# Finding how many by grouping, and teen numbers

Activity Group
6

**In this activity group, children are encouraged to extend their verbal counting range from 10 up to 20, and, where they are ready, beyond. Activities with structured apparatus provide opportunities for children to begin to recognize the patterns in our number-naming system, and to explore number ideas through action, imagery and conversation. Alongside this, children begin to expand their counting strategies to include finding 'how many' by grouping objects into Numicon Shape patterns.**

**When talking about and using 'teen' numbers (13–19) with children, emphasize the pronunciation of the '-teen' part of the number name, to help avoid later confusion with '-ty' (e.g. confusion of 'thirteen' with 'thirty').**

**In the number rod activities, children make rod 'trains', and are encouraged to take steps towards constructing number meaning for the rods.**

**There are a variety of suggestions for involving children in making patterns, and sorting and organizing objects and equipment according to a range of criteria. This encourages them to use the kinds of systematic and organized approaches that are a feature of mathematical thinking.**

**Shape, space and measures focus: length**

**Children also compare, order and begin to measure length in a variety of contexts. The important term 'equal' is introduced as a natural part of conversation about this work.**

## Key mathematical ideas

Before teaching this activity group, refer to the Key mathematical ideas section in the Teaching Guide:

Contrasting, comparing and combining, Equivalence, Order, sequences and direction, One-to-one correspondence, The successor relation, Counting, Not-counting, Grouping and place value, Pattern and generalizing, Measuring, Shape and space, Reasoning and logic

## Communicating

Use the following words and terms and listen for children using them:

number names (one, two, three, …), teen numbers, how many?, pattern, arrange, group, tens, order, equal, the same, estimate, guess, words for comparing length (e.g. longer, longest, shorter, shortest, between)

## Learning opportunities

- To use Numicon Shapes, Numicon Shape patterns, numerals and number names confidently to represent number ideas.
- To begin to group objects into Numicon Shape patterns as an efficient way of finding out how many there are.
- To begin to represent numbers greater than 10 with Numicon Shapes and Numicon Shape patterns.
- To build 'trains' with number rods and compare their lengths.
- To compare lengths in a range of different situations.
- To sort objects into sets.
- To create repeating patterns.

## Assessment opportunities

Look and listen for children who:

- Show understanding of the words and terms for communicating in what they say and do.
- Use structured apparatus to communicate their ideas.
- Are beginning to represent numbers greater than 10 with Numicon Shapes and Numicon Shape patterns.
- Use some number names for the number rods.
- Make comparisons about the length/width/height of different objects using non-standard measures.
- Describe two objects that are the same length as being of equal length.
- Devise simple repeating patterns.
- Arrange and organize equipment in a logical way.

# All doing maths together

**Select from the activities suggested in:**

- Activity Group A: Daily maths opportunities
- Activity Group B: Daily counting activities

**Also:**

- Count with children along the Numicon Display Number Line, emphasizing clear pronunciation of '-teen'. Discuss the fact that the Numicon Shapes 1–9 are repeated to show 11–19.
- Order Numicon Shapes 1–10 with children. Agree 11 comes next and discuss how to show it with Shapes. At this stage children are likely to suggest the image they have seen on the Numicon Display Number Line. Continue to build numbers to 20. 1 Discuss the patterns children notice. Note: some children may suggest showing 11 with a 1-shape on top of the 10-shape to continue the staircase pattern. Encourage them to explore building a staircase to 20.
- Provide collections of objects. Start with collections of 1–10 objects, extending to 20 and, if appropriate, beyond. Help children to estimate how many objects there are, then to check by making Numicon Shape patterns. Where there are more than 10 objects, make 10-patterns first. Talk about these larger numbers with children, encouraging them to use Shapes and Number Lines to help. This could also be done with pieces of fruit at snack time.

> Do all of these satsumas have an equal number of segments?

- Choose a rod and discuss which other rods are longer and shorter. Talk about the fact (where it is the case) that there are several possible answers.

  Play 'swaps' and 'fill-the-gap' with an ordered set of rods, white to orange (see Activity Group 2, Activities 4 and 5).

# Activities with structured apparatus

### Activity 1 Making Numicon Shape patterns without the Baseboard

**Have ready:** Numicon Large Format Table-top Number Line, Numicon Spinners with 1–5 and 6–10 Spinner Overlays (cut from photocopy master 6), counting objects, e.g. 1p coins, Numicon Feely Bag

Children take turns to spin a number, read it aloud, arrange counting objects into the matching Numicon Shape pattern and find the number on a Number Line.

