Pedal Power

You need ★ Pedal Power game board (see copymaster) ★ 24 counters ★ 4 dice ★ classmates

TECHNOLOGY New and old technologies can work together to help the environment or make life more convenient.

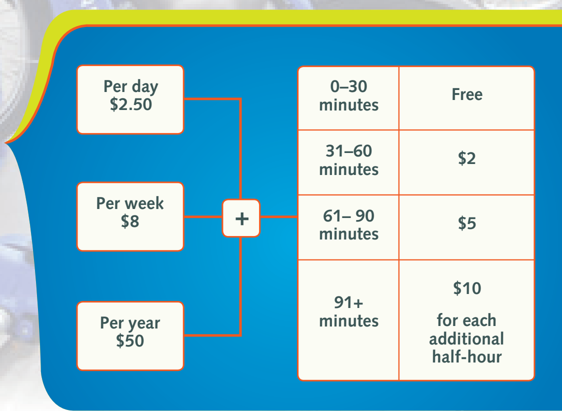
Activity One

To encourage more people to use bicycles, Riverford City Council is investigating bicycle sharing, in which people hire bicycles from a docking station and return them to a docking station when finished.

Melbourne has 50 bicycle stations and 600 bicycles in its bicycle-sharing system. Users pay $2.50 for a 5-digit code that is valid for 1 day. This code is used to unlock a bicycle. Each trip is timed until the bicycle is docked. For trips longer than half an hour, an extra fee is charged.

1. Using the rates shown in the table, work out the cost of these trips:

	Bicycle unlocked	Bicycle docked
Jane	12.30 p.m.	1.07 p.m.
Thomas	10.12 a.m.	10.34 a.m.
Steve	4.05 p.m.	5.38 p.m.
Molly	Trip 1: 7.25 a.m.	8.03 a.m.
	Trip 2: 5.28 p.m.	5.55 p.m.



2. People can buy a weekly pass ($8) or an annual pass ($50).
   a. Greg buys a weekly pass. What is the minimum number of days he should use the pass to make it worthwhile?
   b. Anna buys an annual pass. What is the minimum number of days she should use the pass to make it worthwhile?
   c. Nick is in Melbourne for 1 month and plans to use a bicycle most weekdays. Which pass(es) should he buy?

Game

Working out how many bicycles to have at each station is a complex process. If people find that there are no bicycles available when they want one, they may give up trying to use the system.

Pedal Power is a game for two pairs. Each pair has 10 turns.

Eight stations have been marked on the Pedal Power gameboard (2, 4, 5, 6, 7, 8, 9, 11).
Before the game, decide with your partner how to divide 12 bicycles (counters) between stations.
Not all stations need a bicycle. Place the bicycles on your pair's copy of the game board.

The pair with the highest number of successful journeys wins.

Throw two dice and add the results.

If the total is 3, 10, or 12, throw again until you get a station number.

If the total is 2, 4, 5, 6, 7, 8, 9, or 11, your journey has begun!

Is there a bicycle at the station that matches your dice total?

No – you'll have to walk!

Your turn has ended.

Yes – you're on your way!

Throw the dice again until you get a station number. (It can be the same as the starting station.) "Dock" your bicycle at this station.

Your journey is a success. Your turn has ended.

Activity Two

Jun and Reka notice that some stations in the game get used more than others. Investigate why this happens.

1. a. Throw two dice 40 times and record the sum of each throw.
   b. Which sum(s) occurred:
      i. the most often?
      ii. the least often?
   c. Compare your results with those of two or three classmates.

2. a. As a class, combine everyone's results in a table that shows the number of times each person threw each sum:

Sum	Class results	Total
2	1 + 2 + 0 + 2 + 0 + 0 + 2 + 1 + 0 + 3 + 2 + 0 + 2 + 1 + 0 + 1	17
3	4 + 1 + 3 + 2 + 0 + 3 + 3 + 5 + 1 + 4 + 2 + 1 + 2 + 1 + 1 + 3	36
4		

   b. How do the combined results compare with your individual results?
   c. Which set of results would be the most helpful when deciding where to place the bicycles in the game? Discuss with a classmate.

3.

One way to investigate the likelihood of each sum, for example, "getting a sum of 5", is to write out all the possible outcomes. This can show which sums are more likely than others.

