Spring Block 6

Explore 3-D shape

White Rose MATHS

Teacher guidance

Key books

- *Circle! Sphere!* by Grace Lin
- *Changes, Changes* by Pat Hutchins
- *Naughty Bus* by Jan Oke
- *Rapunzel*
- *Kitten Castle* by Ellen Weiss and Mel Friedman
- *Shapes, Shapes, Shapes* by Tana Hoban
- *Pattern Fish* by Trudy Harris
- *Pattern Bugs* by Trudy Harris
- *Busy, Busy, Busy* by Haneul Ddang
- *The Leopard's Drum* by Jessica Souhami
- *Jamil's Clever Cat* by Fiona French with Dick Newby

Top tips

- Gather a range of recyclable box modelling resources of different shapes and sizes for children to build with.
- Enhance dough areas with 3-D shapes and real objects for children to experiment with and explore the properties of shapes.
- Encourage children to create patterns linked to their interests by providing a range of loose parts in different areas of provision.

Key resources

Small steps

Step 1	Recognise and name 3-D shapes
Step 2	Find 2-D shapes within 3-D shapes
Step 3	Use 3-D shapes for tasks
Step 4	3-D shapes in the environment
Step 5	Identify more complex patterns
Step 6	Copy and continue patterns
Step 7	Patterns in the environment

Recognise and name 3-D shapes

Notes and guidance

At the start of this block, children will focus on the concept of 3-D shapes and their properties. Children will have already explored some of the properties of these shapes in earlier blocks when sorting objects that are 3-D, looking at 2-D shapes, fitting shapes together and moving them apart. They will have also explored printing with 3-D shapes and recognising the flat face the shape makes.

In this small step, children will learn to recognise and name cubes, cuboids, cylinders, pyramids, cones and spheres. They will recognise that whereas a 2-D shape is completely flat, 3-D shapes are solid objects.

When building and constructing, use the correct shape names to categorise the blocks. To further support children, photograph and label these shapes in provision. Use tidy-up time in the brick area as an opportunity to encourage different groups of children to be responsible for collecting all the cylinders or all the cubes. Share texts that include 3-D shapes and encourage children to identify and name shapes. Prompt them to go and find those shapes in provision.

Books

- *Circle! Sphere!* by Grace Lin
- *Changes, Changes* by Pat Hutchins

Key questions

- What do you notice about your shape?
- Which shapes are the same as yours? Which are different?
- How do you know they are the same/different?
- How can you sort the shapes?

Possible sentence stems

- This shape is a _____.
- This shape is the same/different because ...
- The _____ has flat faces/a flat face/a curved surface.

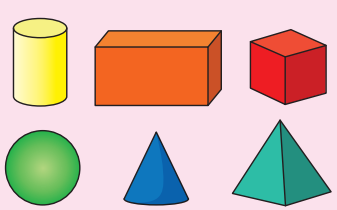
Links to the curriculum

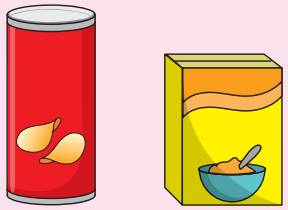
Development Matters – Reception – Select, rotate and manipulate shapes to develop spatial reasoning skills.

Birth to 5 Matters – Range 6 – Investigates turning and flipping objects in order to make shapes fit and create models; predicting and visualising how they will look (spatial reasoning)

Recognise and name 3-D shapes

Show children a range of 3-D shapes and model naming and describing their properties.

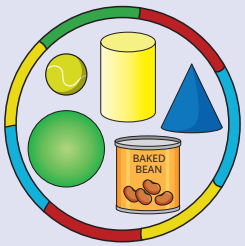


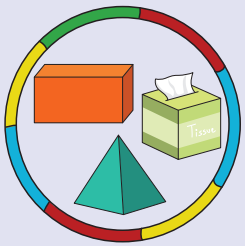


Hold up an object such as a crisp tube or a cereal box. Which of the 3-D shapes is the same as this object? How do you know it is the same? Encourage children to talk about the properties of the 3-D shapes when explaining how they know.

Provide children with a range of 3-D shapes and real objects. Encourage them to sort the shapes into groups within hoops.

Prompt children to talk about why they have sorted the shapes that way. Is there another way we could sort them?

