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Year 3

Small Steps Guidance and Examples

Block 4: Mass and Capacity

White Rose Maths

Year 3 – Yearly Overview

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number – Place Value			Number – Addition and Subtraction				Number – Multiplication and Division			Consolidation	
Spring	Number - Multiplication and Division			Measurement: Money	Statistics		Measurement: length and perimeter		Number - Fractions		Consolidation	
Summer	Number – fractions			Measurement: Time			Geometry – Properties of Shapes	Measurement: Mass and Capacity			Consolidation	

Overview

Small Steps

- Measure mass (1)
- Measure mass (2)
- Compare mass
- Add and subtract mass
- Measure capacity (1)
- Measure capacity (2)
- Compare capacity
- Add and subtract capacity

NC Objectives

Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)

Measure Mass (1)

Notes and Guidance

Children use gram and kilogram weights and standard scales to explore mass. In this step, children focus on the mass of an object in either grams or kilograms, and not as a mixed measurement.

Children can build on their place value skills and explore scales that increase by 4, 8, 50 and 100 where appropriate. They should be able to describe the increments on a scale.

Mathematical Talk

- How can we measure the mass or weight of an object?
- When would we use kilograms or grams to measure the mass of something?
- Which is heavier? Which is lighter?
- Where is the arrow pointing to on the scale? What does this tell us?
- What's the same, what's different about the scales?
- How do we know what each division is worth?

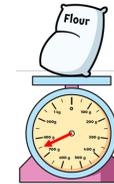
Varied Fluency

1 Use a variety of scales, discuss what's the same, what's different about the scales. Using different weights (kilograms and grams) explore which weights are heavier. Discuss what things would be measured in grams and in kilograms.

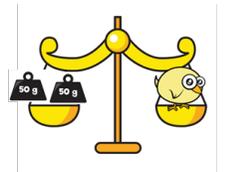
2 How much does each item weigh?



The scale is pointing towards ____
The carrots weigh ____

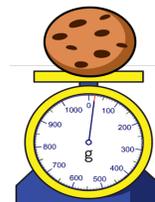


The arrow is pointing towards ____
The flour weighs ____

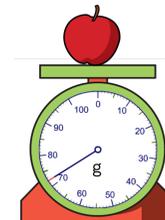


The balance shows ____
The chick weighs ____

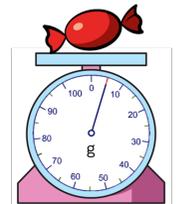
3 Identify what the scale is going up in to find out how much each item weighs.



The increments are in ____
The cookie weighs ____



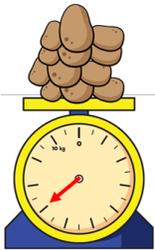
The increments are in ____
The apple weighs ____



The increments are in ____
The sweet weighs ____

Measure Mass (1)

Reasoning and Problem Solving



Who do you agree with?
Explain why.



Hasam

The potatoes weigh 14 kg



Luke

We don't know how much the potatoes weigh because the number is hidden.



Jessie

The potatoes weigh more than half of 10 kg

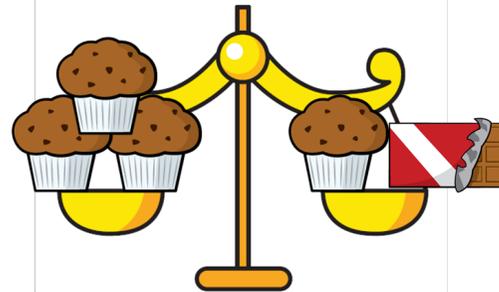
Can you calculate the weight of the potatoes? Explain how you did it.

Hasam is wrong – he has counted each division as 1 kg.

Luke is wrong because we can work out the scale by using the 10 kg and counting back. They weigh 7 kg.

Jessie is correct because half of 10 is 5 and the arrow is past where 5 kg would be.

The chocolate bar weighs 100 g.
How much does one muffin weigh?



How much does each side weigh?

Using only 3 objects each time, try to get as close to 2 kg as possible. Explain why you chose those objects. Work out how much more or how much less is needed to make it 2 kg.

