Does using less water make a difference?

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| Year levelStrand(s)Lesson lengthCD Code: | * Year 6
* Statistics
* 100–120 mins
* [AC9M6ST01](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-6/content-description?subject-identifier=MATMATY6&content-description-code=AC9M6ST01&load-extra-subject=MATMATY6&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&achievement-standard=af52e7b6-c158-4405-b80a-8b705dc5bc1f&side-by-side=1&strands-start-index=2&subjects-start-index=0&view=quick)
* [AC9M6ST03](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-6/content-description?subject-identifier=MATMATY6&content-description-code=AC9M6ST03&load-extra-subject=MATMATY6&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&achievement-standard=af52e7b6-c158-4405-b80a-8b705dc5bc1f&side-by-side=1&strands-start-index=2&subjects-start-index=0&view=quick)
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| Lesson summary | In this lesson, students learn about ways in which water can be saved around the home. They carry out a statistical investigation based on their own inquiry question linked to the overall theme of ‘Does using less water make a difference?’This lesson is the fourth lesson in a series of five lessons that connect the cross-curriculum priority of Sustainability with Number, Measurement and Statistics. It can also complement the science content description AC9S6U04. |
| Learning intention | * We are learning about ways in which water can be saved around the home.
* We are learning about the steps involved in a statistical investigation.
* We are learning to carry out a statistical investigation based on our own inquiry question.

(Also available on slide 2 of the teacher’s slides.) |
| Success criteria | By the end of this lesson, students can:* list three things they can do to save water
* explain what a statistical investigation is
* explain why you might carry out a statistical investigation
* develop their own inquiry question
* carry out a statistical investigation based on their own inquiry question.
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| Why are we learning about this? | Becoming more aware about how much water we use and the need to use it wisely is important, given there is a limited supply of water on the earth.Learning some practical and specific actions that each of us can take to save water in our daily lives helps us to conserve water.Also, a lot of information is displayed via data displays, and this makes the ability to create and interpret data and visual displays an important skill to master.(Also available on slide 3 of the teacher’s slides.) |
| Prerequisite student knowledge and language | Prerequisite student knowledge* Familiarity with reading information on a table.
* Understanding of rate in relation to ‘per minute’, ‘per usage’.
* Representing data in column graphs.

**Language*** litre, kilolitre, megalitre
* per minute/hour/day
* per flush/cycle/fill/wash
* assumption
* statistical investigation
* process
* inquiry question
* comparing, difference
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| **Resources** | **Resources*** Teacher’s slides (PowerPoint)
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Curriculum information

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| Achievement standard | They compare distributions of discrete and continuous numerical and ordinal categorical data sets as part of their statistical investigations, using digital tools. |
| Content description(s) | Interpret and compare datasets for ordinal and nominal categorical, discrete and continuous numerical variables using comparative displays or visualisations and digital tools; compare distributions in terms of mode, range and shape. [AC9M6ST01](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-6/content-description?subject-identifier=MATMATY6&content-description-code=AC9M6ST01&load-extra-subject=MATMATY6&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&achievement-standard=af52e7b6-c158-4405-b80a-8b705dc5bc1f&side-by-side=1&strands-start-index=2&subjects-start-index=0&view=quick) |
| General capabilitiesCross-curriculum priority | General capabilities Numeracy* Number and place value ([Level 9](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-6/general-capability-snapshot?subject-identifier=MATMATY6&content-description-code=AC9M6N06&general-capability-code=N&element-code=NN&sub-element-index=1&sub-element-code=NNNPV&load-extra-subject=MATMATY6&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&achievement-standard=204b4e36-dafd-4b68-9974-1703f28ab395&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick))
* Understanding units of measurement ([Level 8](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-6/general-capability-snapshot?subject-identifier=MATMATY6&content-description-code=AC9M6M01&general-capability-code=N&element-code=NM&sub-element-index=0&sub-element-code=NMUuM&load-extra-subject=MATMATY6&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&achievement-standard=204b4e36-dafd-4b68-9974-1703f28ab395&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick))
* Interpreting and representing data ([Level 4](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-6/general-capability-snapshot?subject-identifier=MATMATY6&content-description-code=AC9M6ST01&general-capability-code=N&element-code=NS&sub-element-index=0&sub-element-code=NSIRD&load-extra-subject=MATMATY6&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&achievement-standard=af52e7b6-c158-4405-b80a-8b705dc5bc1f&side-by-side=1&strands-start-index=2&subjects-start-index=0&view=quick))

Cross-curriculum prioritiesSustainability * World views ([SW2](https://v9.australiancurriculum.edu.au/f-10-curriculum/cross-curriculum-priorities/sustainability/slideout?code=SW2&organising-idea=0))
* Futures ([SF2](https://v9.australiancurriculum.edu.au/f-10-curriculum/cross-curriculum-priorities/sustainability/slideout?code=SF2&organising-idea=3))
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| Areas of challenge | Some students may:* require support to develop an inquiry question that enables them to gather useful and relevant data
* have difficulty interpreting data about water usage given as a dollar amount per kilolitre
* find it challenging to make assumptions about average water usage, number of times per day/week certain activities occur
* require support to present data using an appropriate format and analyse their data.
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| Strategies | * Mathematics investigation
* Questioning
* Explicit teaching
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Lesson structure

