Solutions

2.1

- population: all **2000 bulbs** made that day; sample: the **50 tested**

2.2

- $\frac{2}{50} = 0.04$ of the sample are faulty
- $2000 \times 0.04 = \mathbf{80}$ bulbs

2.3

- every member of the population has an **equal chance** of being chosen

2.4

- people at a bus stop are more likely to travel by bus, so other ways of travelling are under-represented

2.5

- $\frac{33}{60} = 0.55$
- $12\,000 \times 0.55 = \mathbf{6600}$ voters

3.1

- a larger sample is less affected by chance, so its proportion is likely to be closer to the population's

3.2

- criticism: football club members are more likely to choose football, so the sample is **biased**
- improvement: take a **random** sample of all the town's teenagers

3.3

- the boxes **overlap**: 1 and 2 each fit in two boxes
- there is a **gap**: between 3 and 4 hours has no box; and no time frame (per day or per week) is given

3.4

- combined: $24 + 15 = 39$ walkers out of $80 + 40 = 120$
- $\frac{39}{120} = 0.325$
- $600 \times 0.325 = \mathbf{195}$ students

3.5

- marked fraction in the second sample: $\frac{8}{50}$, which should equal $\frac{40}{N}$
- $N = \frac{40 \times 50}{8} = \mathbf{250}$ fish

- assumption: the marked fish mix fully with the others, and no fish are born, die or leave between the catches