Children could use a bar model to work this out. They would see the chocolate bar must weigh the same as two muffins so one muffin must weigh 50 g. Each side weighs 150 g.

Measure Mass (2)

Notes and Guidance

Children use gram and kilogram weights and standard scales to explore mass. Children measure kilograms and grams together and record measurements as ___ kg and ___ g, for example 5 kg and 500 g.

Children continue to build on their place value skills and explore scales that increase by 4, 8, 50 and 100 where appropriate.

Mathematical Talk

How many grams are in 1 kilogram? If we know this, what else do we know?

Look at the scale, show me where ___ would be.

How much does ___ weigh? How can we record this as kg and g?

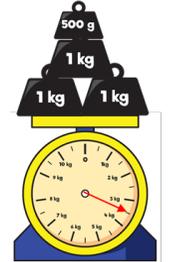
Where would I show the weight of the bananas on the scale?

Varied Fluency

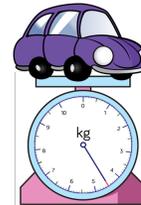
- 1 What weight is on the scales?

How many grams are in 1 kg?

How do the scales show this?

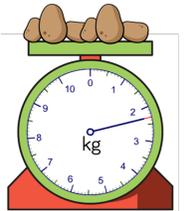


- 2 Complete the missing information.



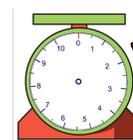
The toy car weighs 4 kg and ___ g

The potatoes weigh 2 kg and ___ g

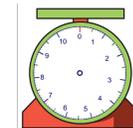


Use your own scales to measure how much objects weigh and record the mass in kg and g.

- 3 Draw an arrow on the scales to show the mass of each object.



= 1 kg and 700 g

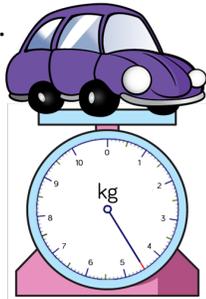


= 2 kg and 100 g

Measure Mass (2)

Reasoning and Problem Solving

Lenny's toy car weighs this.



Use this to work out what the other children's cars weigh.



My car weighs 1 kg more than Ben's.

Emily



My car weighs 200 g less than Lenny's.

Ben



My car weighs 1 kg and 300 g less than Emily's.

Jakub

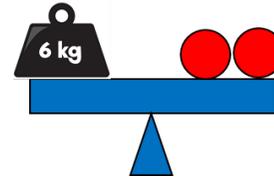
Lenny's car weighs 4 kg and 500 g.

Emily's car weighs 5 kg and 300 g.

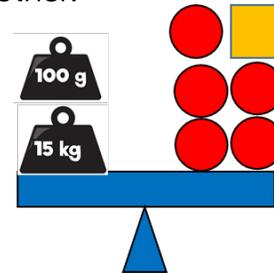
Ben's car weighs 4 kg and 300 g.

Jakub's car weighs 4 kg.

Here is a balance.



Here is another.



Work out the value of 

Can you create your own version for a partner?

One circle weighs 3 kg
The square weighs 100 g.

Compare Mass

Notes and Guidance

Children continue to build on Year 2 and use 'lighter' and 'heavier' to compare mass. They use their understanding that kilograms are used for heavier objects and will use this to help them compare mass. For example 500 g is less than 500 kg. Children also compare actual numerical measures, including mixed measurements using the inequality symbols. For example, 1 kg and 500 g $<$ 2 kg.

Mathematical Talk

Which item is heavier or lighter? How do you know?

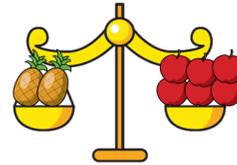
Using the symbols $<$, $>$ or $=$, what can you tell me about each of the scales?

If I added an extra item, what would happen?

Can I work out how much one item weighs? Would this be more or less than the other item?

Varied Fluency

- 1 Complete the sentences.

