

The mean from a frequency table

What you should know

How to find the mean from a frequency table.

New idea

Different people doing the experiment of throwing a die 30 times would get different data and different means. The **expected value** is the mean that you would expect to get if you did the experiment a very large number of times.

Task: Expected value

Throwing dice is not exciting so you can have a computer do it. Either use an online simulator such as <http://syzygy.virtualave.net/spinner2.htm> or use random numbers in an Excel spreadsheet.

- Simulate the results of throwing a die 100 times, 200 times, 500 times then 1000 times.
- Find the mean score each time.
- What would be the mean score if you did the experiment a very large number of times?

Another way to get the expected value is fill in the theoretical frequencies for throwing the die 30 times (or some other total number).

- Copy and complete the table.

Score	1	2	3	4	5	6
Frequency						

- Find the expected value.

The idea of **expected win** is important in analysing games.

- If you got £1 for throwing an even number, £2 for a 3 and nothing for 1 or 5 on one die, what would be your expected win?
- Suppose you throw two dice and get nothing if they land with a total of 7 but £1 for 6 or 8, £2 for 5 or 9, £3 for 4 or 10, £4 for 3 or 11 and £10 for 2 or 12. Would it be worth playing the game if it costs £2 a throw? Use the expected win to find out.

Take it further

- Look up expected value and see if you can use probability to work it out.
- Find out about Premium Bonds and calculate the expected win. Remember some people win nothing.
- What is the expected win in the National lottery?

Where this goes next

At A level you will learn that the expected value is the long-term or theoretical mean. You will calculate expected value from a probability table in Statistics. The idea is also used in Decision Mathematics.