# Ecomaths – Rainwater Harvesting

**ABC ME screening details: Monday** 11 May, 2020 at 11:45am

This episode can also be viewed on [ABC iView](https://iview.abc.net.au/show/ecomaths)

**Key learning areas:** mathematics and science

**Level:** secondary

**About:** Stefan visits a huge hi-tech greenhouse to learn how much rain can be collected from a roof using ideas of conservation of volume and calculating area.

## Before the episode

1. Find 5 different shaped containers and, by estimating their capacity, arrange them from lowest to highest.
2. By filling the containers with water, where possible, compare the capacities of the containers. Change the order of the containers where necessary.
3. Consider the following statement, “taller containers always hold more volume”. Do you agree with this statement? Explain your reasoning.

## During the episode

1. Stefan shows three different containers with different measurements holding 1 litre of water. Make a list of these containers and their measurements, where possible.
2. How much water does the greenhouse use in a year?

## After the episode

1. During the episode Stefan finds out that the rectangular roof is 61 000 m2. What do you think the length and width of the roof might be? Explain your reasoning.
2. Stefan explains that “for every millimetre of water that falls on a square metre of room, you get one litre of water”. In 2019, 1000 mm of rain fell in Kent, the location of the greenhouse. By calculating the volume of water in litres, determine whether this was enough water needed to run the greenhouse?
3. Stefan shows 3 different container with a capacity of 1 litre. Two of the containers had square bases. Using the formula, $Volume = Area of base×Height$, show the square based containers hold the same volume.
4. The third container was cylindrical. Estimate the radius of the circular base and the height of the container. Explain your thinking.

**Follow-up activity:** During the episode, Stefan attempted to estimate the length and width of the greenhouse by counting his steps. By first identifying your stride length, count your strides around a rectangular building or shed to determine its length and width.

Use this information to determine its area in square metres. If you could harvest the rainfall from this building, recommend the capacity of the rainwater tank needed?

# NSW teacher notes

This is an optional standalone resource that could supplement student learning. The activities align with syllabus outcomes across stages and can be modified to meet the needs of your students. Students can complete the activities while learning at home and in the classroom. All activities can be completed without access to the internet or a device. Teachers could collect student work to offer feedback and as evidence of learning.

## Learning intentions

* To develop an understanding of volumes and capacities
* To apply volume and capacity calculations to solve real life problems

## Resources

* tape measure

## NSW Mathematics K-10 Syllabus outcomes

|  |  |  |
| --- | --- | --- |
| Strand | Stage 3 | Stage 4 |
| Working mathematically | describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions (MA3-1WM)gives a valid reason for supporting one possible solution over another (MA3-3WM) | communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols (MA4-1WM)applies appropriate mathematical techniques to solve problems (MA4-2WM) |
| Measurement | selects and uses the appropriate unit to estimate, measure and calculate volumes and capacities, and converts between units of capacity (MA3-11MG) | uses formulas to calculate the volumes of prisms and cylinders, and converts between units of volume (MA4-14MG) |

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