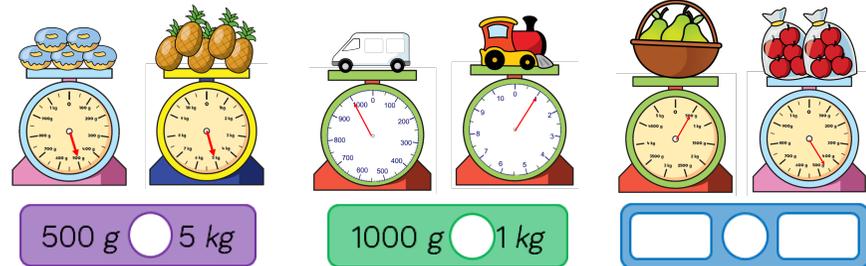


pineapples are equal to apples.

1 pineapple is equal to apples.

Can you write sentences using 'heavier' or 'lighter' about the image?

- 2 Use $<$, $>$ or $=$ to compare the mass of each pair of objects.

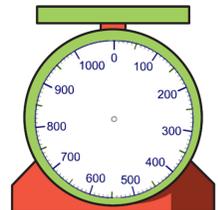


500 g 5 kg

1000 g 1 kg

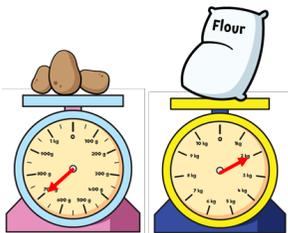


- 3 A pack of strawberries weighing 220 g and 2 jars of coffee, each weighing 280 g, are put on the scale. Draw an arrow to show the weight of the 3 items.



Compare Mass

Reasoning and Problem Solving



Three children are weighing potatoes and flour.



Helena

The potatoes weigh more because the arrow is further than the arrow on the flour scale.



Brahma

The flour weighs less because 2 is less than 700



Raegan

The flour weighs more because 2 kg is more than 700 g

Who do you agree with?
Explain your answer.

Helena is wrong because the scales are different.
Brahma is wrong because he hasn't noticed the flour is weighed in kg and the potatoes are weighed in g.
Raegan is correct because 2 kg is the same as 2000 g which is more than 700 g.

Use the clues to work out who has which measurement.



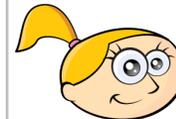
Angelina

My measurement weighs more than $\frac{1}{2}$ of 10 kg.

My measurement weighs $2\frac{1}{2}$ kg more than Demi's item.



Brad



Demi

My measurement weighs more than 2 kg but less than 5000 g

5 kg and 600 g

5 kg

2 kg and 500 g

Demi – 2 kg and 500 g
Brad – 5 kg
Angelina – 5 kg and 600 g

Add & Subtract Mass

Notes and Guidance

Children add and subtract mass. They can apply their understanding of different methods such as formal, finding the difference etc. Children should choose the correct method depending on the context of the problem. They continue to use mixed measures.

Children may use concrete resources to represent kilograms and grams. Children could also use bar models to represent calculations.

Mathematical Talk

How many grams are in a kilogram? How could I represent this using concrete resources?

How can you add/subtract the masses?

What do you know about kilograms or grams that can help you solve this question?

How can you represent this problem with a bar model?

Varied Fluency

- 1 Jenny uses the base ten and place value chart to add 3 kg and 400 g and 2 kg and 300 g.

kg	g
	
	
5 kg	700 g

Use the same approach to calculate:

- 3 kg and 450 g + 4 kg and 200 g = _____
- 4 kg and 105 g + 2 kg and 300 g = _____
- 4 kg and 400 g – 2 kg and 100 g = _____
- 8 kg and 600 g – 1 kg and 550 g = _____

2



The jar of cookies has a mass of 800 g
The empty jar has a mass of 325 g
How much do the cookies weigh?

