

Essential foundations for counting



Pattern

The HfL Primary Mathematics and Early Years teams would like to thank the following settings for their support in the production of these materials:

Four Seasons Pre-school, Stevenage
Roebuck Primary School, Stevenage
Watton-at-Stone Primary School and Nursery
Little Tulips Day Nursery, Welwyn Garden City
Watford Field Infant and Nursery
Coates Way Juniors Mixed, Infants and Nursery School, Watford
Fingerprints Preschool, Watford
Oakwood Primary School, St Albans

This document is designed to work alongside the Early Years Foundation Stage statutory framework and guidance from the DfE, to build a sense of number and quantity across the EYFS. It provides practical suggestions to achieve firmly embedded pre-counting skills and enrich further learning opportunities. The scaffolding of high-quality language, for use by adults and children, is a key ingredient of the resource and is informed by the **HfL Working mathematically** document.

Each of the skills – **comparison, classification, pattern** and **group recognition (subitising)** – is organised in a progression of four steps, in which children notice, **copy, extend** and **create**. Guidance for “What adults could do” and “What adults could provide”, as well as the “Behaviours a child could demonstrate to show understanding” for each of these, is included.

Skill	What adults could do	What adults could provide	Behaviours a child could demonstrate to show understanding
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Introduction

Have you ever thought about what comes before counting? Advisers from the HfL Early Years and Mathematics teams have been working together with practitioners from schools and settings to answer this question. Sometimes the results were surprising. Adapting practice and provision in the very early stages of learning is vital in underpinning the essential foundations for counting.

"This has been a valuable project for us as staff and ultimately in extending and developing the learning of our children. Thank you :)"
EYFS Leader, Watton-at-Stone Primary School

"We didn't realise how much comes before counting and numbers and have already been implementing some of the ideas and activities with our children."
Manager, Four Seasons Pre-School

From the action research, as part of the development of these materials, the powerful learning that we saw did not include any numerals at all but instead focused on children's language, thinking and understanding. This formed the basis of the four pre-counting skills, which you will find in the accompanying booklets, along with lots of ideas for how to make this happen for your children. A range of research has shown that many children have been missing out on these pre-counting skills, which form the foundation of all mathematical understanding.

Comparison

Classification

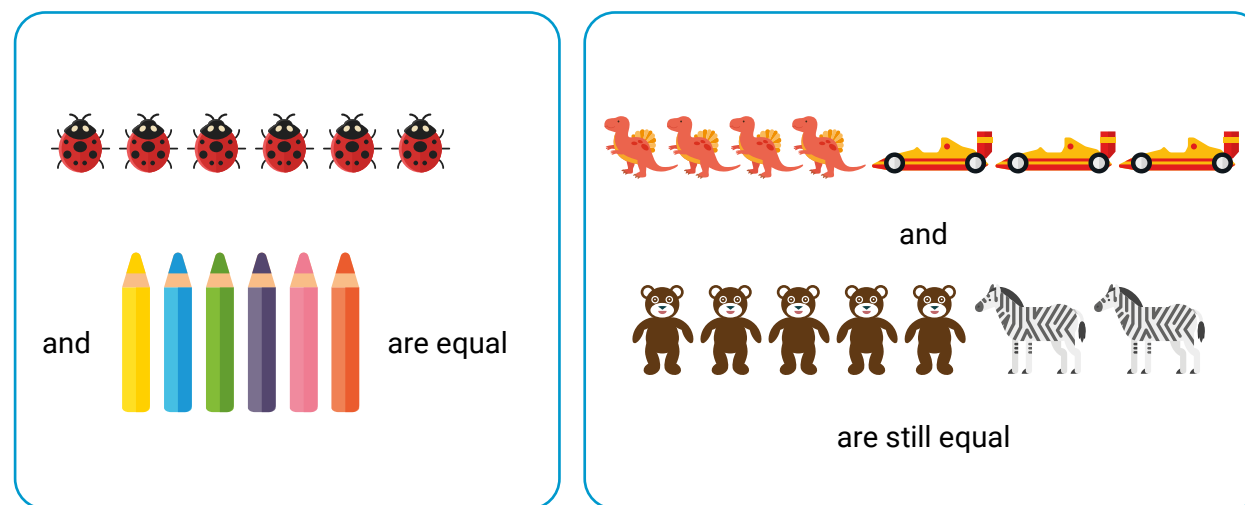
Pattern

Group recognition (Subitising)

Often practitioners tell us that it is difficult to find enough evidence for mathematical development through their observations. These materials will support you and your team in providing more opportunities during child-initiated play, and in developing staff skills and high-quality language for mathematical learning.

