9.1 Sampling methods

Name: _____ Class: _____ Date: _____ **Total: 15 marks**

KEY WORDS systematic sampling • quota sampling

Sampling methods

Objective

Choose and justify simple random, systematic, stratified and quota sampling, compute systematic spacing, and answer inclusion-probability questions (objectives 2.1–2.2).

1 Key knowledge and worked examples

The four methods. Simple random: random numbers on a frame, every sample equally likely. Systematic: every xth from a random start – spacing $x = N/n$; ordering kills selector bias but consecutive members can never co-occur. Stratified: proportional sampling within strata (best when strata differ internally). Quota: interviewer fills quotas without a frame – cheap, non-random.

Worked example (WST03 June 2025 Q1). 360 members, 20 needed, first pick member 5: $x = 360/20 = 18$, so the sample is 5, 23, 41, …, 347. Members 5 and 6 can never both appear (they are 1 apart, the spacing is 18) – probability 0. Reason for the method: it removes bias/favouritism in the selection.

2 Practice

2.1 A factory has 540 items listed serially; a systematic sample of 18 is needed and item 7 is chosen first. Write down x and the first four items. [2]

2.2 A school of 800 pupils has 480 girls and 320 boys. A stratified sample of 40 is needed: how many of each? [2]

2.3 State one advantage and one disadvantage of quota sampling. [2]

3 Exam-style questions

3.1 *(Edexcel IAL WST03 June 2025 Q1.)* A golf club has 360 members. The captain needs to select 20 players for a charity tournament. The members are listed by randomly allocated membership numbers and the captain uses systematic sampling. The members are numbered 001 to 360; the 5th member is randomly selected first and then every xth member thereafter. (a) Give a reason for using systematic sampling in this case. (b) Write down the value of x. (c) Find the probability that the sample includes both the 5th member and the 6th member. [3]

3.2 *(Original.)* A market researcher interviews shoppers outside a store, required to speak to 25 men and 25 women whatever order they arrive. (a) Name the sampling method. (b) State why the sample may still be biased even though the quotas are met. (c) The researcher instead decides to select from a list of 2000 store members a sample of 50, where every member is equally likely: name this method and state one requirement for implementing it. [6]

Solutions

2.1 $x = 540/18 = 30$: items 7, 37, 67, 97.

2.2 Girls $40 \times \frac{480}{800} = 24$; boys $40 \times \frac{320}{800} = 16$.

2.3 Advantage: no sampling frame needed (cheap, quick). Disadvantage: interviewer bias – the choice of who to approach is not random.

3.1 (a) It removes bias/favouritism: with the random start, every member has an equal chance of selection. (b) $x = \frac{360}{20} = 18$. (c) The sample is 5, 23, 41, …, 347 – members 18 apart; 5 and 6 are consecutive, so both cannot be in the sample: probability 0.

3.2 (a) Quota sampling. (b) The interviewer chooses who to approach – the selection within each quota is non-random, so the sample may not represent all shoppers (interviewer bias). (c) Simple random sampling; it requires a sampling frame (the full list of members) and random-number selection from it.

Local review guidance: reasons tied to the method's mechanics, not generic speed claims; spacing as an exact division; impossibility arguments expressed through the spacing. This is authored classroom guidance.