

Probability Exercise

1. A coin is tossed three times. What is the probability of the result:
 - (a) 3 heads;
 - (b) 2 heads and then a tail;
 - (c) two heads and a tail?
2. A coin and a die are tossed. What is the probability of obtaining:
 - (a) a head and a 3;
 - (b) a tail and a 6;
 - (c) a head and a 2 or a tail and a 3;
 - (d) a head and a 2 or a 3?
3. When a die is tossed twice, what is the probability of tossing:
 - (a) two 4's;
 - (b) two 3's;
 - (c) a 3 and then a 4;
 - (d) a 3 and a 4;
 - (e) a total of 11?
4. If, in example (iv) above, the first marble is not replaced before the second marble is selected, find the probability that:
 - (a) both are white;
 - (b) a black is followed by a white;
 - (c) they are different in colour.
5. From a standard pack of playing cards, two are selected at random. What is the probability that they are:
 - (a) the Ace of Clubs and the 3 of Diamonds;
 - (b) the Jack of Hearts and any Club;
 - (c) the Queen of Spades and any 7?
6. Five socks (two pairs and an odd sock) lie in the washing basket. If two socks are selected at random what is the probability that they are a pair?
7. Two hunters go duck shooting. One hunter is a very good shot and the probability of hitting any target is considered to be 0.9. The other hunter has only a 0.6 probability of hitting a target. If they both aim at the same duck what is the probability that:
 - (a) they will both hit the duck;
 - (b) either (but not both) will hit the duck;
 - (c) neither will hit the duck?
8. In NSW car number plates can take the form of three letters of the alphabet followed by three digits. What is the probability of selecting at random the number plate:
 - (a) ABC 123;
 - (b) ABC and any digits;
 - (c) beginning with A and ending with 9?

Worked Solutions

1. (a) $P(HHH) = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$

(b) $P(HHT) = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$

(c) $P(2H \text{ and } 1T \text{ in any order}) = P(HHT) + P(HTH) + P(THH)$
 $= \frac{1}{8} + \frac{1}{8} + \frac{1}{8} \quad (\text{from (b)})$
 $= \frac{3}{8}$

2. (a) $P(H \text{ and } 3) = P(H \text{ then } 3) \text{ or } P(3 \text{ then } H)$

$$= \frac{1}{2} \times \frac{1}{6} + \frac{1}{6} \times \frac{1}{2}$$

$$= \frac{1}{6}$$

(b) $\frac{1}{2} \times \frac{1}{6} + \frac{1}{6} \times \frac{1}{2} = \frac{1}{6}$

(c) $(\frac{1}{2} \times \frac{1}{6} + \frac{1}{6} \times \frac{1}{2}) + (\frac{1}{2} \times \frac{1}{6} + \frac{1}{6} \times \frac{1}{2}) = \frac{1}{3}$

(d) $(H2) \text{ or } (H3) \text{ or } (2H) \text{ or } (3H) = \frac{1}{3}$

3. (a) $P(4, 4) = \frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$

(b) $\frac{1}{36}$

(c) $\frac{1}{6} \times \frac{1}{6}$

(d) $P[(3, 4) \text{ or } (4, 3)] = \frac{1}{36} + \frac{1}{36} = \frac{1}{18}$

(e) $P[(5, 6) \text{ or } (6, 5)] = \frac{1}{18}$

4. (a) $P(WW) = P(W) \times P(W \text{ given already taken a white})$

$$= \frac{3}{10} \times \frac{2}{9}$$

$$= \frac{1}{15}$$

(b) $\frac{7}{10} \times \frac{3}{9} = \frac{7}{30}$

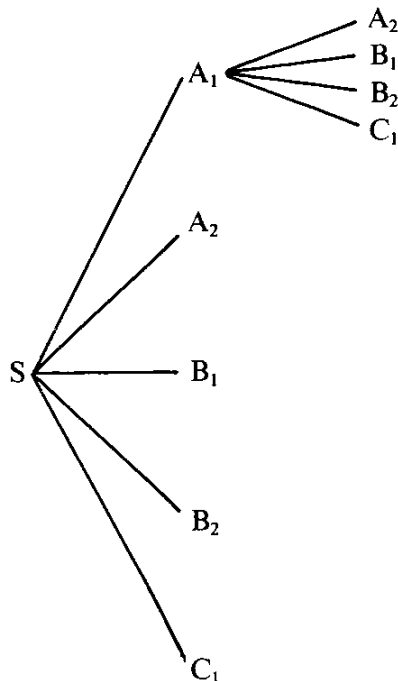
(c) $P(WB \text{ or } BW) = \frac{3}{10} \times \frac{7}{9} + \frac{7}{10} \times \frac{3}{9}$
 $= \frac{7}{15}$

5. (a) $P(A \text{ and } 3) = \frac{1}{52} \times \frac{1}{52} + \frac{1}{52} \times \frac{1}{52}$
 $= \frac{1}{1352}$

(b) $\frac{1}{52} \times \frac{1}{4} \text{ or } \frac{1}{4} \times \frac{1}{52} = \frac{1}{104}$

(c) $\frac{1}{52} \times \frac{1}{13} + \frac{1}{13} \times \frac{1}{52} = \frac{1}{338}$

6.



$$P(A_1 A_2 \text{ or } A_2 A_1 \text{ or } B_1 B_2 \text{ or } B_2 B_1) = \frac{4}{20} = \frac{1}{5}$$

7. (a) $0.9 \times 0.6 = 0.54$

(c) $0.1 \times 0.4 = 0.04$

Note: $a + b + c = 1$

(b) $(A \text{ hit and } B \text{ miss}) \text{ or } (B \text{ hit and } A \text{ miss})$

$$= 0.9 \times 0.4 + 0.6 \times 0.1$$

$$= 0.36 + 0.06 = 0.42$$

8. (a) $\frac{1}{26} \times \frac{1}{26} \times \frac{1}{26} \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10} = \frac{1}{17576000}$

(b) $\frac{1}{26} \times \frac{1}{26} \times \frac{1}{26}$

(c) $\frac{1}{26} \times \frac{1}{10} = \frac{1}{260}$