RICH MATHEMATICAL TASK BOOKLET

MEASUREMENT

YEAR 4

Teacher Booklet

Task 1

Estimate the length of your hand and length of your arm.

Work with a partner to measure these with a piece of string cutting the string to length.

Measure both pieces of string with a tape measure.

Use the different lengths of string (measurement tool) to estimate and meaure items around the classroom. Complete the table below (see copy masters).

Now measure the same items again with a tape measure and see how accurate you were.

Teacher Notes

Have string available for students to measure both their hands and arms creating their measurement tool. Have items around the classroom for students to measure that are both shorter and longer than their potential measurement tools.

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.

Notice students that are making claims about their measure using benchmarks - e.g. the book is half the length of my arm, so I estimate it will be... Higlight these to the students.

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.

Shareback

Select students who have used their measurement tool to accurately meausure the length of items within the classroom.

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.

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

Use your string measurement tool to measure the following paths in a park (see copy masters).

Record your results next to each line.

Now using a measureing tape or ruler, measure the lines to see how accurate you were.

Curriculum Links

During Year 4
Measure body parts (e.g., the arm) or familiar objects and use these as benchmarks to estimate and then measure length, mass (weight), capacity, and duration, using appropriate metric or time-based units.

Use appropriate units to describe length, mass (weight), capacity, and time

Mathematical Language

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

Anticipations

Solutions, Misconceptions

Task 2

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.

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 4
Measure body parts (e.g., the arm) or familiar objects and use these as benchmarks to estimate and then measure length, mass (weight), capacity, and duration, using appropriate metric or time-based units.

Use appropriate units to describe length, mass (weight), capacity, and time.

Use the metric measurement system to explore relationships between units

Connect

Look at the metre ruler and the markings.

What do the numbers represent? What are the extra markings between the centimetre? Elicit that millimetres are centimetres divided into ten parts and written as mm. How many millimetres are in a centimetre? What happens if you measure in millimetres rather than 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

Metre, centimetre, length, unit of measure, measurement count, ruler, millimetre.

Anticipations

Solutions, Misconceptions

Task 3

Make a tape measure from the ribbon and mark this in metres, three-quarter metres, half metres, and quarter metres.
What is the length and width of the school hall?
Estimate:
Measurement:
What is the length and width of the court?
Estimate:
Measurement:

Teacher Notes

During the launch, give the students a metre strip and ask them to fold it to make half a metre, a quarter of a metre, and three quarters of a metre. Ask them to describe how many centimetres are in each of these lengths.

Have one metre lengths from a roll of paper or wide ribbon and 10 m lengths of wide ribbon or thick string.

For the first part of the task, students should mark the 10 m length in metres, half metres, quarter metres, and three-quarter metres to make a tape measure.

Facilitate students to measure accurately in the hall or outside by starting from the edge and keeping the tape measurement straight and flat.

Shareback

Select students to share who are able to accurately measure the space using the metre tape measure.

Connect

Ask students to stand at various points on the court or in the hall and then for students to estimate the distance between them in metres and then check with the metre tape measure.

Discuss that markings between metres can be labelled as 1.5m or 1.8m etc.

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.

Suggested Learning Outcomes

Create a ruler with centimetre units.

Use a ruler with centimetres to measure objects.

Independent Tasks

Choose objects around the classroom to measure using your 10 m ribbon, centimetre ruler, or a metre ruler.

For each object, record the measurement estimation with the correct unit.

Now measure the object with one of the measuring tools and record the measurement with the correct unit.

Convert:
1m = ___ cm =____ mm

Curriculum Links

During Year 4
Measure body parts (e.g., the arm) or familiar objects and use these as benchmarks to estimate and then measure length, mass (weight), capacity, and duration, using appropriate metric or time-based units.

Use appropriate units to describe length, mass (weight), capacity, and time.

Use the metric measurement system to explore relationships between units.

