RICH MATHEMATICAL TASK BOOKLET

MEASUREMENT

YEAR 3

Teacher Booklet

Task 1

Once upon a time, there was a brilliant Ariki in the Cook Islands. She loved measuring things and used parts of her body like her finger, hand, foot, and arm as measurement units.
She decided that every length measurement on the island should be done with her measurement units. However, she couldn't go everywhere to measure everything! How could she solve this problem?
Use the card and design a measurement tool that would help her.

Use your measurement tool and measure each length using two different measurement units. Complete the table (see copy masters) and make sure you write the measurement unit and measurement count.

Teacher Notes

Have card strips of different lengths for students to design their measurement tools.

Notice how the students represent the measurement unit, they may draw around each body measure part separately or alternatively they may mark the end of the body part measurement unit each time which is both more efficient and ensures that there are no gaps. If students draw around the body part draw their attention to a more efficient way of developing the tool.

Support students to notice that if you do not have numbers on the measurement tool, it means that you still have to count the number of measurement units. Labelling the marks on the measurement tool with numbers means that you don't have to count the number of measurement units.

Notice how the students are measuring using the measurement tool and support them to use this correctly and to keep track of the measurement count even if the length is longer than the tool.

For the independent task, have objects that the students can use to measure (e.g., centi-cube, multilink, ones cube). Provide them with a single or two objects.

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume. When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

Conceptual understanding of measurement requires understanding of conservation and transitivity. Conservation requires understanding that when moved or subdivided, an object will retain its size. Transitivity involves understanding that the measures of two objects can be compared to a third object. For example, if object A weighs more than object B, and object B weighs more than object C, then object A will weigh more than object C.

There are key principles related to measurement including that the size of the measurement unit remains the same (including identical units or subdivisions), units are repeated with no gaps or overlaps (iteration), the unit is part of a whole and the measurement is expressed as the total number of units used.

Shareback

Select students to share who have designed a non-standard measurement tool that draws on key measurement concepts (no gaps or overlaps, iteration, begins at the edge) and have used this correctly to measure the lengths. Record the different measurement unit and counts that students have found and include those which have used the same body unit (e.g., feet) but have a different measurement count for the same length. Facilitate discussion of the relationship between measurement units (e.g., two fingers is the same as one hand, etc).

Connect

Ask the students to discuss why they got a different measurement count for the same measurement unit (from different students). Highlight the relationship between the size of the measurement unit and the measurement count and connect this to the need for a standard measurement unit.

Suggested Learning Outcomes

Design a measurement tool using non-standard units.

Use a measurement tool with non-standard units to measure length.

Compare length using non-standard units.

Use measurement language to describe the comparison of length.

Independent Tasks

Litea wants to go on a long bike ride (see copy masters)

Can you use the equipment to measure which path in the park is the longest or are they all the same?

Record your measurement unit and measurement count.

Choose a different set of equipment to measure the paths.

Record your measurement unit and measurement count.

What do you notice about the measurement count when you use a different measurement unit?

Curriculum Links

During Year 3
Estimate and then reliably measure length, capacity, and mass (weight) using whole-number metric units (e.g. from tools with labelled markings).

Compare and order several objects using metric units of length, mass (weight) or capacity.

Mathematical Language

Length, unit of measure, measurement count, longest, shortest, same.

Anticipations

Solutions, Misconceptions

Task 2

1) Make a ruler using one cube and the card strip.

2) Look at your card strip ruler and a ruler.

What do you notice? What is the same? What is different?

3) Draw another card strip ruler which you have improved.

Teacher Notes

To launch this task, ask students to each draw a ruler from memory. Ask them to compare the drawings and discuss what is the same and different in their drawings.

Have centi-cubes, multi-link, or flat square shapes that are one centimetre long, card strips that are all the same length (between 20 – 30 cm), and standard centimetre rulers.

Notice how the students develop the ruler, they may draw around each cube separately or alternatively they may mark the end of the measurement stick each time which is both more efficient and ensures that there are no gaps. Some students may mark the middle of the strip:

Support students to notice that if you do not have numbers on the ruler, it means that you still have to count the number of measurement units.

Labelling the marks on the ruler with numbers means that you don't have to count the number of measurement units.

Ask students to re-develop the ruler that they made until that have a close approximation of a ruler in centimetres.

For the independent task, cut the red and blue strips out or use rods.

