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Week overview

Students need to work out:

We are also hoping that students will learn:

You will need the following objects:

Monday: At-Home Investigation

Tuesday: Connecting lesson

Wednesday: Application and Connection lesson

Thursday: Interleaved Practice Questions

Friday: Connecting Lesson

How to use this work program

Accessing the online resources

To access the online resources, please go to: <https://www.backtofrontmaths.com.au/b2fmathshome>

Running the program each week

Each week is designed with five maths lessons so that you can do it each day. Different days have different types of lessons to make sure that students experience the kind of thinking that they need to continue growing in maths. The types of lessons include:

- **At-home investigation:** This is a hands-on task where students explore a new idea before they are taught that skill. They need to come up with an idea to try to solve the problem, try out their idea, decide if it worked or not, try again if needed, and explain what they did. If your child has time with your teacher with a webcam, the teacher will generally be doing this lesson with your child. This is the lesson that will require the heaviest input from you to help your child think through an idea and generally requires the use of some hands-on materials that are listed in the information page.
- **Connecting lesson:** This type of lesson has questions that lead students to develop their ideas and learn a new skill. It should be fairly easy for a student to do, but you will need to be available to read the question to your child as needed, encourage them to think further, and make sure that they complete the work. Most of these lessons will include 10 minutes of practising number operations or concepts through activities or games.
- **Interleaved practise lesson:** This type of lesson provides 8-10 questions from different areas of maths so that students practise remembering what they have previously been taught. Some of the questions may not be easy for your child, so feel free to help whenever you see them struggling.
- **Number practice:** This lesson contains games and number tasks to do regularly with your child. Number is the most important concept to establish in Foundation, so we will be using similar activities each week to help your child develop a very firm understanding of “how many”, to be able to picture that amount in their head, and to be able to add and subtract small amounts very flexibly. **These sessions will not focus heavily on counting, as counting is far less important than making amounts, drawing those amounts and recognising that the amount is still the same when the objects move.**

Getting help

The website above will have answers to frequently asked questions as well as videos to help you successfully teach your child at home. If you have further questions or need support, please contact your child’s teacher directly using the contact details that they have provided to you. If they can’t answer your questions, they will contact the B2FMaths@Home team directly to get an answer within 3 days.

What you need to know this week

Week overview

This week we are teaching the concept of capacity. Capacity is used to measure how much a container holds (for example, how much water there is in a jug). In early primary we are using informal units to measure how much a container holds (e.g. how many mugs of water fill a bucket), then comparing the capacity of up to 5 containers and ordering them from the smallest to the largest. It is important that students use non-standard units before using millilitres and litres because they need experience with the thinking in the “Students need to work out” section below to properly understand measurement.

For your information: we often use the words capacity and volume interchangeably. Technically, volume is referring to the amount of 3D space an object takes up (it is used for solids). Capacity refers to how much a container will hold and is generally used for measuring liquids and gases. At this stage it really doesn't matter which term you use, so don't be concerned about getting it wrong.

*Please **do not** skip straight to using millilitres or students will be at risk of not understanding concepts such as algebra in later years.*

Students need to work out:

- A good way of measuring is to use smaller **measuring objects** (e.g. how many cups or mugs of water does it take to fill a larger container?)
- The measuring objects should be the same size as each other (e.g. you can't use different sized mugs)
- The measuring objects should always be full so that the measurement is fair for comparison (e.g. if you used partial cups then you can't count them in the same way as full cups)
- In the same way, you should completely fill the container that you are measuring.

We are also hoping that students will learn:

- If the measuring object that you use is big, you won't need as many of them to fill the larger container. You may also have to use only a partial fill of the measuring object at the end.
- If the measuring object you use is small, you will have a lot more of them in the same capacity in comparison to using a big measuring object.
- That means that you can't directly compare capacities of objects unless you know how big the measuring object was. We can't measure one bucket with a small cup and another bucket with a big cup, then say the one measured with the small cup holds more.

You will need the following objects:

- Any large containers that you can fill with water (bucket, ice-cream container, sauce pan, mixing bowl...)
- Smaller containers to act as measuring objects (plastic cups, spoons, coffee mugs...)
- Cut out the number cards for the games this week (Tuesday and Friday, then they will be used again next week) Cards and activity missing?

