Spring Block 4

Mass and capacity

Small steps

Step 1	Use scales
Step 2	Measure mass in grams
Step 3	Measure mass in kilograms and grams
Step 4	Equivalent masses (kilograms and grams)
Step 5	Compare mass
Step 6	Add and subtract mass
Step 7	Measure capacity and volume in millilitres
Step 8	Measure capacity and volume in litres and millilitres

Small steps

Step 9	Equivalent capacities and volumes (litres and millilitres)
Step 10	Compare capacity and volume
Step 11	Add and subtract capacity and volume

Use scales

Notes and guidance

In Year 2, children began using grams and kilograms when exploring mass. In this block, children continue to explore mass in kilograms and grams before moving on to capacity.

An essential skill in this block is for children to be able to use and understand scales. This small step provides opportunity for children to become more familiar with using scales to read measurements. The focus is on dividing 100 into 2/4/5/10 equal parts using number lines, before applying this skill in various contexts later in the block. By working out what the interval gaps are on a number line, children become more experienced at reading scales in the context of measurement. They learn what size groups are made when 100 is split into equal parts, then extend this learning to other multiples of 100

Things to look out for

- Children may be confused by intervals of different values due to different start and end points on number lines.
- Children may count the number of divisions rather than the number of intervals.
- Some children may not know what 100 or a multiple of 100 divided by 2/4/5/10 is worth.

Key questions

- What is the value at the start of the number line?
- What is the value at the end of the number line?
- How many equal parts is the number line split into?
- What is the value of each interval on the number line?
- What is the value of each part if 100 is divided into _____ equal parts?
- What is the same/different about these two number lines?
- What does this mark on the number line represent? How do you know?

Possible sentence stems

- If 100 is shared into _____ equal parts, then each part is worth _____
- The number line is counting up in _____s.
- When counting up in _____s, the _____ interval is _____

National Curriculum links

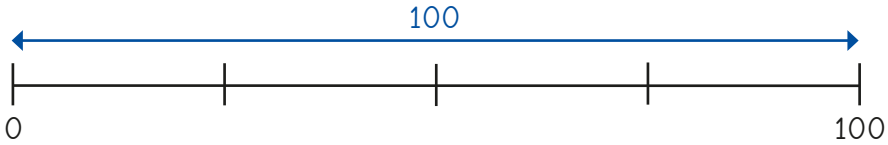
- Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)

Use scales

Key learning

- How many equal parts has each number line been split into?

- Tommy is labelling this number line.

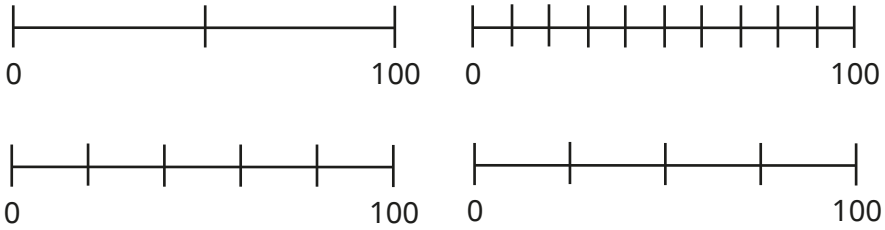


100 ÷ 4 = 25
The number line is counting up in 25s.

Why did Tommy divide 100 by 4?

Label Tommy's number line.

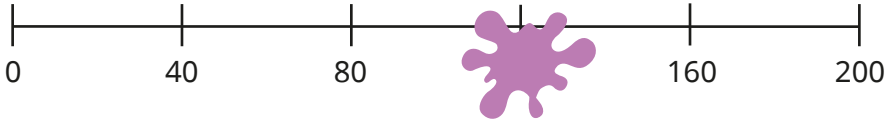
- Label the number lines.



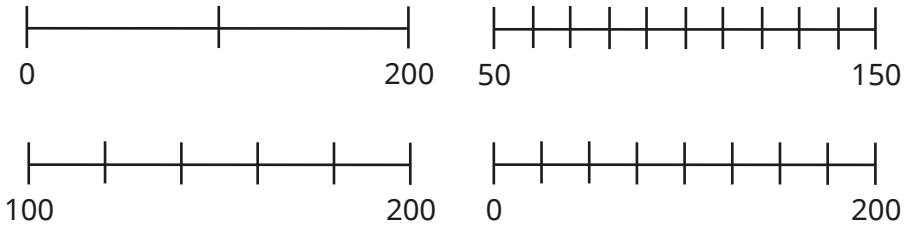
- Dani divides 200 into 5 equal parts on a number line.

She spills some paint.

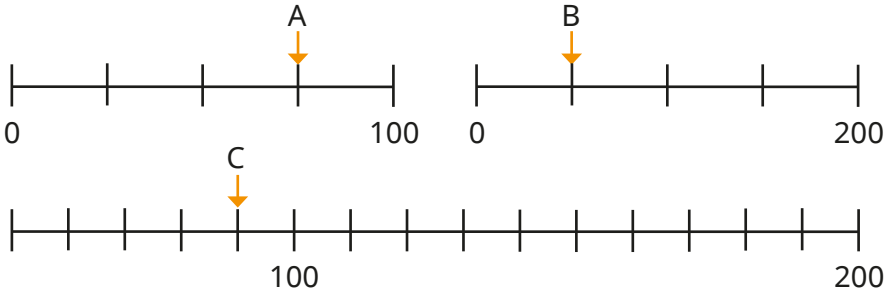
What number is the paint covering?



- Label the number lines.

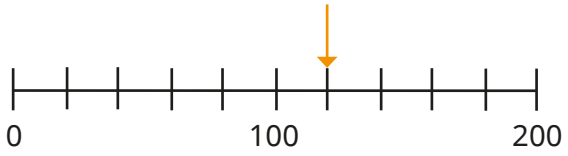


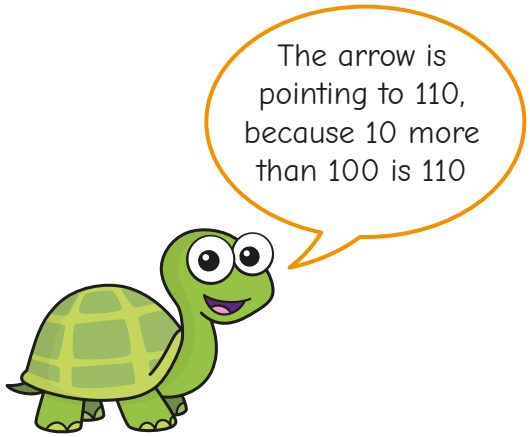
- What number is each arrow pointing to?



Use scales

Reasoning and problem solving



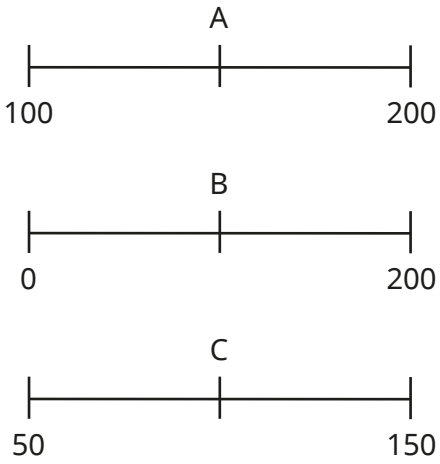


Do you agree with Tiny?

Explain your answer.

No

A, B and C are three numbers on different number lines.



Which number is the greatest?

What number would appear on all three number lines?

What number would only appear on one of the number lines?

Is there more than one answer?

A (150)

B and C: 100

any number 100–150

any number 0–49

Measure mass in grams

Notes and guidance

In this small step, children measure mass in grams only. This builds on their learning from Key Stage 1, but with masses now going up to 1,000 grams.

Give children a variety of objects to weigh using scales, so that they can understand what a given number of grams can look or feel like. This also provides the opportunity to bring in the learning from the previous step, giving children a chance to read a variety of different scales, and compare this to the number lines they used in the last step.

When reading scales, children need to work out missing intervals between numbers. They should recognise that they still need to consider the start and end point, as well as the number of intervals on the scale.

Things to look out for

- Children may be unfamiliar with the approximate mass of objects, and thus unable to identify mistakes.
- When reading scales, children may incorrectly identify the value of the intervals.
- When measuring the mass of an object using balancing scales, children may incorrectly add the masses on the wrong side.

Key questions

- What does "mass" mean?
- What units do you use to measure mass?
- What is the start/end value on the scale?
- How many equal intervals are there on the scale?
- How do you know what the missing numbers are?
- If the measurement is halfway between two marks, how can you work out what it is?

Possible sentence stems

- The start of the scale is _____ grams.
  The end of the scale is _____ grams.
  There are _____ intervals.
  The scale is counting up in _____ s.
- The mass of the _____ is _____ grams.

