# Tree Diagrams With and Without Replacement

(Without = Dependent Events)

**1** A box contains 6 red and 3 yellow tickets. Two tickets are drawn at random (the first being *replaced* before the second is drawn). Draw a tree diagram to represent the sample space and use it to determine the probability that:

**a** both are red

**b** both are yellow

**c** the first is red and the second is yellow

**d** one is red and the other is yellow.

**2** 7 tickets numbered 1, 2, 3, 4, 5, 6 and 7 are placed in a hat. Two of the tickets are taken from the hat at random *without replacement*. Determine the probability that:

**a** both are odd

**b** both are even

**c** the first is even and the second is odd

**d** one is even and the other is odd.

**3** Jessica has a bag of 9 candies which are all identical in shape. 5 are raspberry flavoured and 4 are orange flavoured. She selects one candy at random, eats it, and then takes another, also at random. Determine the probability that:

**a** both candies were orange flavoured

**b** both candies were raspberry flavoured

**c** the first was raspberry and the second was orange

**d** the first was orange and the second was raspberry.

Add your answers to **a**, **b**, **c** and **d**. Explain why the answer must be 1.

**4** A cook selects an egg at random from a carton containing 7 ordinary eggs and 5 double-yolk eggs. She cracks the egg into a bowl and sees whether it has two yolks or not. She then selects another egg at random from the carton and checks it.
Let S represent "a single yolk egg" and D represent "a double yolk egg".

**a** Draw a tree diagram to illustrate this sampling process.

**b** What is the probability that both eggs had two yolks?

**c** What is the probability that both eggs had only one yolk?

**5** Freda selects a chocolate at random from a box containing 8 hard-centred and 11 soft-centred chocolates. She bites it to see whether it is hard-centred or not. She then selects another chocolate at random from the box and checks it.
Let H represent "a hard-centred chocolate" and S represent "a soft-centred chocolate".

**a** Draw a tree diagram to illustrate this sampling process.

**b** What is the probability that both chocolates have hard centres?

**c** What is the probability that both chocolates have soft centres?

**6** A sporting club runs a raffle in which 200 tickets are sold. There are two winning tickets which are drawn at random, in succession, without replacement. If Adam bought 8 tickets in the raffle, determine the probability that he:

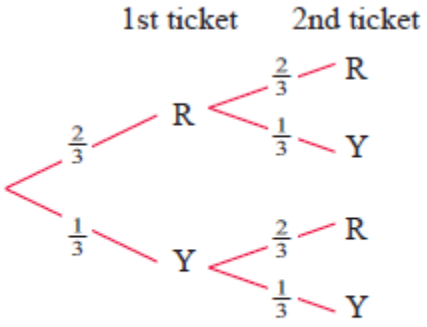
**a** wins first prize

**b** does not win first prize

**c** wins second prize *given that* he did not win first prize.

## Answers

**1**



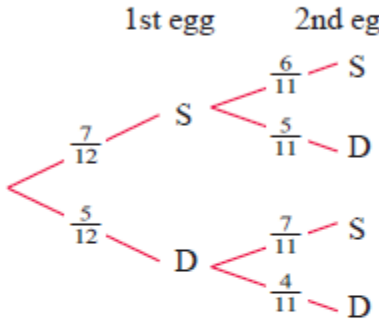

**a** $\frac{4}{9}$ **b** $\frac{1}{9}$ **c** $\frac{2}{9}$ **d** $\frac{4}{9}$

**2** **a** $\frac{2}{7}$ **b** $\frac{1}{7}$ **c** $\frac{2}{7}$ **d** $\frac{4}{7}$

**3** **a** $\frac{1}{6}$ **b** $\frac{5}{18}$ **c** $\frac{5}{18}$ **d** $\frac{5}{18}$

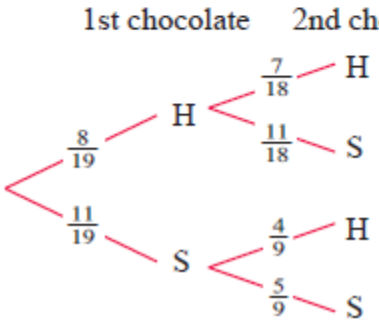
These cases cover all possibilities, so their probabilities must add up to 1.

**4** **a**




**b** $\frac{5}{33}$ **c** $\frac{7}{22}$

**5** **a**




**b** $\frac{28}{171}$ **c** $\frac{55}{171}$

**6** **a** $\frac{1}{25}$ **b** $\frac{24}{25}$ **c** $\frac{8}{199}$