



Move On Up: Learning Chunk – 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.

Length, weight and capacity

Curriculum references: MSS1/E3.5, MSS1/E3.6, MSS1/E3.7

Contexts: Learners will use measuring in a number of everyday and vocational contexts and will find it useful to build their confidence in estimating and measuring using different units. They can also develop their awareness of the links between metric measures and the value of using a system which uses multiples of ten, hundred and thousand.

Teaching approach	Teaching and learning ideas	Resources			
<p>Whole group warm up/ mental maths activities – to get learners active and to build their confidence in working with different units of measurement.</p>	<p>Find the pair</p> <ul style="list-style-type: none">Learners have a set of paired cards which give different measurements, e.g. <table border="1" data-bbox="616 762 1238 831"><tr><td>1 kilogram</td><td>1 kg</td><td>1 km</td></tr></table>The cards are placed face down and learners take it in turns to turn over two cards. If they show the same measurement the learners keeps both cards; if not they turn them back over and the next learner takes their turn.So, in the above example, if the cards turned over were the first and second cards the learner who turned them over would keep them; if the cards picked were the second and third cards shown, they would turn them back without ‘winning’ any cards.When all cards are ‘claimed’, the learner with the most cards in their collection is the winner.	1 kilogram	1 kg	1 km	<ul style="list-style-type: none">Sets of paired cards which show different measurements.
1 kilogram	1 kg	1 km			

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<p>Whole group warm up/ mental maths activities – to get learners active and to build their confidence in working with different units of measurement.</p>	<p>Differentiation</p> <ul style="list-style-type: none"> Different pairs/small groups of learners could have cards that give different combinations of measurements on them depending on their skills. So, for example, learners with more skills could have pairs of cards that give equivalent measurements, e.g. <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin: 2px;">1000 g</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">1 kg</div> </div> <p>Variation on ‘Find the pair’</p> <ul style="list-style-type: none"> The pairs of cards could give a unit of measurement paired with an item that could be measured using that unit, e.g. <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin: 2px;">kg</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">apples</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">metres</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">curtains</div> </div> <ul style="list-style-type: none"> Again this could be differentiated to learners at different levels by including actual measurements for more skilled learners, so they have to decide not only if the unit is appropriate but also if the size of the measurement given is reasonable for the item specified. <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin: 2px;">5 kg</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">potatoes</div> </div>	<ul style="list-style-type: none"> Sets of paired cards with units of measurement and items that could be measured using them.
<p>Whole group warm up/ mental maths activities – to get learners active and to build their confidence in working with different units of measurement.</p>	<p>Number trails</p> <ul style="list-style-type: none"> Teacher creates a short sequence of cards, each of which has a measurement on it and a new everyday item. The next card in the sequence gives the measurement for this item (weight/length/capacity) and names a new item. <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin: 2px; text-align: center;"> Weight: 1 kg Next item: door </div> <div style="border: 1px solid black; padding: 5px; margin: 2px; text-align: center;"> Height: 2 m Next item: wine </div> </div>	<ul style="list-style-type: none"> Sequence of cards making a number trail that involve units of measurement and items measured by them.

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	<ul style="list-style-type: none"> The final card in the sequence gives the item that goes with the measurement on the first card, i.e. in this case an item appropriate to the measurement of 'Weight: 1 kg'. Cards are mixed up and learners are each given one or more cards. One person (could be the teacher initially) reads out their item and the person who has a measurement appropriate to that item calls it out and then reads the new item from their card. To complete the trail all learners should have a go. <p>Differentiation</p> <ul style="list-style-type: none"> The sequence of cards could have calculations of varying difficulty according to the skills of the learners. In this case, to help distribute the cards appropriately, it would be useful to have them coded in some way, e.g. cards that give more complex measurements marked with a different coloured spot in the corner so that these cards can be given to the learners with more skills. <p>Extension of 'Number trails'</p> <ul style="list-style-type: none"> Once learners have had a go at this activity a few times and understand the idea, they could produce their own trails for use in future sessions, working in pairs. 	
<p>Whole group warm up/ mental maths activities – to get learners active and to build their confidence in working with different units of measurement.</p>	<p>Same or not?</p> <ul style="list-style-type: none"> The teacher writes up two measurements on the board. Learners have to indicate if they represent the same amount or not. e.g. 1 kilogram 1000 grams 2 kilometres 2 kg They could do this by calling out, visually indicating (e.g. thumbs up/thumbs down), by writing T/F on an individual mini whiteboard or by moving to agreed points in the room that represent 'same', 'not the same' or 'not sure'. 	<ul style="list-style-type: none"> Individual mini whiteboards if required.

