Solutions

Award method and answer marks as indicated; accept equivalent correct methods.

2.1

- Each sequence occurs once: **HH, HT, TH, TT**.

2.2

- Two of four outcomes qualify: $p = 2/4 = \mathbf{1/2}$.

2.3

- White stays 1/4: $p = (1/4)^2 = \mathbf{1/16}$.

2.4

- $p = (1/2)(2/6) = \mathbf{1/6}$, using independence.

3.1

(a)

- **First branches R** 1/3**, B** 2/3**; each splits again into R** 1/3**, B** 2/3. End labels are RR, RB, BR, BB.

(b)

- $p = (1/3)(2/3) + (2/3)(1/3) = \mathbf{4/9}$.

(c)

- $p = 1 - (2/3)^2 = \mathbf{5/9}$; also $1/9 + 4/9 = 5/9$.

3.2

(a)

- Each stage has $P(B) = 1/4$ and $P(R) = 3/4$.
- Add BR and RB: $p = (1/4)(3/4) + (3/4)(1/4)$, giving $p = \mathbf{3/8}$.

(b)

- Complement is two reds: $q = 1 - (3/4)^2$, so $q = \mathbf{7/16}$.
- It also includes BB, probability 1/16, which exactly-one excludes.

3.3

- Outcomes: H1, H2, H3, H4, T1, T2, T3, T4: 8 equally likely outcomes.
- Head and even: H2 and H4.
- $\mathbf{\frac{2}{8} = \frac{1}{4}}$.

3.4

- P(no rain on one day) $= 1 - 0.3 = 0.7$; multiply for independent days: 0.7×0.7.
- **0.49**.