Complementary events

All situations can be written so that there are only two possible outcomes: **an event may happen or it may _not_ happen.** These probabilities add up to 1.

$$P(event\ occuring) + P(event\ not\ occurring) = 1$$

When two outcomes are the only two possibilities, then each outcome is called the complement of the other. For example, complementary events may be Mr Hermansson wearing a blue shirt to work, or Mr Hermansson not wearing a blue shirt to work. The way that we have phrased our example means that these outcomes are the only two possible options.

1. Write three examples of complementary events in your own words.
    i.
    ii.
    iii.

2. Illona is running a race at the local sports track. If her probability of winning the race is $\frac{1}{8}$, then what is the probability that she will not win?

**Two-step events**

1. 2 coins are tossed.
    a. Follow the steps to complete a two-way table.
        i.   Copy the two-way table into your books as shown.
        ii.   List the outcomes of coin 1 in the orange boxes.
        iii. Why are there only 2 boxes?
        iv.   List the outcomes of coin 2 in the blue boxes.
        v.   Why are there only 2 boxes?
        vi.   By following the headings in the blue and orange boxes, list all the combinations in the purple boxes.
        vii. How many possible combinations of outcomes are there when 2 coins are tossed?
    b. Follow the steps to complete a tree diagram
        i.   First will write the outcomes for the first coin. Fill in the boxes for the first branch.
        ii.   Why are there only 2 branches?
        iii. Next fill in the outcomes for the second coin in the boxes for each of the branches from the first coin.
        iv.   How many branches are there for the outcomes of the second coin? Why?
        v.   List all the possible combinations for tossing 2 coins by following the branches.
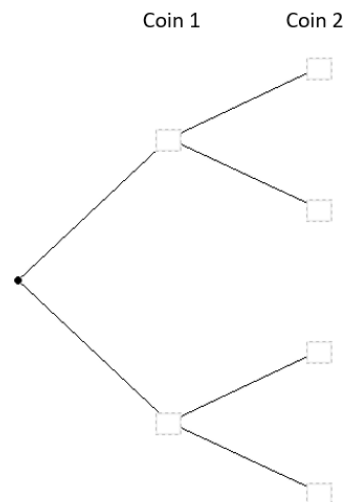
2. A coin is tossed and a standard dice is rolled.
    a. Follow the steps to create a two-way table.
        i.   How many outcomes does tossing a coin have? Draw that number of rows and add headings with the outcomes of the coin.

ii. How many outcomes does rolling a dice have? Draw that number of columns and add headings with the outcomes of the dice.

iii. Fill in the middle of the table with the possible combinations.

iv. How many different outcomes are there? How can you tell by looking at the table?

b. Follow the steps to create a tree diagram.

i. How many outcomes does tossing a coin have? Draw that number of branches and write the outcomes of the coin.

ii. How many outcomes does rolling a dice have? Draw that number of branches from each of the coin branches and write the outcomes of the dice.

iii. Follow the branches to write a list of all the outcomes.

iv. How many different outcomes are there? How can you tell by looking at the table?

3. Create a two-way table to show all the outcomes for rolling 2 standard dice and then adding the results.