

Numicon 2 Measurement: 1 and 4 to show you development



In this sample you will find:

- Information from the Implementation Guide and A summary of Measurement 1
- One of the activities in Measurement 1 and 4 - Comparison of lengths and Introducing Metres
- Two in-class and a 'take home' activities to reinforce the teaching and build generalising skills
- An assessment for #4 you can use at the end of the week as a record of the children's learning. They have to apply what they have learned in these activities.

NZC NUMICON TABLE								
NZC Level	1		2		3		4	
Year	0/1	2	3	4	5	6	7	8
NP Stages (Approx.)	0-3	4	Early 5	Late 5	6	7	8	
Numicon	FF	1	2	3	4	5	6	
Intervention	Numicon Intervention Programme							
Learning Needs	Breaking Barriers							
Acceleration	Big Ideas - Suitable for students in Years 5 – 9 as a catch-up							

Implementation Guide

Length and Ordering

Technically, when we measure 'length' we measure what would perhaps be better called 'linear extension', and confusingly for children, in everyday life linear extension gets called different things in different contexts.

Height, width, depth, length, and distance are all different ways of referring to the same quality of linear extension, and so children need to connect references to their 'height' and how 'tall' they are, with the 'depth' of a swimming pool, the 'width' of their bedroom, the 'length' of a football pitch, and with how 'far' it is to the shops, as all measures of 'the same thing'. Much discussion is needed around this great variety of language use, and also around the wide variety of instruments used to measure different 'lengths' and 'distances' in different contexts.

Gradually, children will learn that there is also an important distinction between 'distance' and 'displacement' when measuring 'how far' it is from A to B. 'Distance' is simply an amount (a magnitude, e.g. how far you actually have to travel), whereas 'displacement' is both a magnitude and a direction (called a vector generally, and a 'translation' in geometry). In everyday life we describe the displacement between two places as the linear distance between them 'as the crow flies'; we assume crows fly along the shortest (straight) path between two points, whereas, e.g. the distance from our home to school will be further than 'the crow flies' because we won't be able to travel in a straight line. Because displacement is a straight-line path, we are able to specify it as movement in a constant direction. This distinction is obviously crucial in answering, 'How far is it from A to B?'.

The standard SI unit of linear extension in all contexts is the metre (m). Length is measured with ratio scales (metric or imperial), since 'zero length' is an absolute. Consequently, ratios of lengths to each other make good sense, and are used frequently in both everyday life and in science.

Lengths are compared and ordered initially in order to recap the work of Geometry, Measurement and Statistics 1, and then centimetres are introduced in the context of growing animals, and metres in the context of heights. Rulers and metre sticks are introduced as standardized instruments. The varied vocabulary of linear extension is further developed by using terms such as 'width' and 'height' and so on.

Standard units

The key aspect of work on measurement at this stage is the introduction of standard units and their different notations. Within various contexts, children are introduced to metres (m) and centimetres (cm), kilograms (kg) and grams (g), litres (ℓ) and millilitres (ml).

The thing to stress in teaching these measuring units is that standardization allows us to communicate effectively about magnitudes, that is, to 'use the same language for' lengths, weights, volumes and capacities. Imperial units are just as effective as metric units; they are simply a different language.

Using the standard units of time (hours and minutes) allows us to keep appointments with each other, and the British standard monetary units give us a shared language – in this country – for economic value as we buy and sell.

You will need to adapt to the NZ Currency. Both NZ and the UK use a decimal system. Many files are downloadable through www.numicon.co.nz

Measurement 1: Introducing centimetres

Key mathematical ideas Length, Ordering, Standard units

Educational context

In this activity group, children begin to use centimetres, as initial 'standard' units of length, in a range of practical situations. The contexts are varied, but in each case the measurement task has a problem-solving purpose, whether showing how a caterpillar grows in a story, contributing to research into fish habitats or making hats.

