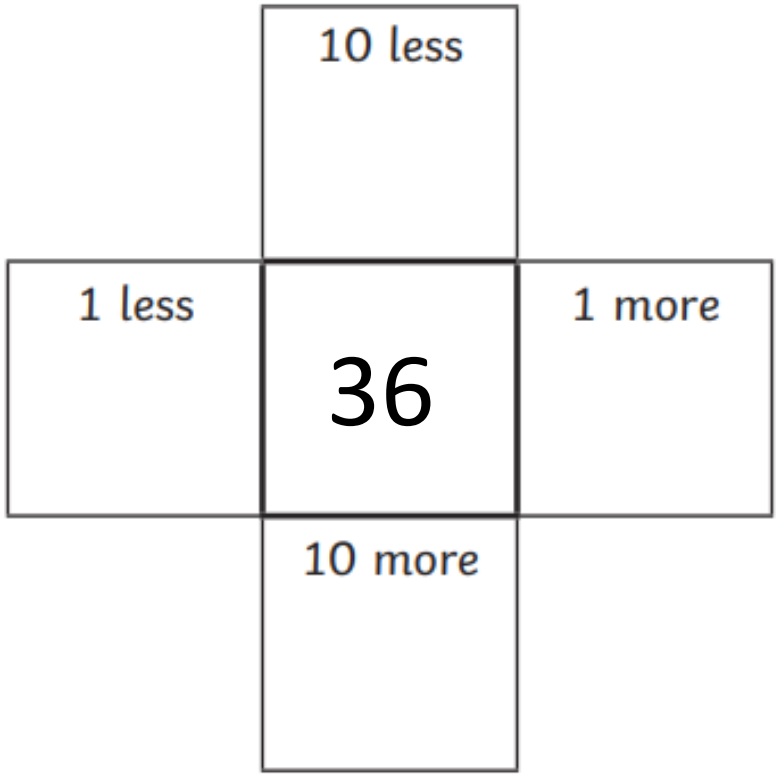
45

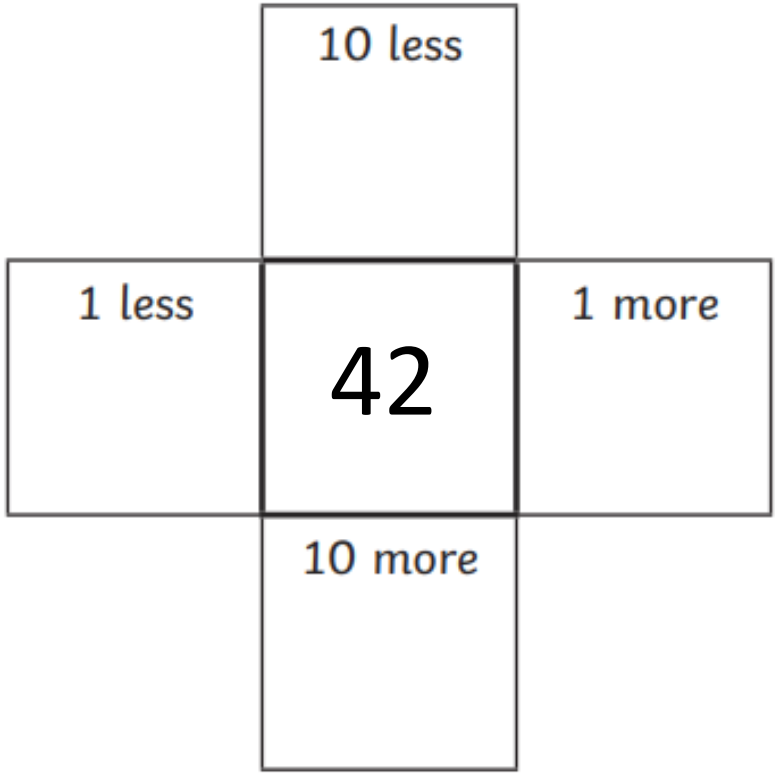
15

7

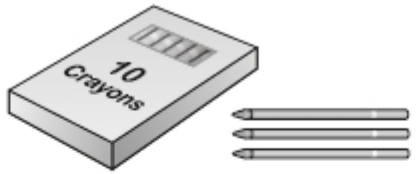
Representing numbers in different ways




10 less
1 less
36
1 more
10 more

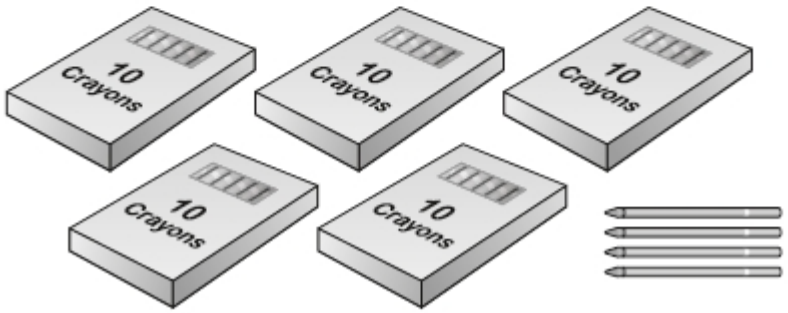

10 less
1 less
42
1 more
10 more

Ben has 13 crayons.