Teacher Overview

Students will be using non-standard measuring objects to measure capacity. Parents have been warned not to skip straight to millilitres, but they may try that anyway.

Ideally, we would use the following sequence of thinking to develop the concept of capacity from Foundation to Year 2/3:

1. Compare containers directly to determine which holds more (Foundation). Learn that you have to pour liquid from one container to another to directly compare.
2. Use smaller measuring objects and count them as a measure of capacity. Realise that you have to use the same object (uniform units), fill them, and fill the containers you are measuring if you want to compare capacities.
3. Realise that a bigger measuring object gives a smaller count for capacity and a smaller measuring object gives a larger count.
4. Realise that smaller measuring objects allow for greater accuracy as there are smaller gaps/overruns at the end.
5. Realise that if we are going to communicate with anyone else, we need a standard way of measuring capacity with units: therefore, develop the need for cups, millilitres and litres.

What to emphasise

If you have time online with a webcam

Ask students questions that emphasise the “students need to work out” section from the previous page, such as asking them to explain how they used their measuring object to measure the capacity of their bucket/container.

Check that the parents understand how the number games for the week work and make sure that you ask the student if they have played them yet. Please note: the cards this week are also available as a commercial product on our website. They are much more robust and appealing, and also come with instructions for multiple games to build fluency.

If you have only email or phone contact

Check that parents have read the “What you need to know this week” section. Check that they understand the importance of using the number games so that students retain what they have learned and think regularly about adding and subtracting.

Tracking student achievement

Has the student measured, compared and ordered the capacity of three containers using informal units?

- If so, tick **M4C** on the tracking sheet.

Can they measure, compare and order 5 objects? Tick **M4B**.

Can they order objects and also identify problems with incorrect measurements? Tick **M4A**

Monday: At-Home Investigation

Today could be quite messy. You might want to do the investigation during bath time and record what happens. A sandpit would work very well too.

You will need:

- Any 3 large containers that you can fill with water or sand (bucket, ice-cream or yoghurt container, sauce pan, mixing bowl, plastic jug...)
- Smaller containers to act as measuring objects (any sized plastic cups, spoons, coffee mugs – they do not need to be measuring instruments, but it is ok for your child to use measuring cups and spoons if they want to)

Steps:

1. Make sure you have read “What you need to know this week” so that you know what to emphasise with your child and why we are not skipping straight to using millilitres.
2. Read the sheet to your child. Ask for their ideas on how to solve the problem. Don’t give your opinion just yet on their ideas, even if they are clearly wrong. Make sure that you do point out that they are not allowed to simply pour from one large container into another or judge by sight. That is the challenging part of the question – they need to work out to use smaller measuring objects to fill up a larger one and keep count.
3. Make sure that you try out their ideas first before you try to help them come up with a better plan. This is important because then they will know *why* their idea didn’t work.
4. Help your child think about what worked and what didn’t, then come up with a new plan if needed.
5. Encourage your child to draw or write answers to the questions on the page. Scribe for them if you need to.
6. Discuss what your child found out with them. Keep in mind the ideas from the “What you need to know this week” section so that you can ask questions that are appropriate to the issues identified.
7. At the end: consider writing a comment on the page to say what went well or what you are concerned about.
8. We will be checking capacity again later this year, so don’t worry too much if today didn’t quite work.

Please note: to receive a B your child will need to accurately measure, compare and order the capacities of 5 containers. You may wish to increase the number of containers today if your child is finding this task easy. To receive an A, your child also needs to be able to identify issues with inaccurate measurements.

At-Home Investigation

Find 3 large containers. *How could you find out which one holds the most, without just pouring from one container into another, or by just looking?*

Adult note: this requires use of a measuring object (e.g. coffee mug)

My plan: answer these questions

- What could I use to measure with? Draw some ideas and choose one.

- How will I make sure that I am measuring accurately?
What would happen if I didn't measure all the way to the top?

Carry out my plan: follow these steps and answer the questions

- Measure your three containers. How much does each one hold? Show what you did.

Apply your learning: follow this step and answer the question

- Compare the containers. Put them in order by how much they hold. Explain how you did it.