**Variation:** use plastic numerals in a Feely Bag.

### Activity 2 Finding how many with Numicon Shape patterns

**Have ready:** Numicon Shapes, Numicon Baseboards, Numicon Coloured Pegs, Numeral Cards 1–10 (cut from photocopy master 2), Numicon Large Format Table-top Number Line

Put 10 or fewer Pegs on the Baseboard, at random. Children estimate how many there are, then find out by grouping them into Numicon Shape patterns (without counting). They check by fitting Shapes over the Pegs and matching them to a Number Line.

> Can we use Numicon Shape patterns to find how many there are?

**Variation:** turn over a Numeral Card for children to build the matching Numicon Shape pattern.

**Increased challenge:** extend to 20 and beyond, as appropriate.

### Activity 3 Finding how many pictures on gift wrap paper

**Have ready:** Numicon Shapes, Numicon Coloured Pegs, Numicon Baseboards, Numicon Display Number Line, gift wrap with repeating pictures

Provide gift wrap. Start with pieces that show 10–20 pictures and extend when children are ready. Children estimate the number of pictures, then find out by 'tagging' each picture with a Peg and grouping the Pegs into Numicon Shape patterns on a Baseboard. They say the number and find it on the Number Line.

**Increased challenge:** ask children to make Numicon Shape patterns on the tabletop.

### Activity 4 Exploring rod trains

**Have ready:** number rods

Ask children to make 'trains' with rods of the same type. Encourage them to compare their trains by number of rods and length. 2

> How many 'carriages' does your train have?
>
> What is the longest train you can make with five rods? How do you know?
>
> Which other rods would make a train of the same length?

### Activity 5 Making trains with white rods

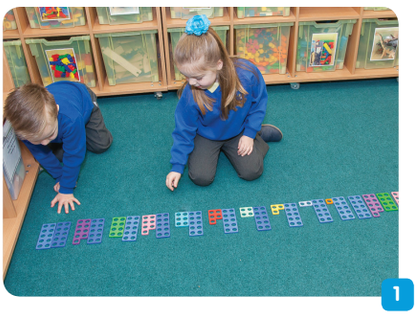
**Have ready:** number rods

Children choose different rods (other than a white rod) and, for each one, experiment to find how many white rods are needed to make a train the same length.

### Activity 6 Linking rods, number ideas and Numicon Shape patterns

**Have ready:** number rods

Give children a container of 10 white rods. Children take some (without counting), and find how many by grouping them into a Numicon Shape pattern.



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# Exploring maths all around us

## Outdoor maths and physical play

- Ask children to run, skip or hop, then, when you give a signal and hold up a Large Foam Numicon Shape, stop and arrange themselves into groups with the number of children matching the Shape. Begin with, e.g. the 2- and 3-shapes, and move on to larger numbers over time.

  Increased challenge: children arrange themselves into the Numicon Shape pattern for the number.
- Provide ribbons and scarves of different colours, lengths and patterns for children to play with creatively.

  Model and invite children to 'draw' 2D shapes in the air with dance ribbons.

  > Can you make big circles?
  > Can you make straight lines?
  > What shapes can you make?

  Encourage children to talk about the different patterns, lengths and widths of the ribbons and scarves. They can select several and order them from shortest to longest or longest to shortest.
- Provide skipping ropes of different lengths.
- Play 'snake hide and seek': hide soft-toy snakes or laminated snake pictures (see Expressive arts and design) for children to find and then order by length. 3

  Encourage children to describe where they find the snakes using positional language, e.g. behind, in front of, above, below, on top, under, inside, and to talk about length when ordering the snakes.
- Set out objects, e.g. cones, shapes, toys, in repeating patterns of, e.g. type, colour; encourage children to describe and continue the patterns, and create their own. 4

  Variation: ask children to sort objects into sets by, e.g. colour, shape.

## Sand, water and messy play

- Bury collections of small objects of different types, e.g. plastic lids, shells, pebbles, in wet sand for children to find and sort, then find how many in each set by grouping them into Numicon Shape patterns. Encourage them to think about different criteria for sorting, e.g. type, size, colour. 5
- Push straws of different colours and lengths into wet sand so that the length left above the sand is the same. Ask children to pull out two straws and say how they compare, e.g. 'The yellow straw is longer than the pink one.'

  Increased challenge: children pull out a third straw and compare it to the first two, or pull out three or more at a time.
- Invite children to make modelling dough snakes, and compare and order them by length.

  > Can you make three snakes, all of different lengths?
  > Can you make two snakes of the same length?