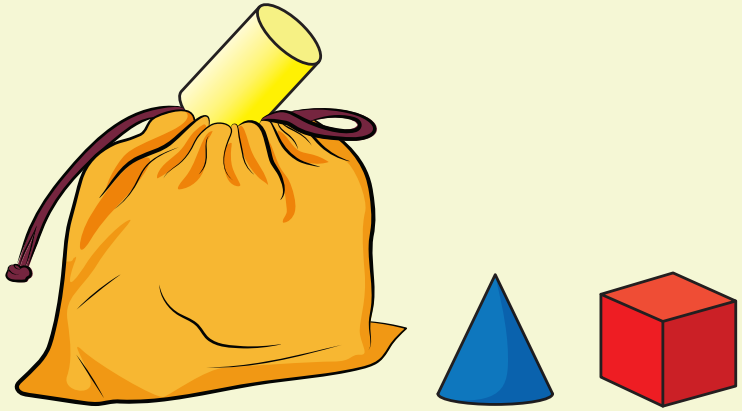




When reading books such as *Circle! Sphere!* by Grace Lin and *Changes, Changes* by Pat Hutchins, encourage children to notice where they can see 3-D shapes.

Prompt children to replicate the images in the stories using 3-D shapes. Ask them to name the shapes as they select them.

Place a range of 3-D shapes in a feely bag.



In pairs, one child selects a shape from the bag without showing their partner. The partner asks questions to try and work out which shape they have selected.

Find 2-D shapes within 3-D shapes

Notes and guidance

In this small step, children extend their knowledge of recognising and naming 3-D shapes to finding and identifying the 2-D shapes on the flat faces of 3-D shapes.

It is important to teach this knowledge through practical exploration, such as making models, and ask children to point out what they notice. Exploring the idea of flat faces and curved surfaces in activities such as printing will support children to see the 2-D shapes within the 3-D shapes. This can be reversed so that children use reasoning skills to find which shape could have made a pre-printed footprint.

Whilst building with children, give reference to what shapes are being used. To emphasise flat faces and curved surfaces, discuss which shapes are better for stacking.

Look at pictures and stories that use 3-D shapes and point out where we can see 2-D shapes on the faces of 3-D ones. Replicating structures in books can help to support this thinking.

Books

- *Changes, Changes* by Pat Hutchins
- *Naughty Bus* by Jan Oke

Key questions

- What shapes can you see?
- What do you notice about your shape?
- Which 2-D shapes can you see within the 3-D shapes?

Possible sentence stems

- This shape is a _____.
- I can see a _____ on the _____.
- This shape has a _____ face.

Links to the curriculum

Development Matters – Reception – Compose and decompose shapes so that children recognise a shape can have other shapes *within* it, just as numbers can.

Birth to 5 Matters – Range 6

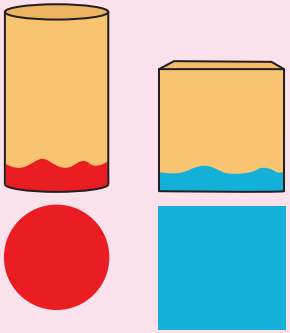
- Enjoys composing and decomposing shapes, learning which shapes combine to make other shapes
- Uses own ideas to make models of increasing complexity, selecting blocks needed, solving problems and visualising what they will build

Find 2-D shapes within 3-D shapes

Adult-led learning

Provide children with a range of 3-D shapes and real-life objects. Encourage them to explore printing with 3-D shapes using paint. What do they notice? What 2-D shape can they see?

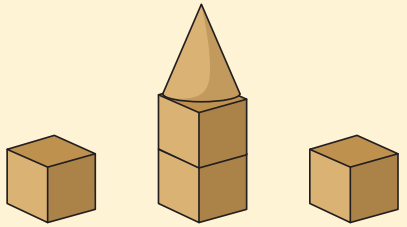
To extend this, ask children to predict what footprint a shape will make. Which shape could you use to print a triangle or a square?



Prompt children to make 3-D shapes using dough. Ask them which shapes are easier or harder to make. Why do they think that?

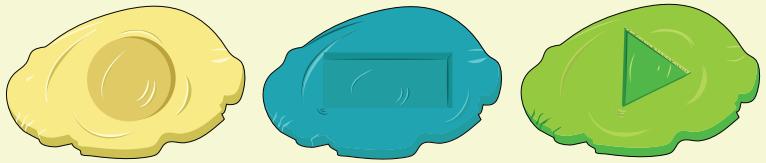
Encourage children to explore how they will make the flat faces. What will they use?