Teacher Overview

This is a ***Problem Solving and Reasoning*** task.

The emphasis is on *designing* an investigation, *developing* a plan, *testing* it out, *verifying* that the plan worked, changing it as needed and *communicating* the procedure. There is also an emphasis on *generalising* an appropriate process that can be replicated when measuring the capacity of other containers.

If you are at school: ask families to bring in one large container (ice cream, yoghurt, bucket...). Take students to the sandpit if it is open and use cups of sand to measure. You might also want to consider running this activity over a few days with smaller groups of students while others work on the number focus or interleaved lessons. NB this is also a good opportunity to practise counting and tallying. You could easily turn this into a picture graph by using one post-it note for each cupful.

Watch out for:

- Using a measuring object rather than just making the decision by sight.
- Taller = holds more.
- Filling the cups all the way.
- Using different measuring objects rather than uniform objects.
- Comparing the capacity of 2 containers when measuring using different objects.

Good questions to prompt thinking:

- How will we know how much the bucket will hold? How can we measure it?
- Which measuring objects might work to measure it?
- What might happen if we don't fill the cup up all the way?
- What might happen if we use a smaller/bigger cup to measure with?
- If we are going to compare the containers, do we need to use the same measuring objects?

Students requiring support:

- Directly compare containers by pouring.
- Identify the largest/smallest rather than attempting to order.
- Use one large and one small container to compare.

Extension:

- Compare and order capacities for multiple containers.
- Model only partly filling the measuring object and play act using that to measure the capacity of the bucket. They should laugh and correct you. Correcting incorrect procedures is important for achieving the A standard.
- Use post-it notes to make a picture graph of the capacity for multiple containers.

Tuesday: Connecting lesson

Number focus: *making and ordering collections worksheet*

You will need: 5 ziplock bags or see-through containers, 50 small items to fit in the bags/containers, a way of labelling the bag/container (e.g. masking tape and a pen to write with)

1. Show your child the items and ask them to put 12 in one bag/container. Write 12 on the label.
 - a. If your child cannot collect 12, try 8.
2. Ask your child to collect 'more than 12' in a second container. Ask your child how many they have collected and record the amount on the label. Please note, you might have to count the items with your child to make sure.
3. Ask your child to collect 'less than 12' in a third container. Repeat the labelling process.
4. Repeat the process by asking your child to make 'more than ___' or 'less than ___' until you have at least 5 different amounts.
5. Ask your child to find the smallest amount (least). Put this at one end of the containers.
6. Ask your child to find the largest amount (most). Put this at the opposite end of the containers.
7. Ask your child to organise the remaining containers from the smallest amount to the largest amount. Compare and count as you need to.
8. Use the worksheet to record your child's thinking.

Measurement worksheet:

The worksheet provided should be fairly self-explanatory. If needed, try modelling the situation by pouring one cup of water between a tall skinny glass and a short, full glass. Here is a picture showing one cup of milk in a measuring cup, then the same milk poured into the empty glass beside the cup. As the glass is thicker, the internal diameter is smaller. That means it ends up holding almost the same amount as the measuring cup despite being taller.



Empty glass



Milk from the cup was poured into the glass

Try to find similar examples from your home.

Comparing and ordering amounts

Order your collections from the smallest to the largest amount.

Write your number and draw the correct number of objects that you collected in the boxes below. The smallest amount should be at the top and the largest amount should be at the bottom.

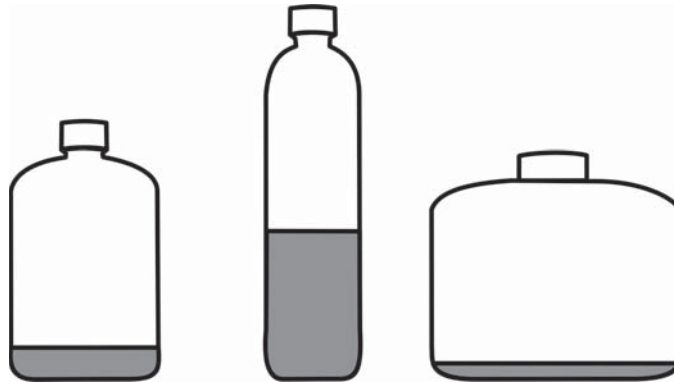
Number	Drawing

Problem 24: Volume

These containers each have 1 cup of water in them.