Here are Abdul's crayons.

How many crayons does Abdul have?

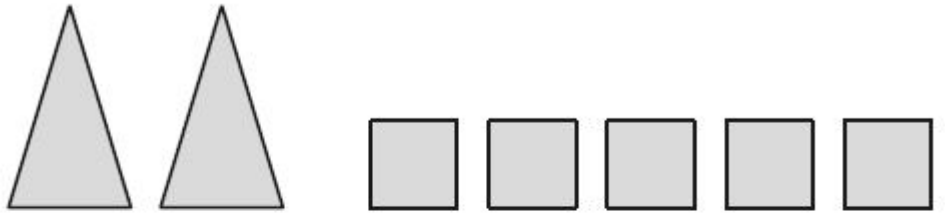


Look at these numbers.

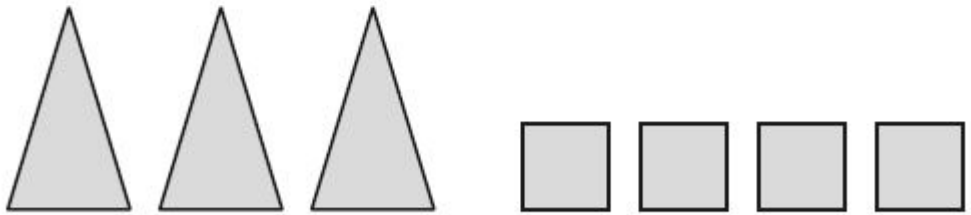
	37	12
45	60	
	72	27

Which of these numbers is between **10** and **20**?

Amy makes **25** using different shapes for tens and ones.



Amy makes a new number.



What is Amy's new number?

Addition

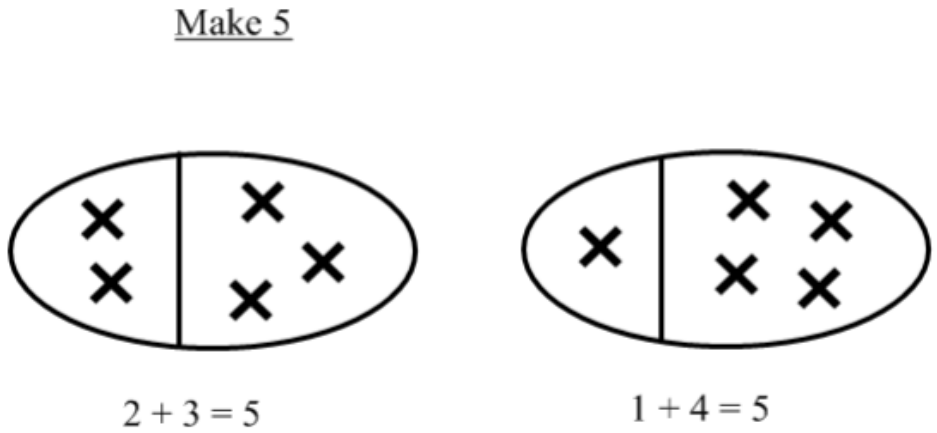
Step 1

- First steps are done practically with apparatus. For example with toy dinosaurs, counters etc. It is essential that children are fully confident in adding with apparatus before they move on.

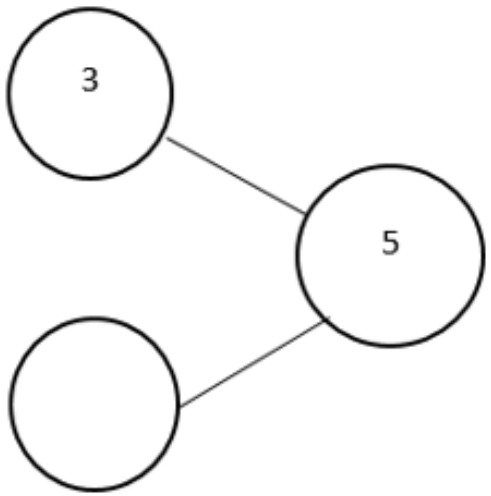
Step 2

- Next, children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, part/part/whole, visuals etc.