By working closely with practitioners, we have developed a progression in pre-counting skills. We have decided to call the steps **notice**, **copy**, **extend** and **create**. There is an interconnectivity between the skills, when children are presented with rich mathematical learning opportunities and environmental provision.

The crucial principle of **conservation** (i.e. where children understand that a quantity will not change even when the objects compared appear to be different in size or move their position) permeates throughout the four pre-counting skills and will benefit from lots of practice.



Comparison

Classification

Pattern

Group recognition (Subitising)

Conservation

We need to ensure that children experience and explore the idea that a quantity does not change just because we are counting objects of different types and sizes, moving objects, or creating different arrangements of objects. Children will continue to secure their understanding well into Key Stage 1.

Pattern

What is it?

Mathematics is essentially the study of patterns. Creating, constructing and describing patterns requires problem-solving skills, which form an important part of mathematics learning. Patterns can be based on a range of attributes or sometimes a combination of several. A sense of number and mathematical exploration grow from such patterning. In the early years, patterns help children develop number sense, ordering, counting and sequencing. Patterns are inviting and stimulating, as they require mental and sometimes physical involvement.

Opportunities to create and explain pattern are limitless, but the following should be regular:

- copying a pattern
- finding the next one
- extending a pattern
- making their own patterns

What does it look like in EYFS?

Children will naturally **notice patterns within their experiences** and will begin to **make links** between the similar patterns they find. It is important that children make the connection that patterns are created in many aspects of learning and are abundant in the **world around them**. It is the repetitive nature of something that makes it a pattern, so this means that patterns can be found in a dance, a song, threaded coloured beads, veins on a leaf, or a staircase made from wooden blocks, to name but a few. Once patterns are identified, children will seek out further examples or create their own, by **playing with what they know** and **initiating their own activities**. The copying, extending or creation of a pattern enables children to **enjoy what they set out to do** and encourages them to **maintain their focus** and **pay attention to detail**. **Predictions** can be made, and discussions about how best to create or continue the patterns will encourage **planning, making decisions** and **problem solving**, both before and during the activity. Children will have to **check how well they are doing** and **change strategy** if needed. As patterns are continuous, children will be able to show **satisfaction at meeting their own goals** and be **proud of accomplishing** a pattern that could be continued or developed further.

What it leads to

Patterns are in all areas of mathematics. The number system itself is a pattern, which needs to be explored before place value can be understood. Children will learn to recognise the patterns of more and less, using a variety of number representations. Once children have explored these, they can understand the importance of 10 within the place value system.

There are many patterns within calculation, and children need time and opportunity to explore these, e.g. why $7 + 8 = 6 + 9$.

Children are often quick to notice the patterns when using shape sequences. Children can identify rules and order. This is the beginning of algebra.

Vocabulary

same

different

repeat

again

follow

order

next

Statutory mathematics educational programme

Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers. By providing frequent and varied opportunities to build and apply this understanding - such as using manipulatives, including small pebbles and tens frames for organising counting - children will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built. In addition, it is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures. It is important that children develop positive attitudes and interests in mathematics, look for patterns and relationships, spot connections, 'have a go', talk to adults and peers about what they notice and not be afraid to make mistakes.

Statutory framework for the early years foundation stage

Setting the standards for learning, development and care for children from birth to five – published March 2021.

In planning and guiding what children learn, practitioners must reflect on the different rates at which children are developing and adjust their practice appropriately. Three characteristics of effective teaching and learning are:

Characteristics of effective learning		
Playing and exploring children investigate and experience things, and 'have a go'	Active learning children concentrate and keep on trying if they encounter difficulties, and enjoy achievements	Creating and thinking critically children have and develop their own ideas, make links between ideas, and develop strategies for doing things

For further detail, refer to non-statutory guidance

Working mathematically

By linking the **Characteristics of effective learning** to the **HfL Working mathematically** document, as illustrated below, it is possible to see how children's reasoning and problem-solving skills can be developed in all learning, deepening the application of their mathematical understanding. It is crucial that adults focus on language development. This enables children to engage in rich mathematical talk and demonstrate their understanding.