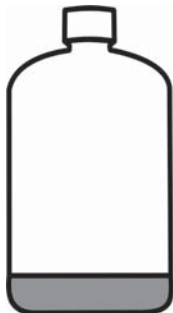
Which container will hold the most water?

 Draw a circle around the container that will hold the most water.

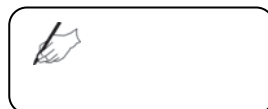




✓ Put a tick on the container that will hold the least amount of water.

 Why did you choose these 2 containers?



How many cups of water do you think this container will hold?



 or  Show how you worked it out.

Problem solving:

Teacher initials:

Date:

Student solved the problem with:

- Minimal help
- Some prompting
- Solved after explanation
- Did not work out a solution by themselves
- N/A – not a novel problem

Choose one of the other containers and work out how many cups of water it will hold.

 Tell a friend how you worked it out.

Peer Assessment

Name:



Teacher Overview

This is an ***Understanding and Reasoning*** task based on the key concept of ***Quantity***. The purpose of this lesson is to make amounts that are more or less, then order these amounts from the smallest to the largest. Children also have to draw the amounts and record the numbers. In addition, students will be considering how to order containers by capacity when observing them as a picture. The picture shows one cup of water in each container. An added explanation is in the page for families to show one cup of milk in two different containers.

If you have time online with students, ask them to show you their bags of objects and their worksheet. Make sure that you talk with parents about the importance of Quantity. Children need practice making, drawing and comparing amounts to develop strong understanding.

You may also want to review the time concept that students were working on last week to build retention.

Wednesday: Application and Connection lesson

This lesson allows your child to examine any measuring objects that you have in your kitchen or medicine cabinet for measuring with and try using one to measure the capacity of a bowl or mug.

You will need:

- Think about any instruments you have for measuring capacity/volume. Do you have a teaspoon, tablespoon, measuring cup? Do you have a syringe for medicine or a tiny measuring cylinder? Do you have a jug that has millilitres on the side?
- A cup or bowl that your child can use to measure by filling with water or sand. They will also need to find a third object with a capacity that is between the two.

Steps:

1. Read the sheet to your child. Ask your child what they have seen you use for measuring. If needed: explain that the sheet wants them to measure how much a container holds (volume or capacity), not the length or the weight.
2. Encourage your child to look through your kitchen cupboards or drawers to find measuring implements and draw them. You might want to locate medicine cylinders etc from your medicine cabinet without your child present.
3. Allow time for your child to draw a selection of the instruments and to discuss how they would be used for measuring.
4. Ask your child which item they would like to use to measure the capacity of the bowl and cup you have selected. Help them to measure it. You will need to explain how to use the item. Help your child to keep count as needed (e.g. spoonfuls).
5. Encourage your child to draw or write answers to the questions on the page. Ask what might have a capacity that is between the bowl and cup. Experiment with using the same measuring instrument until you find one.
6. Discuss what your child found out with them. Keep in mind the ideas from the “What you need to know this week” section so that you can ask questions that are appropriate to the issues identified.
7. If you have extra time: consider including your child in the measuring part of any cooking that you do this week, or make the playdough recipe below together.

Playdough recipe: *If you can find flour and this much salt!*

Ingredients:

- 1.5 cups of flour
- 1/2 cup of salt
- 2 tbs of cream of tartar (skip if you don't have it)
- 1 tbs of oil
- Food colouring
- 1 cup of boiling water

Steps:

1. Mix all dry ingredients in a bowl with the oil. Your child can do the measuring.
2. Mix the water and food colouring together (not for children to do due to the boiling water).
3. Combine everything and roll out the dough. Store in a bag in your fridge.

Investigating measuring instruments

What measuring objects do you have in your kitchen or bathroom to measure capacity (how much a container holds)?

Here are some ideas of what to look for:



You might also have special measuring cups or spoons for medicine.

