Sampling and Capture-Recapture

GCSE Mathematics • **Higher Tier** • Grades 5–7 • Non-calculator

Name: _____ Class: _____ Total: _____ / 56

Show all your working. Marks are given for correct method as well as the final answer.

1. 40 fish are caught, marked and returned. Later 50 are caught and 8 are marked. Estimate the population. **[3 marks]**

Answer: _____

2. 60 birds are ringed. A later sample of 80 contains 12 ringed. Estimate the population. **[3 marks]**

Answer: _____

3. 25 deer are tagged. A sample of 30 contains 5 tagged. Estimate the population. **[3 marks]**

Answer: _____

4. 120 beetles are marked. A sample of 45 contains 9 marked. Estimate the population. **[3 marks]**

Answer: _____

5. Write down the capture-recapture formula. **[2 marks]**

Answer: _____

6. Write down one assumption the capture-recapture method relies on. **[1 mark]**

Answer: _____

7. Write down a second assumption. **[1 mark]**

Answer: _____

8. Write down a third assumption about the marks themselves. **[1 mark]**

Answer: _____

9. Explain what happens to the estimate if some marks fall off. **[3 marks]**

Answer: _____

10. Explain what happens to the estimate if marked animals are easier to catch. **[3 marks]**

Answer: _____

11. Explain what a random sample means. **[2 marks]**

Answer: _____

12. A survey about sport is carried out at a gym. Explain why the sample is biased. **[2 marks]**

Answer: _____

13. A school has 900 pupils. A stratified sample of 60 is taken. Work out the sampling fraction. **[2 marks]**

Answer: _____

14. In that school, Year 11 has 180 pupils. Work out how many are in the stratified sample. **[3 marks]**

Answer: _____

15. In that school, Year 7 has 240 pupils. Work out how many are in the sample. **[2 marks]**

Answer: _____

16. Explain why a stratified sample is better than a simple random one when the groups differ in size. **[2 marks]**

Answer: _____

17. In a sample of 80 people, 18 said yes. Estimate how many of 2 000 would say yes. **[3 marks]**

Answer: _____

18. 200 trout are tagged in a lake. A later sample of 150 contains 15 tagged.

(a) Estimate the number of trout in the lake. **[3 marks]**

(b) Explain why the estimate might be unreliable. **[3 marks]**

Answer: _____

19. A college has 1 200 students: 500 in Year 12 and 700 in Year 13. A stratified sample of 96 is taken.

(a) Work out how many Year 12 students are sampled. **[3 marks]**

(b) Work out how many Year 13 students are sampled. **[2 marks]**

Answer: _____

20. 90 rabbits are marked and released. Two weeks later 60 are caught, of which 4 are marked.

(a) Estimate the rabbit population. **[3 marks]**

(b) Between the two catches, several marked rabbits died. Explain the effect on the estimate. **[3 marks]**

Answer: _____

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