Home Learning TV: **Senior Maths, Tuesday 12th May**

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| **Segment lesson planning details** |  | | |
| Title for segment: | How much water do I use? | | |
| Year levels *(e.g. Yrs1 – 3)*: | 7-10 | | |
| NZC learning areas/ KCs: | Statistics:  S4-1 and 5-1: Plan and conduct investigations using the statistical enquiry cycle: determining appropriate variables and data collection methods; gathering, sorting, and displaying multivariate category, measurement, and time-series data to detect patterns, variations, relationships, and trends.  Measurement:  GM 4-1 and 5-1: Select and use appropriate metric units for length, area, volume and capacity, weight (mass), temperature, angle, and time, with awareness that measurements are approximate  Key competencies  Managing Self  Thinking  Participating and contributing | | |
| Purpose of lesson:  (What learners will learn based on the above) | To guide students through a statistical investigation that they may carry out in their own home. | | |
| Success Criteria – students will be able to:  (how they will know when they have learnt it) | The students will be able to:   * plan and carry out a short investigation | | |
| Links to recordings /resources | <https://www.tvnz.co.nz/one-news/new-zealand/iwi-supply-water-northland-towns-in-wake-ongoing-drought?auto=6134873667001> – end at 2:03  <https://www.tvnz.co.nz/one-news/new-zealand/army-drafted-in-help-northland-drought-conditions-continue?auto=6135990229001> start at beginning- end at 1:26  <https://www.tvnz.co.nz/one-news/new-zealand/more-water-restrictions-put-in-place-northland-drought-continues?auto=6138488038001> | | |
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| **Segment plan content** | | | |
| Stage | Teaching strategies linked to purpose | Learning tasks and activities | High level script (key points/questions for presenter) |
| **Beginning of lesson:**  Activating prior learning and relationships | Making real world connections to current events within New Zealand  Link to prior experiences, personal circumstances  Video: ‘hook’  Link to personal circumstances – how does my house get its water?  Investigate personal water use.  Link to known volume for comparison. | Engage with introduction to the lesson and background information about the impact of the drought effecting the upper North Island.  Link to prior experiences and personal context – think about water use in your own home.  Write list of all water uses in household.  Think about NZ’s water use in an international context. | **Greeting in Te Reo, Samoan, Tongan and Fijian.**  Were you aware that many parts of New Zealand have experienced one of the worst droughts on record recently?  What’s a drought? Ka pai, it’s a long dry period with little or no rain – not enough, anyway.  Do you live in one of these areas? What’s it been like for you?  Have a look at this news clip about what it’s been like in the far north of the country. The iwi Te Rarawa and Ngāi Takoto are seeing what they can do to help.  [play clip 1]  Wow, amazing how people come together to help like that isn’t it?  I’m going to show you one more clip, again in Northland but a different group of people are helping out in this one:  [play clip 2]  Why is drought such a problem? What do you think?  I know some of my friends up north rely on a water tank for their water, which fills up when it rains. Maybe you have a tank at home, too. They had to really cut down on the water they used during the drought.  Other people get water delivered through pipes to their house with help from the council, and others have wells or bore holes in the ground. How does your house get water? Ask someone in your whānau if you don’t know. Just as we have all worked together as a country to fight Covid-19 we all need to work together to conserve water during a drought.Everyone can make a difference.*Ko te wai te ora o ngā mea katoa.**Water is the life giver of all things.*We all need to do our part to help conserve water – no matter where we live in New Zealand.I want you to have a think: what do you use water for every day? Try to list everything you do that uses water. Think about what you do in the morning, when cooking, when cleaning. While you do that, I’m going to write on the board some of the things I use water for. **[write list on board:** Showering  Washing hands  Brushing teeth  Flushing the toilet.  Washing my clothes  Washing the dishes used  Water used for cooking  Drinking water and other drinks made from water  Anything else to add in your list?  Does your family use water in other ways in your household? Water for a pet, water the garden, the grass etc? ].What did you come up with? Anything different to my ones?Guess what - the average use of water per person, per day, in New Zealand is 227 litres. Does that sound like a lot? That’s a more than 100 of those 2L bottles of milk. If it sounds like a lot, that’s because it is. New Zealanders use a lot of water compared to other countries.Some of you will be very aware of how much water you are using right now. If you are living in Northland your whole whānau and iwi will all be working together to conserve water |