Read books such as *Changes, Changes* by Pat Hutchins and *Naughty Bus* by Jan Oke. Prompt children to notice and talk about the 2-D shapes they see on the surfaces of the building blocks in the images.



Encourage children to build their own scenes using building blocks. What do they notice?

Show children a range of footprints made by printing 3-D shapes into dough.



Prompt them to predict which 3-D shapes could have been used to make those footprints. Is there more than one possibility? Encourage children to test their predictions.

Use 3-D shapes for tasks

Notes and guidance

In this small step, children are guided to further expand their knowledge of the properties of 3-D shapes. The suggested tasks and the modelling of shape vocabulary will deepen their understanding of the properties of 3-D shapes.

Support children to determine what are the best 3-D shapes for tasks such as rolling or stacking, to develop children's understanding. They consider why this is the best shape as well as what different 3-D shapes do or do not have in common. This will help to develop spatial reasoning skills but also extend where children are on their building learning journey.

Support children by prompting them to make more complex structures. Block play can be enhanced by children bringing in further props to allow them to build for a purpose, for example, creating a rocket for an astronaut. Children may then design and make their own structures to support role-play and storytelling.

Books

- *Rapunzel*
- *Kitten Castle* by Ellen Weiss and Mel Friedman

Key questions

- Which shape have you chosen and why?
- What do you notice about your shape?
- Does your shape roll/stack?

Possible sentence stems

- I have chosen this shape because ...
- This shape has _____.
- This shape is the same/different because ...

Links to the curriculum

Development Matters – Reception

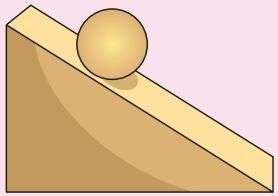
- Select, rotate and manipulate shapes to develop spatial reasoning skills.
- Compose and decompose shapes so that children recognise a shape can have other shapes *within* it, just as numbers can.

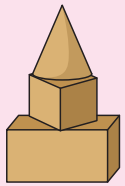
Birth to 5 Matters – Range 6 – Uses own ideas to make models of increasing complexity, selecting blocks needed, solving problems and visualising what they will build

Use 3-D shapes for tasks

Adult-led learning

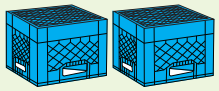
Provide children with different 3-D shapes and a ramp. Prompt them to explore which 3-D shapes roll down the ramp and which do not. What do they notice about the shapes that do roll? What is the same about them all?





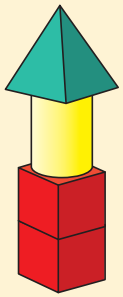
Also encourage children to explore which shapes stack and which do not. What makes a shape good for stacking?

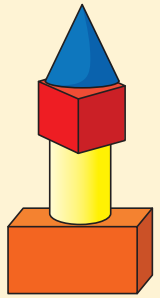
Encourage children to build an obstacle course. Prompt them to consider which objects they choose for different purposes.



Why have they chosen that object? Which shape do they need to use next?

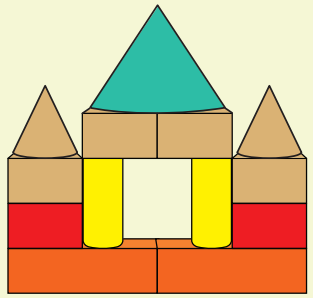
After reading traditional tales such as *Rapunzel*, children explore building towers. Which shapes do they need to use to build Rapunzel's tower? Which shapes do they need to place at the bottom of the tower? Which shapes do they need to place at the top?





Prompt them to say why they have chosen to place that shape in that position.

Read books such as *Kitten Castle* by Ellen Weiss and Mel Friedman. Encourage children to build more complex structures, such as castles.



As children select shapes to build with, prompt them to talk about its different properties and to explain why they have chosen that shape.

3-D shapes in the environment

Notes and guidance

In this small step, children build on their experiences of 2-D shapes in the environment by now looking for representations of 3-D shapes.

Children will already have some understanding of the properties of 3-D shapes and that these are solid objects. Start by referring to everyday objects in the environment using names of 3-D shapes, such as a tin of beans being a cylinder.