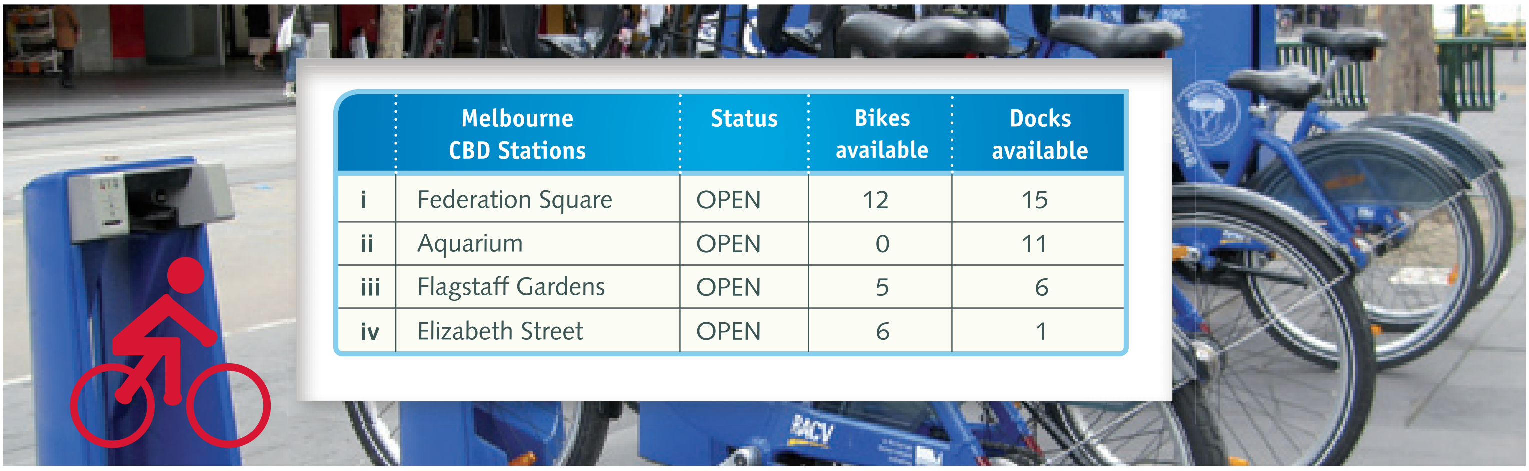
Reka draws a table showing the possible outcomes when two dice are thrown.

		Dice One					
		1	2	3	4	5	6
Dice Two	1	2 (1 + 1)	3	4			
	2	3 (2 + 1)	4				
	3	4	5				
	4	5					
	5	6					
	6	7					

a. Copy and complete the table.
b. i. Which sum occurs most often?
   ii. Which sums occur the least often?
c. Is there a connection between the information in this table and your experimental results from 1 and 2?

Activity Three

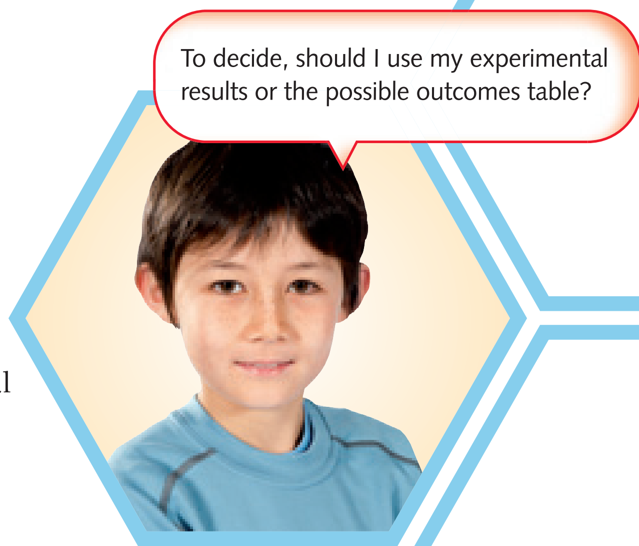
1. In Melbourne, people use the Internet to find bicycle stations and to check whether bicycles or docks are available. Bicycles can't be left at a station if there are no empty docks.
   a. Below is a status report for four stations. How many bicycles can each station hold?



	Melbourne CBD Stations	Status	Bikes available	Docks available
i	Federation Square	OPEN	12	15
ii	Aquarium	OPEN	0	11
iii	Flagstaff Gardens	OPEN	5	6
iv	Elizabeth Street	OPEN	6	1

   b. Discuss what factors planners need to consider when deciding how many docks to have at a station.

2. Play the Pedal Power game again, but this time you have 16 docks to share out between the different stations. In pencil, write the number of docks beside each station. Use your results from **Activity Two** to help you decide where to put them. Place the 12 bicycles (counters).
   - For a successful journey, you need to dock your bicycle at your destination. If your destination does not have any docks available, return your counter to its starting point. The journey was unsuccessful.
   - Make 10 journeys each. Record the number of successful and unsuccessful journeys in a table.



3. Is there is a better way to assign the docks? If so, try it!