Children begin by revisiting work from the *Geometry, Measurement and Statistics 1 Teaching Resource Handbook*, comparing and ordering lengths and using non-standard units. The importance of aligning to a common starting point is emphasized when children create a graph to show growth and compare pairs of lengths using <, > and = symbols. Children are then introduced to centimetres, including the 'cm' abbreviation, and use the already familiar length of a 1-rod to begin estimating and making measurements in centimetres. Encourage them to recognize the usefulness of standard units for communicating – in Activity 3, for example, because they are making measurements in centimetres, they can be confident that the researcher they are sending their findings to will understand.

They are also introduced to centimetre rulers as measuring instruments. Children may take some time to appreciate the importance of 'starting from 0' when measuring with a ruler; allow for plenty of practice and discussion. Finally, children also address the problem of how to measure non-straight lengths, for example using ribbon or string.

Learning opportunities

- To compare two lengths using <, > and = symbols; and to compare and order more than two lengths.
- To understand how to use a ruler.
- To estimate lengths in centimetres.
- To construct a simple pictogram.
- To use a table to record data.

Terms for children to use

length, width, height, depth, longer, longest, shorter, shortest, deeper, deepest, thicker, thickest, thickness, distance, dimension, compare, align, same, different, mark, label, straight, direct, indirect, graph, centimetre (cm), bar chart, block graph

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively.
- Align lengths to measure and compare them accurately.
- Check accuracy by e.g. repeating or comparing measurements.
- Construct a basic table and use it to read and record data independently.
- Measure a length using a ruler, and record the length accurately in centimetres.
- Can construct and interpret a pictogram using a many-to-one correspondence.

GMS Milestone 1

- Compare and order lengths using <, > and = symbols (GMS 2:1a)
- Measure straight and curved lengths to the nearest cm, choosing suitable equipment, e.g. ruler, tape measure, cm cubes (GMS 2:1b)
- Record measurement data in a simple table and pictogram or block graph (GMS 2:1c)

Explorer Progress Book 2, pp. 2–3 and 30

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 6: Caterpillar Lengths

After completing work on Activity 2, give children Explore More Copymaster 6: Caterpillar Lengths to take home.

Focus activities

1. Comparing increasing lengths
2. Ordering lengths
3. Introducing centimeters
4. Presenting data in a pictogram
5. Measuring non-straight lengths
6. Investigating centimetre rulers

Caterpillar Lengths

How this will help your child

- This activity will help your child to compare the lengths of different shapes.
- It will also allow your child to practise using the 'greater than' (>) and 'less than' (<) symbols.

Words and phrases to use

length, longer, longest, shorter, shortest, longer than..., shorter than..., greater than, less than

You will need

- Pair of scissors

During the activity, look at what your child can do

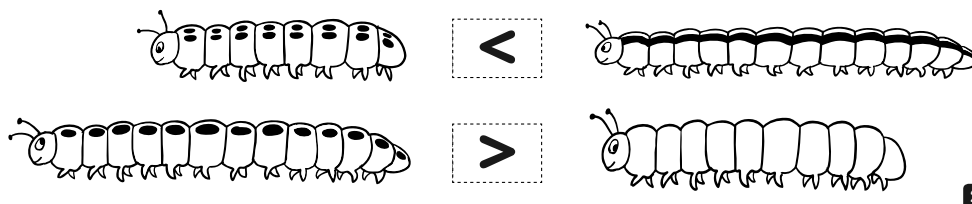
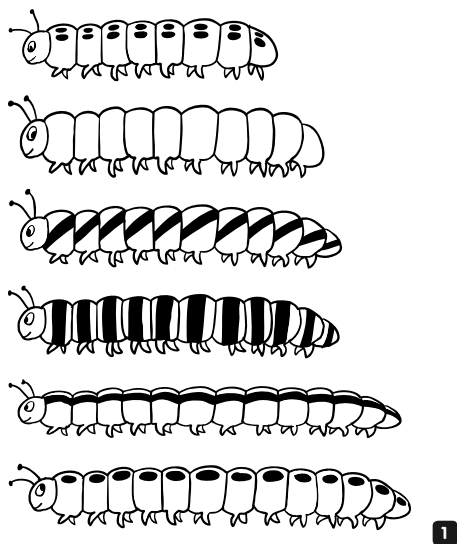
- Put different-sized pieces of paper in size order, by length.
- Use the 'greater than' (>) and 'less than' (<) symbols.