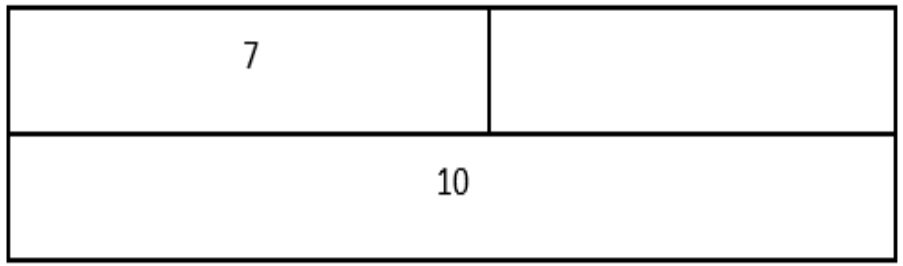
Number Bonds

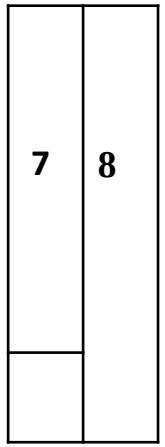


3 + ? = 5



10 = 7 + ☐

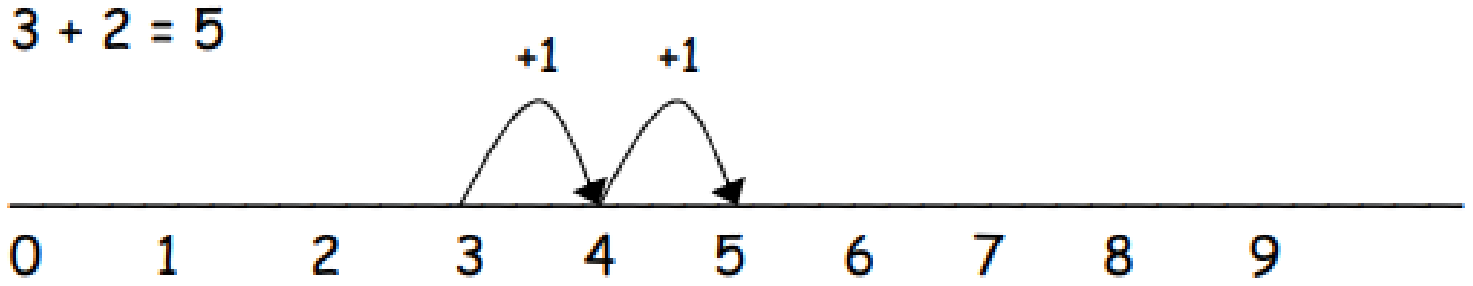




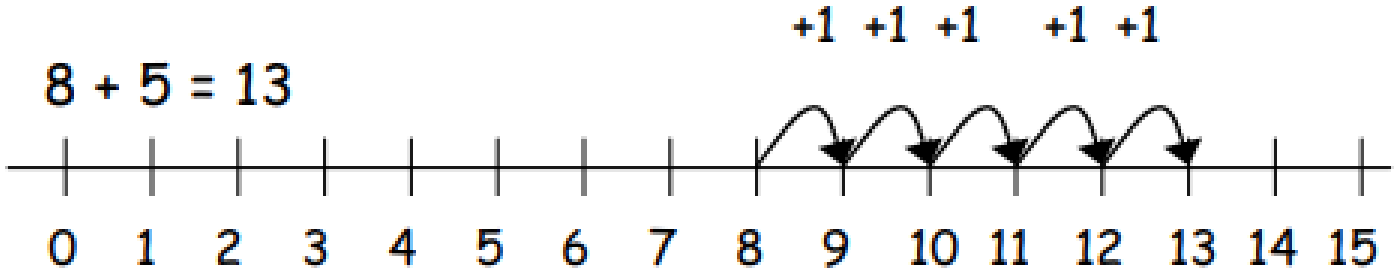
7 + ☐ = 8

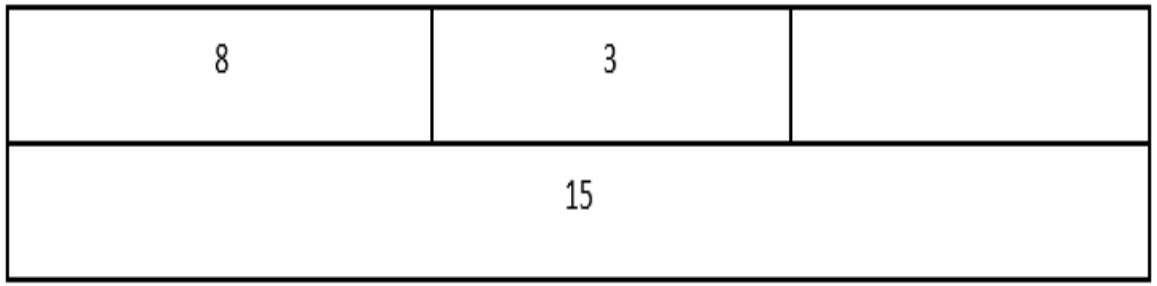
Step 3

- They use numberlines and practical resources to support calculation and teachers demonstrate the use of the numberline.



Children then begin to use numbered lines to support their own calculations using a numbered line to count on in ones.





15 = 8 + 3 + ?

