

High or Low?

- You need**
- ★ plastic or waxed-paper boats (one for each group) with a scale drawn down 1 side
 - ★ 4 identical 3–4 litre plastic basins or buckets
 - ★ water
 - ★ salt ($4\frac{1}{2}$ cups)
 - ★ a cup
 - ★ a stirring spoon
 - ★ relevant books and/or access to the Internet
 - ★ small groups of classmates

Activity One

Huihana, Taine, and Jacob are kayaking on the lake. Huihana notices that their kayaks are floating lower in the water than they do when they go kayaking in the sea.

Sea water is salty. Does that make a difference?



I wonder if waves make a difference?

1. What do you think is the reason? Discuss with a classmate.
2. The three friends decide to investigate buoyancy.

Does the amount of salt affect how low or high in the water a boat floats?



We could try floating a toy boat in different concentrations of salt water.

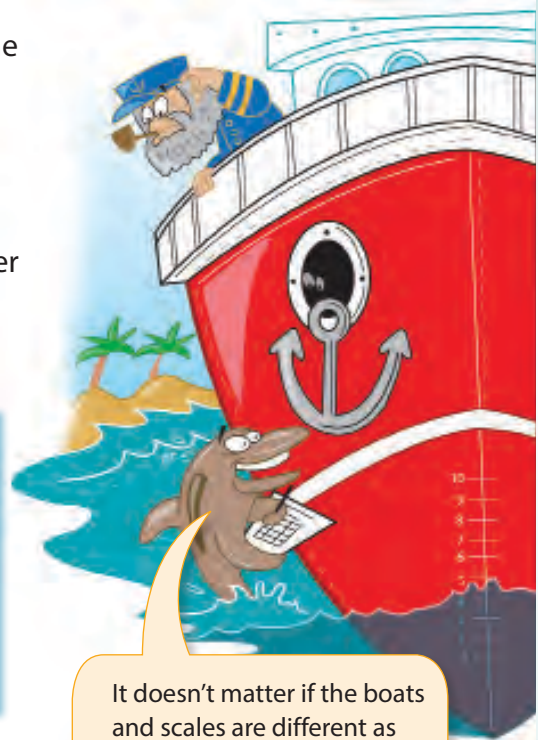


Discuss with a classmate what you think will happen when different amounts of salt are dissolved in the water.

3. a. Before you do this experiment, find out what a Plimsoll line is and why it is used on ships.
- b. As a class, set up 4 basins three-quarters full of water. Leave one basin with no salt. Dissolve 1, 1 $\frac{1}{2}$, and 2 cups of salt in the other basins.
- Put your group's boat into each basin in turn. Let the water settle and then read the scale on the side of the boat.
- c. Add your group's findings to a class table.

Amount of salt	Level of water on the scale on the boat						
	Group						Average
	1	2	3	4	5	6	
None							
1 cup							
1 $\frac{1}{2}$ cups							
2 cups							

- d. Do you notice any patterns in the results? If you think a graph would help, make one.
- e. Make a generalisation about the position of the boats in the different concentrations of salty water.



It doesn't matter if the boats and scales are different as long as each group uses their own boat in each basin.