What to do

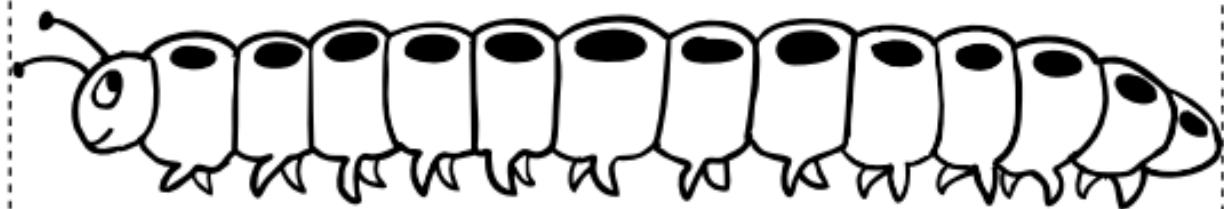
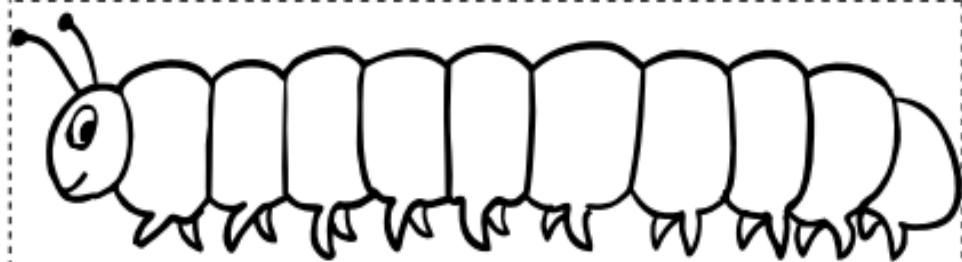
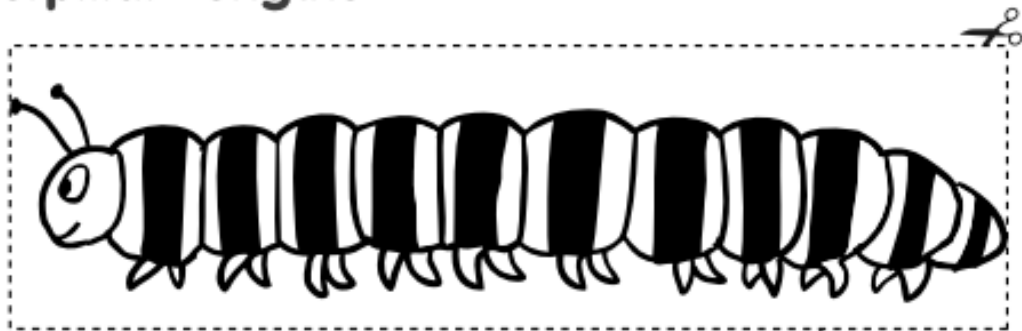
- Cut out the caterpillars and symbol cards from the Caterpillar Lengths sheet.
- Talk to your child about the length of each caterpillar (length will be the longest side each time).
- Ask your child to order the caterpillars according to length, from shortest to longest. **1**
- Next, ask your child to shuffle the caterpillars around.
- Then choose two caterpillars and use the symbol cards to compare them. Remind your child that the 'greater than' and 'less than' symbols are like the open mouth of a hungry bird which always wants to eat the biggest thing. **2**
- Encourage your child to say what they notice about the lengths of the caterpillars, e.g. one caterpillar is 'longer than' or 'shorter than' the other caterpillar.
- Repeat this activity using other caterpillars and symbols from the sheet.

Next steps...

- Compare and order the length of some household objects, e.g. a belt, a trainer.