| **Main part of lesson (a) :**  Introducing learning  Reinforce routines, provide multiple exposure to concepts, and strategies. Scaffolding learning | Explicit explanation of how this lesson will be different to in person.  Stating what we will do together.  Framing with clear investigation question. Multiple representations.  Brainstorming time.  Modelling, think aloud.  Step-by-step modelling of calculation, think aloud.  Time to get equipment.  Suggestion of finding someone to help if needed.  Set out way to record: scaffolding.  Multiple chances for learning  Independent task.  Time to read measurement again – multiple chances  Modelling & think aloud | Engage with investigation question.  Brainstorming time: what do we require to answer this question?  Find necessary equipment to measure, if they have it.  Engage with someone in bubble to help.  Set up recording table.  Engage with video clip – modelling  Read measurement.  Think about importance of taking an average measurement.  Measure flow rate of tap at home if possible.  Read measurement again.  Find average of three measurements. | Today we’re going to explore a simple investigation together. Now, usually at school, we’d all have a think and develop our own investigation questions, and your teacher would help you to really narrow down on a good question that would be straightforward to investigate. Now, on TV that‘s a bit tricky. Instead, what we’re going to do is all have a think about this question here:  *How much water does my household use per day in lockdown?*  That’s a pretty big question. Write that down as a start. Now obviously we won’t be able to answer this during this TV segment either, but what we’ll do is go through the ways you can set up this investigation for yourselves, and we’ll have a go at answering at least part of it.  Ok. I’ve got my question – now, how on earth do I go about answering it? Let’s have some brainstorming time – what kinds of things will I need to know or find out to answer this question?  [wait ten seconds – could begin small brainstorm bubble on board – recording/measuring/different people in my house].  If you thought something like ‘recording’ or ‘measuring’, you’re right. But first, we need to make sure we’ve got down all the ways we use water on our list. Check your list again – and I’ll check mine.  [add in anything else, e.g. washing hands before dinner, brushing teeth…]  Now, for each of these activities, we’re going to need to calculate how much water they require. We could do that by somehow saving all the water they use and measuring that… but that sounds hard.  I’ve got another idea. Have you ever noticed how different taps seem to have different pressures? That is, water seems to come out of some taps faster than others. What if we measured how much water came out of the taps or showers or hoses at our houses, every second? That would give us a really useful number to use – that way all we would need to know in the end is how many seconds the tap of shower was turned on, to know how much water came out of it.  Let’s call this the *flow rate.*  [Write flow rate = volume of water / second].  Alright. Now, let’s begin by finding out how much water we use to say, wash our hands. This is a smaller question to answer, and it’s one we can do together now. Will this be the same for all of us? Probably not. If you still need to find paper and pen to record, go and do that now. This exercise will help you carry out the rest of the investigation by yourself later.  Also, while I prepare, if you have a measuring jug or something similar you can use to measure water, go and see if you can find that now. Or you could use an old milk bottle, or even just a cup. If there’s someone in your bubble that can help you with this investigation, now’s the time to grab them too, if you haven’t done so already.  [write on board: How much water do I use to wash my hands?]  Head up a table (see end of document):  Ok. Here I’ve set up a table I can use for the whole investigation.  [talk through columns with special attention paid to person and time of day – suggest this is where family members could record themselves if they like].  Now, I haven’t got a tap here, but I asked my friend to do this at her house. What she did was put the measuring jug under the tap and turned it on for 5 seconds. The whole idea is not to waste water, so we don’t want it running for much more than that. Have a look at the video:  [play clip attached: water measurement]  Cool. Let’s have a closer look at how much water that was.  [show photo attached: measurement 1]  [talk through reasoning to arrive at measurement. Without a finer scale, use judgement, round to nearest 10mL.]  Approx 790mL.  I asked her to do it three times, so we could take the average of her three measurements. Do you know why? [wait time].  That’s right, to make our calculations more reliable. There’s bound to be some variation each time we do this – we might accidentally start the timer a little late, or if you have a tap that gets stronger the further you lift the handle, there will be variation depending on how far you lift it each time, won’t there?  She’s sent me her three measurements. I’m going to write them down now, and while I do that, it’s your turn. If you have a measuring jug or another jug, go and see how much water comes out of your tap in five seconds. Don’t stress if you don’t have a stopwatch – we’re doing the best we can at the moment! Count to 5 like you normally would when you count to 20 washing your hands. You might not have time right now to take three measurements and find the average – just find one for now. We’ll come back together in a tick.  If you’re not doing this at home, you can use the measurements I’m using for now. I’m just going to check that measurement again.  [show measurement photo again for five seconds].  She’s sent me the other two measurements too, let’s find the average.  [Write measurement on the board to side of table, along with other two measurements. Write out working to find the average: 790 + 770 + 860 = 2420. 2420/3 = 806.67]  Round to nearest mL: 807mL  Ok. Hopefully you have your ‘5 seconds’ measurement at home. Make sure you record it. Now we’re going to get into some of the maths we need to answer our question. |
