

Foundation GCSE: The AND/OR Rules

Name: _____

Class: _____

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

1. Are rolling a 3 and rolling a 4 on a single die mutually exclusive?
2. Two events A and B are mutually exclusive. $P(A) = 0.3$ and $P(B) = 0.4$. Find $P(A \text{ or } B)$.
3. A fair coin is flipped twice. Find $P(\text{Head on 1st AND Head on 2nd})$.
4. A fair die is rolled. Find $P(\text{rolling a 1 OR rolling a 6})$.
5. State whether flipping a coin and rolling a die are independent events.
6. $P(\text{rain}) = 0.2$, $P(\text{bus late}) = 0.3$ (independent). Find $P(\text{rain AND bus late})$.
7. A spinner has $P(\text{Red}) = \frac{1}{5}$, $P(\text{Blue}) = \frac{2}{5}$. Find $P(\text{Red OR Blue})$.
8. Two fair dice are rolled. Find $P(6 \text{ on 1st AND } 6 \text{ on 2nd})$.
9. A bag has 3 red, 4 blue, 5 green marbles. One is drawn. Find $P(\text{Red OR Green})$.
10. $P(A) = 0.6$. A and B are mutually exclusive and exhaustive. Find $P(B)$.
11. Two independent spinners both have $P(\text{Win}) = 0.3$. Find $P(\text{Win on both})$.
12. A fair coin is flipped 3 times. Find $P(\text{HHH})$.
13. In a game, $P(\text{Win}) = 0.25$, $P(\text{Draw}) = 0.45$. Find $P(\text{Win OR Draw})$.
14. $P(\text{pass Math}) = 0.8$, $P(\text{pass English}) = 0.7$ (independent). Find $P(\text{pass both})$.
15. Using Q14, find $P(\text{fail both})$.
16. A die is rolled twice. Find $P(\text{first roll} \leq 2 \text{ AND second roll} \geq 5)$.
17. A bag has 5 red and 5 blue counters. One is picked, replaced, then another picked. Find $P(\text{Red then Blue})$.
18. Events X, Y, Z are mutually exclusive and exhaustive. $P(X) = 2P(Y)$ and $P(Z) = 0.1$. Find $P(Y)$.
19. A coin is flipped and a die rolled. Find $P(\text{Tail AND score} > 4)$.
20. $P(\text{hit target}) = \frac{2}{3}$. An archer shoots twice. Find $P(\text{hits at least once})$.

Answers & Worked Solutions

1. Yes – You cannot roll a 3 and a 4 at the same time on one roll.
2. $0.7 - 0.3 + 0.4 = 0.7$.
3. $\frac{1}{4} - \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$.
4. $\frac{1}{3} - \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$.
5. Independent – The outcome of the coin does not affect the die.
6. $0.06 - 0.2 \times 0.3 = 0.06$.
7. $\frac{3}{5} - \frac{1}{5} + \frac{2}{5} = \frac{3}{5}$.
8. $\frac{1}{36} - \frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$.
9. $\frac{2}{3} - \frac{3+5}{12} = \frac{8}{12} = \frac{2}{3}$.
10. 0.4 – Exhaustive means $P(A) + P(B) = 1 \implies P(B) = 1 - 0.6 = 0.4$.
11. $0.09 - 0.3 \times 0.3 = 0.09$.
12. $\frac{1}{8} - \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$.
13. $0.7 - 0.25 + 0.45 = 0.70$.
14. $0.56 - 0.8 \times 0.7 = 0.56$.
15. $0.06 - P(\text{fail Math}) = 0.2$, $P(\text{fail Eng}) = 0.3$.
 $0.2 \times 0.3 = 0.06$.
16. $\frac{1}{9} - \frac{2}{6} \times \frac{2}{6} = \frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$.
17. $\frac{1}{4} - \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$.
18. $0.3 - 2P(Y) + P(Y) + 0.1 = 1 \implies 3P(Y) = 0.9 \implies P(Y) = 0.3$.
19. $\frac{1}{6} - \frac{1}{2} \times \frac{2}{6} = \frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$.
20. $\frac{8}{9} - 1 - P(\text{misses both}) = 1 - \left(\frac{1}{3} \times \frac{1}{3}\right) = 1 - \frac{1}{9} = \frac{8}{9}$.