Caterpillar Lengths



Measurement 4 Introducing Metres. This activity combines the strands of Measurement, Geometry as well as Number

Measuring Shapes

How this will help your child

- This activity will help your child to compare the lengths and widths of different shapes.
- It will also allow your child to practise measuring with a ruler.

Words and phrases to use

length, width, ruler, longer, longest, shorter, shortest, longer than..., shorter than..., wider than...

You will need

- Pair of scissors
- Pencil

During the activity, look at what your child can do

- Measure in centimetres using a ruler.
- Compare different lengths and widths.
- Use the terms 'length' and 'width' correctly.

What to do

- Cut out the rectangle shapes and ruler from the Measuring Shapes sheet.
- Talk to your child about the length and width of each shape (length will be the longest side each time). **1**
- Ask your child to measure the length of each rectangle in centimetres using the ruler. When using the ruler, they should place the top left corner of the ruler, starting at 0 cm, at the start of the line that is being measured. Check their measurements. **2**
- Next, ask your child to measure the width of each rectangle in centimetres using the ruler. Check their measurements. **2**
- Then ask your child to write the length and width measurements in the table. **3**
- Ask your child which rectangle is the widest and which is the longest? (The widest is C at 6 cm and the longest is E at 12 cm.)

Next steps...

- Put the rectangles together to make bigger shapes and measure the length and width of these.
- Measure the length and width of some small household objects. e.g. a book, a small box.

length

width

Name	Measured height
Joe	1 m 30 cm
Sreya	98 cm
Sam	1 m 16 cm

6 cm C

7 cm

5 cm E

12 cm

3 cm A

4 cm

Length	Width
3 cm	3 cm
7 cm	2 cm
12 cm	6 cm
5 cm	2 cm
12 cm	5 cm
6 cm	1 cm

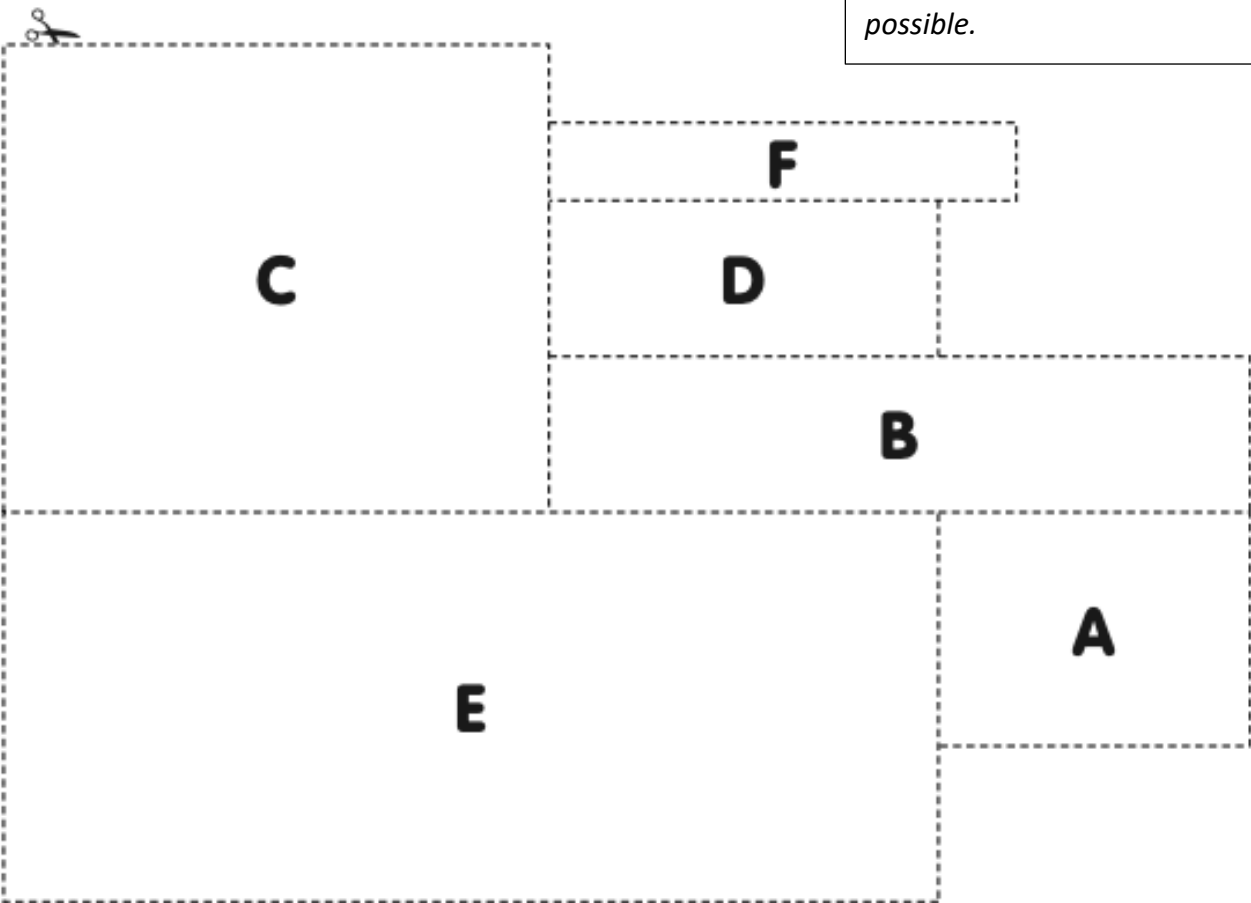
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Measuring Shapes