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume. When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

Conceptual understanding of measurement requires understanding of conservation and transitivity. Conservation requires understanding that when moved or subdivided, an object will retain its size. Transitivity involves understanding that the measures of two objects can be compared to a third object. For example, if object A weighs more than object B, and object B weighs more than object C, then object A will weigh more than object C.

There are key principles related to measurement including that the size of the measurement unit remains the same (including identical units or subdivisions), units are repeated with no gaps or overlaps (iteration), the unit is part of a whole and the measurement is expressed as the total number of units used.

Shareback

For the first question, ask students to share their measurement tools and to compare these. Ask them to discuss how they are the same? Different? Why way works best and why?

For the second question, select students to share who notice that the ruler has the marks at the edge, numbers to represent the measurement count, more marks on it but both have equal spacing. Ask all students to discuss what the numbers mean.

Ask students to redraw and improve their ruler until it looks like this.

Connect

Have a set of objects that have shorter than the length of the student created ruler. Ask students to measure an object using their ruler then measure the same object using the cube.

Ask is your measurement count the same or different?

Suggested Learning Outcomes

Create a ruler with centimetre units.

Use a ruler with centimetres to measure objects.

Independent Tasks

The Ariki decided she wanted a new sleeping mat. She wants the mat to measure six feet long and three feet wide.

The red strip is the same size as her foot measurement unit.

Her helper has lost the foot measurement unit and decides to use their own foot. The blue strip is the same size as the helper's foot. (see copy masters)

Use each strip to make the bed for the Ariki.

Curriculum Links

During Year 3
Estimate and then reliably measure length, capacity, and mass (weight) using whole-number metric units (e.g. from tools with labelled markings).

Compare and order several objects using metric units of length, mass (weight) or capacity.

Mathematical Language

Centimetre, length, unit of measure, measurement count, ruler.

Anticipations

Solutions, Misconceptions

Task 3

Estimate how long the _____ is in metres.
Estimate -
Use the metre strip to measure the length and record the measurement count and measurement unit.
Measurement -

Find some objects in the classroom that are one centimetre in length.

How long is your metre strip in centimetres?

Teacher Notes

During the launch, show the students a metre ruler and model how to record the measurement count (e.g., 5 m). Support students to record their metre estimates as 'about 3 m' or 'between 2 m and 3 m'. To launch the second activity, introduce the grid lines on the centimetre strips as a centimetre and model how to record the measurement count (2 cm).

Have one metre lengths from a roll of paper or wide ribbon. Cut the 1 cm grid paper (see copy masters) so that it is a strip with 1 cm wide and 20 cm in length.

Support the students to measure objects that they think are 1 cm by using the centimetre strip.

Facilitate students to use grouping or structured counting to see how many centimetres are in one metre.

For the independent task, have a set of objects for the students to measure using the centimetre strip.

Shareback

Select students to share who are able to accurately measure objects around the classroom using the metre strips. For the second part of the task, select students to share who used structured counting or grouping to identify that one metre has 100 centimetres in it. If no students identified this, then model how to use the centimetre strip and keep track of the count in tens or twenties.

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume.

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There are key principles related to measurement including that the size of the measurement unit remains the same (including identical units or subdivisions), units are repeated with no gaps or overlaps (iteration), the unit is part of a whole and the measurement is expressed as the total number of units used.

Curriculum Links

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Compare and order several objects using metric units of length, mass (weight) or capacity.

Connect

A child can throw a beanbag 2 metres. What is the length in centimetres?

Suggested Learning Outcomes

Estimate length in metres.

Measure length in metres.

Measure length in centimetres.

Identify the relationship between centimetres and a metre.

Independent Tasks

Estimate the length of each object in centimetres. Check your estimation with your centimetre strip. Make sure you record the measurement unit.

Estimate –
Measurement –

Mathematical Language

Perimeter, length, unit of measure, measurement count, ruler.

Anticipations

Solutions, Misconceptions

Task 4

Hamuera wants to post his friend who lives overseas a book for their birthday. Measure to find out whether the book will fit in the envelope.

Estimate the length of each side of the book first in centimetres.
Estimate –
Perimeter –
Use your ruler to find the perimeter of the book. Record the measurement for each side in centimetres.
Measurement –
Perimeter –

Estimate the length of each side of the envelope first in centimetres.
Estimate –
Perimeter –
Use your ruler to find the perimeter of the envelope. Record the measurement for each side in centimetres.
Measurement –
Perimeter –

Teacher Notes

During the launch, introduce students to the term perimeter and explain that the distance around the edge of a flat object is called its perimeter. Have a range of flat objects (pictures, books, cards) and trace your finger around the perimeter and ask students to do the same.