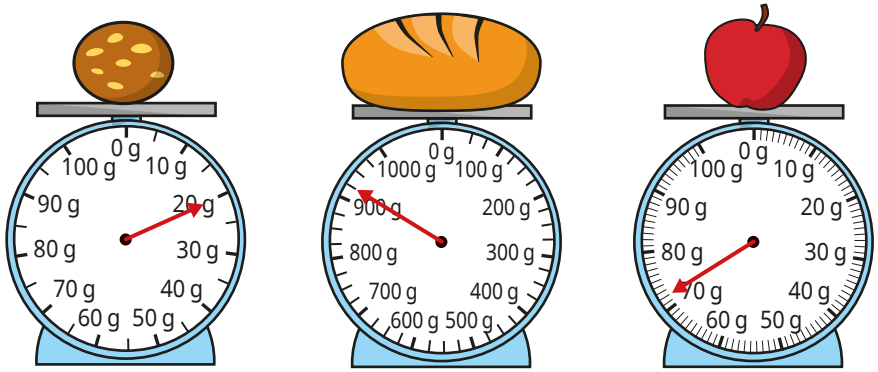
National Curriculum links

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

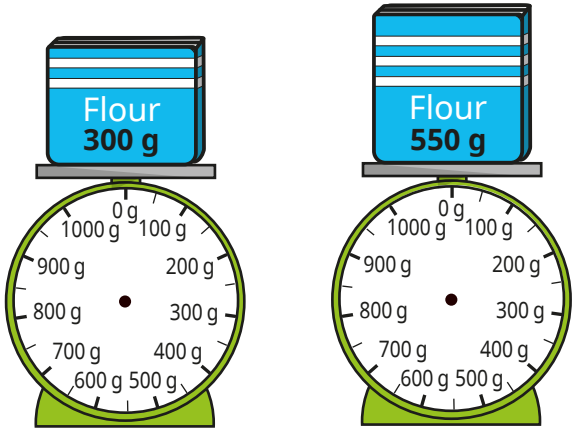
Measure mass in grams

Key learning

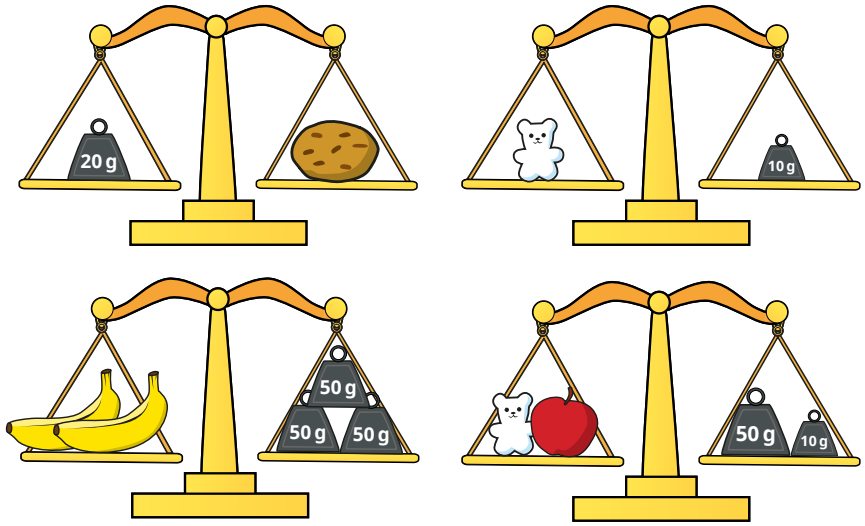
- What is the mass of each object?



- Draw arrows on the scales to show the mass of each box of flour.

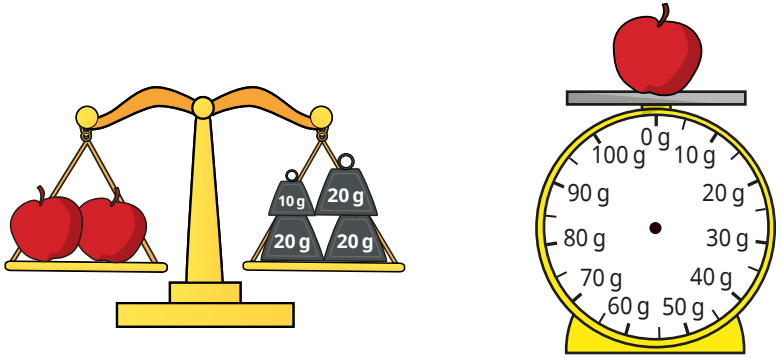


- What is the mass of each object?



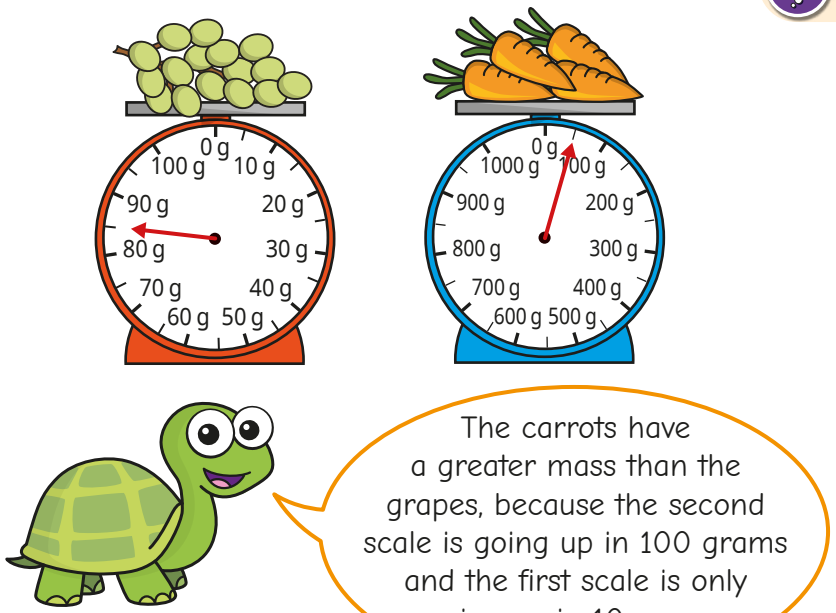
- Work out the mass of one apple.

  Draw an arrow on the scale to show to show your answer.



Measure mass in grams

Reasoning and problem solving



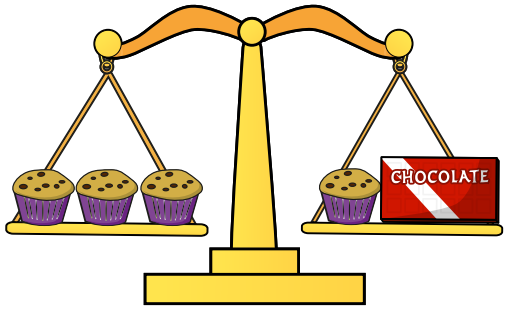
Do you agree with Tiny?

Explain your answer.

No

The chocolate bar has a mass of 100 g.

What is the mass of one muffin?



Nijah takes the muffins and the chocolate bar off the scales.

She puts 10 muffins on one side.

How many chocolate bars will she need to balance the scales?

How did you work it out?

50 g

5

Measure mass in kilograms and grams

Notes and guidance

In Year 2, children measured objects with masses that are whole numbers of kilograms. In this small step, they measure the mass of objects in both kilograms and grams, as well as fractions of kilograms. For example, an object may have a mass of 2 kg and 500 g and children should recognise that this is equivalent to two and a half kilograms. In this block, they always read the measurement as _____ kg and _____ g, not in decimal form, as decimals are not introduced until Year 4

Children use their learning from the previous step alongside the fact that 1,000 g is equivalent to 1 kg to work out amounts of grams on a kilogram scale that is divided into sections.

Things to look out for

- Children may confuse relationships with other units of measure, for example cm and m, and think that there are 100 g in 1 kg.
- Children may assume that the scales always go up in the same intervals, whereas different questions may have different scales.
- Children may mix up the two units, for example writing 2 kg and 300 g as 2 g and 300 kg.

Key questions

- What is mass?
- What are kilograms and grams? What is the same and what is different about them?
- How many grams are there in 1 kg?
- How many grams is half/a quarter of a kilogram?
- If a mass is between two whole kilograms, how can you work out the exact mass?

Possible sentence stems

- The mass is between _____ kg and _____ kg.

  There are _____ intervals.

  Each interval is worth _____ g.

  The mass is _____ kg and _____ g.
- The arrow on the scale is pointing to _____ kg and _____ g.
- The object has a mass of _____ kg and _____ g.

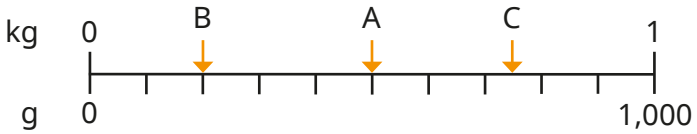
National Curriculum links

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

Measure mass in kilograms and grams

Key learning

- Complete the sentence for each arrow.

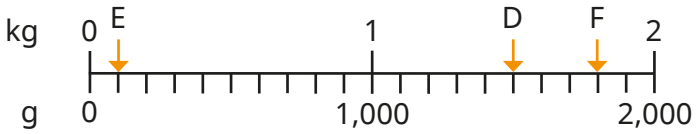


Arrow _____ is pointing to _____ g.

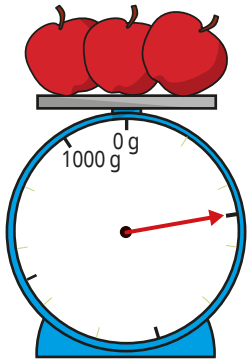
What fraction of a kilogram is each arrow pointing to?

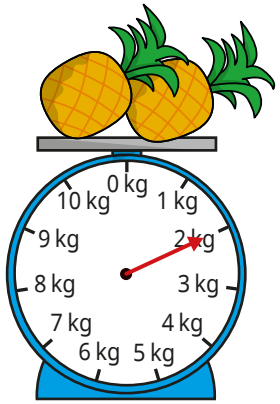
- What mass is each arrow pointing to?

Give your answers in kilograms and grams.

