Maths

Capture-recapture

Miss Parnham

Capture-recapture

1. Tommy captures 40 fish, tags them and returns them to the lake. The following day he captures 30 fish and finds that 5 of them are tagged.

a) What proportion of the fish that Tommy caught on the second day were tagged?

b) Estimate the total fish population in the lake.

2. Annie captures 16 snails in her garden, marks and releases them.

A day later she captures 15 snails and 3 of them are marked.

Estimate the snail population in Annie's garden.

What assumptions did you make?

Capture-recapture

3. Dexter wants to estimate how many buttons are in a jar.
He empties the jar out, marks 50 of them, then mixes the buttons and returns them all to the jar.
He then takes 45 buttons out of the jar, 6 of them are marked.

Show how Dexter would use this information to estimate the number of buttons in the jar.

4. Eva catches some rabbits in a field, tags and releases them.
The next day she captures 48 rabbits and 18 of them are tagged.
Eva estimates that the field has a population of 120 rabbits.

Use this information to work out how many rabbits Eva initially caught and tagged.

Answers

Capture-recapture

1. Tommy captures 40 fish, tags them and returns them to the lake.
The following day he captures 30 fish and finds that 5 of them are tagged.

a) What proportion of the fish that Tommy caught on the second day were tagged?

$$\frac{5}{30} = \frac{1}{6}$$

b) Estimate the total fish population in the lake.   40 × 6 = 240 fish in the lake.

2. Annie captures 16 snails in her garden, marks and releases them.

A day later she captures 15 snails and 3 of them are marked.

Estimate the snail population in Annie's garden.

$$\frac{3}{15} = \frac{1}{5}$$ 16 × 5 = 80 snails

What assumptions did you make?
The snail population remained constant between each capture.

Capture-recapture

3. Dexter wants to estimate how many buttons are in a jar.

He empties the jar out, marks 50 of them, then mixes the buttons and returns them all to the jar.

He then takes 45 buttons out of the jar, 6 of them are marked.

$\frac{6}{45} = \frac{2}{15}$ of the buttons are marked.

Show how Dexter would use this information to estimate the number of buttons in the jar. $50 \div 2 \times 15 = 375$ buttons in the jar.

4. Eva catches some rabbits in a field, tags and releases them.

The next day she captures 48 rabbits and 18 of them are tagged.

Eva estimates that the field has a population of 120 rabbits.

$\frac{18}{48} = \frac{3}{8}$ of the rabbits are tagged.

Use this information to work out how many rabbits Eva initially caught and tagged.

$120 \div 8 \times 3 = 45$ rabbits captured initially.