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	<p>Differentiation</p> <ul style="list-style-type: none"> At a higher level learners could be given options that include the same amounts written in different ways and be asked to decide very quickly if they are the same or not. <p>e.g. 500 g $\frac{1}{2}$ kg</p> <ul style="list-style-type: none"> Or variations such as (a) how many of one amount will go into the other (roughly) or (b) how many complete amounts of one you can get out of the other. <p>e.g. 270 g 1 kg</p> <ul style="list-style-type: none"> For variation (a) the learner would answer 4 ($250 \text{ g} \times 4 = 1000 \text{ g}$ or 1 kg). For variation (b) the learner would answer 3 (not enough for $4 \times 270 \text{ g}$ in 1000 g). 	
<p>Whole group warm up/ mental maths activities – to get learners active and to build their confidence in working with different units of measurement.</p>	<p>Odd one out</p> <ul style="list-style-type: none"> The teacher projects or writes units of measurement onto the whiteboard (one set of three or four at a time) and the learners have to pick the odd one out. <p>e.g.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">kg</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">grams</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">lb</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">litres</div> </div> <p>Differentiation</p> <ul style="list-style-type: none"> Learners with lower level skills could be given a question that would help them think about the problem in everyday terms (certainly for the first few), e.g. ‘Which one would you <i>not</i> use for measuring potatoes?’ If appropriate, learners with more skills could pick the odd one out and also provide an explanation of why this is. This will build their confidence in using the terminology relating to measurement. <p><i>In this example, they would pick ‘litres’ and explain that ‘all the others measure length’ or ‘that’s the only one that measures capacity’.</i></p>	<ul style="list-style-type: none"> Whiteboard Individual mini whiteboards and wipe off pens if required.

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<p>Whole group warm up/ mental maths activities – to get the learners active and to build their confidence in working with different units of measurement.</p>	<p>Measurement bingo</p> <ul style="list-style-type: none"> Learners each have a bingo card giving six or nine everyday things, e.g. <table border="1" data-bbox="616 343 1547 448"> <tr> <td>screws</td> <td>curtains</td> <td>tomatoes</td> </tr> <tr> <td>milk</td> <td>road distance</td> <td>petrol</td> </tr> </table> <ul style="list-style-type: none"> Learners take it in turns to throw a dice that has metric measures marked on its faces (kg, g, km, m, l, ml). If they have something on their card that could be measured using that unit they cross it out on the card. First to cross off all the items named on their card wins. <p>Variation of ‘Measurement bingo’</p> <ul style="list-style-type: none"> The bingo cards could give measuring units and the learners then take it in turns to pick a card giving an everyday item from a pile placed face down. This time, if the item on the card they turn over could be measured using a unit on their bingo card, they cross that unit off. <p>Differentiation</p> <ul style="list-style-type: none"> Learners could have different types of item and a range of units appropriate to their context, experience and life interests, and their skills – so the dice could have different alternative units of measurement on the faces from the ones suggested above. Alternatively, the learners could play with two dice, each having something different on each face (e.g. kg, miles, litres, yards, grams, gallons, metres, cm, mm, cl, Km, ml), and would decide which they wanted to throw when their turn came. 	screws	curtains	tomatoes	milk	road distance	petrol	<ul style="list-style-type: none"> Bingo cards with items to be measured and a dice marked with appropriate metric units of measurement. Bingo cards with units of measurement on them and individual flash cards with items to be measured.
screws	curtains	tomatoes						
milk	road distance	petrol						

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<p>Discussion and small group/pair work – to get learners involved in practical activities that will build their skills with measurement, so they feel able to use these skills to solve everyday problems.</p>	<p>What measurements do we know? (Discussion)</p> <ul style="list-style-type: none"> It can be useful to discuss as a group when learners need to measure things and which units they use and feel confident with. This will vary a lot from group to group and according to the individual learner's age and life experiences. For example, many older learners who grew up before metric measurement became widely used tend to identify this as an area in which they lack confidence (although it's often the case that they have more knowledge than they realise, but may not have seen how things they know link up and fit into the fuller picture). <p>Finding reference points</p> <ul style="list-style-type: none"> If learners are getting familiar with a new measurement system or unit it is useful to have a sense of the relative size/weight /capacity of the units concerned. This gives reference points against which to measure other items. So, for example, if learners are being introduced to metres, centimetres and millimetres, you could discuss as a group some common items which they could use as a reference point for other weights, e.g. an A4 page is about 30 cm, an arm's length is approximately one metre. These reference points work best if they are relevant to the individual learner, i.e. an item they come across frequently or a measurement they might need. Having several reference points is useful. So, for example, they might have a reference point of their own height in metres (e.g. 1.6 m) and how that compares to that of a 'tall' adult (2 m) or a 'small' adult (1.5 m). 	