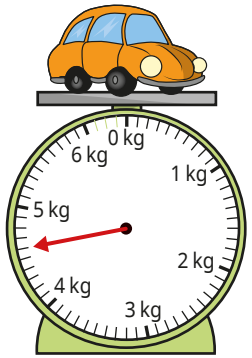


- What is the total mass of the apples and the pineapples?

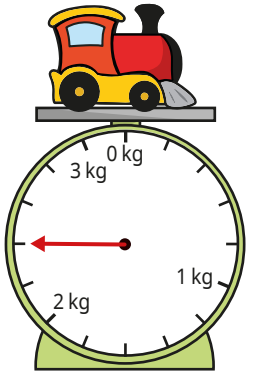




- Complete the sentences.



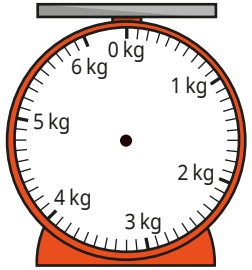
The toy car has a mass of 4 kg and _____ g.



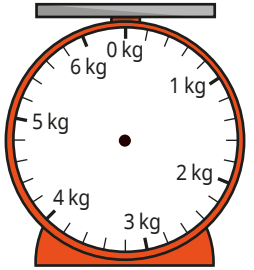
The toy train has a mass of _____ kg and _____ g.

- Draw arrows on the scales to show the mass.

1 kg and 700 g

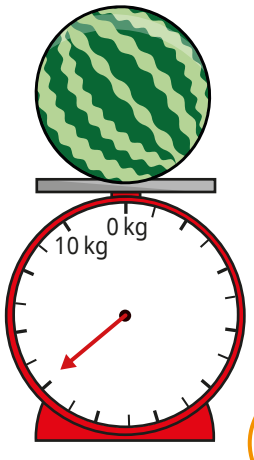


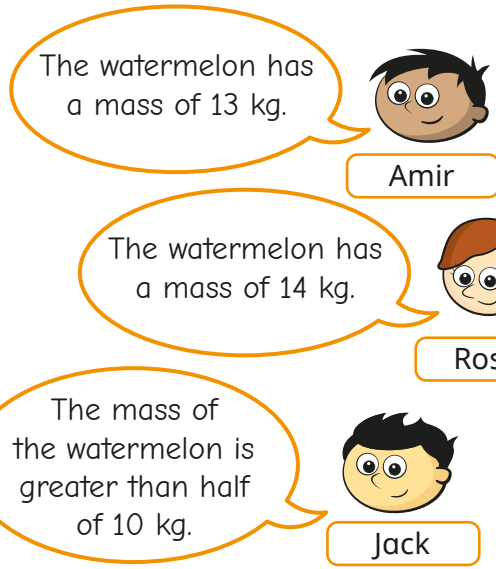
5 kg and 900 g



Measure mass in kilograms and grams

Reasoning and problem solving





Who do you agree with?

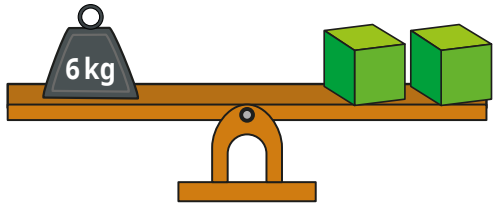
Explain your answer.

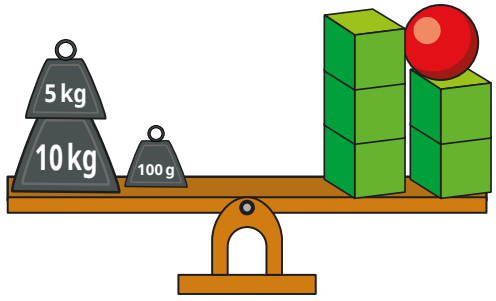
Work out the mass of the watermelon.

Show your workings.

Jack 7 kg

Here are some balance scales.





Work out the mass of the sphere.

100 g

Equivalent masses (kilograms and grams)

Notes and guidance

In the previous two steps, children measured objects in both grams and kilograms, and read scales showing both of these units of measure. In this small step, children build on their understanding of 1 kg being equivalent to 1,000 g, and this point will be explored in great depth, so the masses in the questions will not go over 1 kg. Formal conversion between kilograms and grams is taught in Year 5

Children also draw on other previously learnt skills, as they use addition and subtraction to make amounts of grams up to 1 kg. They continue to look at fractions of a kilogram, and should know that $\frac{1}{2}$ of a kilogram is 500 g and $\frac{1}{4}$ of a kilogram is 250 g.

Things to look out for

- Children may use the incorrect units, for example saying that 1,000 kg is the same as 1 g.
- Children may forget to include units with their answer.
- Children may experience difficulties with calculation when dividing 1,000

Key questions

- How many grams are there in a kilogram?
- How many grams are there in half a kilogram?
- How many grams are there in one quarter of a kilogram?
- If a kilogram is split into _____ equal parts, how many grams is each part worth?
- What is _____ equivalent to?
- How many more grams are needed to make 1 kg?

Possible sentence stems

- _____ g is equivalent to _____ kg.
- _____ g + _____ g = 1,000 g = 1 kg
- I need _____ more grams to make a kilogram.
- This mass is/is not equivalent to 1 kilogram because ...

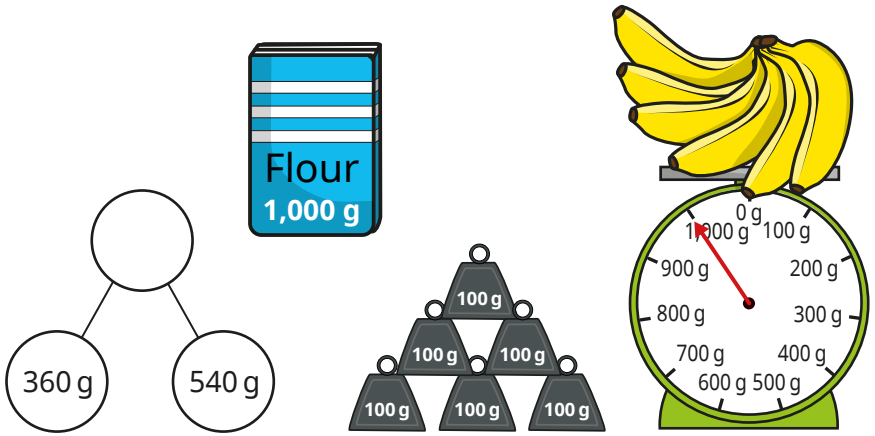
National Curriculum links

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

Equivalent masses (kilograms and grams)

Key learning

- Sort the pictures into the table.



Equivalent to 1 kg	Not equivalent to 1 kg

- Aisha knows that 1,000 g is equivalent to 1 kg.

  She knows that 600 + 400 = 1,000, so 600 g + 400 g = 1 kg.

  Use this information to help you fill in the missing numbers.

  - 400 g + _____ g = 1 kg
  - 350 g + 650 g = _____ kg
  - _____ g + 980 g = 1 kg

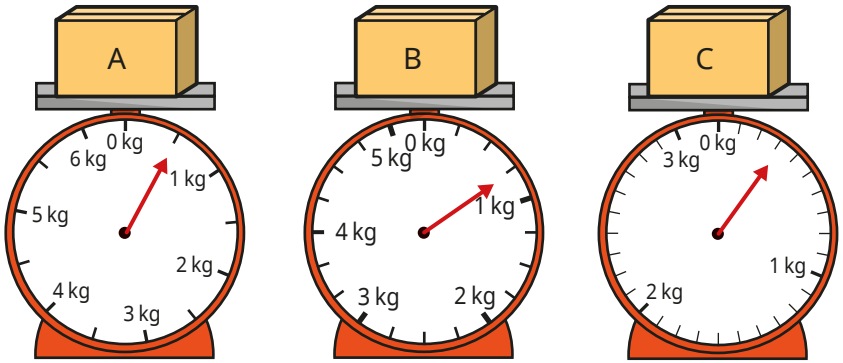
- Scott needs 200 g of flour to bake a cake.

  How many cakes can he bake with 1 kg of flour?

- How many grams is each fraction of a kilogram equivalent to?

  - $\frac{1}{2}$
  - $\frac{1}{4}$
  - $\frac{3}{4}$
  - $\frac{1}{10}$

- Work out the mass of each box.



- Fill in the missing numbers.

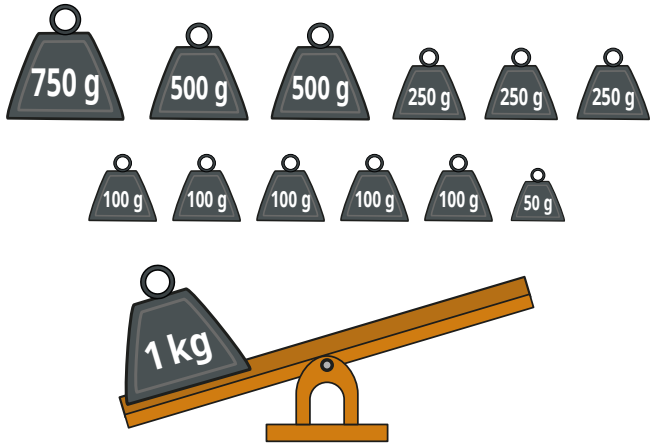
  - 450 g + 550 g = _____ kg
  - _____ g + $\frac{1}{2}$ kg = 1,000 g
  - 635 g + _____ g = 1 kg
  - 1,000 g + _____ g = 1 kg

Equivalent masses (kilograms and grams)

Reasoning and problem solving

Max wants to balance the scale.