As with 2-D shapes, discuss with children when shapes in the environment are 3-D shapes and when they are 'almost' 3-D shapes. In this way, they will recognise that, for example, a tower on a castle is an 'almost cylinder'; however, the turret stops it being a perfect cylinder.

Provide opportunities for children to notice shapes in the environment and use the language of 2-D and 3-D shapes interchangeably to support children's fascinations. Encourage them to take photos when outside or on walks to spark discussion when sharing these in groups or as a class.

Books

- *Shapes, Shapes, Shapes* by Tana Hoban

Key questions

- What shapes can you see? How do you know?
- What can you tell me about your shape?
- Where can you see shapes within shapes?
- What is the same/different about your shapes?

Possible sentence stems

- I can see a _____ .
- This shape is the same/different because ...
- I know this shape is/is not a _____ because ...

Links to the curriculum

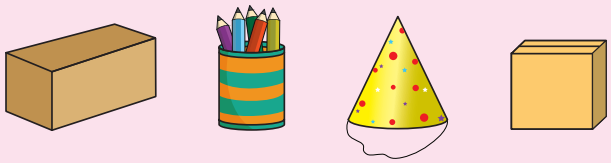
Development Matters – 3 and 4-year-olds – Talk about and explore 2D and 3D shapes (for example, circles, rectangles, triangles and cuboids) using informal and mathematical language: 'sides', 'corners'; 'straight', 'flat', 'round'.

Birth to 5 Matters – Range 6 – Enjoys composing and decomposing shapes, learning which shapes combine to make other shapes

3-D shapes in the environment

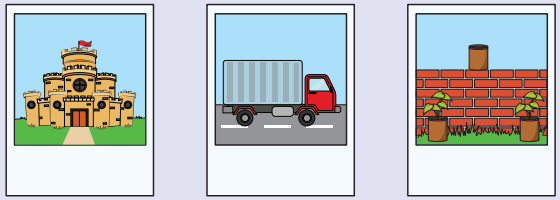
Adult-led learning

Go on a shape hunt around the classroom. Encourage children to recognise and name the 3-D shapes they find and prompt them to describe their properties.



Ask the children to find another object that is the same shape or a different shape.

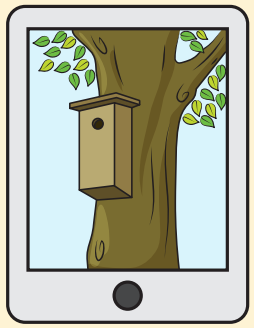
Provide a range of photographs showing a variety of real-life scenes comprising of 3-D objects. Prompt children to find all the 3-D shapes in the images. What do they notice? How can they describe the shapes they see?



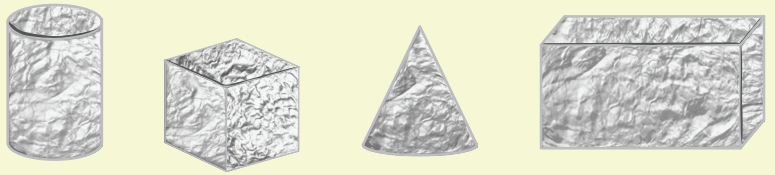
Encourage children to talk about the shapes they can see within shapes.

After reading books such as *Shapes, Shapes, Shapes* by Tana Hoban, encourage children to go on their own 3-D shape hunt around school or outside.

Prompt children to take photographs of the shapes they see. These could be used to make a class shape book.



Wrap a range of objects tightly in brown paper or foil. Encourage children to explore the shapes and predict which objects might be inside.



Prompt them to talk about the properties of each shape to explain why they think it is a particular object.

Identify more complex patterns

Notes and guidance

In this small step, children build on their knowledge of simple AB patterns from the autumn term. They are introduced to more complex patterns such as ABC and ABCD, where all the elements are different. This can then progress to AABB, AAB and ABB patterns. Pattern structures are seen to be easier when all the elements repeat, so children may find AABB easier than AAB. They will then explore patterns with the same start and end point, such as ABBA, which are more complex.

Children may naturally join in with sound patterns that fit different structures, and this is all part of learning. It is important to encourage them to listen carefully to adults or music-making sound patterns and identify which structure is being used.

Sing and make up silly songs that follow different structures, such as, 'stomp, dinosaur, dinosaur, stomp' for ABBA, so that children recognise that this can be audible as well as visual. Allow children to mark-make their own notations to identify patterns and support their thinking.