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<p>Discussion and small group/pair work – to get learners involved in practical activities that will build their skills with measurement, so they feel able to use these skills to solve everyday problems.</p>	<p>Going metric</p> <ul style="list-style-type: none"> If learners are already familiar with one system of measurement (e.g. imperial measures such as yards, feet and inches) and are learning to use a new system, learning by practice and experience using reference points in the new system is usually much more effective than relying on converting between units. So, if they know that 1 mm is roughly a paperclip side on, 1 cm is about a finger nail, 1 m is about an arm's length, an A4 page is about 30 cm and the height of adult between 1.5 m and 2 m, etc., they can use these to help them compare and estimate other amounts. They will increase their skills and accuracy at doing this by estimating a length and then measuring the item to compare how close they were, trying again with other items and reflecting on their experience. <p>Multiplying by ten, hundred, thousand (extension into Level 1)</p> <ul style="list-style-type: none"> An important skill for working with metric measures is being able to work confidently with multiplying and dividing by ten/hundred/thousand. Check that learners are confident with the importance of place value (the position of a digit tells you the magnitude of it). Check also that they can use moving digits around the decimal point as a fixed point to multiply by ten, hundred, etc. You can demonstrate this by having numbers pegged on to a number line with a fixed place marking the decimal point. When you multiply by ten the numbers move one place to the left, multiply by 100 and the numbers move two places to the left; divide by ten and the numbers move one place to the right, etc. Learners can actively be involved in an activity in which they each take the place of an individual digit which moves places left or right as appropriate; one learner (the only one who refuses to move) acts as decimal point around whom the others need to move. 	

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<p>Discussion and small group/pair work – to get learners involved in practical activities that will build their skills with measurement, so they feel able to use these skills to solve everyday problems.</p>	<p>Estimating amounts</p> <ul style="list-style-type: none"> As a group, discuss examples of when learners estimate measurements – think about distance, time, weight and capacity. Also discuss when it's important to measure exactly and when estimating is more appropriate. <p>Extension of 'Estimating amounts'</p> <ul style="list-style-type: none"> If appropriate for higher level learners they could also think about everyday/vocational examples of estimating related to area and volume. They could also discuss if there are situations when it is useful to overestimate and others when it might be better to underestimate amounts. <p>Practise estimating</p> <ul style="list-style-type: none"> Provide some suitable examples and ask the learners to work in small groups to estimate a weight/length/time (as appropriate) and then to compare this with the actual measurement. Repeat several times. Do their estimating skills improve as they practise more? <p>More or less?</p> <ul style="list-style-type: none"> Get learners into small groups and give each group a number of items. Ask them, by estimating, to order their items in order of length/weight/capacity. When they have decided on their agreed order, they can then use appropriate measuring devices to check if they ordered the items correctly. This activity has the useful advantage that it is very easy to provide differentiated options, so learners with greater skills can be in a small group together and can be given more items to order and items that are closer to one another. 	<ul style="list-style-type: none"> Measuring instruments such as scales, stop watches, measuring tapes, measuring jugs, etc. A variety of items to order by weight, length or capacity. Measuring instruments such as scales, stop watches, measuring tapes, measuring jugs, etc.