What weights could he use?



Find as many possibilities as you can.

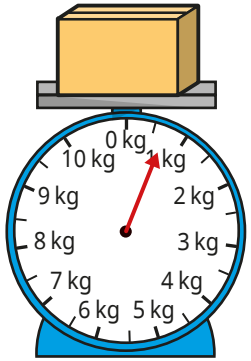
multiple possible answers, e.g.

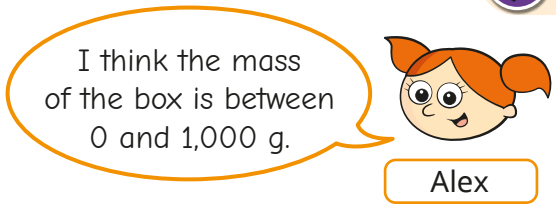
750 g + 250 g

500 g + 250 g + 250 g

750 g + 100 g + 100 g + 50 g

What is the mass of the box?





Whose answer do you think is the best?

Explain why.

Whitney's

Compare mass

Notes and guidance

In this small step, children compare the masses of different objects using grams and kilograms.

In Year 2, children decided if an object was heavier or lighter by using balance scales. They now use units of measure to work out which object is heavier or lighter. Understanding that kilograms are heavier than grams will help them to compare mass, for example 100 g is lighter than 100 kg. They can also compare using fractions: for example $\frac{1}{2}$ kg is heavier than 400 g.

Children then go on to compare masses that combine kilograms and grams. They should recognise that, because kilograms are heavier than grams, they should compare the kilograms first: for example 1 kg and 300 g is lighter than 3 kg and 300 g. If the kilograms are the same, they then need to compare the grams: for example 1 kg and 300 g is heavier than 1 kg and 100 g.

Things to look out for

- Children may focus more on the number than the unit of measure, for example saying 750 g is greater than 50 kg.
- Children need to be secure in reading scales with different intervals.

Key questions

- Which object is heavier/lighter? How do you know?
- Which is heavier: 1 kg or 100 g?
- Which is heavier: 1 kg and 100 g or 1 kg and 400 g?
- Which is heavier: 500 g or 3 kg and 100 g?
- Which is heavier: 600 g or $\frac{1}{2}$ kg?
- If you know the total mass of two identical items, how can you work out the mass of one of them?
- If 2 _____ have the same mass as 3 _____, which object is heavier?

Possible sentence stems

- _____ kg is heavier/lighter than _____ kg, so _____ kg and _____ g is heavier/lighter than _____ kg and _____ g.
- The number of kilograms is the same so I need to compare the _____
  _____ kg and _____ g is heavier/lighter than _____ kg and _____ g.

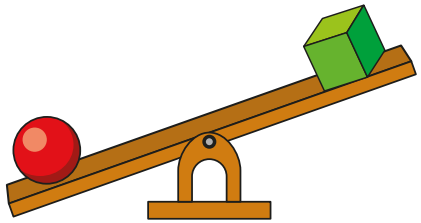
National Curriculum links

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

Compare mass

Key learning

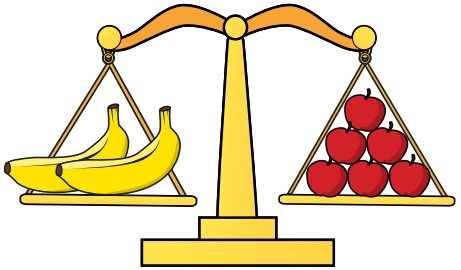
- Write **heavier** or **lighter** to complete the sentences.



The sphere is _____ than the cube.

The cube is _____ than the sphere.

- Complete the sentences.



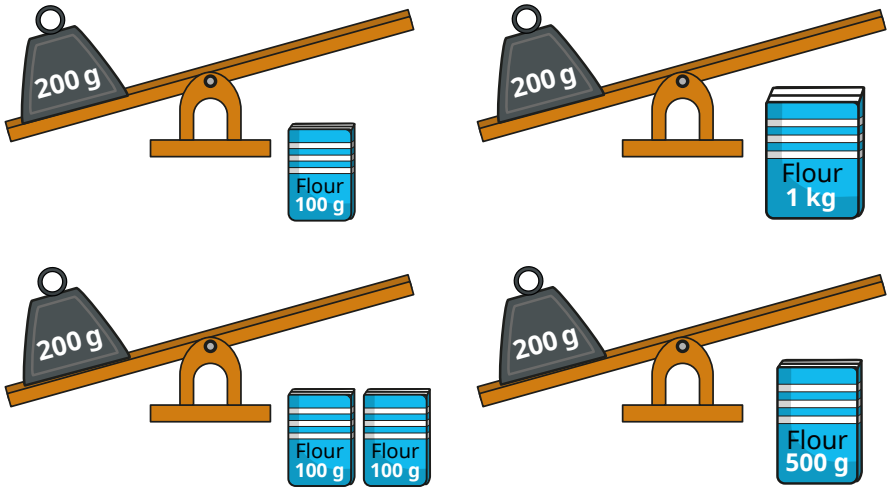
_____ bananas have the same mass as _____ apples.

1 banana has the same mass as _____ apples.

The mass of 1 banana is _____ than the mass of 1 apple.

- Rosie puts different amounts of flour onto the scales.

For each scale, say what will happen and why.



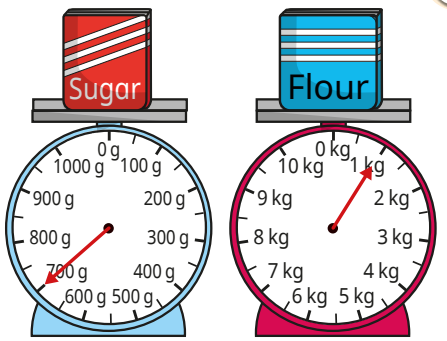
- Write <, > or = to compare the masses.

500 g	◯	500 kg	1 kg and 300 g	◯	3 kg and 300 g
900 g	◯	1 kg	1 kg and 300 g	◯	1 kg and 100 g
210 g	◯	$\frac{1}{5}$ kg	4 kg and 27 g	◯	27 kg and 4 g

Compare mass

Reasoning and problem solving

Which statement is correct?



A The sugar is heavier, because the arrow is further around the scale than the arrow on the flour scale.

B The flour is lighter, because 1 is less than 700

C The flour is heavier, because 1 kg is more than 700 g.

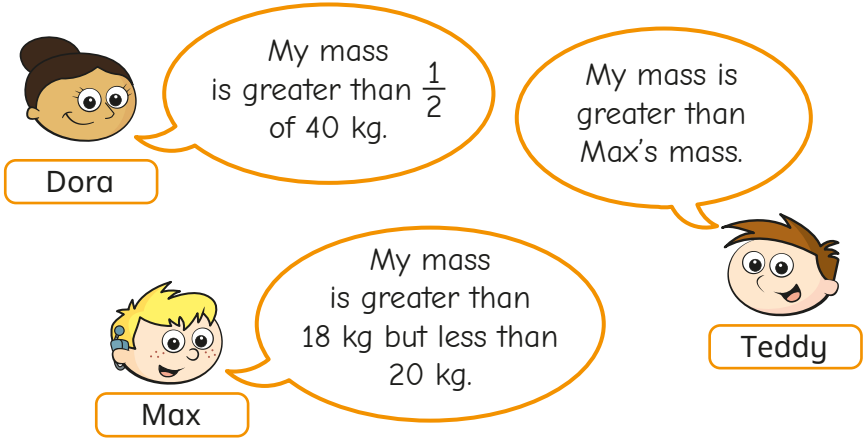
Explain your answer.

C

Here are three masses.

20 kg and 600 g	20 kg	18 kg and 500 g

Match each mass to the correct person.



Dora: 20 kg and 600 g

Teddy: 20 kg

Max: 18 kg and 500 g

Add and subtract mass

Notes and guidance

This step is the final step on mass in this block. In this small step, children add and subtract mass. They transition from writing, for example, 2 kg and 300 g to writing 2 kg 300 g as this makes it easier to read many of the calculations, and makes it easier for children to distinguish between the two quantities.

They use their understanding of kilograms and grams to add and subtract quantities of both. Concrete resources and bar models support their understanding. When a mass that is a mixture of kilograms and grams is added to another mass, the children partition the mass into kilograms and grams, then add the separate parts.

This is a good opportunity for children to practise their mental addition and subtraction, as many of the numbers involved will not necessitate the written method. As children have not yet explored numbers beyond 1,000, there will be no requirement to bridge 1 kg with addition or subtraction.

Things to look out for

- Children may not be clear on which operation is needed.
- Children may ignore the units, for example calculating 300 g + 2 kg = 302 g.
- Children may forget to include units in their answers.

Key questions

- How can you add using kilograms and grams?
- Which part did you work with first? Why?
- What method could you use to add _____ to _____?
- What method could you use to subtract _____ from _____?
- How can you show this question using a bar model?
- What objects can you use to help complete this calculation?
- Do you need to add or subtract to answer this question?

Possible sentence stems

- The total of _____ g/kg and _____ g/kg is _____ g/kg.
- The difference between _____ g/kg and _____ g/kg is _____ g/kg.
- _____ kg add/subtract _____ kg is equal to _____ kg.
  _____ g add/subtract _____ g is equal to _____ g.
  The total/difference is _____ kg _____ g.

National Curriculum links

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

Add and subtract mass

Key learning

- A jar of cookies has a mass of 800 g.

  The empty jar has a mass of 350 g.