Have students' rulers or centimetre strips, picture books, and large envelopes.

Facilitate the students to notice that they need to place the left end of the ruler against the end of the part of the perimeter that they are measuring.

Expect students to use measurement language including perimeter and to record the estimate and measurement using the cm abbreviation.
For the independent task, have a selection of picture books and either the centimetre ruler or strips.

Big Ideas

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Conceptual understanding of measurement requires understanding of conservation and transitivity. Conservation requires understanding that when moved or subdivided, an object will retain its size. Transitivity involves understanding that the measures of two objects can be compared to a third object. For example, if object A weighs more than object B, and object B weighs more than object C, then object A will weigh more than object C.

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Shareback

Select students to share who are able to accurately measure the perimeter using their ruler and explain perimeter as the total of all the sides.

Connect

Give students a ruler with both centimetres and millimetres marked on it. Explain that a millimetre is a centimetre divided into ten equal parts and written as mm. Ask students to discuss what would happen to the perimeter if you measured it in millimetres rather than centimetres.

Suggested Learning Outcomes

Estimate length in centimetres.

Measure length in centimetres.

Find the perimeter of a flat object.

Use measurement language to describe how to measure perimeter.

Independent Tasks

Haumea wants to post his friends who lives overseas a book for their birthdays. Measure to find out whether each book will fit in the envelope.

Estimate the length of each side of the book first in centimetres.
Estimate –
Perimeter –

Use your ruler to find the perimeter of the book. Record the measurement for each side in centimetres.
Measurement –
Perimeter –

Estimate the length of each side of the envelope first in centimetres.
Estimate –
Perimeter –

Use your ruler to find the perimeter of the envelope. Record the measurement for each side in centimetres.
Measurement –
Perimeter –

Curriculum Links

During Year 3

Visualise, estimate, and measure:
– the perimeter of polygons using metric units
– the area of 2D shapes using squares of identical size
– the volume of rectangular prisms (cuboids) by filling them with identical 3D blocks.

Mathematical Language

Perimeter, centimetre, length, unit of measure, measurement count, ruler.

Anticipations

Solutions, Misconceptions

Task 5

Marama is making tivaevae pillowcases for her pillows. She needs to measure the area of the pillow so that she can get the right amount of fabric.
How large is the pillow?
Use one square to find the area of the pillow.
Is the second pillow larger? Find the area and check.

Teacher Notes

During the launch, remind the students of the term area and that the area is the amount of space inside a 2D shape (the surface). Ask students to indicate the area of the surface of a desk or table.

For the task, have two large sheets of paper (newsprint but cut horizontally or vertically to re-size and have them as different sizes) and square shape blocks. Give students one measurement square. If students need more squares than give them two squares so they can place one and then the next one to measure the area.

Facilitate the students to notice that they need to place the squares carefully with no gaps or overlaps and starting at the beginning of each row. Support them to notice that they can use a finger or mark to keep track of where they have placed the square.

Notice whether students measure the entire paper with the square or whether they begin to realise that each row or column would be the same measurement count and this can be recorded instead.

Expect students to use measurement language including area.

For the independent activity, provide students with small square shape blocks to measure the area. See Copy Masters.

Shareback

Select students to share who are able to accurately measure the area using one measurement squares by measuring in a row and then measuring the next row while ensuring no gaps or overlaps. Alternatively, select a student who has measured one row or column and then approximated the rest by using this measurement to work out the total.

Big Ideas

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Connect

Marama says that she has a quick way to work out the area rather than measuring the whole pillow. She measures the top row like this (model measuring the row) and then could work out the rest. What do you think Marama did?

Suggested Learning Outcomes

Use non-standard units (squares) to measure area.

Estimate the area of surfaces using non-standard units.

Find the area of a surface by filling the surface with square measures.

Find the area of a surface by using repeated addition.

Use measurement language to describe how to measure area.

Independent Tasks

Marama is making tivaevae pillowcases for her pillows. She needs to measure the area of the pillow so that she can get the right amount of fabric.
How large is the pillow?

Use one square to find the area of the pillow.

Is the second pillow larger? Find the area and check.

