Exercise 1B

1 a There are 40 + 60 + 80 = 180 pupils altogether.

Year 1: 40 × 0.2 = 8 pupils
Year 2: 60 × 0.2 = 12 pupils
Year 3: 80 × 0.2 = 16 pupils

b Any one from:

A stratified sample accurately reflects the population structure of the school.
A stratified sample guarantees proportional representation of different year groups in the sample.

2 a Taking every 20th person may introduce bias, as the sampling frame is not random.

b A simple random sample using the alphabetical list as the sampling frame.

3 a No, this is not a systematic sample. Any reason from:

The first person is not selected at random.
The required elements of the sample are not being chosen at regular intervals.

b To improve the reliability of the data collected, the gym could use a larger sample.
To reduce bias, take a simple random sample using the list of members as the sampling frame.

4 a Stratified sampling

b There are 70 + 50 + 85 + 75 = 280 students altogether. All answers should be rounded to the nearest whole number as appropriate.

Year 12 Male: $\frac{70}{280} \times 40 = 10$
Year 13 Male: $\frac{50}{280} \times 40 \approx 7$
Year 12 Female: $\frac{85}{280} \times 40 \approx 12$
Year 13 Female: $\frac{75}{280} \times 40 \approx 11$

5 $k = \frac{480}{30} = 16$

Randomly select a number between 1 and 16. Start with the worker having this employee number. Then select the workers that have every 16th employee number after this.

6 a Set up a sampling frame. Use any method to select sampling units in which every member of the population has an equal chance of being selected, e.g. lottery sampling. A disadvantage of this method is that it may not reflect the proportion of members at the club who play each sport.

b The sample will have proportional representation of the members who play the different sports.

c There are 121 + 145 + 104 = 370 members altogether. All answers should be rounded to the nearest whole number as appropriate.

Tennis: $\frac{121}{370} \times 30 \approx 10$
Badminton: $\frac{145}{370} \times 30 \approx 12$
Squash: $\frac{104}{370} \times 30 \approx 9$