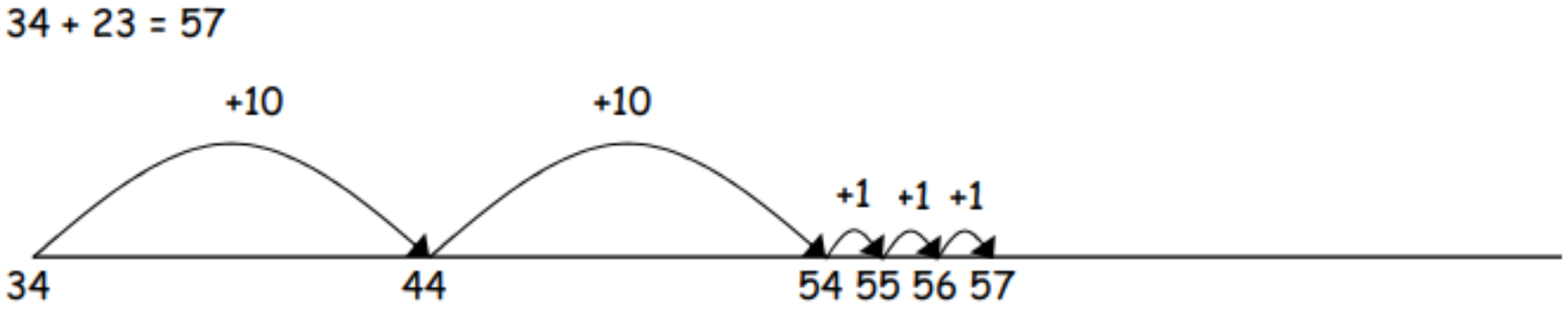
8 + 3 + ? = 15

15 = 8 + 3 + 4

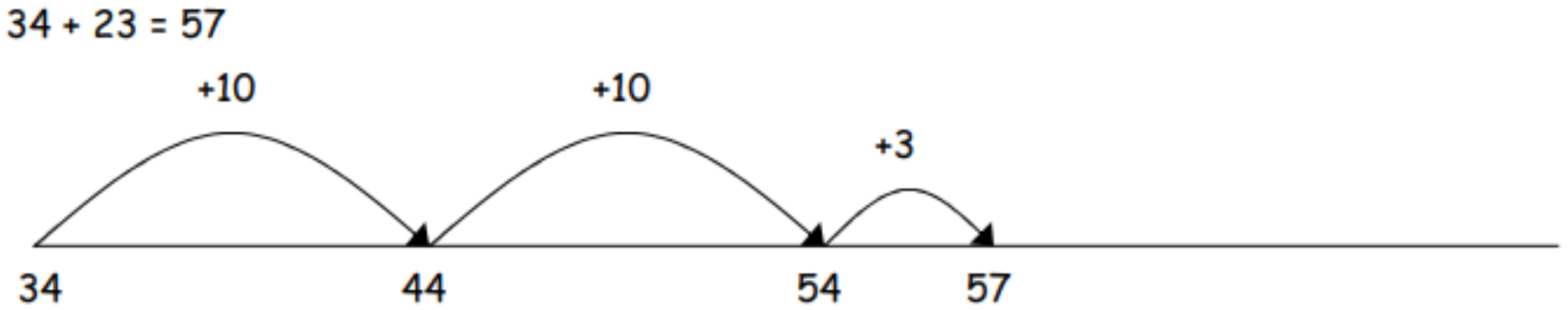
8 + 3 + 4 = 15

Step 4

- Children will begin to use ‘empty number lines’ themselves starting with the larger number and counting on.

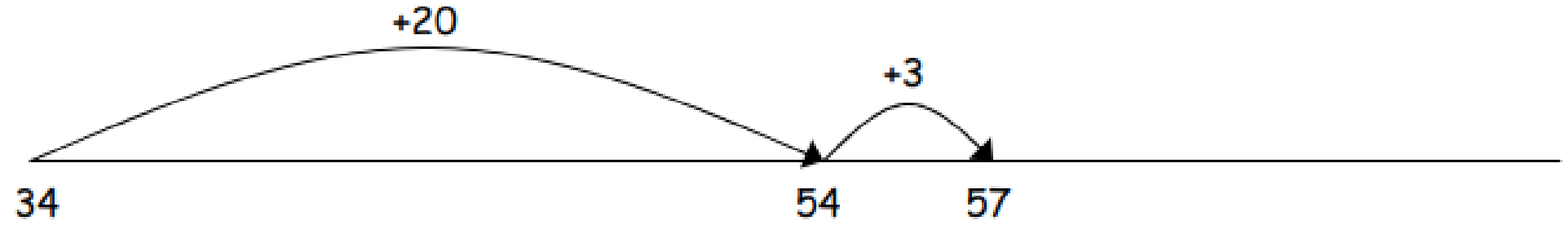


- Then helping children to become more efficient by adding the units in one jump (by using the known fact 4 + 3 = 7).