Curriculum Links

During Year 3

Visualise, estimate, and measure:
– the perimeter of polygons using metric units
– the area of 2D shapes using squares of identical size
– the volume of rectangular prisms (cuboids) by filling them with identical 3D blocks.

Mathematical Language

Area, surface, square, unit of measure, measurement count.

Anticipations

Solutions, Misconceptions

Task 6

I asked the other teachers to help me find the area of these rectangles. They must have got distracted and they didn't finish.
Can you help by drawing the missing lines and finding the area of these rectangles? (See copy masters for images)

Teacher Notes

Provide rulers to the students so that they can draw in the missing line segments to make a complete grid or array.

Notice whether students count all of the squares individually or if they use grouping, repeated addition, or multiplication.

For the independent task, provide rulers so students can draw in the lines to complete the grids.

Shareback

Select students to share who have used repeated addition, grouping or multiplication to find the area rather than counting every square individually.

Connect

Ask the students to develop an explanation for the teachers on a quick way to find the area without counting all the squares individually.

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume.

When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

There are key principles related to measurement including that the size of the measurement unit remains the same (including identical units or subdivisions), units are repeated with no gaps or overlaps (iteration), the unit is part of a whole and the measurement is expressed as the total number of units used.

Curriculum Links

During Year 3

Visualise, estimate, and measure:
– the perimeter of polygons using metric units
– the area of 2D shapes using squares of identical size
– the volume of rectangular prisms (cuboids) by filling them with identical 3D blocks.

Suggested Learning Outcomes

Use non-standard units (squares) to measure area.

Find the area of a rectangle by using grouping or repeated addition.

Find the area of a rectangle by using multiplication.

Use measurement language to describe how to measure area.

Independent Tasks

Timo is choosing a fish tank for his fish. He wants to choose the fish tank with the biggest area. Each shape is the area of the bottom of the tank.

(see Copy Masters for the shapes) .

Estimate the area for each tank. Record your estimate.
Measure the tank using the square measure. Record the measurement count.

Which tank should Timo choose?

Mathematical Language

Area, surface, square, unit of measure, measurement count.

Anticipations

Solutions, Misconceptions

Task 7

Look at the net of the box and estimate how many cubes you will need to fill the box.

Check your estimate by making the box and filling it with 1 cm^3 cubes.

Draw a representation which shows the volume of the box.

Teacher Notes

For the launch, provide a variety of boxes of different shapes and sizes and facilitate students to explore the volume using informal units of measure (e.g., blocks, lego pieces). Revisit the concept that the volume of an object is the amount of space it takes up.

For the task, have a variety of nets for small cuboids with different volumes (e.g., muesli bar or tissue boxes) and centi-cubes.

Launch the tasks by show students the 1 cm^3 cubes but do not let them use them before they make estimates of the volume of their cuboid.

Facilitate the students to notice that an object is measured by the number of unit volumes that fit into it. Additionally, for accuracy of measurement, there should be no gaps or spaces between the 1 cm^3.

Expect students to use grouping and multiplication to find the volume and to represent the volume measurement using cm^3

For the independent task, have a collection of different sized and similar boxes or containers. Give the students the centi-cubes (1 cm^3 & 1000 cm^3) to find the volume

Shareback

Select students to share who have noticed and used the relationship between finding the area (first layer) and using this to find the volume. If no students have noticed this, highlight the relationship to them.

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume.

When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

There are key principles related to measurement including that the size of the measurement unit remains the same (including identical units or subdivisions), units are repeated with no gaps or overlaps (iteration), the unit is part of a whole and the measurement is expressed as the total number of units used.

Curriculum Links

During Year 3

Visualise, estimate, and measure:
– the perimeter of polygons using metric units
– the area of 2D shapes using squares of identical size
– the volume of rectangular prisms (cuboids) by filling them with identical 3D blocks.

Connect

Show students two - three different nets for boxes that have the same volume and ask them to estimate the volume of each box and put them in order from smallest to biggest.

Make the box and then ask students to measure the volume and compare the results.

Ask the students to discuss what they notice.

Suggested Learning Outcomes

Compare and order the volume of objects.

Explain volume as the space inside an object/container.

Use standard units to measure volume.

Calculate the number of units to describe the measurement.

Independent Tasks

What box has the most volume?

What box has the least volume?

Which boxes have the same volume?

Represent how you found the volume for each box and label which one has the most volume, the least volume, and same volume.