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| Learning hook10 mins | * In the previous lesson, we looked at water storage levels and capacities. Ask students*, ‘Is there an endless supply of water? Why, why not?’* (slide 4), and discuss their responses as a whole class. They may need a refresh on the water cycle ([AC9S4U02](https://v9.australiancurriculum.edu.au/f-10-curriculum.html/learning-areas/science/year-4/content-description?subject-identifier=SCISCIY4&content-description-code=AC9S4U02&load-extra-subject=SCISCIY4&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&achievement-standard=3c0cd1fc-0511-4134-8155-26daf85fb6e9&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)).
* Move the conversation to, *‘What are some ways each of us can save water?’* (slide 5). Have students discuss in pairs before sharing with the class. List their ideas on the board.
* Some ideas to be water-wise may include: reduce showering time (around 30% of water used at home is in the shower), use a watering can to water plants, ensure the washing machine or dishwasher is full when using, turn taps off after washing hands and while brushing your teeth, use the half flush when you can (a half flush uses 4.5 litres verses a full flush which uses 9 litres on average), install a rainwater tank.
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| Explore65 -90 mins | **Introduction** (20–30 mins)* Share the lesson focus, which is to conduct a statistical investigation related to the question: ‘Does using less water make a difference?’
* Explicitly teach the four steps of the statistical investigation process (slide 6).
	+ **Pose** a question of interest for a context.
	+ **Collect** data that will enable you to answer the question.
	+ **Analyse** the data.
	+ **Interpret** the data with respect to the context and answer the question (communicate).

Outline that ‘posing a question’ can also be called ‘asking an inquiry question’. Some examples of an inquiry question might be: * I wonder which mobile phone plan is best for me?
* I wonder how much I spend on buying snacks and drinks a month?

Let students know that their task is to come up with their own inquiry question, related to the overall theme of ‘Does using less water make a difference? Refer to the ways to be water wise and reduce their water use. What can we investigate and what is our inquiry question?* Consider the following steps to help students get started (slide 7).
* Think of an area of interest related to the theme being water-wise.
* Brainstorm at least two related inquiry questions.
* Consider what data you would need to collect for each inquiry question. How would you go about collecting this data or can you make some reasonable assumptions about it?
* Select and refine your inquiry question, taking your considerations from Step 3 into account.
* Decide on the scope of your investigation (for example, people at home, class, school, country, world).

Provide students with some examples of what ‘making reasonable assumptions’ in this context might mean, for example, they many need to estimate how long each family member spends in the shower, how many times the dishwasher and washing machine is used each week, how often the dog gets a bath or the toilet is used.* Discuss with students that in order to show whether using less water makes a difference, they will need to be able to compare ‘before’ and ‘after’ numbers/figures for the situation they’re investigating. Consider mentioning here that they will have the next lesson to make an infographic of their findings and conclusions.

Check to see if students have any additional clarifying questions before starting the activity. * Keep slide 7 visible to support students in getting started. Observe how students are approaching the task. Support them with language and enabling and extending prompts, as required.
* Have calculators available to ensure all students can participate in the task. Some students may want to use Excel to help with calculations and to create graphs.
* The average cost of a kilolitre of water to a home in an Australian city is around $3.43 per kilolitre. The cost will vary depending on the city and the water usage tier (slide 8).

**Differentiation** (support)* *What are you thinking your inquiry question might be?*
* *What data do you need to answer this question?*
* *Where could you find this data?*
* *Can you guess how many times* <support them with making an estimate for usage>?
* *How many litres might that use? Can you find where on the table we might look this up?*
* *How much water does ‘…’ use per day/week?*
* *Can you think of a way of doing this with less water?*
* *How much water might this save per ‘…’?*

**Differentiation (**extend)* *List all your assumptions and justify your reasoning.*
* *Explore two to three water-saving actions. How many litres of water would this save?*
* *Can you think of some reasons why people might not want to implement water-saving strategies? What might be some effective ways to overcome this?*
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| Summary and reflection15 mins | Display slide 9 and ask students to answer the following two questions, either individually or in pairs:1. What is a statistical investigation?
2. Why carry out a statistical investigation?

Expected responsesFor a):* A process that involves answering a question.
* It involves collecting data to help you understand something better.
* You collect data and analyse it to better understand a situation.

For b):* Make a decision based on information/data collected.
* To help us choose between different options.
* To better understand a specific situation.
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| Assessment5 mins | Assess students' proficiency against the key stages of the statistical investigation. * **Pose** a question of interest for a context. How well was the question constructed to enable the student to collect relevant data about the topic of interest?
* **Collect** data that will enable you to answer the question. Was the data the student collected useful and did the they use the data to answer their inquiry question?
* **Analyse** the data. Did the student show analysis of the data? Did they discuss the distribution of data in terms of the shape of a graph; compare the spread of each data set represented using side-by-side columns and identify the highest frequency for each data set?
* **Interpret** the data with respect to the context and answer the question (communicate). Did they refer to relevant data when answering the inquiry question?
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