3

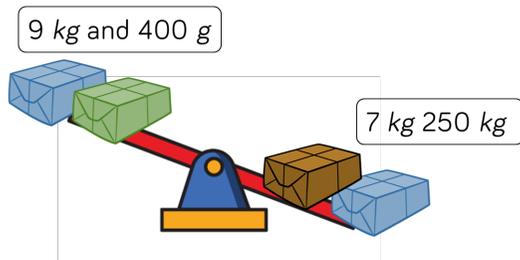
Choose an appropriate approach to solve:

- $7 \text{ kg} - \square = 5 \frac{1}{2} \text{ kg}$
- $3 \text{ kg and } 200 \text{ g} + \square = 4 \frac{1}{2} \text{ kg}$
- $4000 \text{ g} + \square - 1 \frac{1}{2} \text{ kg} = 3 \text{ kg}$

Add & Subtract Mass

Reasoning and Problem Solving

The green parcel weighs 5 kg.
Can you work out what the blue and brown parcel weigh?



How much would the green and brown parcel weigh altogether?

Blue parcel = 4 kg
and 400 g

Brown parcel = 2
kg and 850 g

Green and brown
parcel = 7 kg and
850 g

Alice buys two peaches and three pears.



One peach weigh 75 g

Three pears weigh the same as two
peaches.



How much does one pear weigh?

50 g

Measure Capacity (1)

Notes and Guidance

Children use litres and millilitres and standard scales to explore capacity. In this step, children focus on the capacity in either litres or millilitres and not as a mixed measurement, for example 5 l and 500 ml.

Children continue to use place value skills to explore scales. Children build on their knowledge from KS1, recognising the capacity is the amount of liquid a container can hold and the volume is how much liquid is in the container.

Mathematical Talk

How do we measure liquid?

What does capacity mean? What does volume mean?

What do we measure capacity and volume in?

What unit of measure (ml or l) would we use to measure ____?

How much liquid is in the container?

What is the scale going up in?

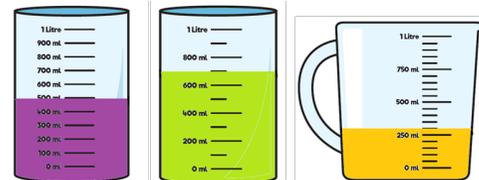
Varied Fluency

- 1 Use a variety of scales, discuss what's the same, what's different about the scales. Using different containers explore which measurement (litres or millilitres) would be used to measure the liquid inside. Discuss what things would be measured in litres and in millilitres.
- 2 Use the sentence stem to describe the capacity and volume of each container.

The volume of liquid is ____ The capacity of the container is ____



- 3 Identify what the scale is going up in to find out the volume in each container. Use the stem sentence.



*The increments are in ____
The volume is ____*

Measure Capacity (1)

Reasoning and Problem Solving

Use a variety of containers.

Can you estimate how much liquid they hold?

Check your estimates using measuring jugs and cylinders to see how accurate you were.

Children will use a variety of containers and gather a range of measurements. Encourage children to record their results in a table.

Use the clues to work out who has which container.



Lacey

I have exactly half a litre.



Mobin

I have 1,000 ml.

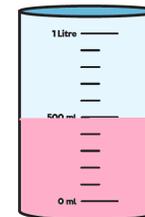


Mia

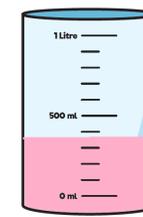
I have more than 300 ml but less than 400 ml.



A



B



C

Lacey has container B

Mobin has container A

Mia has container C

Measure Capacity (2)

Notes and Guidance

Children use litres and millilitres and standard scales to explore capacity. Children measure capacity with litres and millilitres together and record measurements as ___ l and ___ ml, for example 5 l and 500 ml.

Children continue to use place value skills to read and interpret scales.

Mathematical Talk

How many millilitres are in 1 litre? If we know this, what else do we know?

Look at the scale, show me where ___ would be.

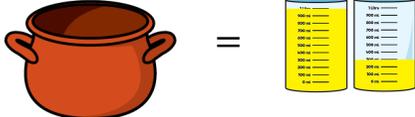
What is the capacity of the _____? How can we record this as l and ml?

How would I show how much water is left on the scale?