Mathematical Language

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

Anticipations

Solutions, Misconceptions

Task 4

We need to measure these books to see if they will fit into the envelopes. However are rulers are broken. Use the broken rulers to find out if the book will fit in the envelope.

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

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

Teacher Notes

As a conceptual starter, ask the students: if I have 1.4m of fabric and another 1.2m of fabric. What is the total length of fabric? 1.4 + 1.2 = 2.6m. Continue using these starters throughout the remainder of the unit. To practice decimals to 1dp.

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 a copy of the broken rulers (in copy masters) or centimetre strips, picture books, and large envelopes.

Notice whether the students realise that the broken ruler does not begin from zero so they cannot read from the last number for the measurement and use this to add up the lengths for the perimeter.

Notice whether the students are beginning the measurement by aligning a line against the edge of the book that they are measuring and then counting the gaps between the lines as the centimetre measurement units.

Expect students to use measurement language including perimeter and to record the estimate and measurement using the cm abbreviation.

Big Ideas

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For the independent task, have a selection of shapes (see Copy Masters) and broken rulers.

Shareback

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

Connect

Ask the students to come up with a length of steps or instructions that must be used when measuring with a broken ruler.

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

Measure these items with the broken rulers.
Estimate the length of each side of the ___ first in centimetres.
Estimate –
Perimeter –

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

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

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

Curriculum Links

During Year 4

Visualise, estimate, and measure:
– the perimeter of polygons, using metric units (cm and m)
– the area of shapes covered with squares or half squares
– the volume of shapes filled with centicubes, taking note of layers and stacking.

Use the metric measurement system to explore relationships between units.

Mathematical Language

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

Anticipations

Solutions, Misconceptions

Task 5

Ayaan is helping his father prepare to put new tiles in the bathroom. Here is a model of the floor that they need to tile. (see copy masters).

They have to pay $1 for each of the smaller tiles and $2 for the larger tiles.
Which is the better deal?

Teacher Notes

For the task, give students one large tile and one small tile. If students need more tiles than give them two tiles 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 task give the students different coloured squares cut out from the 1 cm^2 template and a piece of blank paper.

Shareback

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

Connect

What happened to the area measurement when the tile was larger? Why is that true? What is the relationship between the small tiles and the large tiles?

Big Ideas

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Suggested Learning Outcomes

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

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

Find the area of a surface by using grouping or 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 4

Visualise, estimate, and measure:
– the perimeter of polygons, using metric units (cm and m)
– the area of shapes covered with squares or half squares
– the volume of shapes filled with centicubes, taking note of layers and stacking.

Mathematical Language

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

Anticipations

Solutions, Misconceptions

Task 6

How big are our shoes?

Use the 1 cm grid paper and draw around the left shoe for each person in your group.

What is the area of each shoe?
Record using the correct area unit.

Who has the biggest shoe?

Who has the smallest shoe?

Teacher Notes

During the launch, tell students to initially count only the whole squares in their outline of their shoe.

Have 1 cm grid paper for the students to draw the outline of their shoe.

Highlight the students that have drawn a rectangle on their shoe to make it easier to measure the area.

Expect students to represent their results using the correct area unit (cm^2).

For the independent task, have sets of flat shape blocks, and 1 cm grid paper to measure the shapes.

Shareback

Select students to share who have used repeated addition or multiplication to find the area of the shoe.

Connect

Show the students an outline of the shoe where there are partial squares within the outline. Ask the students to discuss how these could be included in the measurement outline to have a more accurate area measurement.

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

During Year 4

Visualise, estimate, and measure:
– the perimeter of polygons, using metric units (cm and m)
– the area of shapes covered with squares or half squares
– the volume of shapes filled with centicubes, taking note of layers and stacking.

Suggested Learning Outcomes

Measure area in square centimetres.

Find the area of a surface by using repeated addition.

Find the area of a surface by using multiplication.

Compare area in square centimetres.

Mathematical Language

Square centimetre, area, unit of measure.

