**Teacher background**

Using spreadsheets to automate calculations can be considered a form of programming known as 'rapid application development' (RAD). Skills applied in the process involve each of the aspects of computational thinking: decomposition, pattern recognition, abstraction and algorithm design.

Note: Please be aware that examples and instructions below use Office for Mac 2011. If you are using a different operating system then the layout may be different.

In this lesson sequence, students tackle two problems:

* coin toss
* odds and evens (investigating a mathematical problem).

Students should be encouraged to tackle the two problems by working through the stages of problem solution. We use this approach to develop an automated tool for generating tosses of a coin and for investigating a mathematical problem.

The following functions will be required in this lesson sequence, but it is suggested that students look for the particular function they require in Excel's in-built list of functions at the time they require it:

* RANDBETWEEN(bottom integer, top integer)
* MAX(range)
* IF(logical\_test, value\_if\_true, value\_if\_false)
* COUNTIF(range,criteria)
* SUM(range)

Students will also need to know:

* how to fill down and how to format cells in a spreadsheet
* how to recalculate a spreadsheet using the F9 key
* how to add form buttons (see details in the 'Extension' section under 'Learning hook').

**Resources**

We use Microsoft Excel here as our spreadsheet application for demonstration purposes. Other standard spreadsheet applications will serve equally well.

**Coin toss**

* [Coin toss spreadsheet](https://www.digitaltechnologieshub.edu.au/docs/default-source/getting-started-years-9-10/spreadsheets-come-alive/coin-toss-spreadsheet.xlsx?sfvrsn=0) (XLS); or
* [Coin toss spreadsheet with macro](https://www.digitaltechnologieshub.edu.au/docs/default-source/getting-started-years-9-10/spreadsheets-come-alive/coin-toss-spreadsheet-with-macro.xlsm?sfvrsn=0) (XLSM): this file uses a format that preserves the coin toss macro and button function
* [Odds and evens worksheet](https://www.digitaltechnologieshub.edu.au/docs/default-source/getting-started-years-9-10/spreadsheets-come-alive/odds-and-evens-worksheet.pdf?sfvrsn=0) (PDF)
* [Odds and evens: Student example](https://www.digitaltechnologieshub.edu.au/docs/default-source/getting-started-years-9-10/spreadsheets-come-alive/odds-and-evens-student-example.xlsx?sfvrsn=0) (XLS)
* [Odds and evens: Advanced](https://www.digitaltechnologieshub.edu.au/docs/default-source/getting-started-years-9-10/spreadsheets-come-alive/odds-and-evens-advanced.xlsx?sfvrsn=0) (XLS)

**Student introduction**

Introduce automated spreadsheet calculations to students:

Maths teachers, and their students, have a problem when beginning to study probability: repeatedly tossing a coin 100 times is very tedious and boring!

In this lesson sequence we will use a spreadsheet to create 'working engines' for two maths-based experiments, and use these to make our lives easier.

You will learn how to program spreadsheets to automatically perform a huge number of steps very quickly. You will even discover how to add buttons in your spreadsheets to set them into action!