Varied Fluency

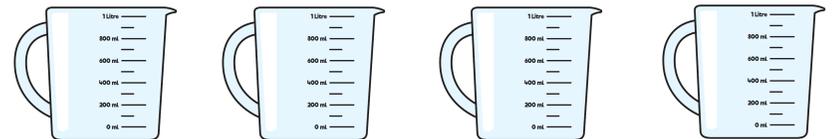
- 1 Use equipment and liquid to count in increments of 100 ml. Discuss what happens when you reach 1000 ml. Explore other connections linked to this. For example, 2 l = 2000 ml.

- 2 Complete the missing information.


=
The pot's capacity is ___ l and ___ ml


=
The barrel's capacity is ___ l and ___ ml

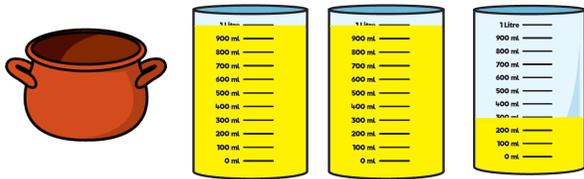
- 3 The capacity of the fish bowl is 8 l and 750 ml. Hannah pours 5 l of water out of the bowl. Show how much water is left on the measuring jugs.



Measure Capacity (2)

Reasoning and Problem Solving

Raj and Eva work out the capacity of the pot by filling it with water, then pouring the water into the measuring cylinders.



The capacity of the pot is 3 l and 300 ml.

Raj

The capacity of the pot is 2 l and 300 ml.



Eva

Who do you agree with?
Explain why.

Eva is correct because there are 2 full litres and 300 millilitres in the third cylinder.

True or False?

The tallest container has the largest capacity.

Use containers to decide whether the statement is true or false

Record the capacity of the different containers in a table.

Children will collect different measurements of capacities from different containers. Children will hopefully find that as well as height it also depends on how wide a container is in terms of its capacity.

Compare Capacities

Notes and Guidance

Children continue to build on Year 2 and use ‘full’ and ‘empty’ to compare capacity. They use their understanding that litres are used for larger containers and will use this to help them compare capacity. For example 500 ml is less than 5 l. Children also compare actual numerical measures, including mixed measurements using the inequality symbols. For example, 1 l and 500 ml < 2 l.

Mathematical Talk

Which container is the most full?
Which container is the least full?

Which has the most liquid in it?
What does the liquid measure?

Which has the least liquid in it?
What does the liquid measure?

Varied Fluency

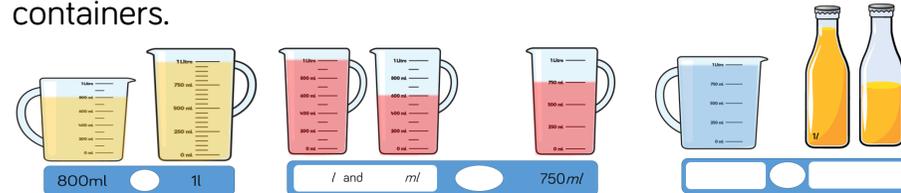
- 1 Complete the sentences.



cans of pop are equal to jug of orange juice.

1 can of pop is equal to jug of orange juice.

- 2 Use <, > or = to compare the capacity of each pair of containers.



- 3 Lilia has 3 bottles of water with 500ml in each.
Sophie has one bottle of water with 1 and a half l in it.
Who has the most water?
Can you prove it?

Compare Capacities

Reasoning and Problem Solving

Seth has a litre bottle of water.



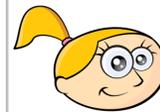
He pours a drink for himself and two friends. Their glasses can hold up to 250ml.



Ellis has more than James.
Seth has the most.

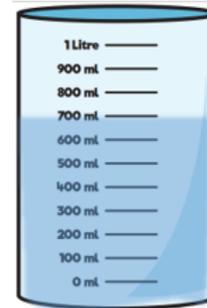
How much could each child have in their glass?

There are a range of possible answers the children could find. Seth should have the most and James should have the least. The total should not exceed 1l.

