

**Age 14+ Level ★  
Worksheet 1****1. Flipping Coins**

A fair coin is flipped 4 times.

What is the probability of getting heads at least 3 times?

**2. Boy or Girl**

A witch claims that she can predict whether your baby will be a boy or girl, and she charges £100 for this service.

If her prediction is wrong, she offers to return your £100 fee and pay you an extra £50 compensation for any distress that she may have caused.

Assuming she does not have any supernatural powers, can you explain whether she is likely to make a profit or loss after 100 clients have given birth?

**3. Collecting Marbles**

A bag contains hundreds of red, orange, green and blue marbles. Marbles are drawn randomly from the bag, one at a time, and not replaced.

How many marbles must be taken out of the bag in order to ensure that at least three are of the same colour?

**4. Tying the Rope**

Sam is holding two lengths of rope by their mid-points.

Pat chooses two of the loose ends at random and ties them together.

What is the probability that both pieces of rope are tied together?

**5. Swapping Sweets**

Kate and Anna each have a bag that contains a red sweet, a blue sweet, a green sweet and a yellow sweet.

Without looking, Kate takes a sweet out of her bag and puts it into Anna's bag. Then, without looking, Anna takes a sweet from her bag and puts it into Kate's bag.

What is the probability that after this, each bag contains a red sweet, a blue sweet, a green sweet and a yellow sweet?

*These problems are adapted from UKMT ([ukmt.org.uk](http://ukmt.org.uk)) and WMC ([competition.ac](http://competition.ac)) problems.*