Books

- *Pattern Fish* by Trudy Harris

Key questions

- What do you notice?
- What pattern can you see/hear?

Possible sentence stems

- I can see/hear a _____ pattern.
- This is a _____ pattern.

Links to the curriculum

Development Matters

- 3 and 4-year-olds – Notice and correct an error in a repeating pattern.
- Reception – Continue, copy and create repeating patterns.

Birth to 5 Matters – Range 6

- Spots patterns in the environment, beginning to identify the pattern "rule"
- Chooses familiar objects to create and recreate repeating patterns beyond AB patterns and begins to identify the unit of repeat

Identify more complex patterns

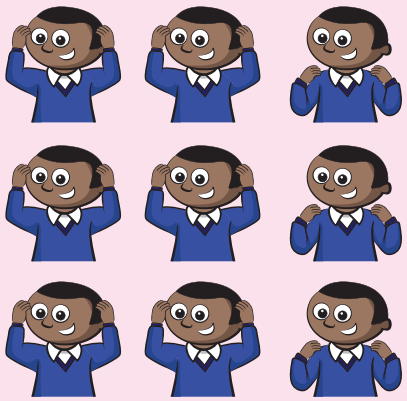
Adult-led learning

Explore pattern books such as *Pattern Fish* by Trudy Harris with children, paying particular attention to the pages with more complex patterns such as ABCD, AABB, AAB and ABB.

Encourage children to identify the patterns and talk about what they can see.

Demonstrate action patterns for children to copy:

- clap, jump, jump, clap, jump, jump, clap, jump, jump
- head, head, shoulders, head, head, shoulders, head, head, shoulders

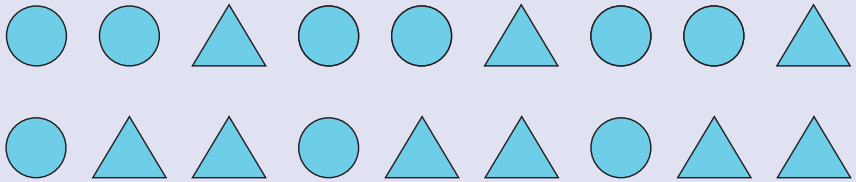


Say the pattern aloud as you act it out and encourage children to join in.

What patterns do they notice?

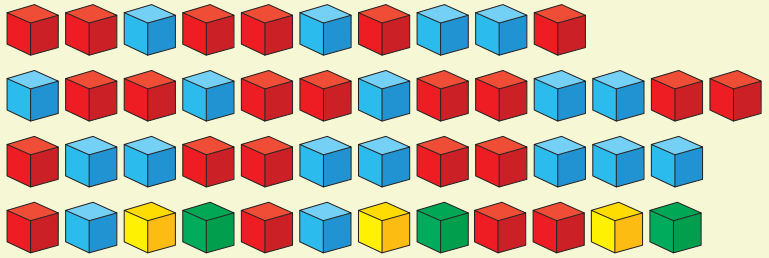
Show children an AAB and ABB pattern and ask them what they notice.

What patterns can they see?



What is the same? What is different?

Show children an AAB, ABB, ABBA or ABCD pattern with a deliberate mistake, such as an extra item added.



Can they identify the mistake and correct it?

Copy and continue patterns

Notes and guidance

In this small step, children move on from exploring the features of more complex patterns to being able to competently copy and continue them.

Support children to copy ABC, ABCD, AABB, AAB and ABB patterns. Patterns may be easier when all the elements repeat, so children may find AABB easier than AAB. Children may then move on to ABBA patterns. When showing and modelling patterns, remember to show three full units of repeat for them to be able to copy and continue it.

If children need additional support, first encourage them to copy small sections of patterns before combining them to make the full pattern, then they can attempt to continue it. You may notice that some children find different types of patterns harder than others. To support this, ensure that there are different resources that link to children's interests and fascinations so they can be encouraged to copy and continue more complex patterns.

Books

- *Pattern Bugs* by Trudy Harris

Key questions

- Copy my pattern – what do you hear/see?
- How does the pattern continue?

Possible sentence stems

- The _____ comes next in the pattern.
- The pattern is _____, _____, _____ (, _____).