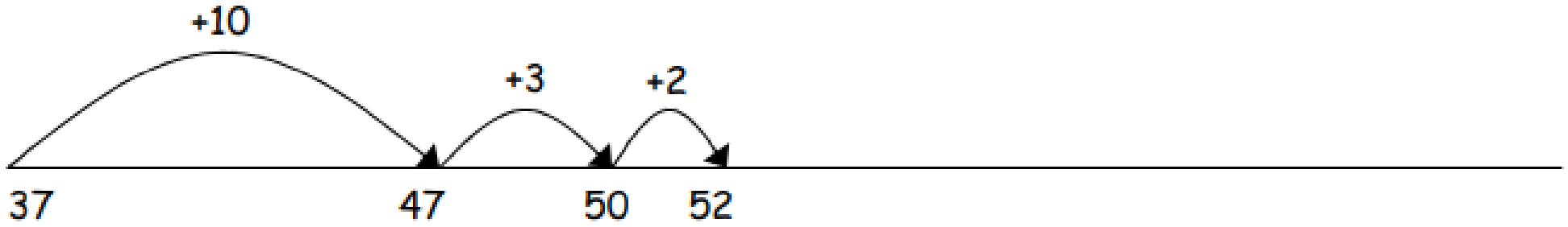
- Followed by adding the tens in one jump and the units in one jump.

34 + 23 = 57



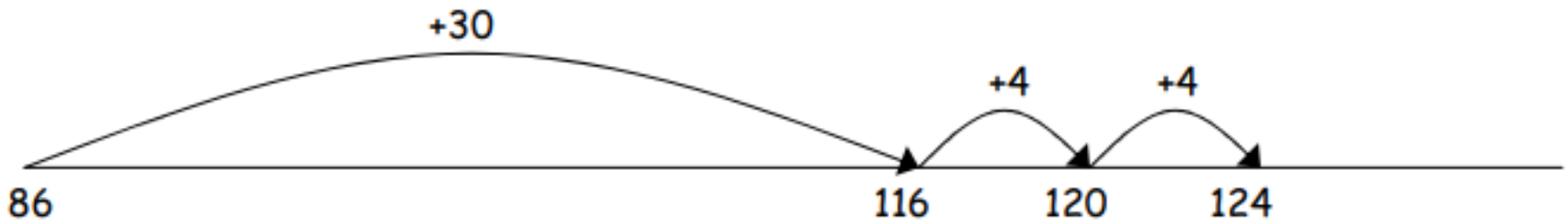
- Bridging through ten can help children become more efficient.

37 + 15 = 52



Count on from the largest number irrespective of the order of the calculation.

38 + 86 = 124



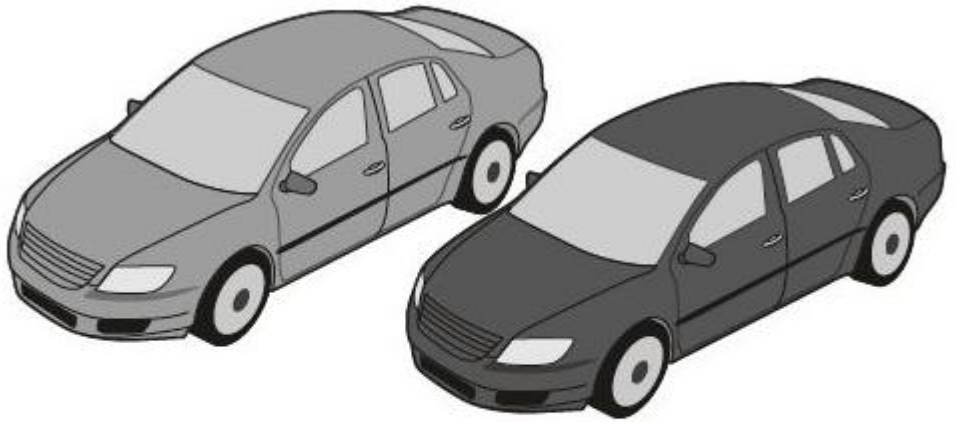
Kemi has **25** red beads and **6** green beads.

How many beads does Kemi have **altogether**?

beads

32 + 46 =

Ben and Sita count cars.



Ben counts **38** red cars.

Sita counts **23** blue cars.

How many cars do they count **altogether?**

Reasoning

Subtraction

Step 1

- First steps are done practically with apparatus. For example with toy dinosaurs, counters etc. It is essential that children are fully confident in subtracting with apparatus before they move on.