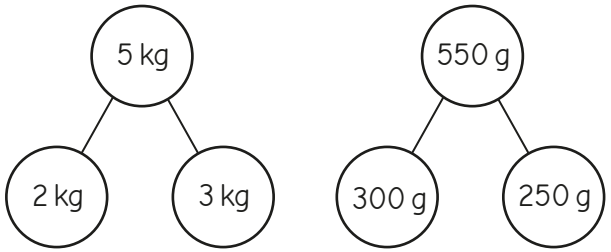
  What is the mass of the cookies?

- Rosie has 600 g of sweets.

  Jack has 1 kg and 200 g of sweets.

  What is the total mass of their sweets?

- Huan uses part-whole models to add 2 kg 300 g to 3 kg 250 g.



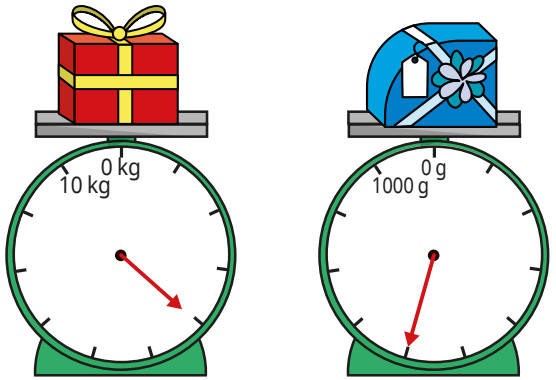
5 kg + 550 g = 5 kg 550 g

Use Huan's method to work out the totals.

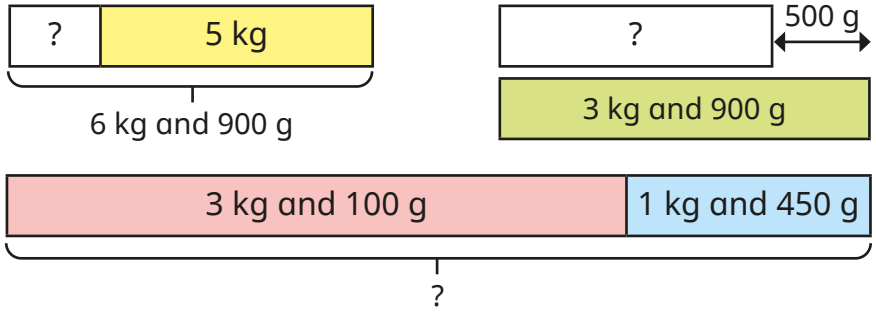
3 kg 450 g + 4 kg 200 g

4 kg 105 g + 2 kg 300 g

- What is the total mass of the two presents?



- Complete the bar models.



- Brett and Esther each have 1 kg 200 g of pasta.

  They put their pasta together.

  They then cook a meal using 300 g of the pasta.

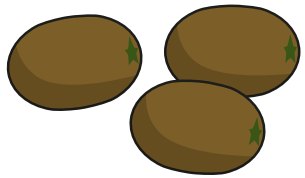
  How much pasta do they have left?

Add and subtract mass

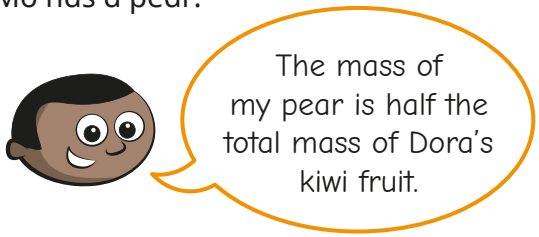
Reasoning and problem solving

Dora has 3 kiwi fruit.

The mass of each kiwi fruit is 70 g.



Mo has a pear.



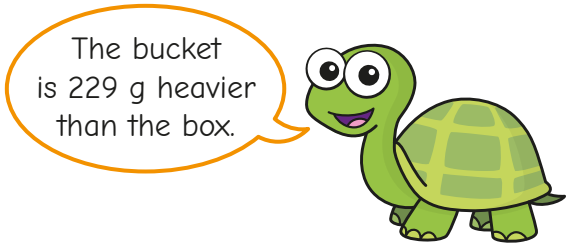
How much heavier is the pear than a kiwi fruit?

How did you work it out?

35 g

A box has a mass of 1 kg.

A bucket has a mass of 230 g.



Explain the mistake that Tiny has made.

Which is heavier, the box or the bucket?

How much heavier is it?

A bag is 320 g lighter than the box.

What is the total mass of the box, the bucket and the bag?

How did you work it out?

The box is heavier by 770 g.

1 kg 910 g

Measure capacity and volume in millilitres

Notes and guidance

In this small step, children begin to explore capacity and volume. They can find the concept of capacity and volume confusing and often use the terms interchangeably. Capacity is the maximum amount of liquid a container can hold when full, whereas volume refers to the specific amount of liquid in a container.

In this step, children only explore millilitres as a measure of capacity or volume.

It is important to address the common misconception that taller containers always have a greater capacity. Giving children time to fill and pour liquids from a range of containers can support them in this, as well as helping them become more confident with estimating capacities.

Things to look out for

- Children may confuse the terms "capacity" and "volume".
- Children may think that taller containers have a greater capacity.
- Children may find interpreting scales difficult, for example working out what the marked increments represent and also halfway between two marks.

Key questions

- What is the difference between capacity and volume?
- What is the capacity of the container? How do you know?
- What is the difference between the start and end values on the scale?
- How many equal intervals are there?
- What is each interval worth?
- How can you work out halfway between two marks?
- What unit is the volume/capacity measured in?

Possible sentence stems

- The scale has been split into _____ equal parts, so each mark represents _____ ml.
- The water is full to the _____ mark, so the volume of water is _____ ml.

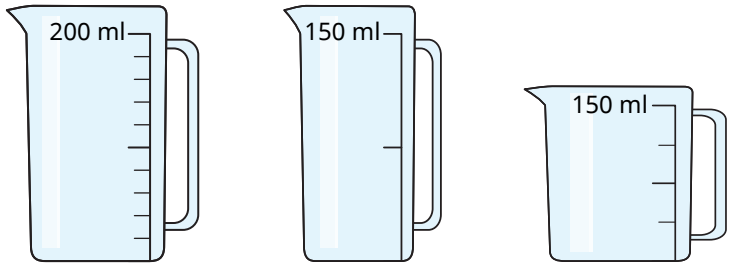
National Curriculum links

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

Measure capacity and volume in millilitres

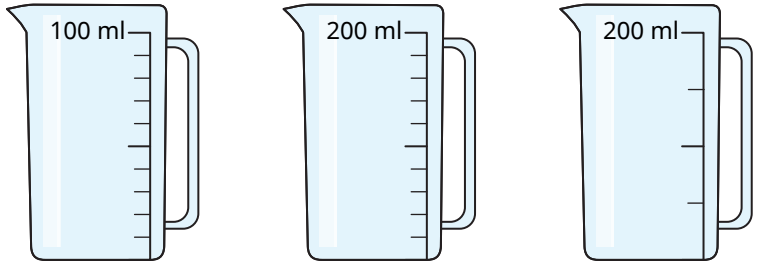
Key learning

- What is the capacity of each jug?



- Label the divisions on the scales of the jugs.

  Complete the sentences to help.

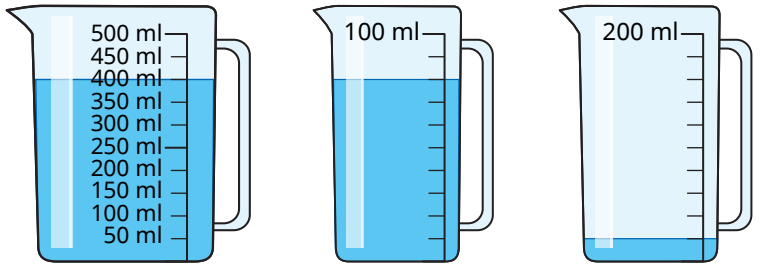


The difference between the start and end values on the scale is _____

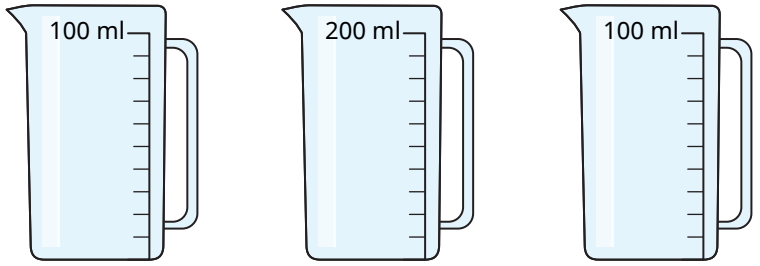
There are _____ equal intervals.

_____ ÷ _____ = _____

- What is the volume of water in each jug?

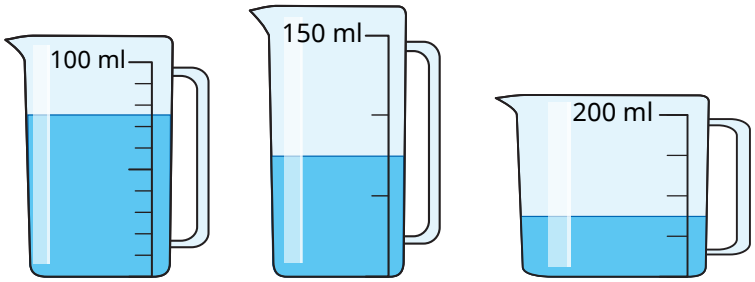


- Colour the jugs to show where the given amount of water will reach.



