

## COMBINING PROBABILITIES

- 1) An ordinary die is thrown twice. Find the probability of:
- obtaining a number less than 3 on the first throw.
  - obtaining a 6 on the second throw.
  - a number less than 3 on the first throw and a 6 on the second throw.
- 2) A bag contains 6 red beads and 4 white beads. Beads are drawn out one at a time and then REPLACED before the next draw. Find the probability of:
- a red bead on the first draw.
  - a white bead on the second draw.
  - a red bead on the first draw and a white bead on the second draw.
  - a red bead on both the first draw and the second draw.
- 3) Two girls take a practice shot at netball. The probability that Ann will score is  $\frac{1}{3}$ ; the probability that Belinda will score is  $\frac{1}{4}$ . Find the probability that:
- both girls score.
  - Ann scores and Belinda doesn't score.
  - neither girl scores.
  - Belinda scores and Ann doesn't score.
  - Add together the answers to parts (a) to (d). Is the answer what you would expect? Explain why.
- 4) The probability that Jane is late for school is 0.2. Find the probability that:
- She is late for school 3 days running.
  - She is on time for school every day for a week (5 days).
  - She late at least once in a week (use the answer to (b)).
  - She is on time every day for half a term (30 days).
- 5) There are 180 people at a conference.
- What is the probability that none of them have their birthday on June 1<sup>st</sup>? (Assume 365 days in a year - ignore leap years.)
  - What is the probability that at least one of them has their birthday on June 1<sup>st</sup>?
  - Use trial and improvement to find how many people you would need before it is more likely than not that there is someone with their birthday on 1<sup>st</sup> June.
- 6) There are 4 candidates in an election. Their probabilities of winning are reckoned to be: Peter 0.4; Quentin 0.2; Richard 0.3.
- The fourth candidate is Stephen. What is his probability of winning?
  - What is the probability that either Peter or Richard will win?
- 7) There are 4 runners in a race: Alf, Betty, Clarence and Diana. Their probabilities of winning are  $\frac{1}{2}$ ,  $\frac{1}{12}$ ,  $\frac{1}{6}$  and  $\frac{1}{4}$  respectively.
- Add together the 4 probabilities. Is the answer what you would expect?
  - What is the probability that the race will be won by Betty or Clarence?
  - What is the probability that the race will be won by a girl?
- 8) A card is drawn from a complete pack.
- What is the probability that it is a Heart?
  - What is the probability that it is an Ace?
  - Add together your answers to (a) and (b)
  - What is the probability that it is either a Heart or an Ace?
  - Why is your answer to (d) different to your answer to (c)?

9) A card is drawn from a standard pack of cards and then replaced, after which another card is drawn.

Find the probability that:

- (a) the first is a club and the second a black card.
- (b) both are hearts.
- (c) the first is an Ace and the second is not an Ace.
- (d) both are Aces.

10) A bag contains 7 beads - 3 blue ones numbered 1, 2 and 3, and 4 green ones numbered 1, 2, 3 and 4. A bead is drawn at random. Find the probability:

- (a) it is blue
- (b) it is numbered 4
- (c) it is numbered 2
- (d) it is blue or numbered 4
- (e) it is blue or numbered 2
- (f) Is the answer to (d) equal to the sum of the answers to (a) and (b)? Is the answer to (e) equal to the sum of (a) and (c)? Explain.

11) A bag contains 5 red beads and 4 black beads. Beads are drawn out one at a time and NOT REPLACED before the next draw is made. Find the probability of

- (a) a red bead on the first draw.
- (b) a black bead on the second draw, GIVEN THAT the first bead drawn was red.
- (c) a black bead on the second draw, GIVEN THAT the first bead was black.
- (d) a red bead on the first draw and a black bead on the second draw.
- (e) a black on both the first and second draws.

12) Repeat Q9 if the first card is not replaced before the second card is drawn.

13) After a lot of trials Angela has worked out that her probability of throwing a javelin over 20m on a given throw is 0.6

- (a) What is her probability of throwing it less than 20m?
- She has also worked out that her probability of throwing over 30m is 0.15
- (b) What is her probability of throwing less than 30m?
  - (c) What is her probability of throwing over 20m but less than 30m?