Please adjust on your printer settings to make the measurements as close to real centimetres if possible.



Rectangle	Length	Width
A		
B		
C		
D		
E		
F		

Date ____/____/____

Adventure Park

8 children are visiting an adventure park.

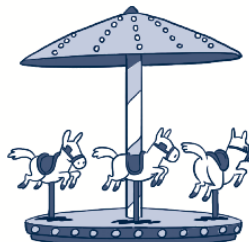
Their teacher wants to know how many tickets to buy for each ride.

The children want to know if there will be enough of them on each ride for them to sit in pairs.

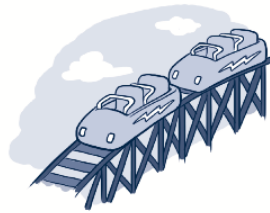
Can you use the information to complete the table?
Choose a ride for each child to go on.



A
1 m or
shorter



B
95 cm to
1 m 25 cm



C
1 m 20 cm
or taller

		Height	Ride A, B or C?
Artem 90 cm	Sophia 1 m 30 cm	Artem 90 cm	A
Ed 84 cm	Peter 1 m 23 cm	Sophia	
		Ed	
		Peter	
Tom 1 m 10 cm	Lakisha 1 m 3 cm	Tom	
		Lakisha	
Jess 96 cm	Agata 1 m 25 cm	Jess	
		Agata	



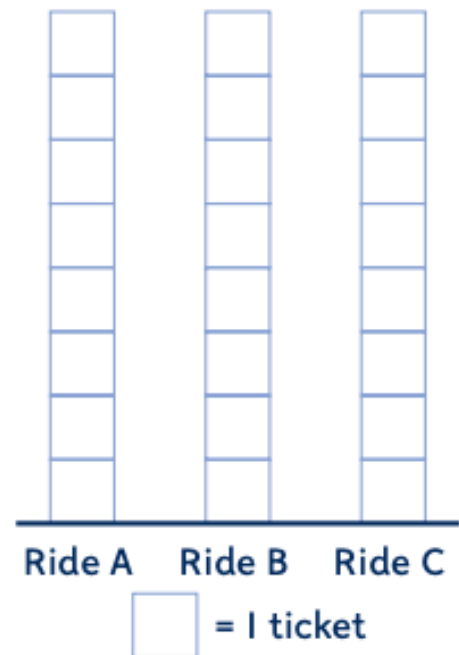
Teacher notes

Date ____/____/____

Adventure Park

Can you use the information from your table to complete this block graph?

How many tickets should the teacher buy for each ride?



Can the children sit in pairs on each ride?

Which ride has the most children?



Teacher notes

