Early Years Typical Progression Chart with additional guidance for practitioners

National Centre for Excellence in the Teaching of Mathematics

Measures

Mathematically, measuring is based on the idea of using numbers of units in order to compare attributes, such as length or capacity. Although young children engage with using rulers and experience being measured in centimetres, kilos – and years! – the measuring units themselves are hard to understand. Children need to realise which attribute is being measured, e.g. weight as opposed to size, and the idea of conservation: that the amount stays the same, even if the appearance alters, e.g. if dough is stretched out or in bits. In order to understand units, they need to realise that two items can be compared using a third item, or 'go between', such as a stick. Finally, children need to understand how equal size units are used repeatedly to express an amount as a number. While young children can engage actively in making comparisons and exploring equivalence of length, volume, capacity and weight in different ways, some of these ideas are challenging and will develop later in primary school. For instance, weight (mass or density) is difficult to distinguish from size since it is invisible, and the concept of conservation is harder to understand for weight and capacity. Measuring with non-standard units of different sizes in order to appreciate the need for equal units is less effective with younger children, so centimetre cubes are recommended as accessible units. While time is also elusive to measure, young children can sequence events and, for example, count 'sleeps'. (Money as a measure of value is too advanced to consider here.)

	Activities and opportunities	Practitioner notes
Recognising attributes		
In this first stage, children are able to recognise the specific attributes of (for example) length – that a stick is long; adults are tall. Their initial recognition may be a descriptor and over-applied (all straight things are long, and if it is not straight it cannot be long; all adults are tall). Children may use gestures or words to start to compare amounts of continuous quantities (length, capacity, weight), pointing to items that are big, tall, full or heavy. Children learn this vocabulary from the adults around them. Adults can seek opportunities to extend and refine conversations about things that are long, tall, high, heavy, full, etc. rather than just 'big'. At this point children may not be using comparative language such as, 'You are taller than me.'	• ensuring adults model language which highlights the specific attribute that is the focus of attention • dough modelling, which can provide a good opportunity to discuss the length of snakes, or the weight of different-sized lumps • water and sand-play, which can provide lots of opportunities to highlight capacity.	

	Activities and opportunities	Practitioner notes
Comparing amounts of continuous quantities		
Children can find something that is longer/shorter or heavier/lighter than a given reference item. They will utilise strategies such as direct comparison, e.g. placing objects side by side to determine which is longer. Children compare sizes, lengths, weights and capacities verbally and begin to use more specific terms, such as 'taller than', 'heavier than', 'lighter than', and 'holds more than', as well as more general comparative phrases, such as 'not enough', 'too much', and 'a lot more'. When comparing lengths directly, children need to ensure that they align the starting points, and compare like-for-like, e.g. straightening skipping ropes before comparing lengths. When comparing capacities directly, children can pour from one container to another to find which holds more, or find one that is the same. However, children may conclude that if one container overflows that must mean 'bigger'. Ensure that children have opportunities to see a jug of coloured water poured into a range of container shapes. Ask: 'What do you think will happen if we pour this tall thin jugful into this short fat dish?' Comparing weight can be tricky to conceptualise. One way is to identify that greater mass is shown by a greater downward pull. Ask children to hold a carrier bag; encourage them to notice it feels as though their hand is being pulled down when something heavy is put in it. Place a carrier bag in each hand and identify which one is heavier, by discussing which arm feels more pulled down. Show this using a simple spring balance or a box attached to elastic bands; identify that the elastic is being	• encouraging children to compare different attributes in everyday situations: 'I wonder who has the longest snake?' 'I wonder whose pot will hold the most water?' 'I wonder which ball is the heaviest?' • cutting a piece of ribbon as long as a child's arm and encouraging them to find things in the environment that are longer, shorter or the same length • focusing on asking for specific things according to their attributes. For example: 'Please can you pass me a ... that is ... than this one?' • when comparing directly, finding the odd one out, by providing a varied range of container shapes all containing the same amount of liquid except for one. 'Which one do you think is the odd one out? Why? How will we check? Were we right?' • posing see-saw problems, relating to weight: 'What can we do to make this side of the see-saw go down?' • using a simple spring balance to compare the weight of cargo for a toy boat • setting up a 'balancing station' with interesting things to weigh and to balance, indoors and outdoors • comparing different parcels, ensuring some of the smaller parcels are heavy, and some of the larger parcels are light.	

stretched by being pulled down, just like our arms. Explore the link to the balance scales to show that the heavier side goes down. If possible, exemplify this with a see-saw. Ensure that children are presented with large, light things and small, heavy things, to prevent the over-generalisation that big means heavy and small means light.		

Showing awareness of comparison in estimating and predicting		
After children have had lots of practical experiences of comparing attributes, they can begin to estimate and to predict. For instance, they can start to consider which container would be best to store a specific item in: 'Which box should Teddy have?', 'What will fit in here?'	• making a bed for a teddy using blocks • selecting a box or container to store a specific item • dressing dolls, and selecting different-sized clothes • finding things that will fit inside a matchbox.	

Comparing indirectly		
Children can then move onto using one thing to compare with two others, if, for example, asked to put things in order of height, weight or capacity. This may involve using a 'go between', for instance pouring a jugful of water into two bottles to see which holds more. Problems may be posed such as: 'I would like to move this table outside – do you think it will fit through the door?'	• making 'Russian doll'-type sets of nesting boxes from a collection • finding ways of seeing if the cupboard or carpet will fit in the role-play area without moving it • finding which of three pairs of shoes is heaviest for packing in a rucksack • packing a shopping bag, making sure the lightest items do not get squashed by heavier things.	

