

Capture-Recapture

For Pearson Edexcel GCSE Mathematics (1MA1) • Higher tier

Name _____

Total marks: **21**

Answer **all** questions in the spaces provided. Show your working: marks are given for correct method.

- 1** Ria catches 30 beetles in her garden. She marks them and releases them.
A week later she catches 50 beetles. 6 of these beetles are marked.

(a) What fraction of the beetles in the second sample are marked?

.....
(1)

(b) Assume that the same fraction of all the beetles in the garden are marked.
Work out an estimate for the number of beetles in the garden.

.....
(2)

(Total for Question 1 is 3 marks)

- 2** Alex wants to estimate the number of fish in a lake.
He catches 60 fish, marks them and puts them back.
Later he catches 40 fish. 8 of these are marked.

(a) Work out an estimate for the number of fish in the lake.

.....
(3)

(b) Write down one assumption you have made.

.....
.....
(1)

(Total for Question 2 is 4 marks)

- 3** A scientist marks 120 birds on an island and releases them.
A week later she catches 75 birds and finds that 18 are marked.
Work out an estimate for the number of birds on the island.

.....
(3)

(Total for Question 3 is 3 marks)

- 4** An estimate of 400 frogs in a pond was made. 50 frogs were marked first.
In the second sample, 5 frogs were marked.
How many frogs were in the second sample?

.....

(2)

(Total for Question 4 is 2 marks)

- 5** Explain why capture-recapture gives only an estimate.

(1)

(Total for Question 5 is 1 mark)

- 6** A ranger wants to estimate the number of deer in a forest.
In March, she puts a collar on 45 deer and releases them.
In April, she counts 80 deer. 12 of these deer have collars.

(a) Work out an estimate for the number of deer in the forest.

.....
(3)

(b) Deer with collars are easier to spot than deer without collars.
Explain what effect this could have on the estimate in part (a).

.....
.....
(1)

(Total for Question 6 is 4 marks)

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- 7** Lena and Kofi want to estimate the number of newts in a pond.
On Monday, they catch 60 newts, put a small mark on each one and release them.
On Tuesday, Lena catches 50 newts and finds that 6 of them are marked.
At the same time, Kofi catches 70 different newts and finds that 9 of them are marked.

- (a) Use all of these results to work out an estimate for the number of newts in the pond.
You must show all your working.

.....
(3)

- (b) Explain why the estimate in part (a) is likely to be more reliable than an estimate that uses only Lena's sample.

.....
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(1)

(Total for Question 7 is 4 marks)