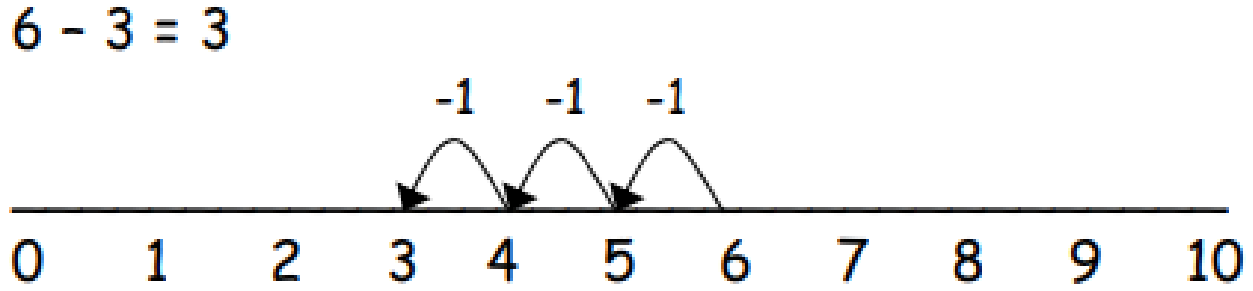
Step 2

- Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, part/part/whole etc.

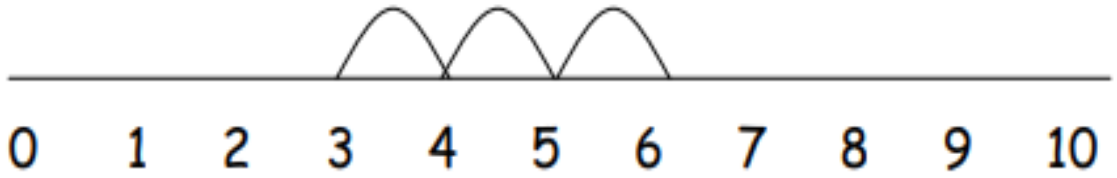
5 - 2 = 3

Step 3

- They use number lines and practical resources to support calculation. Teachers demonstrate the use of the r



- The number line should also be used to show that 6 - 3 means the ‘difference between 6 and 3’ or ‘the difference between 3 and 6’ and how many jumps they are apart. Children can find the difference by counting on as well as counting back.

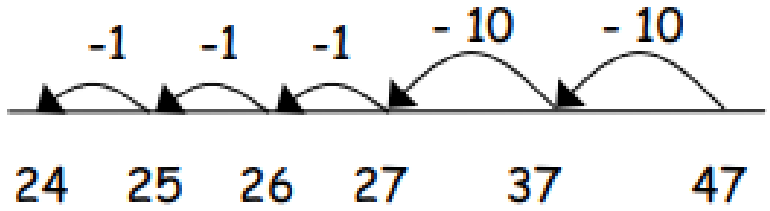


Step 4

- Children will begin to use empty number lines to support calculations.

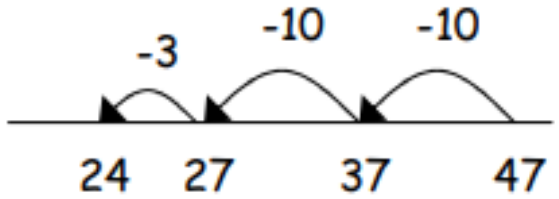
Counting back

- First counting back in tens and ones. 47 - 23 = 24

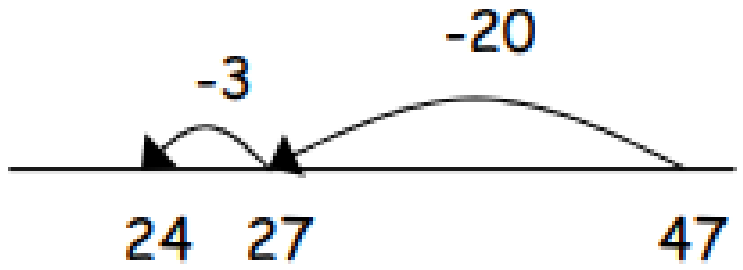


- Then helping children to become more efficient by subtracting the units in one jump (by using the known fact 7 – 3 = 4).

47 - 23 = 24



- Subtracting the tens in one jump and the units in one jump



Step 5

- **<u>Counting on</u>**

If the numbers involved in the calculation are close together it can be more efficient to count on.

54 – 49 =

Count up from 49 to 54 in their heads or using their fingers.

Ben has **63** beads.

He gives **37** beads away.

