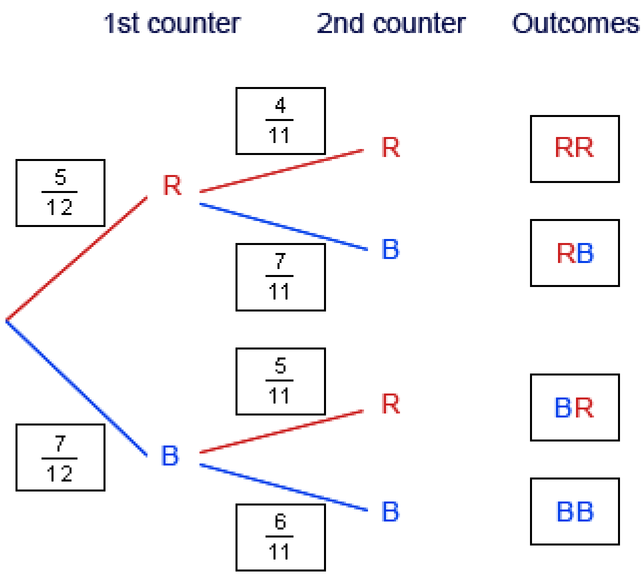
PROBABILITY TREES WITHOUT REPLACEMENT

SOLUTIONS

TASK 1 Counter counting

Since you do not replace the first counter in the bag before taking the second one, the numerators and denominators of the fraction probabilities will change from step 1 to step 2. This is called selection **without replacement**.

1



2 **a** P(BB) $= \dfrac{7}{12} \times \dfrac{6}{11}$

$= \dfrac{7}{22}$

b P(two counters same colour) = P(RR) + P(BB)

$= \left(\dfrac{5}{12} \times \dfrac{4}{11}\right) + \dfrac{7}{22}$

$= \dfrac{5}{33} + \dfrac{7}{22}$

$= \dfrac{31}{66}$

c P(different colours) = P(RB) + P(BR)

$= \left(\dfrac{5}{12} \times \dfrac{7}{11}\right) + \left(\dfrac{7}{12} \times \dfrac{5}{11}\right)$

$= \dfrac{35}{132} + \dfrac{35}{132}$

$= \dfrac{35}{66}$

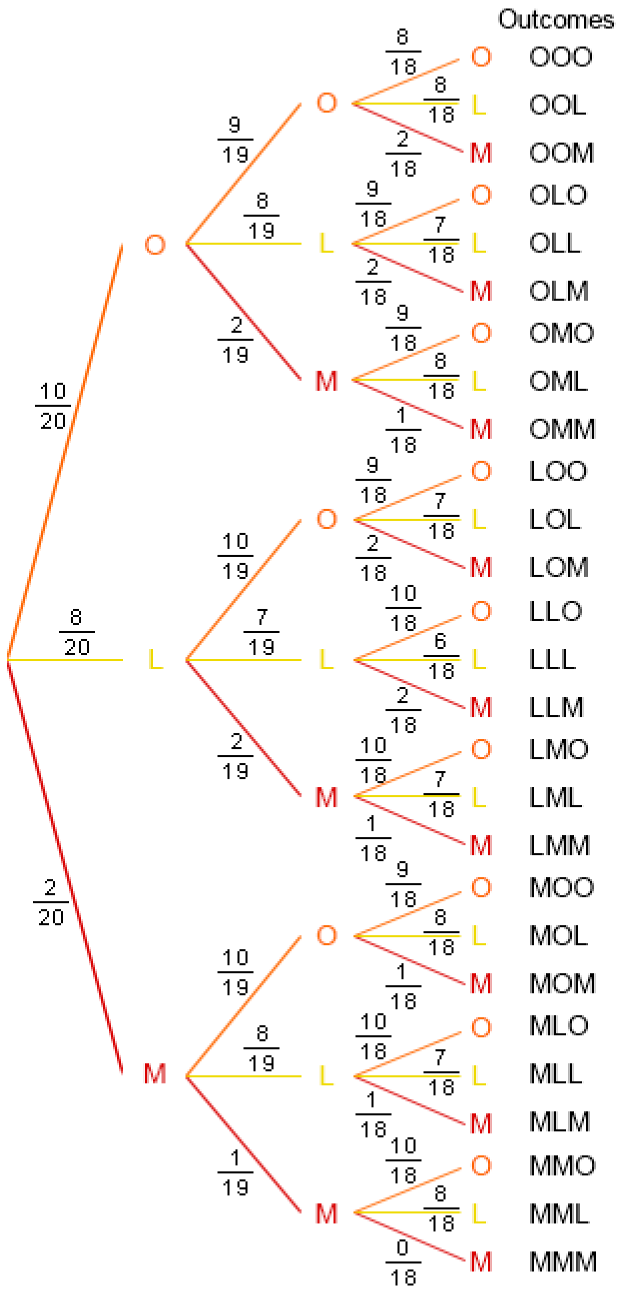
TASK 2 Flavour challenge

1 $n(O) = \frac{1}{2} \times 20 = 10$ $n(L) = \frac{2}{5} \times 20 = 8$ $n(M) = 20 - 10 - 8 = 2$

$\therefore P(M) = \frac{2}{20} = \frac{1}{10}$

2 See diagram.

Note: This question involves **dependent events**, so the fractional probabilities on the branches **change** from step to step.



3 $P(\text{L then M}) = \frac{8}{20} \times \frac{2}{19}$

$= \frac{16}{380}$

$= \frac{4}{95}$

4 P(L and M, in any order)

$= P(LM) + P(ML)$

$= (\frac{8}{20} \times \frac{2}{19}) + (\frac{2}{20} \times \frac{8}{19})$

$= \frac{32}{380}$

$= \frac{8}{95}$

5 $P(MMM) = \frac{2}{20} \times \frac{1}{19} \times \frac{0}{18}$

$= 0$

Note: P(MMM) = 0 means that it is impossible to get 3 mandarin jubes—there are only 2 mandarin jubes in the packet.

6 P(all three jubes the same colour) $= P(OOO) + P(LLL) + P(MMM)$

$= (\frac{10}{20} \times \frac{9}{19} \times \frac{8}{18}) + (\frac{8}{20} \times \frac{7}{19} \times \frac{6}{18}) + 0$

$= \frac{720}{6840} + \frac{336}{6840}$

$= \frac{44}{285}$