60 ml 60 ml 35 ml

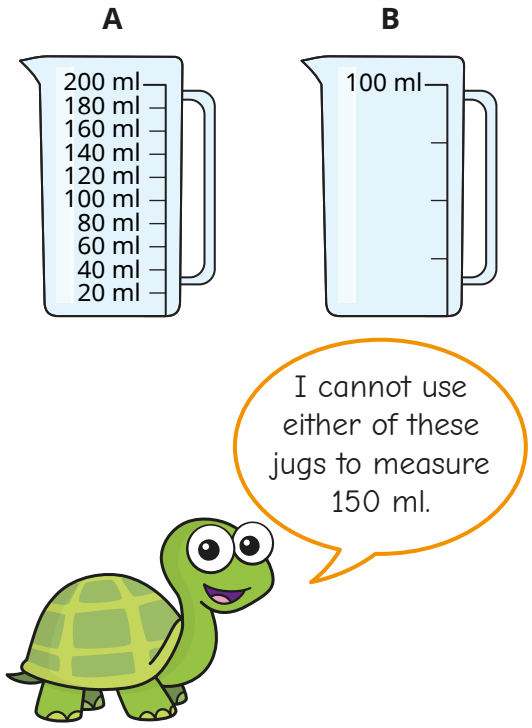
- What is the volume of water in each jug?



Measure capacity and volume in millilitres

Reasoning and problem solving

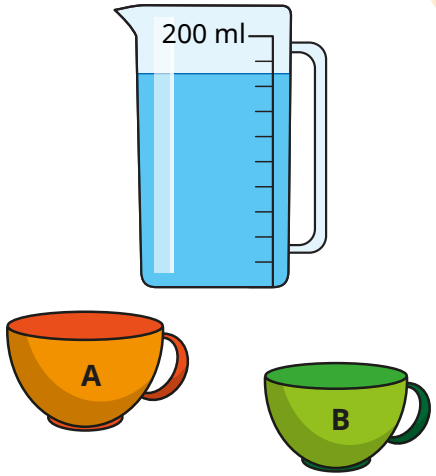
Tiny needs 150 ml of water.



Do you agree with Tiny?

Explain why.

No



Cup A has a capacity of 30 ml.

Cup B has a capacity of 20 ml.

How many cups can be filled so that there is no water left in the jug?

How many different answers can you find?

multiple possible answers, e.g.
1 of cup A and
7 of cup B

Measure capacity and volume in litres and millilitres

Notes and guidance

In this small step, children use the units of litres and millilitres to measure capacity and volume. They describe mixed amounts as "_____ litres and _____ millilitres", so do not need to use decimal notation or make conversions such as 2 litres and 400 ml is equal to 2,400 ml.

Children use their learning from the previous small step alongside the fact that 1,000 ml is equal to 1 litre to allow them to interpret different scales. Interpreting scales is a vital skill, so children should be exposed to a range of different-sized containers as well as scales split into a different number of intervals.

Continue to reinforce the difference between capacity and volume.

Things to look out for

- Children may find interpreting scales difficult, for example working out what the marked divisions represent and also halfway between two marks.
- Children may find the relationship between litres and millilitres confusing, leading to statements such as "300 ml is greater than 3 litres."

Key questions

- What is the difference between capacity and volume?
- What is the capacity of the container? How do you know?
- How many millilitres are there in 1 litre?
- How many intervals are there between 0 and 1 litre? What is each interval worth?
- How can you work out halfway between two marks on a scale?
- In this question, what unit is the volume/capacity measured in?

Possible sentence stems

- The arrow on the scale is pointing to _____ l and _____ ml
- The volume is between _____ l and _____ l

  There are _____ intervals.

  Each interval is worth _____ ml.

  The volume is _____ l and _____ ml.

National Curriculum links

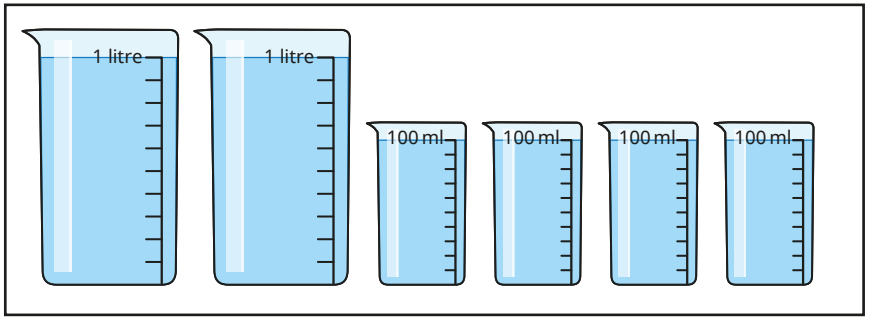
- Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)

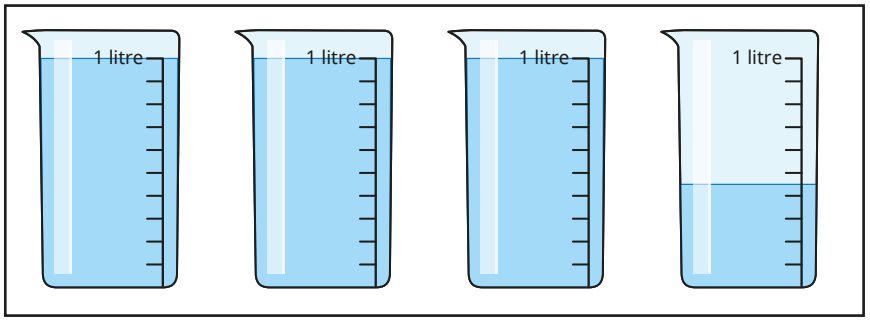
Measure capacity and volume in litres and millilitres

Key learning

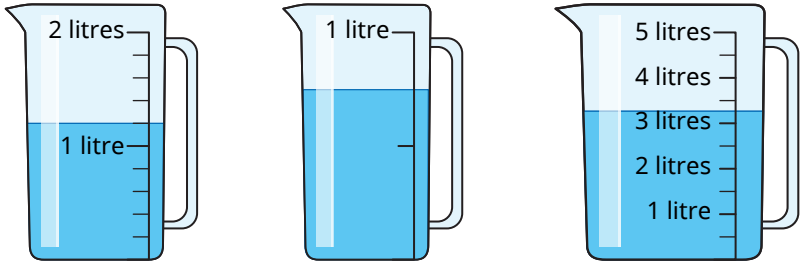
- Label the missing divisions on the jugs.

- How much water is there in total in each set of beakers?



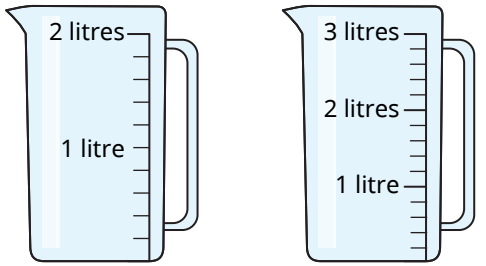


- What is the volume of water in each jug?



How accurate do you think your answers are?

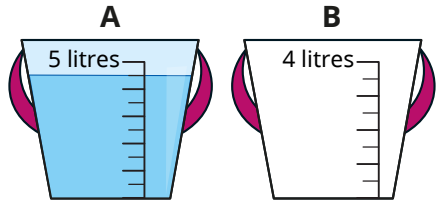
- Shade the jugs to show where the water will reach.



1 l and 400 ml 2 l and 900 ml

- Half of the water from bucket A is poured into bucket B.

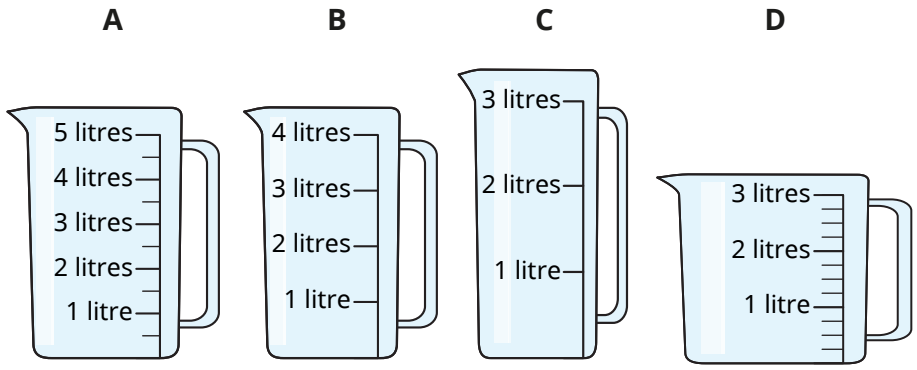
  Shade bucket B to show where the water will reach.



Measure capacity and volume in litres and millilitres

Reasoning and problem solving

Tommy needs to measure 2 litres and 350 ml as accurately as possible using these jugs.

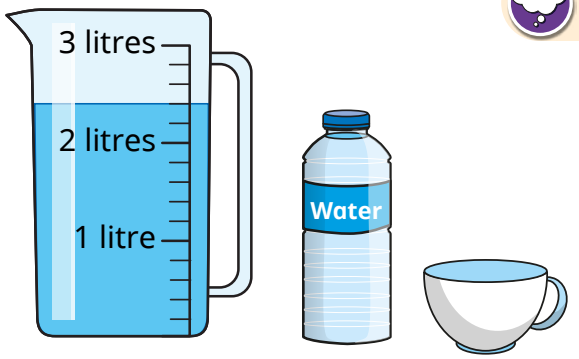


Which jug do you think will be easiest to use?