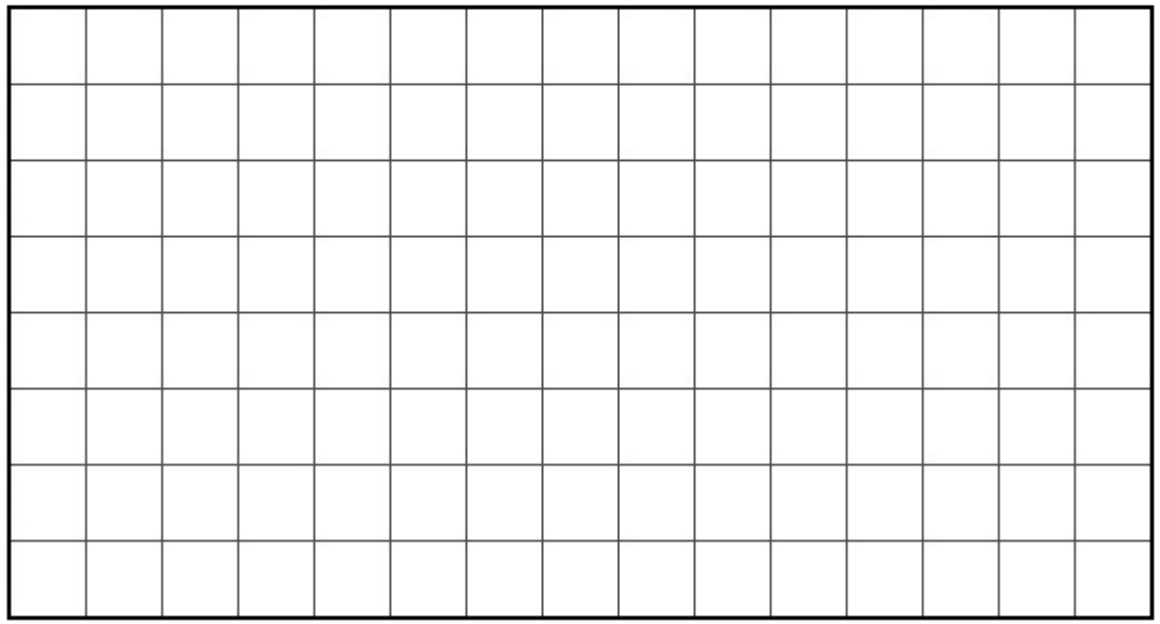
How many beads does Ben have **left**?

beads

Reasoning

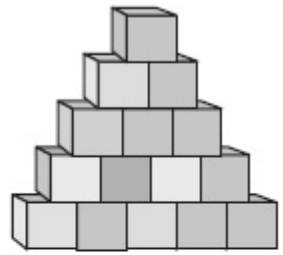
92 − 85 =

45 − 13 =



Ben wants to build a tower with **15** blocks.

He only has **9** blocks.



How many **more** blocks does Ben need?

blocks

Multiplication

Multiplication facts

- Knowing multiplication facts (tables) is a vital part of children's mathematical knowledge. By the end of Year 2 children should know:

2 times table

5 times table

10 times table

Step 1

- Children will experience equal groups of objects and will count in 2s and 10s and begin to count in 5s. They will work on practical problem solving activities involving equal sets or groups.

$2 \times 3 = 6$

Step 2

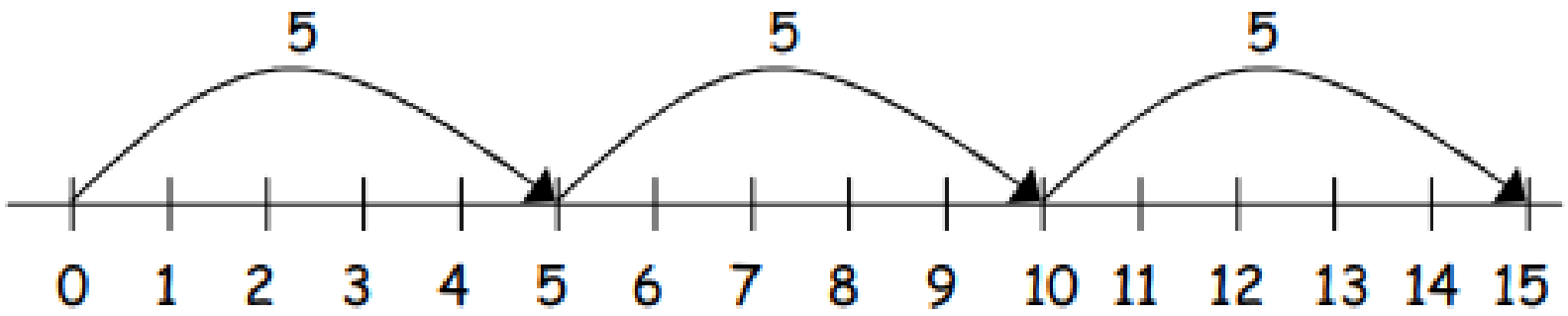
Children will develop their understanding of multiplication and use jottings to support calculation:

Repeated addition

3 times 5 is ***5 + 5 + 5 = 15*** or ***3 lots of 5*** or ***3x5***

Repeated addition can be shown easily on a number line:

5 x 3 = 5 + 5 + 5

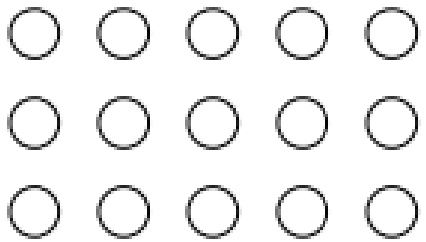


Commutativity

- Children should know that 5 x 3 has the same answer as 3 x 5.

