



Move On Up: Learning Chunks – Entry 3 numeracy

A learning chunk is not a session plan. It provides a series of teaching and learning ideas around a skills(s) area. It is intended that teachers can select and adapt the ideas to meet the requirements of their learners in different contexts.

2D and 3D shapes

Curriculum references: MSS2/E3.1

Contexts: Learners will be involved in using spatial skills in a variety of contexts and understanding more about the properties of shapes can be of use to them. In addition, some learners who are not good with arithmetic operations and number bonds may have good skills in this area and so working on shape can be important to build their confidence and give them successful maths experiences on which to build.

Teaching approach	Teaching and learning ideas	Resources
Whole group warm up/ mental maths activities – to get the learners active and to build their confidence with recognising and naming different shapes and describing their properties	Name the shape <ul style="list-style-type: none">Learners have cards which each give the name of a shape. The teacher shows a shape and learners hold up its name. One of them could also be asked to say the name (with more difficult names being asked of more confident learners).Alternatively, the learners could have the visual shapes and the teacher gives the name. Variations – this activity could use the names of 2D or 3D shapes or could mix both together into one activity. <ul style="list-style-type: none">The teacher could give the name of a 3D (or 2D) shape and learners write on an individual whiteboard an example of an item which has that shape. e.g. 3D – teacher names the shape ‘sphere’. <i>Learners could give the example of golf ball, planet, globe.</i> e.g. 2D – teacher names the shape ‘rectangle’. <i>Learners could give examples of table top, football pitch, sheet of paper.</i>	<ul style="list-style-type: none">Cards giving the names of different shapes (or individual whiteboards and wipe off pens)Cards showing different shapesCards involving 2D and 3D shapes (names or shapes, as appropriate) or individual whiteboards and wipe off pens

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	<ul style="list-style-type: none"> If learners like to be competitive, they could get one point for providing an appropriate example and two points if they name an example which is different to all other learners' suggestions. The one who gets most points overall wins. <p>Mine fits</p> <ul style="list-style-type: none"> Learners have cards each showing a different 2D shape (e.g. circle, square, triangle, rectangle, hexagon, parallelogram, trapezium, etc). The teacher names a possible property and learners have to hold up shape(s) they have which have that property. <p>e.g. Teacher asks for shapes with a right angle in them. <i>Learners who have a square, rectangle or right-angle triangle would hold these up</i></p> <p>Shape bingo</p> <ul style="list-style-type: none"> Learners each have a card with several shapes on it (e.g. six shapes). The teacher gives different properties in turn and if a learner has a shape with that property on their card they cross it off (only one shape each time). The first to cross off all their shapes wins. <p>Extensions</p> <ul style="list-style-type: none"> Once they have played several times it may be appropriate for some learners to have a go at being the one who gives the properties. For more confident learners, the properties described could include sometimes asking for a shape that 'does not have . . . ' as well as 'a shape that has . . . 	<ul style="list-style-type: none"> Sets of cards showing a variety of different shapes Bingo cards with different combinations of shapes on them

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	<p>Match them up</p> <ul style="list-style-type: none"> Learners have a set of paired cards which show various shapes and their names. They place them face down and take it in turns to turn over two cards. If the shape shown and the name match they keep those two cards. If not, they turn them over ready for the next person's turn. <p>Variation</p> <ul style="list-style-type: none"> Learners can work with sets of cards appropriate to their current skills and knowledge, so some (Entry 2 or Entry 1) will have only the most common shapes while others will have a wider selection. <p>Extension</p> <ul style="list-style-type: none"> Learners have sets of cards showing different shapes in a range of sizes. They place them face down and take it in turns to turn over two cards. If they can identify and describe something that the shapes have in common they keep those two cards. If not, they turn them over ready for the next person's turn. 	<ul style="list-style-type: none"> Sets of paired cards giving shapes and their names
<p>Discussion and small group/pair work – to get the learners involved in practical activities, which will build their skills with the vocabulary of shape and their awareness of how different shapes combine</p>	<p>Extensions of 'Name the shape' and 'Match them up'</p> <ul style="list-style-type: none"> Learners could discuss and collect examples of everyday items with different shapes and make a joint display of these. They could also use these examples to make their own set of cards to use in some of the warm-up activities. 	<ul style="list-style-type: none"> Blank cards

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	<p>What's my shape?</p> <ul style="list-style-type: none"> Learners work in pairs, with one describing a 2D shape (but not naming it directly) and the other drawing the shape described. They then compare the original and the shape created. They discuss together any things about the shape or its description which were difficult or confusing. <p>Variation</p> <ul style="list-style-type: none"> Some learners could have simple regular shapes to describe, while others could have composite shapes or a geometric picture made up of several shapes. <p>Properties of shapes</p> <ul style="list-style-type: none"> As a group, discuss the properties of different shapes to help develop learners' understanding of key vocabulary such as angle (right angle, acute angle), side, parallel sides, etc. As a group, discuss the terms used to describe the dimensions of different shapes, e.g. length, breadth, width, height, depth, etc. How do these relate to one another and which terms are used in which contexts? Is it important which you use – and, if so, when and why? As a group, discuss and collect together words that are associated with 2D shapes (e.g. side), those which are associated with 3D shapes (e.g. edge) and those which may be used for either. Create a joint glossary. <p>Tessellation (includes extension to Level 1)</p> <ul style="list-style-type: none"> Working in pairs/small groups, ask learners to use some templates in different shapes to find out which ones will fit together easily without leaving any gaps between them. Can they identify examples of this pattern from real life? Are there some combinations of shapes which go together to tessellate? 	<ul style="list-style-type: none"> Some example shapes for learners to describe. (it might be useful to model this activity and do it together as a group first before learners move on to working in pairs) Whiteboard to show examples of shapes Shape templates to draw round or multiples of single shapes to try combining together