Which do you think will be hardest?

Explain your reasons.

Compare answers as a class.



3 full cups hold the same amount of water as a bottle.

4 full bottles were used to put the water into the jug.

What is the capacity of a cup?

How many cups and bottles can be filled from the jug, so that there is no water left in the jug?

Is there more than one answer?

200 ml

multiple possible answers, e.g.
3 bottles + 3 cups

Equivalent capacities and volumes (litres and millilitres)

Notes and guidance

In the previous two steps, children measured capacity and volume in both litres and millilitres, and read scales using both of these units of measure. In this small step, they build on their understanding of 1 litre being equivalent to 1,000 ml, and this point will be explored in great depth, so the volumes and capacities in the questions will not go over 1 litre.

Children also draw on other previously learnt skills, as they use addition and subtraction to make amounts of millilitres up to 1 litre. They continue to look at fractions of a litre, and should know that $\frac{1}{2}$ of a litre is 500 ml and $\frac{1}{4}$ of a litre is 250 ml.

Things to look out for

- Children may confuse relationships with other units of measure, for example cm and m, and think that there are 100 ml in 1 litre.
- Children may experience difficulties with calculation when dividing 1,000

Key questions

- How many 100 ml containers full of water fill a 1 litre container?
- How many millilitres are equivalent to 1 litre?
- How many equal parts are there?
- What is each interval worth?
- Do you always need to count up the scale to find out how much there is?
- How can you use number bonds to 100 to help?

Possible sentence stems

- There are _____ ml in 1 litre.
- _____ ml + _____ ml = 1,000 ml = 1 litre

  I need _____ more millilitres to make 1 litre.
- The capacity/volume is/is not equivalent to 1 litre because ...

National Curriculum links

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

Equivalent capacities and volumes (litres and millilitres)

Key learning

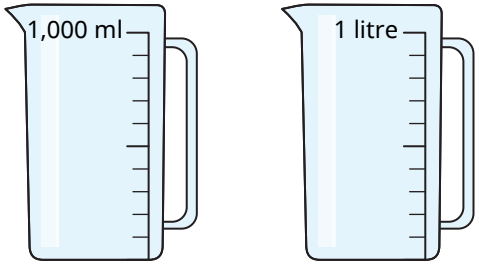
- Give children a 100 ml container, a 1 litre container and some water.

  Ask them to use the 100 ml container to fill the 1 litre container.

  How many times did they need to fill the 100 ml container?

  What does this tell them?

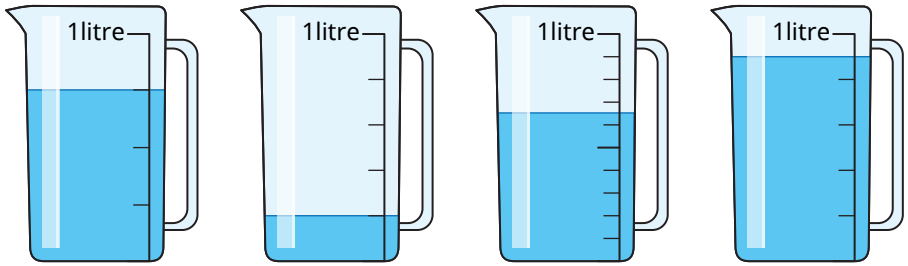
- What is the same and what is different about these jugs?



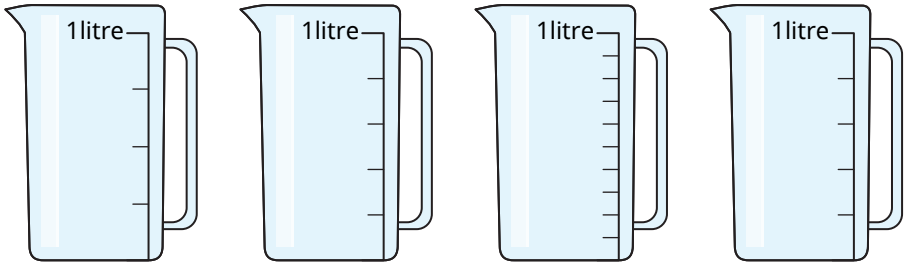
  Label the missing divisions on each jug.

- What is the volume of liquid in each jug?

  Give your answers in millilitres.



- Shade the jugs to show where the water will reach.



500 ml | 700ml | 150 ml | 1,000 ml

- Complete the number sentences.

  - 30 ml + 70 ml = ____ ml
  - 45 ml + 55 ml = ____ ml
  - 100 ml – 38 ml = ____ ml
  - 21 ml + ____ ml = 100 ml
  - ____ ml + 340 ml = 1,000 ml
  - 300 ml + 700 ml = ____ ml
  - 450 ml + 550 ml = ____ ml
  - 1,000 ml – 380 ml = ____ ml
  - 210 ml + ____ ml = 1,000 ml
  - ____ ml + 340 ml = 1 litre

- Tom has a 1 litre bottle of water.

  He drinks 350 ml.

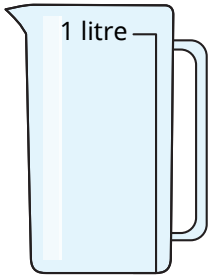
  How much water is left in the bottle?

Equivalent capacities and volumes (litres and millilitres)

Reasoning and problem solving

Jo has these bottles.

She uses the bottles to fill this 1 litre jug.



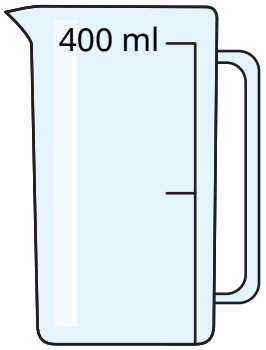
How many different ways can it be done?

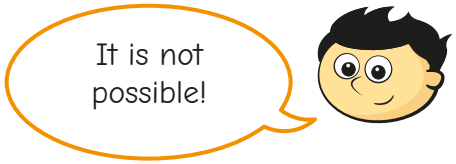
Jo can use each bottle more than once.

multiple possible answers, e.g.

500 ml, 2 × 200 ml, 100 ml

Jack is trying to measure 1 litre using this container.





Do you agree with Jack?

Explain your answer.

No

Compare capacity and volume

Notes and guidance

Building on their understanding of litres and millilitres, in this small step children compare capacities and volumes.

Children first compare capacities or volumes purely by visual estimation, for example a bath must have a greater capacity than a cup. They also use language such as "full", "nearly full", "half full" and "nearly empty" to compare volumes without measuring. They then progress to using "greater than" and "less than" as well as the inequality symbols (<, >, =) to compare capacities and volumes that can be measured.

It is important to explore the common misconceptions that a taller container must have a greater capacity, and that if the level of liquid is higher up a scale, the volume must be greater. Initially, children compare the same units of measure, but then move on to comparing litres to millilitres, building on the work done in Step 8

Things to look out for

- Children may find the relationship between litres and millilitres confusing, leading to statements such as "300 ml is greater than 3 litres."

Key questions

- What is the difference between capacity and volume?
- Which container do you think has the greater capacity? Why?
- Which container do you think has the greater volume of liquid in? Why?
- How can you work out the actual capacity of each container?
- What is each interval worth?
- How can you work out halfway between two marks?
- What unit is the volume/capacity measured in?
- How many millilitres are there in _____ litres?

Possible sentence stems

- The capacity of the first container is _____ than the capacity of the second container because ...
- The volume of liquid in the first container is _____ than the volume in the second container because ...
- There are _____ millilitres in _____ litre.

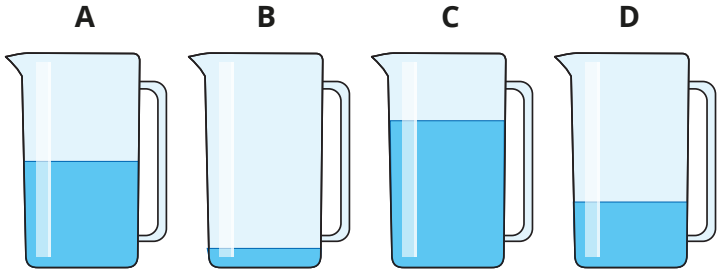
National Curriculum links

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

Compare capacity and volume

Key learning

- Each container has the same capacity.

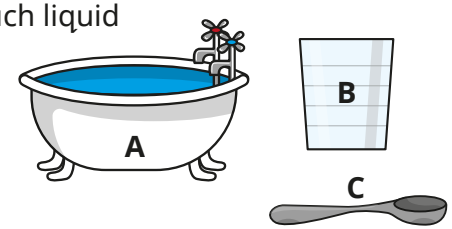


Put the containers in order of the volume of liquid they contain.

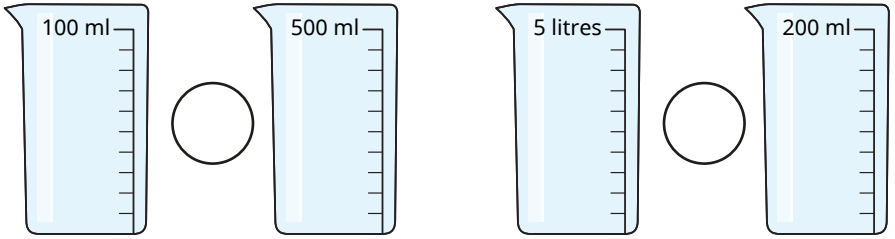
Start with the container with the greatest volume.

- Put the objects in order of how much liquid they can contain.