Arrays

- Children should be able to model a multiplication calculation using an array.

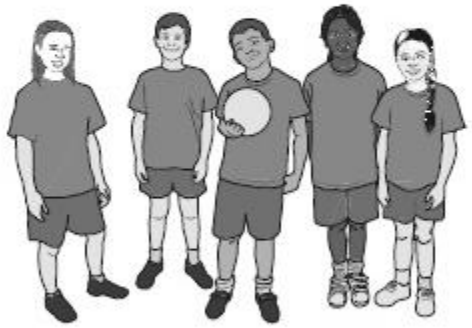


3 x 5 = 15

5 x 3 = 15

6 teams play football.

Each team has **5** children.



How many children play football **altogether**?

A classroom has **6** tables.

Each table has **5** children sitting at it.

Complete the number sentence to show how many children there are **altogether**.

☐ × ☐ = ☐ children

$2 \times 7 =$ ☐

8 children are eating plums.

Each child eats **2** plums.

How many plums do they eat **altogether**?

☐ plums

Reasoning

Division

Deriving and recalling division facts

- For example, from knowledge that 8 x 5 = 40, know that 40 ÷ 5 = 8.

Knowing division facts is a vital part of children's mathematical knowledge.

By the end of year 2:

2 times table

5 times table

10 times table

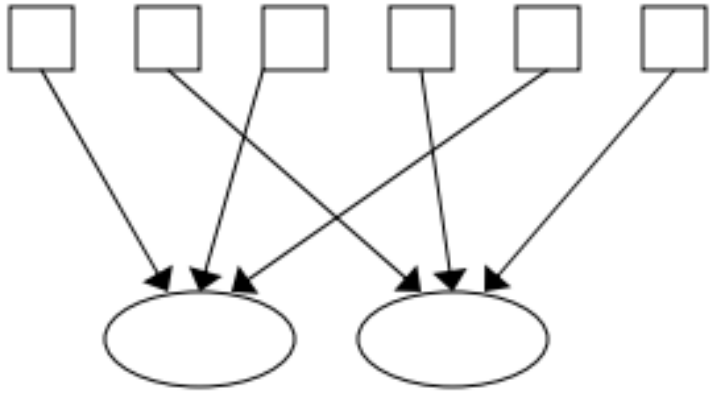
Step 1

- Children will understand equal groups and share items out in play and problem solving. They will count in 2s and 10s and later in 5s.

Share 12 crosses equally between 3.

Step 2

- Children will develop their understanding of division and use jottings to support calculation

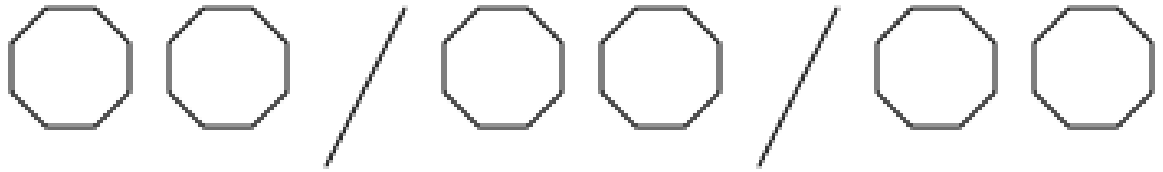


Sharing equally

6 sweets shared between 2 people, how many do they each get?

Grouping

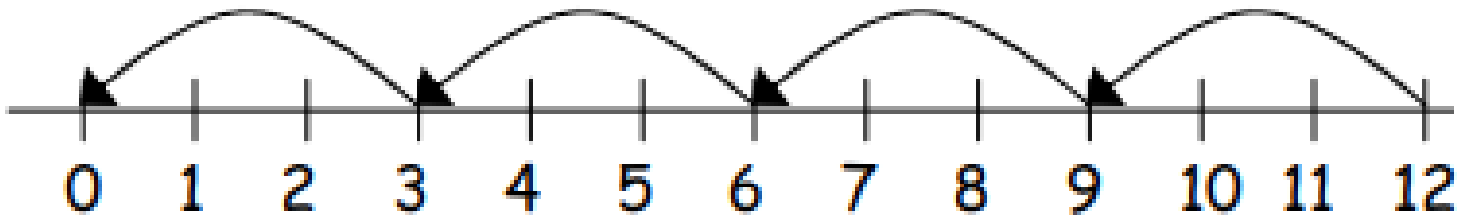
There are 6 sweets, how many people can each?



Step 3

- Repeated subtraction using a number line

$12 \div 3 = 4$



Ben has **40** cards.

He shares them equally between **4** party bags.

How many cards does he put in each bag?

cards

Sam puts **18** cards in rows.

He puts **3** cards in each row.

How many **rows** of cards are there?

rows

$15 \div 5 =$

A shopkeeper has **20** fish and **5** fish bowls.

He puts the same number of fish in each bowl.

How many fish go in each bowl?

fish