

Foundation GCSE: Tree Diagrams

Name: _____

Class: _____

Instructions: Answer all questions. Questions are ordered from easiest (1) to hardest (20). Working out should be shown where appropriate.

1. A branch on a tree diagram has probability 0.7. What is the probability on the opposing branch?
2. A coin is flipped twice. Complete the probability for each branch. What is $P(H, H)$?
3. $P(\text{Rain}) = 0.4$. If it rains, $P(\text{Late}) = 0.5$. Find $P(\text{Rain AND Late})$.
4. A bag has 6 red and 4 blue counters. A counter is replaced before picking a second. Find $P(\text{Red, Red})$.
5. Using Q4, find $P(\text{Blue, Blue})$.
6. A probability tree has outcomes A and B for test 1, C and D for test 2. How many final outcome paths exist?
7. $P(\text{Win game 1}) = 0.6$. $P(\text{Win game 2}) = 0.6$ (independent). Find $P(\text{Win both})$.
8. Using Q7, find $P(\text{Lose both})$.
9. A bag contains 3 red and 7 yellow counters. One is picked, replaced, then another picked. Find $P(\text{different colors})$.
10. $P(\text{bus is on time}) = 0.8$. Sam takes the bus on Monday and Tuesday. Find $P(\text{on time at least once})$.
11. A spinner with $P(\text{Green}) = \frac{1}{3}$ is spun twice. Find $P(\text{Green on exactly one spin})$.
12. A bag has 4 red and 6 white counters. A counter is drawn and NOT replaced. Find $P(\text{Red 1st, Red 2nd})$.
13. Using Q12 (without replacement), find $P(\text{White 1st, Red 2nd})$.
14. Using Q12 (without replacement), find $P(\text{both same color})$.
15. Hannah plays tennis: $P(\text{win 1st match}) = 0.7$. If she wins, $P(\text{win 2nd}) = 0.8$. If she loses, $P(\text{win 2nd}) = 0.4$. Find $P(\text{wins 2nd match})$.
16. Using Q15, find $P(\text{wins exactly one match})$.
17. A box has 5 milk chocolates and 3 dark chocolates. Two are eaten without replacement. Find $P(\text{both milk})$.
18. Using Q17, find $P(\text{at least one dark chocolate})$.
19. $P(\text{alarm rings}) = 0.9$. If it rings, $P(\text{on time}) = 0.8$. If it doesn't ring, $P(\text{on time}) = 0.3$. Find $P(\text{on time})$.
20. A bag has n red and 3 blue counters. Two are drawn without replacement. If $P(\text{Blue, Blue}) = \frac{1}{15}$, find n .

Answers & Worked Solutions

1. $0.3 - 1 - 0.7 = 0.3$.
2. $0.25 - 0.5 \times 0.5 = 0.25$ or $\frac{1}{4}$.
3. $0.2 - 0.4 \times 0.5 = 0.2$.
4. $0.36 - \frac{6}{10} \times \frac{6}{10} = \frac{36}{100} = 0.36$.
5. $0.16 - \frac{4}{10} \times \frac{4}{10} = \frac{16}{100} = 0.16$.
6. 4 – Paths: AC, AD, BC, BD.
7. $0.36 - 0.6 \times 0.6 = 0.36$.
8. $0.16 - 0.4 \times 0.4 = 0.16$.
9. $0.42 - (R,Y) + (Y,R) = (0.3 \times 0.7) + (0.7 \times 0.3) = 0.21 + 0.21 = 0.42$.
10. $0.96 - 1 - P(\text{late both}) = 1 - (0.2 \times 0.2) = 1 - 0.04 = 0.96$.
11. $\frac{4}{9} - (G, \text{Not } G) + (\text{Not } G, G) = \left(\frac{1}{3} \times \frac{2}{3}\right) + \left(\frac{2}{3} \times \frac{1}{3}\right) = \frac{2}{9} + \frac{2}{9} = \frac{4}{9}$.
12. $\frac{2}{15} - \frac{4}{10} \times \frac{3}{9} = \frac{12}{90} = \frac{2}{15}$.
13. $\frac{4}{15} - \frac{6}{10} \times \frac{4}{9} = \frac{24}{90} = \frac{4}{15}$.
14. $\frac{7}{15} - P(RR) + P(WW) = \frac{12}{90} + \left(\frac{6}{10} \times \frac{5}{9}\right) = \frac{12+30}{90} = \frac{42}{90} = \frac{7}{15}$.
15. $0.68 - (0.7 \times 0.8) + (0.3 \times 0.4) = 0.56 + 0.12 = 0.68$.
16. $0.26 - P(\text{Win, Lose}) + P(\text{Lose, Win}) = (0.7 \times 0.2) + (0.3 \times 0.4) = 0.14 + 0.12 = 0.26$.
17. $\frac{5}{14} - \frac{5}{8} \times \frac{4}{7} = \frac{20}{56} = \frac{5}{14}$.
18. $\frac{9}{14} - 1 - P(\text{both milk}) = 1 - \frac{5}{14} = \frac{9}{14}$.
19. $0.75 - (0.9 \times 0.8) + (0.1 \times 0.3) = 0.72 + 0.03 = 0.75$.
20. $3 - \text{Total counters} = n + 3$. $\frac{3}{n+3} \times \frac{2}{n+2} = \frac{1}{15} \implies \frac{6}{(n+3)(n+2)} = \frac{1}{15} \implies (n+3)(n+2) = 90 \implies n = 7$.