Mathematical Language

Volume, cubic centimetres, cubes, cuboids, units of measure, measurement count.

Anticipations

Solutions, Misconceptions

Task 8

Matiu and Linea have a carton of juice the same size. Matiu measures the volume of the carton of juice using cubic centimetres. Linea measures the capacity of her carton using water and millilitres. They compare their results and are surprised.

With your carton use the two units of measure to find out what surprised them.

Make sure you explain and justify your answer using representations.

Teacher Notes

Have cuboid containers to represent the cartons and measuring jugs with millilitre scales and centicubes to use as measuring tools.

Facilitate students to notice the use of the different measuring units for liquids and solid objects and the terms capacity and volume.

Expect students to record their ideas using representations (3D drawings) and measurement units.

Emphasise the following to support students in developing sound benchmarks:
- A millilitre is about the same volume as a cubic centimetre.
- The litre is defined as the amount of liquid that will fill a cube, which is a volume of 1000 cm^3. So, 1 mL is the same as 1 cm^3.
- Millilitres is the measure used for liquids and cubic centimetres for solids.
- The space any container holds is its volume
- The term capacity is used to talk about the volume of the liquid a container holds without spilling any.

Emphasise that the term litre/litres are used for measuring the volume of liquids.

For the independent activity, have collections of 1 cm3 cubes for the students to use to build cuboids.

Shareback

Select students to share who use a range of measurement language and have recorded using both cm^3 and ml. Alternatively model the measurement recording for the students.

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume.

When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

There are key principles related to measurement including that the size of the measurement unit remains the same (including identical units or subdivisions), units are repeated with no gaps or overlaps (iteration), the unit is part of a whole and the measurement is expressed as the total number of units used.

Curriculum Links

During Year 3

Visualise, estimate, and measure:
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– the volume of rectangular prisms (cuboids) by filling them with identical 3D blocks.

Connect

Have a set of pictures of containers and ask students to estimate and record their volume as cm^3 and mL.

Suggested Learning Outcomes

Measure the volume of a container using millilitres (mL).

Measure the volume of a container using cubic centimetres (cm3)

Compare and describe the relationship between volume and capacity and millilitres and cubic centimetres.

Calculate and record measurement units to describe the measurement count.

Independent Tasks

Use the 24 cubes to design some box shaped buildings.

Draw a representation of your design and write the volume for each one.

Mathematical Language

Liquids, cubic centimetres, capacity, millilitres, litres, volume.

Anticipations

Solutions, Misconceptions

Task 9

Find the containers that have the same capacity but are a different shape.

Prove that they have the same or almost the same capacity.

Make sure that you explain and justify your reasoning using a range of representations including a number-line.

Teacher Notes

To launch the task, ask students to discuss what they know about millilitres and litres and to give benchmarks of when they would be used.

Have a range of measuring jugs/cups with different marked measures and closely watch for students who choose inappropriate measures.

Expect students to use a number line to re-represent the measurement. Support them to notice that the marks on the number line need to be equally spaced because the spaces between them represent slices of equal volume. Highlight that uniformity needed in measuring volume and this is the same in measuring capacity.

Facilitate students count in 100s (or other combinations) to work out that one litre is 1000 mL. Support them to go beyond one litre and to use fractional language.

Make links to the terms, millilitre, and millimetre, and that the term milli represents one thousand.

For the independent task, have a selection of measuring jugs/cups with millilitre markings on the side and a selection of unmarked containers.

Shareback

Select students to share who have used a variety of representations including a number line with equally spaced marks to represent equal volume between measurements. Encourage and model the use of standard unit measurement language (e.g., millilitres, litres, 500 mL is halfway to 1 L).

Connect

Have a number line which is marked from 50 mL to 1000 mL with a scale but no other numbers. Ask students to identify how many millilitres would be represented at certain points.

Big Ideas

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There are key principles related to measurement including that the size of the measurement unit remains the same (including identical units or subdivisions), units are repeated with no gaps or overlaps (iteration), the unit is part of a whole and the measurement is expressed as the total number of units used.

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Suggested Learning Outcomes

Use standard units (millilitres and litres) to describe and measure capacity.

Calculate the numbers of units to describe the measurement.

Represent measurement scales in different ways.

Mathematical Language

Capacity, millilitre, litre, scale, unit, measurement count.

Independent Tasks

Estimate how many millilitres would fit in each container. Write your estimate down.

Use one of the measuring jugs to compare how much liquid in millilitres the container would hold.