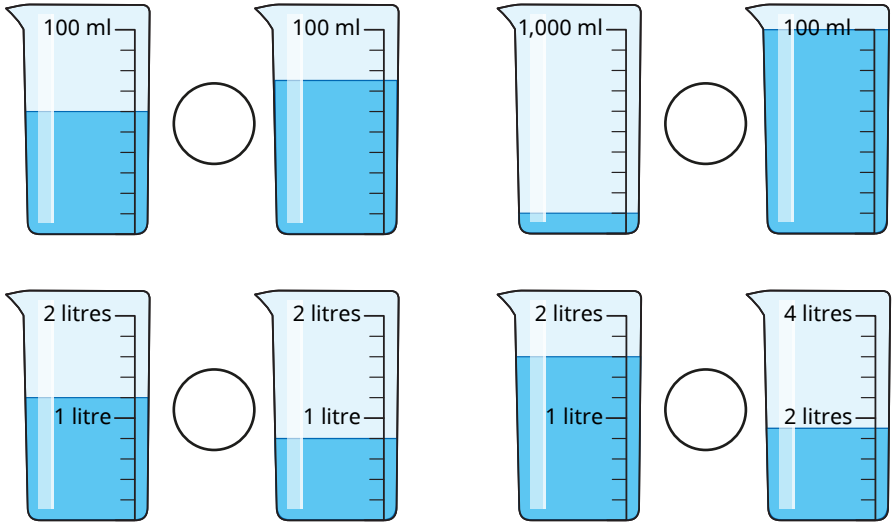
Start with the greatest capacity.



- Write <, > or = to compare the capacities.

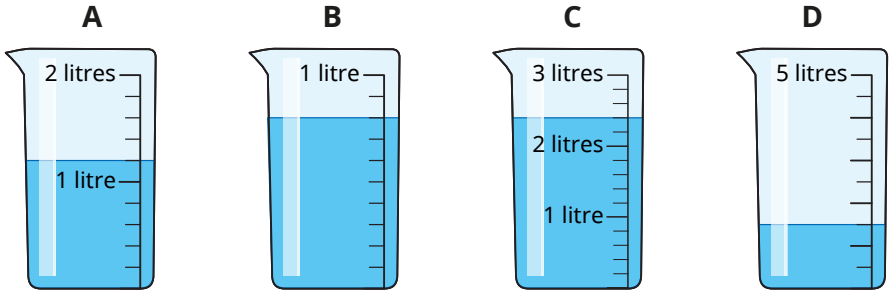


- Write <, > or = to compare the volumes.



- Put the containers in order of the volume of liquid they contain.

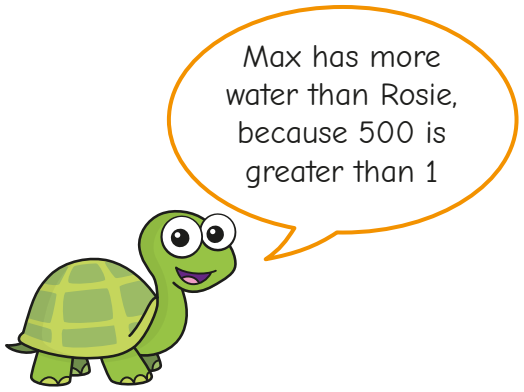
Start with the smallest volume.



Compare capacity and volume

Reasoning and problem solving

Rosie's water **Max's water**



Do you agree with Tiny?

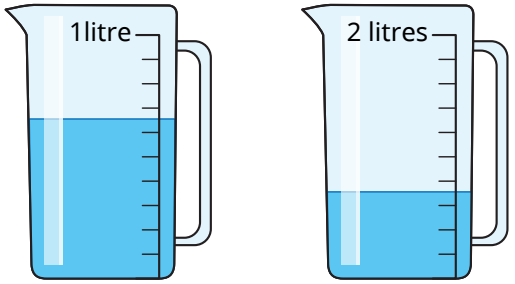
Explain your answer.

No

Is the statement true or false?

The volume of water in jug A is greater than the volume of water in jug B.

A **B**



Explain your answer.

False

jug A: approximately 650 ml

jug B: approximately 700 ml

Add and subtract capacity and volume

Notes and guidance

In this small step, children explore adding and subtracting capacities and volumes.

Children use mixed units, adding the litres and millilitres separately. Use of part-whole models can support this. This is a good opportunity for children to practise their mental addition and subtraction, as many of the numbers involved will not necessitate the written method. As children have not yet explored numbers beyond 1,000, there will be no requirement to cross 1 litre with addition or subtraction, but children will use their knowledge of 1,000 ml being equivalent to 1 litre to subtract from whole litres.

Things to look out for

- Children may mix units incorrectly, for example 300 ml + 2 l = 302 ml.
- Children may struggle with subtracting from a whole litre if they do not first convert to millilitres.
- Children may make errors in interpreting scales.

Key questions

- What units are being used? Can you add/subtract them?
- How many litres are there altogether? How many millilitres are there?
- What volume do you need to add to reach 1 litre? How much more liquid is still left to add?
- How could you work out the difference?
- In what order are you going to do the calculations? Do you have to do them in a certain order or is there a more efficient method?

Possible sentence stems

- _____ litres add/subtract _____ litres is equal to _____ litres.

  _____ ml add/subtract _____ ml is equal to_____ ml.

  So the total/difference is _____ l _____ ml.

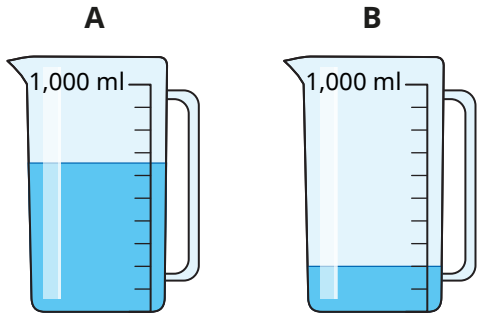
National Curriculum links

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

Add and subtract capacity and volume

Key learning

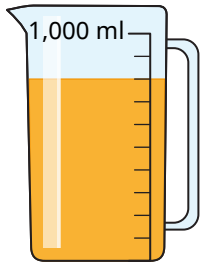
- Whitney has some jugs of water.



She pours all the water from jug A into jug B.

How much water is now in jug B?

- Alex has this orange juice in a jug.

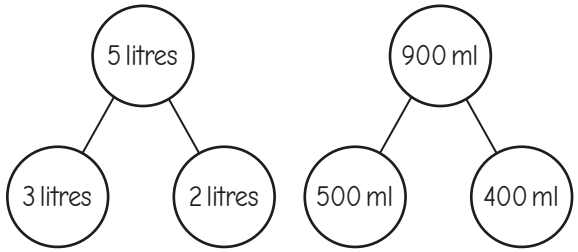


She drinks 300 ml.

How much orange juice is left in the jug?

- Work out the calculations.
  - 200 ml + 320 ml
  - 5 l + 7 l
  - 450 ml – 100 ml
  - 720 ml – 510 ml
  - 100 l – 63 l
  - 1 l – 310 ml

- Amir uses part-whole models to add 3 l 500 ml and 2 l 400 ml.



3 litres + 2 litres = 5 litres
500 ml + 400 ml = 900 ml
So the total is 5 litres 900 ml.

Use Amir's method to work out the totals.

1 l 300 ml + 2 l 450 ml	3 l 400 ml + 500 ml
3 l 600 ml + 400 ml	4 l 150 ml + 3 l 800 ml

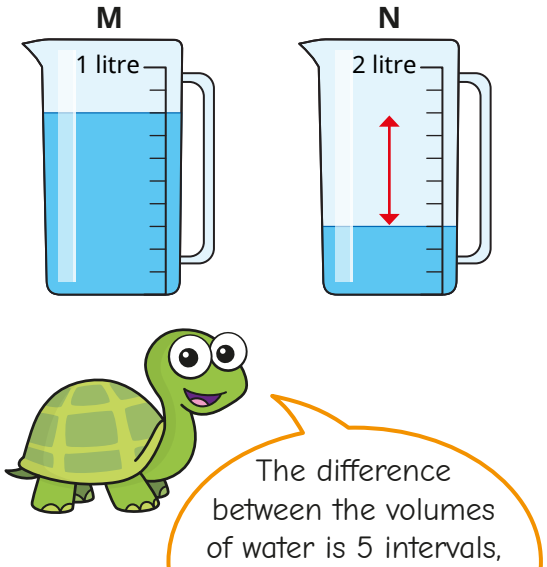
- Work out the subtractions.

3 l 400 ml – 2 l	10 l 195 ml – 8 ml
10 l 195 ml – 3 l	3 l 400 ml – 400 ml

Add and subtract capacity and volume

Reasoning and problem solving

Tiny is finding how much more water is in jug M than jug N.

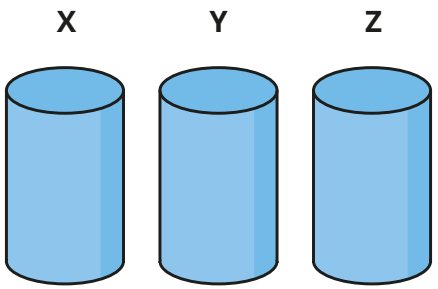


Do you agree with Tiny?

Explain your reasons.

No

Here are some measuring cylinders.



The total liquid in all three cylinders is 400 ml.

Cylinder X has half of the total amount in it.

Cylinder Y has 67 ml less than cylinder X.

How much liquid does each cylinder contain?

X: 200 ml

Y: 133 ml

Z: 67 ml