| **Main part of lesson (b)**  Providing opportunities to use and practice | Repetition of calculation – multiple exposures  Modelling calculation and think aloud  Link to known volume - comparison | Repeat of finding average.  Calculate flow rate.  Think what to do with the answer.  Final calculation for total.  Link total to known volume as comparison. | First, see how I’ve found the average of my friend’s three measurements. I did this just before but some of you may have been off measuring. After this show, you can do this too. I’ve used my calculator to do this. [talk through average calculation].  My friend uses 807mL water for five seconds.  Let’s figure out the flow rate of her tap – this is going to be different for different taps.  [take audience through calculation – mL/seconds. Note how using original calculations is best – I still have 806.666 in my calculator – I’m going to use that. Explain that we lose accuracy each time we use a rounded number in a subsequent calculation].  806.666…/5 = 161.33.  Let’s keep 2 decimal places – we’re going to use this flow rate in lots of calculations over the course of our investigation so we want to be as accurate as possible, but we want something that’s easy to type into our calculator as well.  Ok, so we’ve got the flow rate of the tap. We know how many millilitres of water comes out of that tap every second. So, what do we need to know now?  Ka pai, how many seconds we spend washing our hands.  Well, what does our PM say? 20 seconds each time, that’s right. You might have the water running for the full 20 seconds, or you might only have it running for half of that.  I use soap for ten seconds, and then water for ten seconds.  So, what do we do with that information?  Exactly. We need to multiply our flow rate by the number of seconds.  Model calculation: 161.33 \* 10 = 1613.3 mL  [comment on the total – convert to litres and compare with a litre bottle of milk, for example.] |
| **End of lesson:**  Learner and parent reflection on learning and engagement and what they can do next | Instructions for how to carry on independently.  Link water use to personal circumstances.  Examples given – scaffolding  Refer back to beginning of lesson.  Suggest sending in answers: accountability | Instructions for how to carry on independently.  Consider factors affecting validity of results.  Link back to beginning of lesson.  Encouraged to send in results of independent investigation. | Now – we’ve carried out a small part of this investigation. At home, you can carry on. You might use the same tap to brush your teeth. We’ve got the flow rate – so all you need to do is record the time spent running the water when you brush your teeth.  Take some time to really plan out your investigation. Make sure you consider the questions you are going to ask your family carefully. And don’t forget to ask your whānau for help and for ideas, too.  Have you covered all the ways water is used in your house? Are there some family traditions or cultural activities that impact on your water usage?  When you have the questions- think about how accurate will the answers be. What might be the factors that influence that accuracy? We’ve already mentioned different flow rates for taps depending on how far you lift the handle – what other factors could affect the validity of your information? Have a quick think.  [write ‘What factors could affect the validity of your information’ on board]  Perhaps it’s laundry day on the day you decide to do your measuring and recording. How would that affect the total?  Finally, you will be able to answer the question: How does your water usage compare to the New Zealand average?  [refer to average written at beginning of lesson]  Send in the results of your investigation to me, I’d love to know! You can email me on info@hltv.co.nz or text on 5811 and use the keywords ‘**water investigation**’ – that’s really important.  [have details pop up on screen? Or write if needed.].  Did you know the water usage we have talked about today is only a small part of our water footprint?  *[for reference: Water Footprint: All human activities use water: drinking, cooking, washing, and any form of production. The water footprint is a way of measuring direct and indirect water use. The water footprint is the total volume of water used to produce the goods and services consumed by an individual, community, or business.*  *(Adapted from Food and Agriculture Organization of the United Nations 2012)]*  If we want to know our real water footprint we need to consider how much water is used to grow the food we eat, to make the clothes we wear. Remember, *ko te wai te ora o ngā mea katou. Water is the life giver of all things.* Have some fun investigating your family’s water usage.And think about what you can do to help. Every litre saved helps.Ka kite ano. |