  Children may also like to decorate their snakes with repeating patterns by scoring them with different marks or making impressions with different objects, e.g. pen lids, paper clips. 6
- Make Numicon number line head bands: children cut out Printable Numicon Shapes (available on the Oxford Owl website) and stick them on a strip of paper or card to show a number line, then join the ends to make a head band to wear and keep.

## Expressive arts and design

- Set up an area with, e.g. a piece of garden netting or a bicycle wheel into which children can weave different-length strips of interesting materials, e.g. fabric, ribbon, plastic from plastic bags, gift string. Encourage children to talk about what they are doing and how the design is developing, describing and comparing lengths, shapes and materials.

  > Why did you choose that ribbon?
  > What shapes can you weave in?
  > Could we weave that in again, but make it bigger this time? How?

- Provide outline pictures of snakes of different lengths for children to decorate with repeating patterns. They might create patterns of, e.g. thick and thin lines, large and small marks, different 2D shapes, different colours. Cut out and laminate the pictures for children to use in 'snake hide and seek' (see Outdoor maths and physical play).


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## Games, puzzles and tabletop

- Provide a container of identical small objects, e.g. interlocking cubes, building bricks, that children can lay end to end or stack to measure lengths, as well as a selection of interesting items to measure.

  Invite children to choose an item and find its length, width or height using cubes to equal its length, width or height. Talk about how to do this, e.g. making sure the cubes are touching and lined up with the end of the item. 7

  > How many bricks long is the car?
  > What can we do to make sure the bricks make the same length?
  > What if I left a gap between these cubes? What would happen to my answer?

- Invite children to make repeating patterns by threading different beads onto laces of different lengths. 8

  > Which lace are you going to use?
  > Can you tell us about your pattern?

- Provide a selection of jigsaws that show numbers 1–10 and 1–20.
- Provide a variety of materials for children to use to create their own number lines and games, including strips or squares of paper or card, colouring pencils or pens, whiteboards and dry-wipe pens, and a variety of objects, e.g. socks, tinsel, beads.
- Ask children to work on the next number in their counting and number ideas book.

## Role play, small world and construction

- Work with children to devise ways of ordering and arranging equipment when it is set out at the start of the day or session. Encourage them to leave it the same way at the end.
- Provide several dressing-up items of the same type, e.g. aprons, scarves, shirts, skirts, in different lengths or sizes, for children to use and discuss. As children explore how the clothes fit, they will be discussing size and length.
- Set up a role-play vet's surgery or toy hospital with different-sized toy animals and bandages for children to play with and talk about. 9

  > Which bandage will you use for this teddy? Why?

  Include a cash register, coins and blank 'forms' for children to use to pay for treatment, write invoices and receipts, and so on.

  > How much will it cost to treat my horse?

- At the beginning or end of a session or day, set out objects, e.g. natural objects, toy cars, in lines of different lengths. Talk about the lines with children.

  > Which line is the longest?
  > Are there any lines of equal length?

## Stories, songs and rhymes

- Share and talk about stories that refer to length.
- Sing songs involving different lengths or add new verses to songs. Discuss these with children, encouraging them to describe and compare them, e.g. how a song is getting longer and longer.
- Recite new number rhymes with children, including numbers beyond 10.

## Other curriculum links

**Understanding the world – People and communities**

- Role playing being at the vet's surgery.

**Understanding the world – The world**

- Thinking about animals at the vet.
- Sorting and ordering objects, including natural objects.

**Understanding the world – Technology**

- Grouping on-screen pictures into Numicon Shape patterns.

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# Halving and sharing

Activity Group
12

**These activities encourage children to explore sharing fairly and finding half. These ideas are explored in many ways throughout all areas of the setting, building on children's everyday experience of sharing to help them understand that fair shares are equal. Connections with number ideas are made through sharing collections of up to 10 objects into two equal parts, including using Numicon Shape patterns. Developing the language for sharing, and the ideas of fair shares and halving, lays important foundations for children's later work on dividing and fractions.**

**Shape, space and measures focus: 2D and 3D shapes**

**Children continue to explore sharing by finding half by weighing, sharing liquids, and cutting fruit, cakes and sandwiches in half, noticing the resulting shapes.**

## Key mathematical ideas

Before teaching this activity group, refer to the Key mathematical ideas in the Teaching Guide:

Equivalence, Part-whole relationships, Fractions, Counting, Not-counting, Pattern and generalizing, Dividing, Measuring, Shape and space

## Communicating

Use the following words and terms and listen for children using them:

number names (one, two, three, ...), whole, fair, share, equal parts, equal share, equal number of, half, halves, halve

## Learning opportunities

- To create shares and equal shares of a whole or an amount.
- To understand that a 'whole' can be made up of different-sized parts or parts that are the same size.
- To identify and create two equal parts and know that each part is called a 'half'.
- To begin to realize that a whole shape can be halved in different ways.
- To halve collections of up to 10 objects accurately.
- To find 'half' of Numicon Shapes.
- To find two identical number rods that are equal in length to one larger rod.