Draw a picture of some measuring instruments that you find:

Try using one of them to measure how much a coffee cup will hold. Measure how much your bowl holds too. Find an object that holds an amount that is between the cup and the bowl.

Draw a picture to show what you did and write what you found:

Teacher Overview

This is an ***Application and Connection*** lesson. It gives students an opportunity to look for measuring instruments for capacity in their home and to explore how they are used. It also gives students another opportunity to compare and order 3 objects by capacity.

This lesson should also encourage families to consider cooking or using the measuring instruments with their children, including making the playdough. Playdough is great for considering volume so if you are at school it might be worth trying to use it. Many children think that flattening out a ball of dough means you have made more dough. They are surprised to see it “shrink” back to the size of the original ball. This is a good opportunity to bring in mass if you have time. You can make 2 identical sized balls, weigh them, flatten one and weigh them again.

Thursday: Interleaved Practice Questions

Why we are using mixed up questions:

In this lesson your child will be reviewing a range of skills that they have learned previously. Each question is unrelated to the previous question, because we want your child to have to *think hard* about what to do. Mixing up questions like this, rather than just practising related questions, has been shown in research to improve student retention of concepts by 60% over a 4 month period.

What to expect:

Your child will probably have forgotten how to complete quite a few of the questions. If needed, change the numbers in each question to make them easier because this will still require your child to think hard and remember a process. If they still can't work it out, feel free to show them, but try using different numbers rather than the exact same question. There are answers to each question on the website in case you get stuck.

Interleaved practice

Number:

1. Draw 26 counters arranged as a rectangle.
2. Three flowers were growing. Each had 8 petals. How many petals altogether? Draw them.
3. What number comes before 300?

Measurement/Geometry:

4. Draw the biggest mug or cup that you have in your house, next to the smallest one. How many small cups fit in the large one?
5. What time will it be when you go to bed? Draw the clock face.
6. Draw an object that has flat faces, but is not a cube or rectangular prism.

Chance/Data:

7. Do you have more cups and glasses or more cutlery in your kitchen? How many more? Write the number sentence and show your working.

Teacher Overview

The questions on this worksheet are drawn from the “C standard” of the Achievement Standard. See your tracking sheet for more detail. Each week the interleaved questions will get a little harder, and more concepts will be reviewed throughout the program as we teach that concept. We have included answers to these questions on B2FMaths@Home so that parents can find them if needed.

Support for struggling students:

You might like to reduce the numbers in the questions. You might also give the student the answer, then ask them to work out how the answer was obtained.

Application question

Work with a partner for this activity.

Your task is to find the container that will most closely hold 1 litre of liquid.

You will need: a measuring jug, a variety of containers, water.

Place the containers in order from the one you think will hold the least amount of water to the one that will hold the most.




Draw the containers here. Draw a circle around the one that you think is closest to 1 litre.









Decide what you will do together to find out if you are right.

Use the strategy you decided on to test the containers.



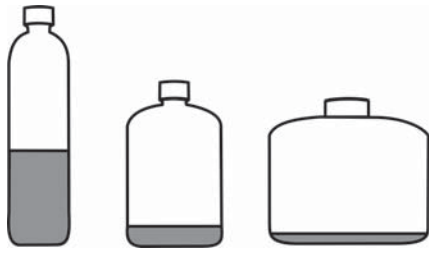
or  Fill in the table below.

Containers that hold less than 1 litre  or 	Containers that hold close to 1 litre  or 	Containers that hold more than 1 litre  or 





Draw a circle around the container that is the closest to 1 litre in volume.

Manipulation problem



These containers have been arranged in order from the one that will hold the least amount to the one that will hold the most.

Are there other ways that they could be put in order?



 or  Show at least one other way that they could be ordered.

Backwards question

Katy's bucket holds exactly 9 cups of sand.
She used 2 cups of sand to make each of these little castles.



If Katy puts all of the sand from the sand castles back into the bucket, will the bucket be full?

 or  Show how you worked it out.

Teacher Overview

This is a **Reasoning** lesson. It is designed to extend student understanding further and promote generalising. In particular, this lesson asks students to compare the capacity of objects to one litre. If families cannot do this, just leave it out. This will be a particularly tricky concept for many children so it should provoke good discussion.