Application	
Ideas, questions and lines of enquiry	• chooses and identifies ways of bringing mathematical thinking to everyday activities - <i>shows curiosity, is willing to have a go and begins to develop an approach, e.g. trial and error</i> - <i>makes connections and asks questions about aspects that are familiar</i> • selects appropriate resources and adapts work where necessary • asks appropriate questions relevant to the activity and finds new ways to do things
Represent and communicate	• uses talk to connect ideas and describe what is happening - <i>creates simple representations of the story of the problem</i> • captures experiences and responses in a range of ways - <i>constructs and/or makes marks with a purpose in mind</i> - <i>records, using marks that they can interpret and explain</i> • uses talk to organise their activities, taking account of one another's ideas, and checks how well it is going • in practical activities and discussion, begins to use the vocabulary involved in mathematical thinking
Plan an approach and implement it	• draws on their knowledge of their familiar world to make decisions about how to approach a task, solve a problem and reach a goal • initiates activities and seeks challenge, applying their knowledge of mathematical concepts and appropriate vocabulary, e.g. counting, comparing, pattern making • checks how well their activities are going, changes strategy as needed and reviews how well the approach worked
Computational complexity (within the range of number facts known)	• shows an interest in number problems • responds to instructions involving a two-part sequence

Reasoning	
Make connections	• uses talk to make links and notice patterns in their experiences • uses their experience to test their ideas and anticipate what might happen • comments and asks questions about aspects of their familiar world
Evaluate	• questions why things happened and gives explanations
Draw conclusions	• makes predictions and tests them, e.g. developing ideas of grouping, sequences, cause and effect • answers how and why questions about their experiences
Generalise	• recognises similarities between learning experiences and begins to use this understanding in new contexts - <i>realises not only objects but anything can be counted, including steps, claps or jumps</i> • builds up vocabulary that reflects the breadth of their experiences to describe patterns and characteristics of the world around them
Justify	• uses talk to clarify thinking • talks about why things happen and how things work

Problem solving
• chooses ways to do things • checks how well their activities are going • notices patterns in their experiences • uses a range of ways to capture experiences • looks closely at similarities, differences, patterns and change • makes decisions about how to approach a task



Criteria for planning and assessing pattern

Pattern	What adults could do	What adults could provide	Behaviours a child could demonstrate to show understanding
Notice	• point out patterns seen in the environment and talk about the repetition • teach children songs and rhymes and note the repetition, using actions to highlight the repetitive phrases • play sound patterns, using a variety of musical instruments, and guide children in their listening to recognise the different patterns in the sounds • help children to recognise rhythm and pattern in the syllables of their names and other nouns • teach children to identify sequences of movement, through dance and songs • draw children's attention to repeated events in the daily routine • draw children's attention to repeated patterns in the natural environment • provide a commentary alongside varied activities, to model talk about pattern, and display thought processes that are appropriate to the context	• images of pattern, including photographs, artwork, wallpaper, wrapping paper, fabric, patterned clothes for dolls/role play – used purposefully to promote discussion • props to invite children to sing or retell familiar songs, rhymes or stories, with repeated phrases • opportunities for children to listen independently, or as part of a group, to different kinds of music, noticing repetition in the sounds and words • storybooks with rich opportunities for children to identify and join in with repetitive phrases and words • opportunities for children to respond and move rhythmically to music	• children will point out patterns through actions and verbal comments • children will use the language of pattern, making comparisons and recognising repetition • children will join in with familiar rhymes, songs and stories, pre-empting repeated phrases • children will actively participate in repeated sequences of movement, with confidence

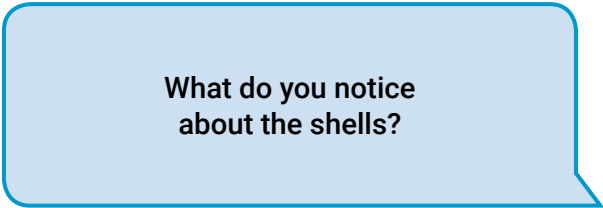
Pattern	What adults could do	What adults could provide	Behaviours a child could demonstrate to show understanding
Copy	• read stories with repeated refrains and encourage children to join in with familiar phrases, predicting when they might happen • teach children to listen and respond to a variety of music • encourage children to move rhythmically to the beat, with repetitive movements • encourage children to copy or imitate patterns heard and seen through art, music, songs, rhymes, stories and movement • make suggestions and model examples of making patterns, using natural and manmade materials • lead action songs and rhymes that require repeated actions and words in response from the children	• visual aids and direct modelling, to help some children recognise and copy patterns. These should be rich and varied, using the children's interests and fascinations	• children will select appropriate objects and materials, which match the characteristics and sequence of the original pattern provided by the adult, demonstrating sustained focus to complete the task • children will join in accurately and with confidence with any familiar taught sequences in music, movement and stories