Links to the curriculum

Development Matters

- 3 and 4-year-olds – Notice and correct an error in a repeating pattern.
- Reception – Continue, copy and create repeating patterns.

Birth to 5 Matters – Range 6

- Spots patterns in the environment, beginning to identify the pattern "rule"
- Chooses familiar objects to create and recreate repeating patterns beyond AB patterns and begins to identify the unit of repeat

Copy and continue patterns

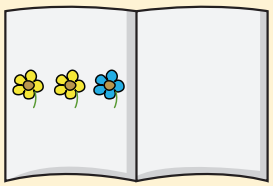
Adult-led learning

Go outside and model making large-scale patterns with more complex pattern structures such as ABCD, AAB, ABB and ABBA. Use a range of large outdoor resources such as crates, tyres and sticks.

Support children to copy and continue the patterns. What comes next in the pattern?

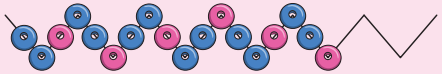
Explore books such as *Pattern Bugs* by Trudy Harris, focusing on pages with more complex pattern structures. What patterns do they see?

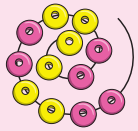
Encourage children to make their own page by copying and continuing one of the patterns. What will come next in the pattern?



Provide children with a range of loose parts, such as buttons, beads, pebbles, shells or seeds. Encourage them to use these to make, copy and continue different patterns.

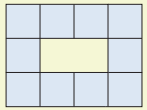
To extend this, provide children with wavy lines, spirals or zigzag lines for them to build their patterns along.

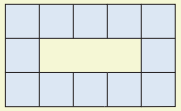


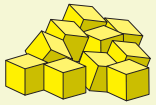


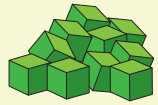
Provide frames with a set number of spaces and a range of loose parts.

Ask children to build patterns around the frame by putting one item in each space.









Prompt them to investigate whether AB, ABC, ABB, AAB, AABB and ABBA patterns will fit around the frame. Which patterns will fit exactly, and which will not?

Patterns in the environment

Notes and guidance

In this small step, children build on what they have learned about more complex patterns by applying their skills to patterns in the environment. This might start with spotting patterns in the classroom then extend to looking at patterns when out on walks and when visiting places that are full of pattern experiences.

Immerse children in different types of patterns by pointing out patterns and bringing in a selection of wallpapers and fabrics. Allow them to notice pattern styles by reading stories that show different cultural styles of pattern, for example, where certain forms of shape are used or how fabric is weaved.

Model noticing patterns all around us, so that it becomes a key talking point. Praise children for making links between the different elements of pattern and shape.

Books

- *Busy, Busy, Busy* by Haneul Ddang
- *The Leopard's Drum* by Jessica Souhami
- *Jamil's Clever Cat* by Fiona French with Dick Newby

Key questions

- What pattern can you see?
- What do you notice about your pattern?
- Where else might we see this pattern?
- What will come next?

Possible sentence stems

- This is a _____ pattern.
- _____ will come next in the pattern.

Links to the curriculum

Development Matters – Reception – Continue, copy and create repeating patterns.

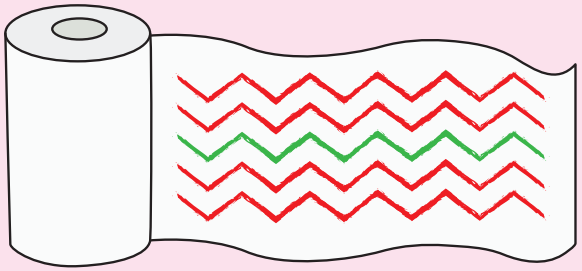
Birth to 5 Matters – Range 6

- Spots patterns in the environment, beginning to identify the pattern "rule"
- Chooses familiar objects to create and recreate repeating patterns beyond AB patterns and begins to identify the unit of repeat

Patterns in the environment

Adult-led learning

Show children a selection of patterned wrapping paper. What patterns can they see?



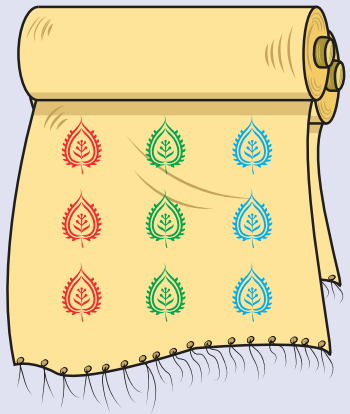
Provide large sheets of paper and some items for printing and designing.