Independent Tasks

Draw around the shape blocks on the 1 cm grid paper and work out the area.

Record the area measurement including the area unit.

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 task, have a variety of nets for cuboids with different volumes 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.

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

For the independent activity, provide students with centi-cubes or multi-link cubes.

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.

Connect

Ask the students to build different cuboids with 20 x 1 cm^3 cubes and record the volume. Discuss and explore with students how the shape changes but the volume stays the same.

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 4

Visualise, estimate, and measure:
– the perimeter of polygons, using metric units (cm and m)
– the area of shapes covered with squares or half squares
– the volume of shapes filled with centicubes, taking note of layers and stacking.

Suggested Learning Outcomes

Use standard units to measure volume.

Find the volume of cuboids.

Compare and order the volume of objects.

Describe the relationship between area and volume.

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

Nets, volume, cubes, area, cubic centimetres, cuboids, units of measure, measurement count.

Anticipations

Solutions, Misconceptions

Task 8

What is the volume of the classroom using the unit measure of cubic metres?

Draw a representation to use to explain and justify your solution.

Teacher Notes

For the launch, have pictures of large spaces (e.g., shipping container, warehouse, hall, lounge) and ask students to identify the units of measure which would be used to measure these larger units. Explore why you need a larger and uniform unit of measure.

Have a cubic metre prepared and introduce this to students as a cubic metre and record as 1 m^3.

Facilitate students to understand that volume is the space inside a unit.

Expect students to use grouping or multiplication and to represent using 3D representations as a way to explain and justify finding the volume of a uniform space.

Support students to develop a sound benchmark of the size of a cubic metre.

For the independent activity, have a variety of pictures of different sized cuboid spaces (e.g., shipping container, aquarium, lounge, warehouse).

Shareback

Select students to share who have developed a 3D representation to justify or those who have used multiplication and the relationship between area and volume to develop their volume estimate.

Connect

Ask students to make predictions about the volume of another school space (e.g., corridor, hall) and draw a 3D representation of this.

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 4

Visualise, estimate, and measure:
– the perimeter of polygons, using metric units (cm and m)
– the area of shapes covered with squares or half squares
– the volume of shapes filled with centicubes, taking note of layers and stacking.

Suggested Learning Outcomes

Estimate volume measurement using standard units.

Represent volume measurement using a 3D representation.

Use grouping or multiplication to find volume measurement.

Identify and explain the relationship between area and volume measurement.

Mathematical Language

Cubic metre, cuboids, cubes, volume, area, unit, measurement count.

Independent Tasks

Estimate the volume of the space using cubic metres. Record your estimate using m^3 and draw a 3D representation to justify this.

Choose 5 spaces around your home and community and write the place. Estimate the volume of the space using cubic metres. Record your estimate using m^3 and draw a 3D representation to justify this.

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

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

During Year 4

Visualise, estimate, and measure:
– the perimeter of polygons, using metric units (cm and m)
– the area of shapes covered with squares or half squares
– the volume of shapes filled with centicubes, taking note of layers and stacking.

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

Tasi is making juice for a party. He would like to know how much liquid each container will hold.

Predict the millilitres and litres for each container.

Test your prediction with the measuring jug. Use a number line to represent the measurement.

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 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 4

Measure body parts (e.g., the arm) or familiar objects and use these as benchmarks to estimate and then measure length, mass (weight), capacity, and duration, using appropriate metric or time-based units.

Use the metric measurement system to explore relationships between units.

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.

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Curriculum Links

During Year 4

Measure body parts (e.g., the arm) or familiar objects and use these as benchmarks to estimate and then measure length, mass (weight), capacity, and duration, using appropriate metric or time-based units.

Use the metric measurement system to explore relationships between units.