## Assessment opportunities

Look and listen for children who:

- Show understanding of the words and terms for communicating in what they say and do.
- Use structured apparatus to communicate their ideas.
- Share whole objects equally.
- Share collections of discrete objects equally.
- Divide a 'whole' into different-sized parts and parts that are equal in size.
- Halve whole shapes in different ways.

# All doing maths together

**Select from the activities suggested in:**

- Activity Group A: Daily maths opportunities
- Activity Group B: Daily counting activities

**Also:**

- Talk with children about objects that can be shared easily and objects that cannot, including how some objects are made up of smaller parts. Look at a range of different items, e.g. a satsuma that breaks into segments; a wrapped loaf that breaks into slices of bread; a jug of juice that can be poured into beakers; an apple, cake or pizza; a collection of identical objects; a collection of ribbons; a bag of shells; a DVD.

  Agree with children that some things have smaller parts that make it easier to share them, other things can be shared by cutting/separating and some things cannot be cut but can be 'shared' or enjoyed in a different way, e.g. all take turns to borrow a DVD or watch it together.

  How could we share this?

- Give children sharing problems and talk about different possibilities, e.g. a share in (or part of or piece of) a cake or drink may vary in size. Some people like a small slice or a big drink, but sometimes everyone likes it to be fair and to have the same size, or an equal part.
- Set out a collection of interesting objects. Talk about how many children are going to share the collection and share it out.

  Does it share fairly? How do you know?

  Some children may decide to count to find out. Children group the objects into Numicon Shape patterns and check. Talk about how to make it fair. 1
- Discuss the word 'half' and invite children to share their ideas, e.g. 'half each', 'half past', 'halfway'. Agree that 'half each' means that each of two people gets a fair share.

# Activities with structured apparatus

## Activity 1 Halving collections

**Have ready:** collections of interesting objects (initially up to 10) in different pots

Children have one pot between two and estimate how many objects are in their pot. They then share out the collection. Talk about whether it can be shared fairly and whether each child has an equal share or number. Children check by arranging their share into a Numicon Shape pattern to see if anyone has one more or one fewer. 2

## Activity 2 Halving Numicon Shapes

**Have ready:** Numicon Shapes, Printable Numicon Shapes (available on the Oxford Owl website), extra paper

Children choose a Shape and find the matching paper Shape. Discuss how they could cut it in half. They stick both halves onto paper. 3

Which Shapes can you cut in half exactly?

## Activity 3 Sharing Pegs from Numicon Shape patterns

**Have ready:** Numicon Shapes, Numicon Coloured Pegs

Children choose a Shape and fill it with Pegs. They share out the Pegs with a few other children and decide whether everyone has an equal share or whether anyone has more or fewer Pegs. Discuss how to make it fair, so everyone has an equal share. Check by finding the corresponding Shapes.

## Activity 4 Sharing collections

**Have ready:** Numicon Shapes, collections of interesting objects, selection of small pots

Children choose a pot and fill it with objects. They share out the objects with their friend(s) and decide whether everyone has an equal share or whether anyone has more or fewer.

Do they share fairly? How do you know?

How can you make it fair so everyone has an equal share?

Check by finding the corresponding Shapes.

## Activity 5 Rod trains to match a longer rod

**Have ready**: number rods

Children choose a number rod and then experiment to find another rod that, when several are placed end to end, fits alongside the first rod exactly.

Do the red rods fit exactly along every other rod?

What about the light green rods?

**Variation:** children find out whether it is possible to use two identical rods that equal the length of the bigger rod.

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# Exploring maths all around us

## Outdoor maths and physical play

- Play games where children run halfway around the hall or halfway around the outside area.

  Discuss children's ideas about how they will know they have run halfway.
- Ask children to get into groups of six or eight (depending on their counting and social skills). Encourage them to arrange themselves so that half of each group sits down while the other half stands up tall, then half lies down while the other half kneels, and so on. 4

  Challenge groups to arrange themselves into the Numicon Shape pattern for their number.

  Does everyone have a partner?
- Cut pictures, e.g. old greetings cards, postcards, pictures from magazines (stuck onto card), in half. Hide the halves around the outside area for children to find two halves to complete a whole picture.
- Share out beanbags fairly for children to throw into Numicon buckets (see Activity Group 4, Fig. 5). Encourage children to throw two beanbags each, and add to find the total of their scores. Provide Numicon Shapes for children to use to help them add. 5

  Can you find the total on a number line?