Pattern	What adults could do	What adults could provide	Behaviours a child could demonstrate to show understanding
Extend	• rephrase children's comments in order to emphasise the elements of pattern, and use key words such as again, the same, repeated • use language to further develop children's understanding of the characteristics of pattern, beyond what they already know • use effective questioning to challenge children's thinking about what they know and understand about pattern • give children sufficient time to think and respond • provide opportunities for children to talk and listen to each other • make suggestions that children share their findings with others, to enable them to explain their thinking • listen carefully to what the child is saying about pattern, in order to seize an opportune moment to clarify ideas, challenge thinking, model improved vocabulary, etc	• a range of natural and manmade materials, to provide pattern starters from which children will continue • daily opportunities and time for children to rehearse and consolidate patterns in a variety of contexts, through music, movement, stories, art and play • increasingly complex patterns and sequences in a broad range of learning experiences, using a mixture of manmade and natural materials. Complex patterns should include different features/characteristics, and the lengths of the initial sequence to be continued should be varied • images of natural and manmade materials, forming a more complex pattern in a grid	• children will show interest and curiosity, sometimes seeking pattern all around them • children will make decisions about what to use to accurately complete and extend patterns • children will talk about and describe the key features of pattern they come across • children will respond appropriately to questions and with accurate detail, using language associated with pattern • children will be willing to have a go at extending a pattern starter, changing strategy where appropriate, so that key features/characteristics are repeated accurately
Create	• plan ways that invite children to make patterns for a purpose, e.g. a dance sequence for performance • work alongside the children when they are creating patterns, and talk about the decisions they are making • encourage children to reflect upon patterns they have made and talk about them	• sufficient resources and opportunities that encourage children to explore and create pattern throughout the year • learning culture that enables children to be flexible, independent, curious and unafraid of risks, in order to create patterns meaningfully • time for children to become absorbed and immersed in the learning enough to plan what materials they will use and to create their own patterns	• children will show sustained engagement in creating patterns, using their own ideas and self-selected materials • children will reason the choices they have made and explain their thinking in the patterns they have created • children will show satisfaction at meeting their own goals and will be proud of their achievements

The following pages provide exemplification of **some** of the criteria, to illustrate how they could be achieved across provision.

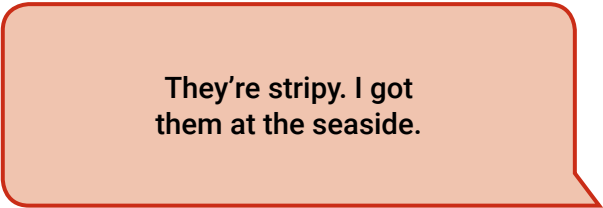
In the illustrations you will see the following:

Blue speech bubbles indicate key questions and teaching points for adults

A blue speech bubble with a tail pointing to the bottom right.

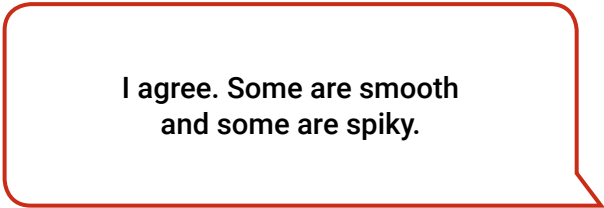
What do you notice about the shells?

Red speech bubbles indicate things children may say

A red speech bubble with a tail pointing to the bottom right.

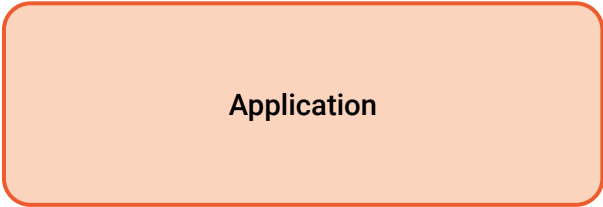
They're stripy. I got them at the seaside.