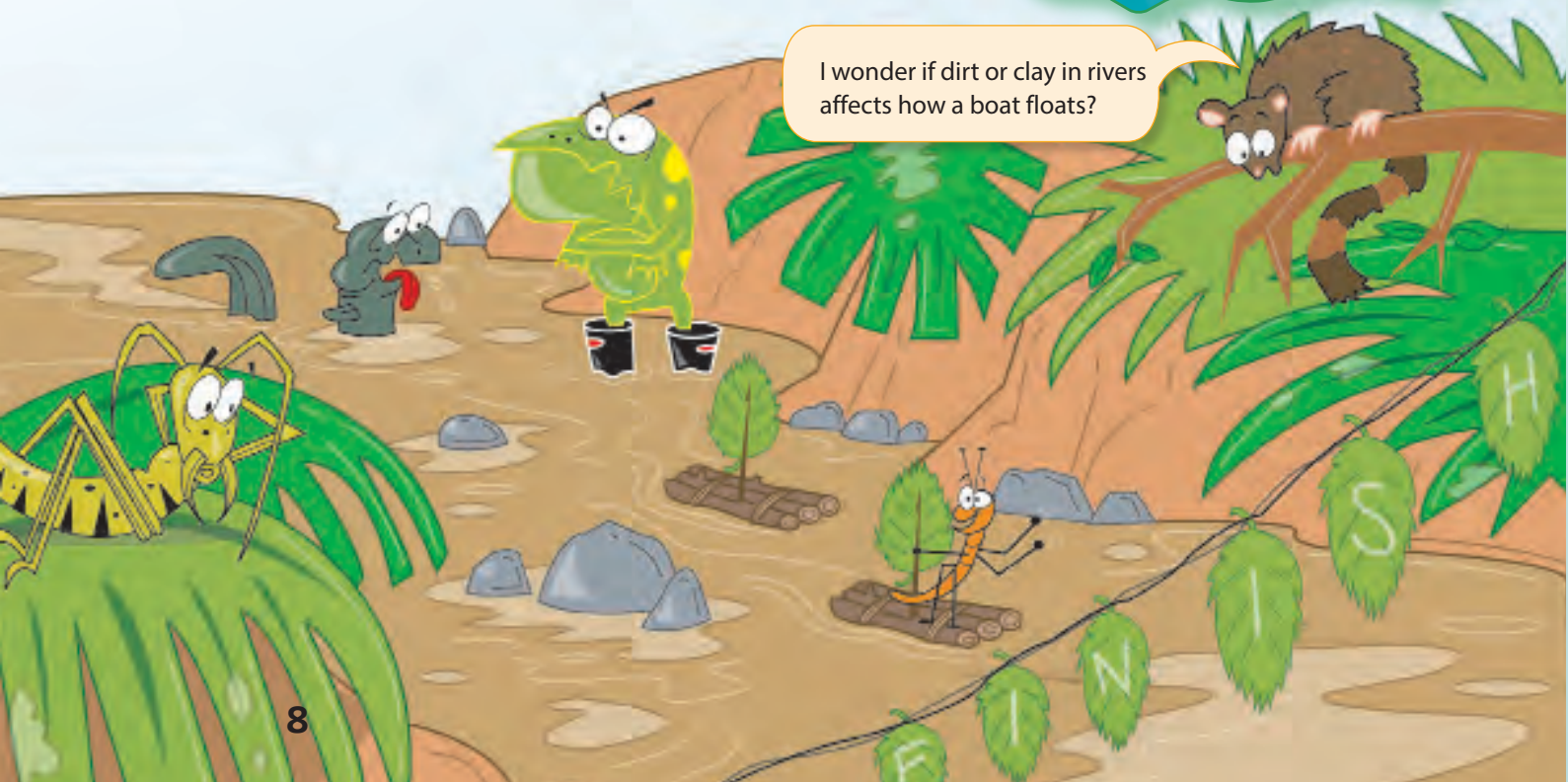
Investigation

1. Find out which seas in the world contain the most salt and why.
2. Investigate how other substances in water might affect floating.



The Dead Sea

I wonder if dirt or clay in rivers affects how a boat floats?



Activity Two

Huihana, Taine, and Jacob decide to investigate how the number and placement of crew affect how waka ama float.



They ask a waka ama crew these questions:

- i. What happens to the waka as more people get on board?
- ii. What happens if the heavier people sit in the bow, the stern, or the middle?
- iii. How can you arrange the crew so that the whole waka floats as high as possible?

Huihana, Taine, and Jacob investigate each question and discuss their observations.

1. With a classmate, discuss possible answers to the questions above and then find a way to model them (for example, using aluminium foil and modelling clay, with paperclips or washers to represent the crew).
2.
 - a. Describe the steps in your experiments.
 - b. What have you found out about weight and distribution of weight?
 - c. How could a waka ama crew use your findings?



Focus

Investigating relationships