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	<p>Mirror images (includes extension to Level 1)</p> <ul style="list-style-type: none"> Working in pairs, ask learners to use small mirrors to explore various shapes provided and to decide if they have any lines of symmetry or not. If they do, does it matter where the mirror goes? Is there sometimes more than one place to put the mirror? Discuss this and relate it to the number of lines of symmetry different shapes have. Once they have the general idea of symmetry, encourage learners to predict how many lines of symmetry different shapes will have and to check this out using either a small mirror or by folding a paper version of the shape. Similarly, encourage learners to draw the mirror image of given shapes (or letters) and then check their version using a small mirror. 	<ul style="list-style-type: none"> Small mirrors Paper/cards shapes or small mirrors
<p>Problem-solving/ investigations – to develop learners' awareness of the relationships between shapes</p>	<p>Extension of 'Shape bingo'</p> <ul style="list-style-type: none"> Once learners have played 'Shape bingo' several times, get them to explore and discuss tactics for winning. Depending on which shapes you have on your bingo card, does it matter which shape you cross off if you have a choice for the property given by the caller? <p>Regular and irregular shapes</p> <ul style="list-style-type: none"> Encourage learners to explore what options there might be for drawing irregular examples of common shapes e.g. shapes with four sides, six sides, etc. 	<ul style="list-style-type: none"> Rough paper

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	<p>Properties of 2D and 3D shapes</p> <ul style="list-style-type: none"> Encourage learners to explore relationships between 2D and 3D shapes, i.e. that a circle, sphere and cylinder have something in common – as do a square, a cube and a cuboid. If appropriate use visual material (plasticine or appropriate IT applications) to encourage learners to experiment with creating 3D shapes from different 2D starting shapes. Do the shapes created have a name? Are there everyday examples of items with that shape? <p>Tessellation</p> <ul style="list-style-type: none"> Ask learners to think about packing boxes into crates and to explore which combinations of sizes/dimensions (for box and crate) and numbers of box per crate will pack most easily? Is there any pattern to the best combinations? If appropriate, ask learners to do a similar activity for packing cylinders into boxes. Ask learners to investigate why some shapes fit together well and others don't. Do they have any ideas why this might be? How would they explain it to someone else? Encourage learners to think about examples of everyday 3D manufactured items. What are the advantages if they fit together easily? Given the disadvantages if they don't fit together easily, can they suggest why companies still make items in these shapes? What might the implications of this be for the company, e.g. in terms of cost? 	<ul style="list-style-type: none"> Plasticine, modelling clay or play dough (as appropriate) A range of packaging and containers might be useful (learners could bring in their own examples).
<p>Using IT</p>	<ul style="list-style-type: none"> Software on plans and elevations, which allow the building of 3D 'houses', may be useful for extension activities. This is part of the Improving Learning in Mathematics Programme CD-ROM: http://www.ncetm.org.uk/Default.aspx?page=13&module=res&mode=100&resid=1442 	

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<p>Embedded/contextualised activities – to encourage learners to practise/use the skills they are learning in contexts most relevant to them</p>	<ul style="list-style-type: none"> • Awareness of shapes and how they combine is important in various vocational contexts, including warehousing, retail, storing ingredients in catering establishments, horticulture, and storing equipment and medical items in health contexts. The ability to use appropriate vocabulary to describe shapes and the relationship between items may also be important in some of these and other contexts, e.g. describing where to plant something or place an item of furniture. • Using scale plans and scale bits of cards representing the sorts of items you may want to fit into a space, ask learners to explore room layouts for different rooms. • Alternatively, as appropriate, ask learners to do a similar thing but focusing on possible arrangements of beds in a garden and planting items (with different heights and spreads) into a choice of beds. • Explore the idea of some shapes being easier to work with than others. Why might you need/want to work with other shapes? 	<ul style="list-style-type: none"> • Embedded Materials: Warehousing – Wa 1:7–1:8 (pp. 61–64) • <i>SfL</i> learner materials – <i>SfL</i> LM/NE3 Unit 1 (pp. 18 and 19) • Scale plans for rooms, area of land or garden • Cards to represent items to be fitted into the above spaces, or simple instructions which learners could follow to create their own
<p>Application of skills – to build learners' confidence to apply the skills they are learning in real life contexts and to reflect on this</p>	<ul style="list-style-type: none"> • Encourage learners to notice examples in everyday/working life which involve shapes being put together and to bring back one or more examples of how items are stacked/packed/combined and, if possible, how many fitted into what size space. For example, this could be the number of bricks in a length of wall, boxes in crates, items stacked on shelves, etc. Discuss these examples together in a future session. 	
<p>Assessment for learning</p>	<ul style="list-style-type: none"> • Move Up Test, Q 23 	<ul style="list-style-type: none"> • Move Up Test