White speech bubbles with a red outline indicate how the child's talk could be remodelled by an adult

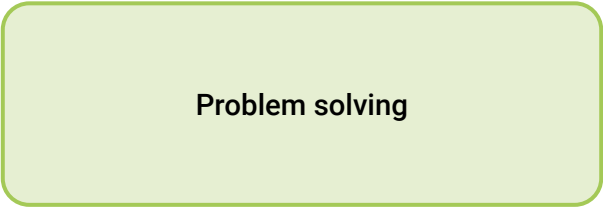
A white speech bubble with a red outline and a tail pointing to the bottom right.

I agree. Some are smooth and some are spiky.

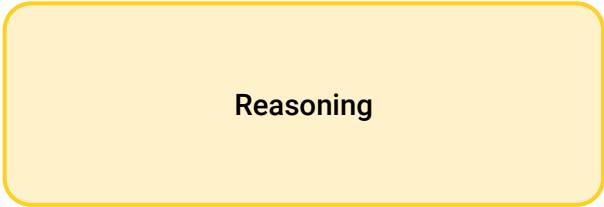
Rectangular boxes indicate **Working mathematically** criteria, as follows:

An orange rectangular box with rounded corners and a thin orange border.

Application

A green rectangular box with rounded corners and a thin green border.

Problem solving

A yellow rectangular box with rounded corners and a thin yellow border.

Reasoning

Pattern – NOTICE: What adults could do

- point out patterns seen in the environment and talk about the repetition
- draw children's attention to repeated patterns in the natural environment



Can you see a pattern in the trees?

The leaves have got a pattern on, and Mrs B has put some more up there.

You are right! Each leaf has a pattern on it. Can you see what patterns Mrs B has put in the tree and find another one the same?

Ideas, questions and lines of enquiry

Shows curiosity, is willing to have a go
Makes connections about aspects that are familiar

- teach children songs and rhymes and note the repetition, using actions to highlight the repetitive phrases
- play sound patterns, using a variety of musical instruments, and guide children in their listening to recognise the different patterns in the sounds
- help children to recognise rhythm and pattern in the syllables of their names and other nouns



Let's sing
"Wind the bobbin up" –
get yourself ready!

It's wind up first, then pull.

That's right! We sing it in a pattern – wind, pull, clap.

Represent and communicate

Captures experiences and responses
in a range of ways

Pattern – NOTICE: What adults could do



- draw children's attention to repeated events in the daily routine

Do you remember what comes next today?

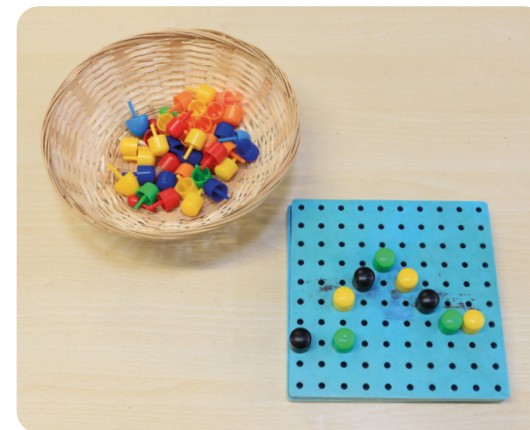
It's snack time.

That's right – snack time next, then outdoor play and then story time.

Make connections

Uses their experience to anticipate what might happen

- provide a commentary alongside varied activities, to model talk about pattern, and display thought processes that are appropriate to the context



I can see you have made a pattern of colours and put the pegs in a wave.

It's blue, green, yellow and a wiggly line!

That's right! There are two patterns – one of colour and one of shape!

Represent and communicate

Uses talk to connect ideas and describe what is happening

Review and evaluate

Behaviours a child could demonstrate to show understanding:

- children will point out patterns through actions and verbal comments
- children will use the language of pattern, making comparisons and recognising repetition
- children will join in with familiar rhymes, songs and stories, pre-empting repeated phrases
- children will actively participate in repeated sequences of movement with confidence

Observation:

Freddie played with the pegs alongside John, putting them in random patterns and talking about them. He said, **“Look, it’s a circle. Look, that’s green.”**

Evaluation:

Freddie is beginning to notice and experiment with pattern.