## Sand, water and messy play

- Hide treasure in wet sand (or another suitable material) for children to find and then share with a friend.
- Put teacups and a teapot in the water tray. 6

  Can you share the tea between two cups, one each for you and your friend?

  What would happen if another friend wanted a drink?
- Give children cups and bottles to use with coloured water. Invite them to work in pairs. Set them the challenge of sharing a 'bottle of juice' fairly between two cups.
- Put containers of different sizes and shapes in the sand or water tray for children to work together to half-fill. 7

  How will you know when the container is half full?
- Provide modelling dough for children to share equally with a friend, checking the shares are equal using a pan balance (e.g. the Numicon Pan Balance). Encourage them to make different items or shapes to cut in half (or into fair shares) and share with a friend(s), e.g. a flat 'pizza', a cupcake, a pie.
- Provide tubs of interesting stones and shells for children to share, including sharing out equally.

## Expressive arts and design

- Explore symmetrical printing using paint and a range of 3D shapes.
- Share interesting-shaped sponges or cut potatoes fairly between children. Invite them to make repeating or symmetrical patterns on paper or fabric to use as drapes in role play.
- Use chalks to create patterns on boards and the playground.
- Give children a range of media, such as lengths of paper, string, tinsel, paper shapes, that they can fold or cut in half to create their own collages. Invite them to make designs or repeating patterns with halved shapes. Encourage children to work with a partner, sharing their ideas and working together.

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## Games, puzzles and tabletop

- Provide a range of games and puzzles that involve matching two halves of a picture.
- Invite children to take photos of only half of various familiar objects. Share and discuss them, then print and laminate the photos. Encourage children to experiment with mirrors to make the reflection reveal the whole object. 8
- Help children to make their own books about half and sharing fairly. Start by folding sheets of paper in half and stapling them together into a booklet for them to illustrate with their own ideas.
- Make simple chocolate crispy buns with a group. Talk about the number of pieces in a bar of chocolate as children help to break it up.

> Can we break the bar in half?
>
> How many squares in half a bar?
>
> How many paper cases will we need so everyone in the group can have two buns each?

  Choose a child to share out the crispy buns for everyone to take home.
- Make simple biscuits with children. After rolling out the dough and cutting it into different shapes, ask children to cut the shapes in half.

> What two shapes will you have if you cut your square biscuit in half?
>
> Can you cut it in half in a different way to make different shapes?

- Make simple, healthy sandwiches using a slice of bread with a choice of grated cheese and carrot, sliced tomatoes, cucumber and salad leaves. Put filling on half of the slice of bread, fold the bread over and then slice in half, talking about what 'a half' means.
- Ask children to work on the next number in their counting and number ideas book.

## Role play, small world and construction

- Provide children with plastic food that has hook and loop fastenings so that it can be 'cut' in half and 'stuck' back together. 9
- Provide a marble run with 10 marbles and a Numicon 10-shape. Choose different numbers of children to play and encourage them to share the marbles fairly. 'How many marbles will you have each if you share them with a friend?', 'How many each if you share them between five friends?'
- Set up a role-play bakery making 'cakes'. Children share counters and cut straws (to represent cherries and candles, respectively) between two or more cakes. Encourage children to share the decorations in different ways.

> Can you count out ten cherries and share them equally between two cakes?
>
> How many cherries would be on each cake if you shared the ten cherries between three or four cakes?

- In role play, share out equipment and dressing up resources and encourage children to take turns to play.
- Set up a picnic where children share equipment out between picnickers to lay places and share food fairly.
- With small-world resources, encourage children to share 'special' pieces fairly, e.g. trains and carriages, cars and special creatures or play people.

## Stories, songs and rhymes

- Encourage children to share stories with a friend, taking turns to 'read', talk about the story and ask questions. 10
- Use counting songs like Four Fine Flags, Six Ice Creams and Nine Shells on the Beach from *Numicon at the Seaside* as a starting point to discuss sharing in different ways.
- Invite children to compile their photographs of halves of familiar classroom objects into a class puzzle book, then share and discuss what the objects are.
- Read stories about sharing.

## Other curriculum links

**Physical development – Health and self-care:**

- Healthy diet.
- Basic hygiene when cooking.

**Personal, social and emotional development – Making relationships:**

- Working as part of a group, sharing and cooperating.

**Understanding the world – The world:**

- Learning about changes when cooking.

**Understanding the world – Technology:**

- Taking photographs using a tablet or digital camera and sharing them.

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