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<p>Discussion and small group/pair work – to get learners involved in practical activities that will build their skills with measurement, so they feel able to use these skills to solve everyday problems.</p>	<p>Mix ‘n’ match</p> <ul style="list-style-type: none"> From a set of cards each showing an everyday item of shopping, small groups of learners pick (or are given) an agreed number of cards. They imagine they only want to carry home a certain amount of weight (e.g. 2000 g), so they need to decide which items they can get without going over that weight. They work together to decide how much they think each of the items named on their cards will weigh and then agree between them which they will get on this trip to the shop. They then use a list giving typical weights of the items and work out if they were right in their estimation that their total weight is less than the amount given. Alternative contexts could include choosing presents to be included in a Christmas parcel or packing a suitcase for travel by air. <p>Differentiation</p> <ul style="list-style-type: none"> Learners with more skills could have a bigger weight given, e.g. kg, and would need to add up the weight of the items (many of which may have measurements given in grams) and then change the total into kilograms to check the amounts. Learners could do a similar activity related to bigger weights – especially if appropriate to their vocational context or life interests. So, for example, they could have a list of the weights of animal feed sacks and decide which can be combined to go on a fork lift/trailer which only takes a certain weight (or building/DIY materials on a trolley, crates in a lorry, etc.). <p>Standard and non standard measures:</p> <ul style="list-style-type: none"> Discuss with learners the difference between standard and non-standard measures. Identify some examples of non-standard measures they may use in everyday situations, e.g. working out the length of a field, garden or room in paces, measuring cooking ingredients or food in handfuls, etc. Discuss why people use both standard and non-standard measures and the advantages and disadvantages of each. Encourage learners to share examples of when and how they use non-standard measures and relate this to estimating skills. 	<ul style="list-style-type: none"> Sets of cards which show everyday items bought when shopping. List giving typical weights of the items on the cards.

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<p>Problem-solving/ investigations – to develop learners’ awareness of units of measurement.</p>	<p>Investigating packing (length, area, volume and capacity)</p> <ul style="list-style-type: none"> • Ask learners to estimate how many of specific items will fit into a given space (e.g. books on to a shelf, tiles on to a wall, bricks into a wall, packets into a box, items into a suitcase or drawer, equipment into a cupboard, glasses from a bottle, etc.) and then to explore this in practice. • Ask them to explore whether for 3D shapes (such as boxes) it matters which way round you orientate the items. Will more fit if you lie them down or put them on their side? How do the dimensions of the item being packed and the space to fit them into combine to determine which way round is best to pack? <p>Carry it away</p> <ul style="list-style-type: none"> • See learning chunk ‘Weights and scales (Entry 2)’, which can be adapted to suit Entry 3 learners. <p>Weigh them out</p> <ul style="list-style-type: none"> • For some common food items (or other as appropriate) that are typically bought by weight (e.g. vegetables), ask learners to weigh a set number of items (e.g. four carrots) and note their combined weight, then to weigh a larger (or smaller) number of the same item and note this down as well. They could record their results in a simple table. The learners can then work out for each group of items the average weight of one item (give them the formula for this unless they are confident – $\text{weight of all items in each group} \div \text{number of items in that group}$). When they have done this for several batches of the item, ask them to sum up what they would say is the typical weight of that item if they had to generalise their results. Can they use this to weigh out agreed weights of that item? • They could discuss and explore what significance it has to the combined and average weights if the items used are not of fairly equal sizes (e.g. potatoes that vary in size from one potato to the next), and the implications of this for supermarkets, shops, packing firms, etc. 	<ul style="list-style-type: none"> • Appropriate items to pack and something to pack these into (e.g. packets into a box). • Bottles, cups, containers, etc. <ul style="list-style-type: none"> • Food items typically bought by weight (or other items as appropriate) to weigh.

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<p>Problem-solving/ investigations – to develop learners’ awareness of units of measurement.</p>	<p>Margins of variation</p> <ul style="list-style-type: none"> Encourage learners to explore the margins of variation you might get when using non-standard measures. Working in small groups, ask them to repeat the same measure an agreed number of times, e.g. picking out five handfuls of sand ten times or stepping twenty paces ten times. Get them to measure the actual amount on each of the ten occasions and record this. They could use a table to record this data. Ask them to analyse the variation between the different occasions. What is the highest actual measurement and the lowest? Is there a trend to overestimate or underestimate? Did the amounts get closer to one another as the activity went on? If so, why do they think this might have been? If appropriate they can also work out the average actual amount per batch (per five handfuls or per handful) and discuss how they could use this to help them estimate given amounts based on the knowledge gained, e.g. how many handfuls would I need for 1 kg? <p>Variation on ‘Margins of variation’</p> <ul style="list-style-type: none"> Ask the learners to do a similar activity to the one described above, but working out the margins of variations between different members of their group. Each person does an agreed number of measures and they measure the actual using standard measures and compare the variation between group members. <p>Extension of ‘Margins of variation’ (estimating first)</p> <ul style="list-style-type: none"> If appropriate before they start you could ask them to predict how much the equivalent actual measurement will be for the amount agreed, e.g. estimate how many grams five handfuls of sand will be or how many metres for 20 paces. Similarly once they know the actual for the first occasion, you could also ask them to estimate how much variation they think there will be over the next nine occasions of measuring that amount. 	<ul style="list-style-type: none"> Appropriate items to measure, e.g. sand, water, etc. Measuring instruments such as scales, stop watches, measuring tapes, measuring jugs, etc., as appropriate.

