LIFE ON THE MURRAY RIVER

Level: 7 & 8
Activity: 4

Overview

In 1922 a system of locks and weirs were gradually installed along the length of the Murray River. The locks store water that can be used for irrigation and water supply for townships, and they also raise the river level upstream of the weir. Raising the level of the water makes it easier for large vessels to navigate the river and it also provides pools of water that can be used for recreational activities. During this lesson, students will demonstrate their understanding of how a lock works. They will calculate a lock's capacity using its dimensions.

Resources

- Isometric Paper

Activity

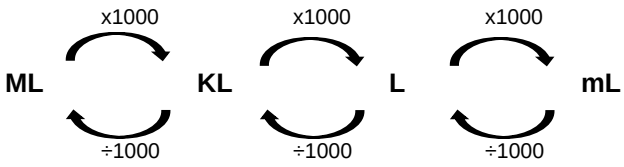
ENGAGE

In their books, students need to draw a series of diagrams to show how a lock works. Remind them to make it as detailed as possible and to include labels. Invite some students to share their diagrams with the class.

EXPLORE

Ask students to estimate how much water they think the lock at Mildura might hold. They should write their estimate on a piece of paper and keep this for later. Now ask:

- What is this measurement called? What units of measurement would we use?
  Answer: Capacity, millilitres (mL), litres (L), kilolitres (kL), megalitres (ML)



- What information will we need to calculate the capacity of the lock?
  Answer: We need its dimensions (length, width and height)

EXPLAIN

Ask students:

- What is the difference between volume and capacity?
  Answer: Volume is the space taken up by an object and is measured in cubic units (eg. cm^3, m^3). Capacity is how much a container can hold and measurements depend on what it holds (eg. for liquid: L, mL etc.)

Demonstrate how to calculate capacity:

e.g. A container is 8cm long, 5cm wide and 3cm high

Step 1: Calculate its volume

Volume = L x W x H

= 8cm x 5cm x 3cm

= 120cm^3

Step 2: Convert to capacity

1cm^3 = 1mL

120cm^3 = 120mL

Give students the dimensions of the lock at Mildura (61.5m long, 17.1m wide and 7.6m deep) and ask them to calculate capacity (they may use a calculator). *Hint: 1m^3 = 1000L*. Ask students to look again at their estimate and see who was closest.

ELABORATE

Explain to students that they are being asked to design a lock. The total capacity needs to be 8 megalitres. Using the isometric paper they need to draw as many different models as they can, labelling the dimensions of each.

EVALUATE

Discuss as a whole class:

- Describe the hazards around locks.
- Given how much water is flowing in and out of a lock, how could this affect conditions downstream?
- What can you do to make sure you stay safe around weirs and locks?

Curriculum Links

Victorian Curriculum
Foundation–10

Level 7		
MATHEMATICS	Measurement and Geometry: Using units of measurement	Calculate volumes of rectangular prisms(VCMMG259)
Level 8		
MATHEMATICS	Measurement and Geometry: Using units of measurement	Choose appropriate units of measurement for area and volume and convert from one unit to another(VCMMG286)
		Develop the formulas for volumes of rectangular and triangular prisms and prisms in general. Use formulas to solve problems involving volume (VCMMG289)

Sample Report Comments

{Name} can describe the relationship between volume and capacity. {He/She} confidently converts between common units of capacity and volume (for example $3cm^3$ = 3mL)

{Name} can use the formula to accurately calculate the volume of a rectangular prism. {He/She} applied this knowledge to identify rectangular prisms of different dimensions for a given capacity.

References

Goulburn Murray Water. *Mildura Weir and Lock 11,* https://www.g-mwater.com.au/downloads/gmw/Storages/12-05-2015-TATDOC-3964403-v1-FACT_SHEET_MILDURA_WEIR_AND_LOCK_11_MAY_2015.pdf [viewed 15 July 2018]