 Probability investigation

Your investigation

Calculate the relative frequencies and theoretical probabilities of a series of simple events. Conduct your own experiments and compare the results.

Experiments

Run one or all of the following experiments:

* Flip a coin and/or
* Roll a standard die
* Select a card from a set of cards labelled 1 to 10 (For example, you could use the Ace to 10 of Hearts in a standard deck of cards)

Record the results

Record your results in a table similar to the ones featured below.

**Coin flip**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number of trials | Theoretical probability | Expected number of tails | Results | Number of tails | Experimental probability (as a fraction) | Experimental probability (as a decimal) |
| **Example** 10 | $$\frac{1}{2} or 0.5$$ | $$\frac{1}{2}×10=5$$ | T, T, H, T, H, H, H, T, T, T | $$6$$ | $$\frac{6}{10}= \frac{3}{5}$$ | $$0.6$$ |
| 20 |  |  |  |  |  |  |
| 30 |  |  |  |  |  |  |
| 40 |  |  |  |  |  |  |
| 50 |  |  |  |  |  |  |

**Die roll**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number of trials | Theoretical probability | Expected number of 6’s | Results | Number of 6’s | Experimental probability (as a fraction) | Experimental probability (as a decimal) |
| **Example** 12 | $$\frac{1}{6} or 0.1\dot{6}$$ | $$\frac{1}{6}×12=2$$ | $$5, 2, 2, 1, 6, 3, 4, 3, 4, 3, 5, 3 $$ | $$1$$ | $$\frac{1}{12}$$ | $$0.08\dot{3}$$ |
| 24 |  |  |  |  |  |  |
| 36 |  |  |  |  |  |  |
| 48 |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |

Other suggestions

Coin flip

You may like to run the experiment for heads

Die roll

You may like to choose another number instead of 6. You may like to test the experiment for odd, even or prime numbers.

Select a card

If you run this experiment with 10 cards, make sure the number of trials is a multiple of 10 i.e. 10, 20, 30,… 100. You may like to run the experiment for a particular number such as 1 or you may like to test the experiment for odd, even or prime numbers or numbers divisible by 5.

Spin a spinner

You may like to create your own spinner to gather data.

To create a spinner, you will need to:

1. Use a piece of cardboard (cereal box) to draw and cut out a square
2. Draw diagonal lines across the square
3. Divide the spinner into equal parts. You can number them, colour them different colours or give each of them a different label.
4. Make a hole in the centre and push through a pencil so that approximately 1 cm is visible out of the bottom.

This process can be repeated using a variety of shapes. For example, students may like to construct a spinner in the shape of a circle, triangle, pentagon, hexagon or any other basic shape.

Analysing the results

When analysing the data, think about the following questions:

* Was the experimental probability always the same as the theoretical probability?
* Did the number of trials have any impact on any differences between the experimental and theoretical probability?