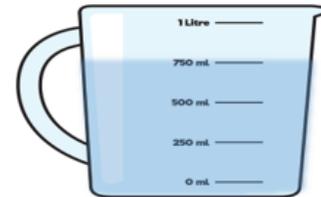


Evie

I know container 1 has more than container 2 in it because the water goes further up the side.



Container 1



Container 2

Is Evie correct? Explain your answer.

Evie is not correct. The measurements show that container 1 has 700ml in it where as container 2 has 750ml in. Container 2 is wider than container 1 which is why it looks like it has less in it.

Add & Subtract Capacities

Notes and Guidance

Children add and subtract capacities. They can apply their understanding of different methods such as formal, finding the difference etc. Children should choose the correct method depending on the context of the problem. They continue to use mixed measures.

Children may use concrete resources to represent litres and millilitres. Children could also use bar models to represent calculations.

Mathematical Talk

What many millilitres are in one litre? How could I show this using concrete resources?

How many litres are there in total?
How many millilitres are there in total?

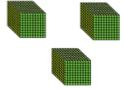
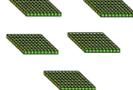
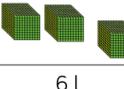
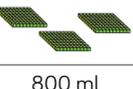
What methods can we use to add capacities?
What methods can we use to subtract capacities?

Varied Fluency

- 1 Ed uses the base ten and place value chart to add 3 l and 500 ml and 3 l and 300 ml

Use the same approach to calculate:

- 4 l and 600 ml + 2 l and 100 ml
- 7 l and 320 ml + 1 l and 125 ml
- 3 l and 950 ml – 3 l and 50 ml
- 800 ml – 375 ml

l	ml
	
	
6 l	800 ml

- 2
- To make Summer Punch for 2 people:

 - 300ml of pineapple juice
 - 250ml of orange juice
 - 500ml of lemonade
- How much liquid is used in total to make Summer Punch for 2 people?
 - How much orange juice would be need to make enough for 4 people?
 - Would a 1/ bottle of lemonade be enough to make drinks for 6 people?

- 3 Tess keeps a record of how much milk she has in her café. Work out how much milk is used for each order.

Amount of milk to start	Amount of milk used	Amount of milk left
1 l and 430 ml		1 l and 100 ml
1 l and 100 ml		890 ml
890 ml		545 ml

Add & Subtract Capacities

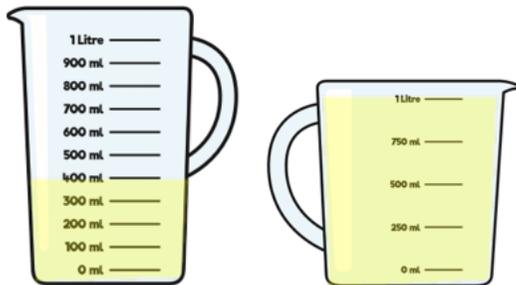
Reasoning and Problem Solving

Stanley is making drinks using these jugs.
Each drink is 125 ml.



Stanley

If I make three more drinks using jug 2, both jugs will have the same amount of juice in.



Is Stanley correct?

If not, how much juice will be left in jug 2?

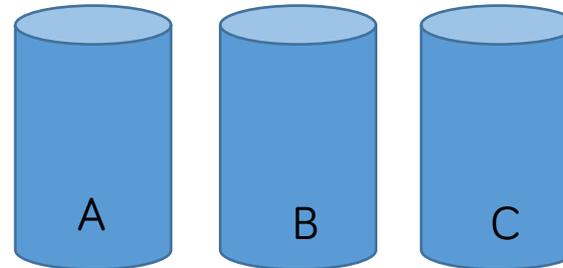
Stanley is not correct.
If Stanley makes three more drinks he will use a further 375 ml of juice.
 $1\text{ l} - 375\text{ ml} = 625\text{ ml}$

Here are some measuring cylinders.
The total liquid in all three cylinders is 400ml.

Cylinder A has half of the total amount in it.

Cylinder B has 67ml less than Cylinder A.

How much liquid does each cylinder contain?



A: 200 ml
B: 67 ml
C: 133 ml