

Spatial Reasoning Toolkit



Shape composition and construction

Birth to 7 years



Children are learning to:
Attempt to fit shapes into spaces
e.g. pushing objects through holes, sometimes successfully



6-12 months



Children are learning to:
Begin to explore stacking objects with flat surfaces together, e.g. stacking blocks and cups.



1 to 2 years



Children are learning to:
Attempt to fit shapes into spaces, beginning to select a shape for a specific space and put objects of similar shape inside each other.



1 to 2 years



Children are learning to:
Use blocks to create their own simple structures and arrangements including lines of identical shapes.



1 to 2 years



Children are learning to:
Predict and fit pieces into inset puzzles.



2-year-olds



Children are learning to:
Make simple constructions with blocks, combining identical shapes to make walls, towers, etc.



2-year-olds



Children are learning to:
Partition and combine shapes to make new shapes with 2D and 3D shapes (e.g. putting blocks together to make a 'floor').



3-year-olds



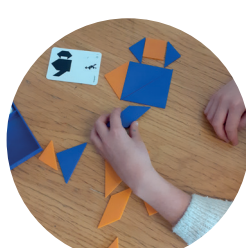
Children are learning to:
Create arches and enclosures when building, using trial and improvement to select blocks.



3-year-olds



Children are learning to:
Solve shape puzzles of increasing complexity, selecting shapes according to their properties.



4- and 5-year-olds



Children are learning to:
Compose and decompose shapes, knowing how shapes combine to make other shapes, and identifying shapes within shapes (decomposing).



4- and 5-year-olds



Children are learning to:
Build complex compositions that include arches (made of three blocks), corners (pieces at right angles) and ramps. Selects shapes to solve a problem.



4- and 5-year-olds



Adults could:

Provide bowls, boxes, toys etc. which nest inside each other. Encourage children to try and slot similar shaped objects inside one another.



Spatial Language:

'inside' 'under' 'that's too big', 'that fits perfectly' and 'just right'

1 to 2 years



Adults could:

Provide a range of construction materials, e.g. wooden blocks, cups and build towers up for children to knock down.



Spatial Language:

'up' and 'down'

1 to 2 years



Adults could:

Explore shape sorters and home-made posting toys with children e.g. posting a pompom through a cardboard tube or hole in a plastic lid.



Spatial Language:

'in' and 'on'

6-12 months



This keyring includes typical spatial reasoning development and how adults can support this.

Please note:

- Ages are approximate
- Each child develops differently and at their own rate
- Ages are a guide and not expectations
- The stages build so earlier spatial learning continues to develop alongside new learning.



Adults could:

Cut food items into different shapes e.g. sandwiches, perhaps predicting the shape before cutting. Display children's constructions and talk about how shapes have combined to make new shapes.



Spatial Language:

'round', 'corners', 'together'

3-year-olds



Adults could:

Provide a variety of indoor and outdoor construction materials. When building, talk about the shape of the blocks you are selecting and why.



Spatial Language:

'on top of' and 'fits'

2-year-olds



Adults could:

Provide inset boards and jigsaw puzzles of increasing complexity. Talk about the shape of the pieces and the holes when fitting pieces into puzzles.



Spatial Language:

'turn' and 'too big/small'

2-year-olds



Adults could:

Provide a range of construction materials, e.g. wooden blocks, Duplo, packaging. Play alongside children, building your own structure with a commentary, or building together.



Spatial Language:

'on top' and 'underneath'

1 to 2 years



Adults could:

Provide construction materials of different sizes such as blocks and junk modelling for children to build complex models that include corners, arches and ramps.



Spatial Language:

'in front', 'between' and 'beside'

4- and 5-year-olds



Adults could:

Look at photos of paving and tiling and talk about how the shapes fit together in the patterns made (e.g. triangles making a rectangle).



Spatial Language:

'similar', 'beside', 'inside' and 'fit together'

4- and 5-year-olds



Adults could:

Cut up greeting cards to make puzzles and use outline shapes to fit pattern blocks into. Teach strategies (e.g. turning it around) and describe properties.



Spatial Language:

'between', 'turn around' and 'flip'

4- and 5-year-olds



Adults could:

Challenge experienced builders to make entrances, bridges and rooms. Offer choices of block: "Would you like one of these or one of these next?".



Spatial Language:

'over', 'next to' and 'beside'

3-year-olds



Children are learning to:
Plan mentally by visualising what they will build and selecting blocks needed.



4- and 5-year-olds



Children are learning to:
Solve shape puzzles of increasing complexity, predicting which shapes will fit and how.



6- and 7-year-olds



Children are learning to:
Build complex constructions including repeated units, staircases and ceilings.



6- and 7-year-olds



Children are learning to:
Decompose shapes in different ways e.g. predicting folds, nets and cross-sections.



