1. experiment; outcomes

2. sample space

3. probability

4. impossible; certain

5. mutually exclusive

6. independent

7. complement

8. (a) iii
(b) i
(c) iv
(d) ii

9. $\{(H, 1), (H, 2), (H, 3), (H, 4), (H, 5), (H, 6),$
$(T, 1), (T, 2), (T, 3), (T, 4), (T, 5), (T, 6)\}$

11. {ABC, ACB, BAC, BCA, CAB, CBA}

13. {AB, AC, AD, AE, BC, BD, BE, CD, CE, DE}

15. $E = \{HHT, HTH, THH\}$

$$P(E) = \frac{n(E)}{n(S)} = \frac{3}{8}$$

17. $E = \{HHH, HHT, HTH, HTT\}$

$$P(E) = \frac{n(E)}{n(S)} = \frac{4}{8} = \frac{1}{2}$$

19. $E = \{HHH, HHT, HTH, HTT, THH, THT, TTH\}$

$$P(E) = \frac{n(E)}{n(S)} = \frac{7}{8}$$

21. $E = \{K\clubsuit, K\diamondsuit, K\heartsuit, K\spadesuit, Q\clubsuit, Q\diamondsuit, Q\heartsuit, Q\spadesuit, J\clubsuit, J\diamondsuit, J\heartsuit, J\spadesuit\}$

$$P(E) = \frac{n(E)}{n(S)} = \frac{12}{52} = \frac{3}{13}$$

23. $E = \{K\spadesuit, K\heartsuit, Q\spadesuit, Q\heartsuit, J\spadesuit, J\heartsuit\}$

$$P(E) = \frac{n(E)}{n(S)} = \frac{6}{52} = \frac{3}{26}$$

25. $E = \{(1, 5), (2, 4), (3, 3), (4, 2), (5, 1)\}$

$$P(E) = \frac{n(E)}{n(S)} = \frac{5}{36}$$

27. Use the complement.

$$E' = \{(5, 6), (6, 5), (6, 6)\}$$

$$P(E') = \frac{n(E')}{n(S)} = \frac{3}{36} = \frac{1}{12}$$

$$P(E) = 1 - P(E') = 1 - \frac{1}{12} = \frac{11}{12}$$

29. $E_3 = \{(1, 2), (2, 1)\}, n(E_3) = 2$

$E_5 = \{(1, 4), (2, 3), (3, 2), (4, 1)\}, n(E_5) = 4$

$E_7 = \{(1, 6), (2, 5), (3, 4), (4, 3), (5, 2), (6, 1)\}, n(E_7) = 6$

$E = E_3 \cup E_5 \cup E_7$

$n(E) = 2 + 4 + 6 = 12$

$$P(E) = \frac{n(E)}{n(S)} = \frac{12}{36} = \frac{1}{3}$$

31. $P(E) = \dfrac{{}_3C_2}{{}_6C_2} = \dfrac{3}{15} = \dfrac{1}{5}$

33. $P(E) = \dfrac{{}_4C_2}{{}_6C_2} = \dfrac{6}{15} = \dfrac{2}{5}$

35. $P(E') = 1 - P(E) = 1 - 0.87 = 0.13$

37. $P(E') = 1 - P(E) = 1 - \frac{1}{4} = \frac{3}{4}$

39. $P(E) = 1 - P(E') = 1 - 0.23 = 0.77$

41. $P(E) = 1 - P(E') = 1 - \frac{17}{35} = \frac{18}{35}$

43. (a) $0.14(8.92) \approx 1.25$ million

(b) $40\% = \frac{2}{5}$

(c) $26\% = \frac{13}{50}$

(d) $26\% + 3\% = 29\% = \frac{29}{100}$

53. (a) $\frac{{}_{15}C_{10}}{{}_{20}C_{10}} = \frac{3003}{184{,}756} = \frac{21}{1292} \approx 0.016$

(b) $\frac{{}_{15}C_8 \cdot {}_5C_2}{{}_{20}C_{10}} = \frac{64{,}350}{184{,}756} = \frac{225}{646} \approx 0.348$

(c) $\frac{{}_{15}C_9 \cdot {}_5C_1}{{}_{20}C_{10}} + \frac{{}_{15}C_{10}}{{}_{20}C_{10}} + \frac{25{,}025 + 3003}{184{,}756} = \frac{28{,}028}{184{,}756}$

$= \frac{49}{323}$

≈ 0.152

55. (a) $\frac{1}{{}_5P_5} = \frac{1}{120}$

(b) $\frac{1}{{}_4P_4} = \frac{1}{24}$

66. (a) $P(AA) = (0.90)^2 = 0.81$

(b) $P(NN) = (0.10)^2 = 0.01$

(c) $P(A) = 1 - P(NN) = 1 - 0.01 = 0.99$

67. (a) $\frac{1}{38}$

(b) $\frac{18}{38} = \frac{9}{19}$

(c) $\frac{2}{38} + \frac{18}{38} = \frac{20}{38} = \frac{10}{19}$

(d) $\frac{1}{38} \cdot \frac{1}{38} = \frac{1}{1444}$

(e) $\frac{18}{38} \cdot \frac{18}{38} \cdot \frac{18}{38} = \frac{5832}{54{,}872} = \frac{729}{6859}$

68. (a) $P(BBBB) = \left(\frac{1}{2}\right)^4 = \frac{1}{16}$

(b) $P(BBBB) + P(GGGG) = \left(\frac{1}{2}\right)^4 + \left(\frac{1}{2}\right)^4 = \frac{1}{8}$

(c) $P(\text{at least one boy}) = 1 - P(\text{no boys})$

$= 1 - P(GGGG)$

$= 1 - \frac{1}{16}$

$= \frac{15}{16}$