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

Fill in the missing values:

1000 mL = __l
1500 mL = __l and __mL
1340 mL = __l and __mL
1750 mL = __l and ___mL
2 l = __mL
1000 g = ____kg
1250 g = ___kg and ____g
1500 g = ____kg and ___g
2000 g = ___kg

Mathematical Language

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

Anticipations

Solutions, Misconceptions

Task 12

The yoghurt container label shows a mass of 125 g, but the container is empty.

How can you measure whether the mass would be 125 g when it is full?

Be ready to explain and justify how a unit of measure could prove that the mass of the full container would be 125 g.

Test your solution and unit of measure with other empty containers of different sizes and justify whether their mass when full is correctly recorded.

Teacher Notes

For the launch, have pictures of objects of different mass and ask the students to identify which should be measured using grams or kilograms and why.

Have water and measuring jugs available to use.

Facilitate students to notice and discuss the relationship between mass and volume. The relationship between mass and volume is called density. Density is mass divided by volume $p = \frac{m}{v}$ and water was used as the basis for establishing the metric unit of mass, which means a cubic centimetre (1 cm3) of water weighs one gram (1 g). So, 1 g/1 cm3 = 1 g/cm3, giving water its easy-to-remember density.

For the independent task, have analogue/digital scale and a selection of objects to measure.

Shareback

Select students to share who make connections between measures for mass and capacity.

Connect

The yoghurt container has a mass of 125 g. What would the capacity be?

The yoghurt container has a mass of 500 g. What would the capacity be?

The yoghurt container has a mass of one kilogram. What would the capacity be?

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 4

Measure body parts (e.g., the arm) or familiar objects and use these as benchmarks to estimate and then measure length, mass (weight), capacity, and duration, using appropriate metric or time-based units.

Use the metric measurement system to explore relationships between units.

Suggested Learning Outcomes

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

Compare and describe the relationship between capacity and mass and millilitres and grams.

Independent Tasks

Assessment Task 1: Area
Assessment Task 2: Volume Task

Mathematical Language

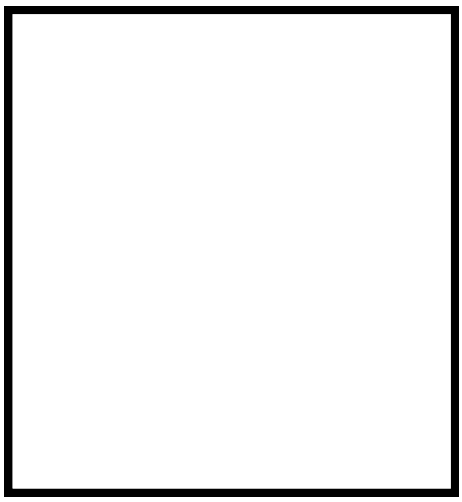
Mass, massive, measure, grams, kilogram, greater than, less than, the same.

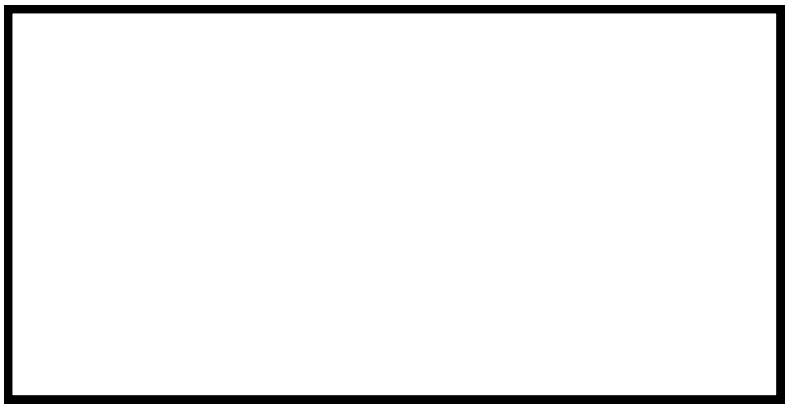
Anticipations

Solutions, Misconceptions

Assessment Task 2 - Year 4

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 4

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?