6- and 7-year-olds



Children are learning to:
Relate 2D and 3D in making models from photos and plans and draw 3D models.



6- and 7-year-olds



For children's book ideas related to shape composition and construction visit
www.earlymaths.org/spatial-books

Birth to 7 years

Print on both sides of the paper (macOS)

1. Open the document, and then click File > Print.
2. Select your printer, and then click Show Details if the button displays.
3. From the print settings, look for a Double-sided or Two-sided print option. If the neither option is available, continue with these steps to print manually on both sides of the paper.
Click Double-sided, and then select On for a book (long-edge binding) or On (Short Edge) for a tablet . Click Print. You are done.
Select Two-sided, and then open Layout from the print options menu. Select Long-Edge binding for a book or Short-Edge binding for a tablet . Click Print. You are done.
4. If the Two-sided or Double-sided options are not available, select Paper Handling from the print options menu.
5. Select Odd Only from the Sheets to Print or Pages to Print drop-down menu.
6. From the Sheet Order or Page Order drop-down menu, select Reverse (for bottom-loading input trays) or Automatic (for top-loading input trays), and then click Print.
7. After the pages are done printing, remove any remaining paper from the input tray to prevent issues.
8. Remove the printed pages from the output tray, and then reload them into the input tray.

For bottom-loading input trays, load the pages print-side up with the top edge towards the printer (book) or bottom edge towards the printer (tablet).

For top-loading input trays, load the pages print-side down with the top edge towards the printer (book) or bottom edge towards the printer (tablet).

9. From the software, change the page settings for the second side.
From the Sheets to Print or Pages to Print drop-down menu, select Even only.
From the Sheet Order or Page Order drop-down menu, choose Normal (for bottom-loading input trays) or Automatic (for top-loading input trays).
10. Click Print to complete the two-sided print job.

To change back to one-sided printing, reopen the print settings and remove the selections for two-sided printing.

Once printed you can laminate the A4 pages and then use a guillotine or scissors to cut out each card. A hole punch can be used to create a hole at the top to connect them on a key ring. We hope you find these Spatial Reasoning Toolkit Keyrings helpful in your practice.



To provide feedback on the materials in the Toolkit please scan the QR code or visit www.earlymaths.org/spatial-reasoning

The following print instructions are based on HP printers. Refer to your printer's handbook for more detailed instructions.

Print on both sides of the paper (Windows)

1. Open the document, and then click File > Print.
2. Select your printer, and then click Printer Properties, Preferences, or Printer Setup.
3. From the print settings, select the option for a two-sided print job. Menu options vary by printer model.
Click the Layout, Features, or Finishing tab. Click the Print on Both Sides drop-down menu, and then select Flip on Long Edge for a book or Flip on Short Edge for a tablet .
Click the Printing Shortcut tab, and then select the Two-sided (Duplex) Printing shortcut. Click the Print on Both Sides Manually drop-down menu, and then select Flip on Long Edge for a book or Flip on Short Edge for a tablet .
4. Click OK, and then click Print.

5. If the printer does not automatically print the other side, remove any remaining paper from the input tray to prevent issues.

6. Remove the printed pages from the output tray, and then reload them into the input tray.

For bottom-loading input trays, load the pages print-side up with the top edge towards the printer (book) or bottom edge towards the printer (tablet).

For top-loading input trays, load the pages print-side down with the top edge towards the printer (book) or bottom edge towards the printer (tablet).

7. Click Continue to complete the two-sided print job.



Adults could:

Ask children to use visualisation to predict and justify the shape of the paper after cutting across a piece of folded paper.



Spatial Language:

'slanting' 'diagonally' and 'greater/less than 90 degrees'

6- and 7-year-olds



Adults could:

Provide images of constructions (including pictorial instructions) and encourage children to create instructions for their own models.

Point out the single units of combined blocks within models.



Spatial Language:

'between', 'underneath' and 'across'

6- and 7-year-olds



Adults could:

Provide a range of jigsaws of increasing complexity.

Encourage collaborative jigsaw completion, discuss different strategies with children. Ask to predict ('try it in your head') which piece before trying it.



Spatial Language:

'upside down', 'turn it around' and 'edge'

6- and 7-year-olds



Adults could:

Provide 2D images of models to inspire children to create a 3D model. Predict what it will look like from the back, side, etc.

Discuss *same* and *different* (model and image) when created.



Spatial Language:

'same shape as', 'from above/behind', 'sideview' and 'larger/smaller than'

4- and 5-year-olds

For more ideas and information please scan the QR code below to visit the Spatial Reasoning Toolkit



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Adults could:

Provide 2D pictures and 3D model making resources so children can construct 3D models (e.g. recreate a street plan in 3D) from 2D, predicting what the 3D will look like from different viewpoints.



Spatial Language:

'between', 'opposite', 'overlapping', in front of', 'front/side/back view'

6- and 7-year-olds