# Strand D *PROBABILITY*   Introductory Problems

We have developed a number of problems that are related to the concepts in this strand. You can use these as an introduction to the work that follows and we recommend that you work on them with colleagues.

The problems are designed to encourage mathematical thinking. You can also use them with your classes.

1. These bags all contain some sweets. The sweets may be red or black.
How might you colour them in to match their position on the probability line?
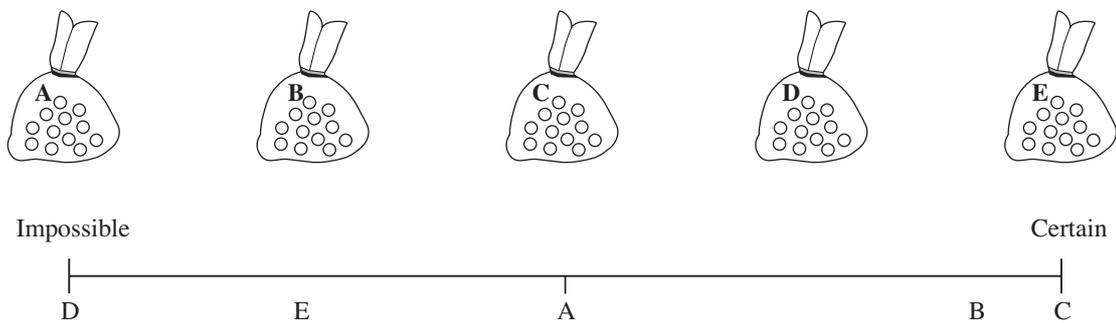
2. Explain which bag you would choose to have the best chance of choosing a grey sweet.
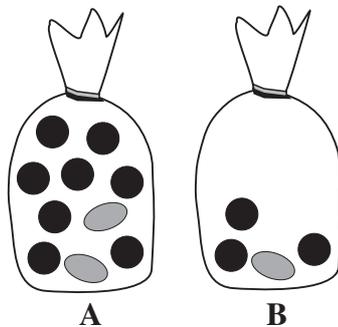
3. How certain are you of these outcomes occurring? Write **C** for **certain**, **P** for **possible but not certain** or **I** for **impossible**.

a) The final of the next *Football World Cup* will be in 2013.

b) The next time I toss a coin I will get a *Head* or a *Tail*.

c) The next time I throw two dice the total will be more than 6.

d) The next time I throw two dice the total will be more than 12.

e) It will rain next week in my home town.

Strand D *PROBABILITY* ✳   Introductory Problems

4. When we throw an **unbiased** dice, there are 6 possible outcomes, each equally likely:

1, 2, 3, 4, 5 or 6

Show the probability of each of these outcomes by joining it to the correct point on the probability scale.

a) Throwing a 2

b) Throwing a number less than 3

c) Throwing a number not less than 3

d) Throwing a 7

e) Throwing a number less than 1

f) Throwing a number greater than 0

g) Throwing a number greater than 5

1 — 100%

$\frac{5}{6}$ —

$\frac{4}{6}$ —

$\frac{3}{6}$ — 50%

$\frac{2}{6}$ —

$\frac{1}{6}$ —

0 — 0%
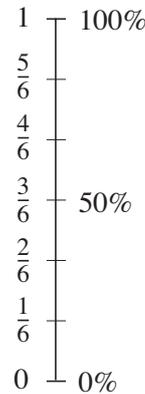
5. Four children are playing a game with these cards.

| 0 | 1 | 2 | 3 | 4 | 5 |

Rules of the game

1. *Player 1*   shuffles the cards, then lays them out face down on the table.

2. *Player 2*   picks 2 cards and turns them face up. The first card is the tens digit and the 2nd card is the units digit.

   Player 2   notes down his number. e.g. 0 and 3 → 03

3. *Player 2* shuffles the cards for *Player 3* to choose a number, and so on.

4. Each player keeps a running total of their numbers and the first one to reach 100 is the winner.

BUT the 4 children made up their own extra rules for their game:

- *Alan* misses a turn if the 2-digit number is even.
- *Becky* misses a turn if the 2-digit number is odd.
- *Callum* misses a turn if the 2-digit number is a whole 10.
- *Diana* misses a turn if the 2-digit number is divisible by 5.

a) List in all the 2-digit numbers that could be chosen.

b) Who might complain because the extra rules are unfair?   . . . .

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6. At the entrance to a wood there are 5 paths leading to the first clearing.
From the first clearing there are 6 paths leading to the 2nd clearing.

From the 2nd clearing there are 3 paths leading to the 3rd clearing.

a) How many routes could you take from the 1st clearing to the 3rd clearing?

b) What chance would you have of guessing correctly a person route from the entrance of the wood to the 3rd clearing?

7. If we put a set of 4 videos (A, B, C and D) back on the shelf without ooking at their titles, in what order could they end up?

Show all the possibilities.

What is the probability that:

a) the videos will be in the correct order

b) *Video A* will be on the left-hand side?

8. A bag of sweets contains 8 mints, 6 toffees and 2 boiled fruits, all wrapped in foil and all the same size and shape.

You take one sweet from the bag with your eyes closed. What is the probability that it is:

a) a mint

b) a toffee

c) a boiled fruit

d) **not** a mint

e) **not** a toffee

f) a mint **or** a toffee?

9. Write problems which have these probabilities as their solutions.

a) $\dfrac{3}{10}$ b) $\dfrac{1}{4}$ c) $\dfrac{5}{6}$ d) $\dfrac{7}{13}$ e) $\dfrac{8}{15}$