Make a number line which shows the scale for each container.

Anticipations

Solutions, Misconceptions

Task 10

Find the mass of each bag of objects.

Record the mass in grams and represent this on a number-line.

Find the difference in grams between for the bags of objects and put them in order from most massive to least massive.

Teacher Notes

To launch the task, ask students if they have heard the word 'gram' and 'kilogram' and what they think it means. Have centi-cube (1gm) and bags of objects which have a mass equivalent to 1 kg. Let the students lift and hold them. Discuss the use of g for grams and kg for kilograms to record the measures of mass.

Have digital or analogue scales which measure in grams and kilograms and bags of objects which have differing measures of mass.

The mass of an object is the amount of matter in it. Avoid using the term "weigh" instead refer to finding the mass of objects. Similarly, facilitate students use the terms more massive or less massive rather than heavier or lighter.

Note, the mass of the object is measured by the number of unit masses that balance it. Scales find the weight of an object. This is the force of gravity by which it is attracted to the Earth (gravitational pull). However, because gravity is almost the same everywhere on Earth an object's weight provides a good estimate of its mass. A kilogram is a national and international agreed unit (metric standard) for measuring mass.

Expect students to use a number-line as a representation and facilitate students to ensure that the marks on the number line are equally spaced because the spaces between them represent slices of equal mass.
Notice whether students use multiplicative reasoning when counting in groups of tens to make a 100 g, or 20s, or 50s to make 100 g or 1000 g, or 100s to make 1000 g.

Shareback

Select students to share who have used a variety of representations including a number line with equally spaced marks to represent the scale. Encourage and model the use of standard unit measurement language (e.g., grams, kilograms, 1000 grams is the same as one kilogram).

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume.

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Curriculum Links

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Connect

Ask students to draw a numberline and represent the difference between:
49 grams and 32 grams
330 grams and 500 grams
850 grams and 1 kilogram.

Suggested Learning Outcomes

Compare and order the mass of objects.

Use measurement language to describe the comparison of mass.

Find the mass of objects in grams and kilograms.

Independent Tasks

Find the difference in mass between each pair of measures. Represent your solution on an empty number-line.

19 grams and 67 grams
26 grams and 75 grams
183 grams and 57 grams
43 grams and 118 grams
312 grams and 99 grams
708 grams and 409 grams
687 grams and 1 kilogram
1 kilogram and 446 grams

Mathematical Language

Mass, same, different, heavier, lighter, less mass, more mass, massive, kilogram.

Anticipations

Solutions, Misconceptions

Task 11

Find three things which would have a total mass of one kilogram.

Draw a number line to represent the mass measure of each item and show how altogether their estimated mass is one kilogram.

Now use the scales to check the mass of each object against your estimation.

Draw another number line to represent the mass measure of each item from the scale and show the individual and combined mass.

How close to one kilogram was your estimation?

Teacher Notes

Have a range of objects of differing size and mass and a digital/analogue scale to measure the mass.

Facilitate students to notice that different scales may have different markings but the space between markings still represents grams.

Expect students to use measurement language including finding the mass, more massive, less massive, grams, kilograms.

Facilitate students to notice and use benchmarks such as 1000 grams is one kilogram (composite units), 500 grams is half of a kilogram.

Notice students who understand that the measurement total in grams is recorded as a larger number than the measurement in kilograms although these are equivalent. If this does not emerge then address it explicitly.

For the independent task, have digital/analogue scales and a selection of objects.

Shareback

Select students to share who have closely approximated a total mass of 1 kg (including slightly below and above a kg). Facilitate students to describe how 1000 grams is the same as one kilogram.

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume.

When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

There are key principles related to measurement including that the size of the measurement unit remains the same (including identical units or subdivisions), units are repeated with no gaps or overlaps (iteration), the unit is part of a whole and the measurement is expressed as the total number of units used.

Curriculum Links

During Year 3

Estimate and then reliably measure length, capacity, and mass (weight) using whole-number metric units (e.g. from tools with labelled markings).

Compare and order several objects using metric units of length, mass (weight) or capacity.

Connect

Ask students to explain and justify which measure is closest to one kilogram.

1k g and 9 g OR 990 g
1 + half kg OR 750g
500g OR 1 + half kg

Suggested Learning Outcomes

Estimate the mass of objects in grams and kilograms.

Find the mass of objects in grams and kilograms.

Convert grams to kilograms.