	Activities and opportunities	Practitioner notes
Recognising the relationship between the size and number of units		
Before children use standard units of measure, they begin to compare units of different sizes in practical contexts. One example may be in the water tray, where children realise it will take them longer to fill a bucket using teaspoons than bottles. Another example would be to fill identical containers with different-sized objects, e.g. small balls or large balls. These sorts of playful experiences enable children to make the generalisation that the smaller the unit the more we need of them, or the bigger the unit the less we need of them. These experiences can be extended by encouraging estimations: 'How many tennis balls do you think will fit in this tub?' Then check this by filling it. 'What if I try to fill it with ping pong balls? Will our answer stay the same? If not, why not?' In practical situations, these sorts of questions can be asked to support children in their justification of the choice of equipment. For example: 'What can I use to help fill the water tray? Which bag shall I use for my shopping? Which box would be best to store these buttons? Why did you think that is a good choice?'	• setting up an Estimation Station and guessing how many things are in the jar each day • making biscuits from a given amount of dough – choosing cutters to see who will make the most biscuits • choosing from a selection of spoons, ladles, etc, to see who can fill their pot the quickest with rice. How do you know who will be quickest?	

	Activities and opportunities	Practitioner notes
Beginning to use units to compare things		
Experiences can be provided where children use units to 'measure' and compare. It is better to provide identical bricks, centimetre cubes or metre sticks so they can count physical units, rather than repeating the use of one item as with using hands or feet. In order to measure accurately, they need to ensure there are no gaps between units of measure. Using standard units helps children make connections with measuring in 'real life'. Young children also enjoy using height charts, measuring tapes, rulers, digital scales and timers, although will not yet fully understand how they work.	• setting up a 'filling station' with lots of different-sized containers to fill with beads, then comparing capacities • using large bricks to measure the height of individuals • using metre sticks to see if an elephant or dinosaur would fit in the room • measuring the growth of a beanstalk or sunflower with interlocking centimetre cubes • comparing the capacity of different bottles by filling lots of glasses.	

Beginning to use time to sequence events		
Time is an abstract aspect to measure, and tricky in a range of ways. Although their age may be the most familiar number they know, children may have little sense of the unit of a 'year', and few may know the date of their birthday. In order to tell the time, children need a sense of number, space and time, the ability to count, and some notion of fractions (for half and quarter hours). In the Early Years we begin by drawing children's attention to sequencing of activities, important times in their day, and some sequences of time that are significant to them. Vocabulary that supports the understanding of this concept includes the positional language of 'before', 'after', 'next', and the relative terms 'yesterday' and 'tomorrow'. Knowing days of the week also helps children to keep track of time. Direct children's attention to the short hand, pointing to a number on a clockface, and identify what we are doing at that time.	• un-muddling visual timetables • making picture sequences for cooking instructions • describing sequences by re-telling stories • discussing 'o'clock' times at registration, lunchtime, snack time, tidy-up time, etc. • making their own timetable for a day – selecting activities and ordering them.	

	Activities and opportunities	Practitioner notes
Beginning to experience specific time durations		
Children need to experience specific time spans in order to start to develop an overall sense of time. Initially, this may be based on familiar activities such as the number of 'sleeps' before an event. A class calendar may support this by highlighting certain events (‘How many sleeps until the chicks start to hatch?’, ‘How many sleeps until my birthday?’, ‘How many sleeps until we go to the park?’). Discuss the number of sleeps getting smaller and what this means. By using timers in play, children can start to explore what they can do in a certain time period. For example: ‘I wonder how long it takes you to run around the track?’, ‘How would we know if you were getting quicker?’. Identify that, in this case, the smaller the number of seconds the quicker you are getting (this is tricky for a child, as usually bigger numbers are ‘better’). Children may also have the opportunity to see how many things they can do in a minute. For example: ‘How many play people can you rescue from the pit?’ (Wrap fabric around a water tray to create small gaps though which people can be rescued.)	• events on a class calendar to count down to • timers provided for children to set and respond to challenges; e.g. ‘I wonder if we can run as fast as a cheetah’, ‘I wonder how many hops I can do in ten seconds’, ‘I wonder how many times I can write my name in a minute’, etc. • time durations with songs or music.	

Common errors in this area may include:	What to look for Can a child:
• keeping track of events, e.g. ‘Have I had my lunch yet?’ • positional language associated with time; muddling the relative terms ‘yesterday’ and ‘tomorrow’ • using ‘long’ to describe the shape of something (e.g. a block that is much longer than it is wide) rather than to compare lengths • not taking into account both ends as the starting and stopping point • not being able to say ‘than’ in the phrase, ‘this is longer than that’ • not understanding that units must cover a complete length, with no gaps or overlaps, demonstrated by thinking that measuring is about counting units placed along something, or putting a ruler alongside and saying a number • not understanding that units must be equal.	• find something that is longer, shorter, heavier, lighter (etc.) than a reference item? • find an appropriate container for a specific item? • describe the location of something using positional language? • accurately use the relative terms ‘yesterday’ and ‘tomorrow’? • order a short sequence of events?