Encourage children to use repeating patterns to design and create their own wrapping paper.

Explore artwork from artists such as Andy Goldsworthy and James Brunt and discuss the patterns they can see. Prompt children to hunt for natural objects to make patterns with outside.

Show examples of patterned fabric from different cultures or traditions.

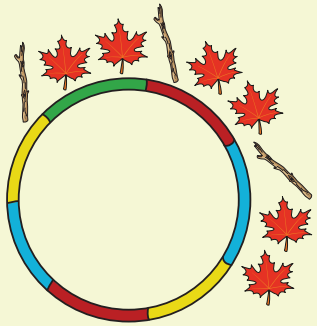
Prompt children to discuss and recreate the patterns they see. Encourage them to design their own patterns in a similar style.



Ask children to arrange patterns around a circle, such as a hoop or a paper plate.

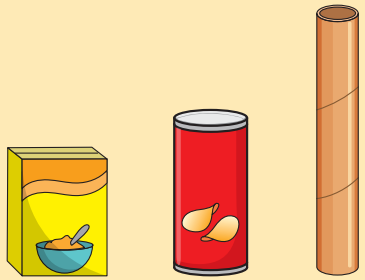
Prompt them to consider how they will continue the pattern all the way round. Does their pattern fit?

Encourage children to view other patterns in the environment and replicate them.



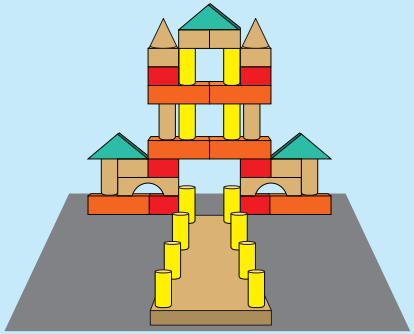
Continuous provision

Provide a variety of empty boxes, tubes and lids. Ask children to make a model for a particular purpose, for example, to build a bridge for the three billy goats or a new chair for Baby Bear. Encourage them to tell you about their model.



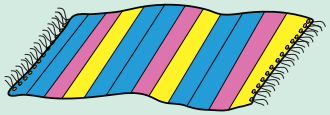
Which shapes were easy to build with? Which shapes were difficult to fasten together?

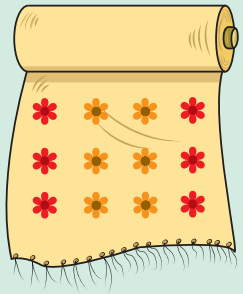
Provide pictures of buildings such as castles, palaces, mosques and city skyscrapers. Ask children to discuss the shapes they can see in the buildings.



Encourage children to design their own models and to extend these by adding arches, bridges, spires and moats.

Enhance the provision with a range of fabrics and saris that show more complex patterns. As the children explore the fabrics and dress up, prompt them to talk about the patterns they see.





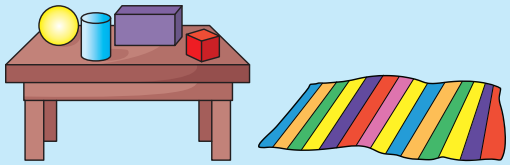
Use 3-D shapes to press patterns into the dough. Prompt children to ask a partner which shapes they used and encourage them to copy the pattern.

Children can make patterns such as AAB, ABB, ABBA and ABCD in the dough using loose parts such as shells, stones, beads or buttons.

End of block checkpoint

Checkpoint 1

Show children a range of 3-D shapes of various sizes and colours. Cover the shapes with a piece of material, ask children to close their eyes and remove one of the shapes.



Lift off the material and encourage children to identify which shape has been removed. Ask them to explain how they know by referring to the properties of the shapes.

Checkpoint 2

Show children a pattern that uses a more complex structure, such as ABCD, AAB, ABB or ABBA. Can they identify the pattern?

Can they copy and then continue your pattern?

Provide children with the resources, such as pattern blocks, for them to use to copy and continue the patterns.

Checkpoint 3

Provide children with objects and loose parts to make more complex patterns.

Ask children to use the resources independently to make an ABCD, AABB, AAB, ABB or ABBA pattern. Encourage them to talk about the pattern and its structure.