Observation:

Shannon put her name card in the box and said, **“It’s play time, snack time, story time and then home. That’s the same as yesterday.”**

Evaluation:

Shannon is recognising patterns of the day that are repeated.

Observation:

Erin said, **“I have got a stripy top and so has Amala.”**

Evaluation:

Erin is noticing pattern in everyday items.

Pattern – COPY: What adults could do

- encourage children to copy or imitate patterns heard and seen through art, music, songs, rhymes, stories and movement



What sounds do the wobbly lines represent?

Running water,
running water,
splash, splash, splash!

The wobbly lines look
like the running water,
and the dots look like
splashes in the water.

Make connections

Uses talk to make links and notice patterns in their experiences



- encourage children to move rhythmically to the beat, with repetitive movements



Can you hear the
music? Shall we march
to the beat?

I am like an elephant.

That's right! You can
use the beat to march left,
right, left, right.

Represent and communicate

Uses talk to connect ideas and describe what is happening

Pattern – COPY: What adults could do

- teach children to listen and respond to a variety of music



Can you copy my pattern:
tap, tap, tap?

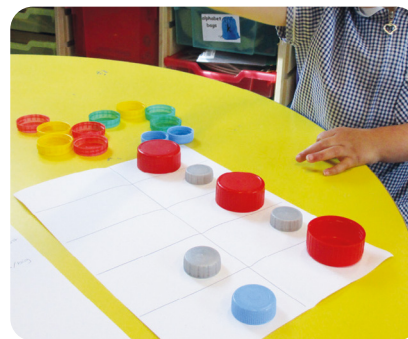
I can do it!

I can hear your pattern!
Tap, tap, tap.

Make connections

Uses talk to make links and notice patterns in their experiences

- make suggestions and model examples of making patterns, using natural and manmade materials



I can see that you have the
same pattern of lids
as me.

But that looks different.

You're right. It's the same
pattern but mine are in
different spaces.

Represent and communicate

Uses talk to connect ideas and describe what is happening

Review and evaluate

Behaviours a child could demonstrate to show understanding:

- children will select appropriate objects and materials, which match the characteristics and sequence of the original pattern provided by the adult, demonstrating sustained focus to complete the task
- children will join in accurately and with confidence with any familiar taught sequences in music, movement and stories

Observation:

Jessica was at the mark-making table and drew a pattern of round spots while looking at pictures of giraffes. She said, “**Look – it’s like his neck.**”

Evaluation:

Jessica is beginning to notice and copy patterns.

Observation:

Frankie made a pattern with pebbles and leaves. His friend, Harry, picked up some resources and made the same pattern next to Frankie’s pattern.

Evaluation:

Harry can notice a pattern and reproduce it accurately.

Observation:

Dani copied the vehicle sounds from the book *Who’s Driving?*, whilst playing the instruments. She made the sounds whilst tapping the rhythms.

Evaluation:

Dani understands she can copy patterns she heard in a story whilst using musical instruments, even though it is arranged over a longer space.

Pattern – EXTEND: What adults could do

- rephrase children's comments in order to emphasise the elements of pattern, and use key words such as again, the same, repeated
- use language to further develop a child's understanding of the characteristics of pattern beyond what they already know



You've made a tower.

It's tall and goes flat, tall, flat, tall.

It is tall, and you have repeated the types of blocks, making a pattern.

Generalise

Recognises similarities between learning experiences

- use effective questioning to challenge children's thinking about what they know and understand about pattern



I can see you have been making a pattern with the animals. Can you tell me about it?

I made it with red and blue.

So, you have repeated the colours. Could you use different animals to make a different pattern?

Justify

Uses talk to clarify thinking

Review and evaluate

Behaviours a child could demonstrate to show understanding:

- children will show interest and curiosity, sometimes seeking pattern all around them
- children will make decisions about what to use to accurately complete and extend patterns
- children will talk about and describe the key features of pattern they come across
- children will respond appropriately to questions and with accurate detail, using language associated with pattern
- children will be willing to have a go at extending a pattern starter, changing strategy where appropriate, so that key features/ characteristics are repeated accurately

Observation:

Ryan was making a two-colour pattern. He decided to add another colour, checked back, and then continued to extend his pattern using three colours.

Evaluation:

Ryan understands pattern and is able to extend one on his own terms.