Use measurement language to describe the measurement of mass.

Independent Tasks

Choose a group of objects that you predict will have a total mass of:

50 grams
175 grams
500 grams
1 kg
2 kg

Use the scales to check the mass of the group. Draw a number line and represent the mass measure of each item in the group and show the total mass.

How close were you to the total mass you were trying to make?

Mathematical Language

Mass, less massive, more massive, equal mass, kilogram, gram, scales.

Anticipations

Solutions, Misconceptions

Task 12

Maia and her sister Quantum have each picked a bucket of strawberries. The strawberries in Quantum's bucket are bigger than Maia's and she says that her bucket is more massive than Maia. They both measure the mass of their buckets.

Maia's box is 1 kg and 373 g and Quantum's box is 1 kg and 294 g.

Which box is more massive?
How many grams would you need to add to make the boxes the same mass?
Represent your solution using a number-line.

Teacher Notes

Expect students to use a number line and equations to represent their solution.

Notice and facilitate student reasoning which recognises that size does not determine density.

Shareback

Select and share student solutions in which they have subtracted in parts, used bridging to decades or used equivalence and compensation.

Connect

What is the difference in mass between these measures?
1 kg and 9 grams
1 kg and 19 grams
1 kg and 99 grams

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume.

When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

There are key principles related to measurement including that the size of the measurement unit remains the same (including identical units or subdivisions), units are repeated with no gaps or overlaps (iteration), the unit is part of a whole and the measurement is expressed as the total number of units used.

Curriculum Links

During Year 3

Estimate and then reliably measure length, capacity, and mass (weight) using whole-number metric units (e.g. from tools with labelled markings).

Compare and order several objects using metric units of length, mass (weight) or capacity.

Suggested Learning Outcomes

Identify the most mass.

Solve addition and subtraction problems that involve mass.

Independent Tasks

Assessment Task 1: Dog Bed Area
Assessment Task 2: Volume Task

Mathematical Language

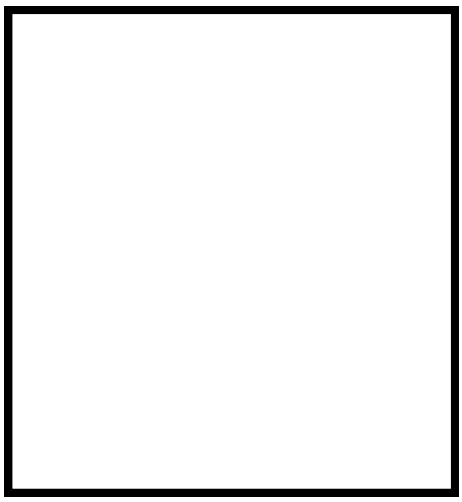
Mass, massive, measure, grams, kilogram, greater than, less than, the same.

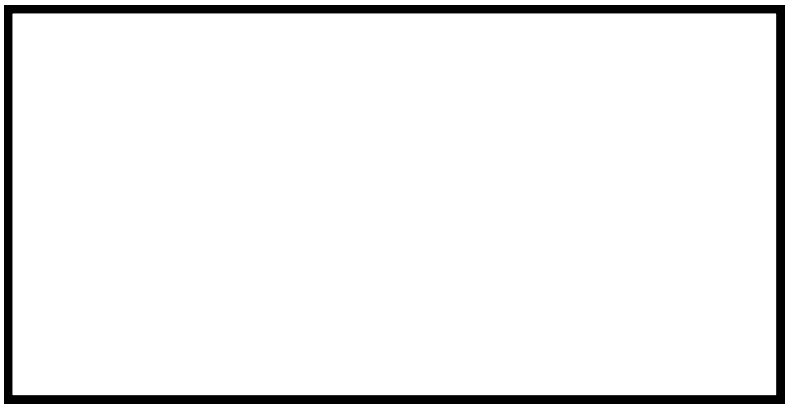
Anticipations

Solutions, Misconceptions

Assessment Task 2 - Year 3

Which of the dog beds has the biggest or smallest area?
Use the 1 cm squares or a ruler to measure the dog beds. Write the measurement and area unit.
Explain and justify how you measured each dog bed using numbers, pictures, or words.





Assessment Task 2 - Year 3

Jodie has used these cubes ($1cm^3$) to work out the volume of the container.

What is the volume of the container?
Show and explain different ways that she could use to work this out. What would be the quickest way and why?