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<p>Problem-solving/ investigations – to develop learners’ awareness of units of measurement.</p>	<p>Extension of ‘Measurement bingo’</p> <ul style="list-style-type: none"> • Once learners have played ‘Multiple bingo’ several times, they could work in small groups to make bingo cards and label dice faces for a game to be played in another session/by another group. They would need to discuss which units would match with which items and come up with a range of items that could go on different cards. • If they are interested and enjoy the game, they could also discuss tactics for playing the game while they do this. For example, by thinking about and discussing questions such as: <ul style="list-style-type: none"> – Are there some items that could be measured using more than one of the units available on the dice? – If you throw a certain unit and have a choice of which item to cross out on your bingo card, does it matter which item you choose to cross out? – Do some bingo cards give a built in advantage to a player? If so, how? – If you are playing the version with more than one dice, what will influence your choice of which dice to throw each go? 	<ul style="list-style-type: none"> • Blank bingo cards • Dice
<p>Integration of IT</p>	<ul style="list-style-type: none"> • Learners could use a spreadsheet to record their list of items and weights used in ‘Mix ‘n’ Match’ (see group work section above) and then add up the items they had chosen using the Σ function and selecting the appropriate cells. 	<ul style="list-style-type: none"> • IT and appropriate spreadsheet application.

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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"> Learners will use measuring skills in a variety of everyday situations including DIY, shopping, cooking, gardening, craft activities and in a range of vocational contexts, such as agriculture and horticulture, building trades, healthcare, warehousing, etc. 	<ul style="list-style-type: none"> Embedded Materials: <ul style="list-style-type: none"> Horticulture, Ho 3:10–3:19 (pp. 173–199) Sports leadership, SL 4:5–4:10 Retail, Re 2:9–2:10 (pp. 134–137) E2E, Ee 3:15, Ee 5:5–5:8, Ee 6:12 <i>Skills for Life</i> Learner Materials: <ul style="list-style-type: none"> SfL LM/NE3 Unit 4 (p. 2–10)
<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>	<p>Measuring log</p> <ul style="list-style-type: none"> Encourage learners to keep a log of when they use measuring skills in everyday or working life. Discuss these examples as a group in a subsequent session. When did they measure and when did they estimate? Which types of measurement did they use most frequently? Are there specific examples of measuring/estimating other things they could agree to go away and try, e.g. capacity, if they typically haven’t done this. 	

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<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>	<p>Value for money</p> <ul style="list-style-type: none"> • Discuss with learners if they compare the relative cost of different options when they are shopping, e.g. buying food. Explore ways to do this. Compare the cost of the same item bought in different size packets where the packets available are multiples of one another, e.g. 250 g or 500 g. • Discuss if they notice or use the price comparison labels in their local supermarket (which typically give price per 100 g for different items). Ask learners to compare the prices of different options for two or three items between sessions. Next time, discuss their findings as a group. What did they do, what did they find out? How did they feel about it? Was it easy, useful, etc.? Were there any examples when the price comparisons given turned out not to be very useful, e.g. one label gave price per 100 g and the next label gave price per item? What about examples where sometimes the price is given per kg and others per 100 g? Discuss all these options and their implications. • Using what they learnt from doing the ‘Weigh them out’ activity, encourage learners to compare the prices of suitable items on their next trip to the shops/supermarket, e.g. comparing prices of oranges. For that item compare two options of how to buy them (different sized pre-packs of the item or pre-packed compared to buying by weight). For that item is it better to buy them by weight or in a pre-pack. In the next session give feedback about the items they compared, how they did this and what they concluded. Also, as a group, discuss what other factors will influence which way they buy the items (e.g. personal preference, concerns about packaging and its effects on the environment, the number of the item they actually want, the comparative attractiveness of the items in the different options, sell by dates, etc.) 	
<p>Assessment for learning</p>	<ul style="list-style-type: none"> • Move Up test: Q17, Q24 	