Observation:

Louie saw a stripy pattern of Josie's skirt and said, "**It's like tiger stripes.**" Miss F asked, "**Why do you say that?**" Louie replied, "**They go thinner and fatter.**"

Evaluation:

Louie showed curiosity, seeking out familiar patterns. He used appropriate language to describe the pattern.

Observation:

Jamie kept adding more fir cones and sticks to make a repeated pattern. He was working along the floor to make it longer and longer, going under tables and chairs.

Evaluation:

Jamie understands how to extend and maintain a pattern over a long measurement.

Pattern – CREATE: What adults could do

- plan ways that invite children to make patterns for a purpose, e.g. a dance sequence for performance



Let's move to the music – can you leap and hop?

I can do that!

You are making a pattern with your body and movement!

Problem solving
Chooses ways to do things

- work alongside the children when they are creating patterns, and talk about the decisions they are making
- encourage children to reflect upon patterns they have made and talk about them



Let's see what we can do with these items – what pattern could you make?

I like the stones and the sticks, and this is how I have made them.

I can see you are laying out the sticks and putting stones in between. Your pattern is in the same order all the way around.

Plan an approach and implement it
Uses talk to connect ideas and describe what is happening

Review and evaluate

Behaviours a child could demonstrate to show understanding:

- children will show sustained engagement in creating patterns, using their own ideas and self-selected materials
- children will reason the choices they have made and explain their thinking in the patterns they have created
- children will show satisfaction at meeting their own goals and will be proud of their achievements

Observation:

Harry talked about his pattern, **“There are stones and cars and hoops and I have put the stones inside the hoops and the cars round the edge. I made another one the same and another one the same.”**

Evaluation:

Harry can create his own patterns, showing sustained engagement in completing multiple patterns. He is very pleased with himself!

Observation:

Sandeep told me about his pattern. He said, **“This is how I started. I put the blue beads first then I put the red ones, they are square. Then I put the purple ones, then I did it again, and then I found some more and made another line the same going down this way.”**

Evaluation:

Sandeep is able to talk about how he has created his pattern, reasoning the choices he made and explaining how he is going to extend that pattern in a different direction.

Observation:

George used trains, cars and animals and laid them out in a pattern. He was engaged in his activity and chose how to lay out the items.

Evaluation:

George is experimenting and choosing ways to do things. He is creating his own patterns, explaining the reasons for his choices.

Essential foundations for counting

Devised and created by the Herts for Learning mathematics and Early Years educational specialists responsible for **ESSENTIALmaths** and **Places to Play Every Day**, the highly acclaimed teaching resources also available from Herts for Learning.

Places to Play Every Day, for 3- to 5-year-olds

Creating learning spaces to inspire, challenge and motivate children in the Early Years.

Places to Play Every Day sets out clear guidance on developing each area of provision, including information on the adult's role, resource ideas and skills to be taught in a variety of contexts.

"The **Places to Play Every Day** guidance and audits book provide ideas for new and experienced practitioners to develop their learning environment. The photographs included give a helpful visual representation of high quality EYFS provision."
EYFS Leader, Knutsford Primary School

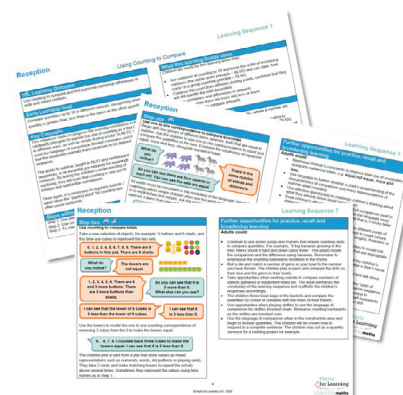


ESSENTIALmaths and Reception ESSENTIALmaths

The complete suite of Herts for Learning **ESSENTIALmaths** resources is an invaluable planning tool for teachers to find practical support and many resources, to improve the teaching of mathematics. The learning sequences are written to ensure pupils are able to master the learning and meet the challenges of an age-related curriculum.



"I know this has been said before but I can't stress how good **ESSENTIALmaths** for Reception has been for the strong grounding of number. We have seen a massive impact."
EYFS teacher, Aston St Mary's CofE Primary School



"The school's involvement in the Hertfordshire Essential Mathematics programme has supported the development of mathematics, by providing a clear teaching sequence to develop pupils' number fluency and reasoning at greater depth."
Ofsted Report, Field Manor JMI School, St. Albans (2018)

About Herts for Learning

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