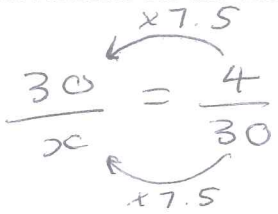
1. Bhavna has a bag containing a large number of beads.
She wants to find an estimate for the number of beads in the bag.

Bhavna takes a sample of 30 beads from the bag.
She marks each bead with a black cross.
She then puts the beads back in the bag.

Bhavna shakes the bag.
She now takes another sample of 30 beads from the bag.

4 of these beads have been marked with a black cross.

(*a*) Work out an estimate for the total number of beads in the bag.



$\frac{30}{4} = 7.5$

30×7.5

225 beads
(2)

(*b*) Write down any assumptions you have made.

- None of the crosses wiped off
- She shook the bag well enough to make the second sample representative

(1)

(Total for Question 3 is 3 marks)

2. Carlos wants to find an estimate for the number of ants in a colony.

He catches 60 ants from the colony and marks each one with a dye.
He then returns the ants to the colony.

A week later, Carlos catches another 60 ants.
8 of these ants are marked with the dye.

Work out an estimate for the number of ants in the colony.
Write down an assumption you have made.

$\frac{60}{x} = \frac{8}{60}$ (×7.5 above, ×7.5 below)

$\frac{60}{8} = 7.5$

$60 \times 7.5 = 450$

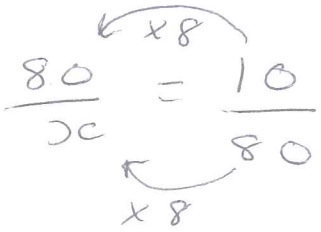
450

The dye stayed on all of the ants

(Total for Question 2 is 3 marks)

3. Beth wants to estimate the number of frogs in a lake.
She catches a sample of 80 frogs, marks them and puts them back in the lake.
Later that day, in a second sample of 80 frogs, she finds that 10 of them are marked.

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



80 x 8

640

(2)

(*b*) Write down any assumptions you have made.

None of the marks faded

(1)

(Total for Question 3 is 3 marks)

4. Ravina wants to find an estimate for the number of birds in a sanctuary.

She catches a sample of 70 birds in the sanctuary and tags each of these birds.
These birds are then released back into the sanctuary.

The next day she catches a sample of 60 birds in the sanctuary.

Ravina has tagged 12 of these birds.

Work out an estimate for the number of birds in the sanctuary.

Write down an assumption you have made.

$\frac{70}{x} = \frac{12}{60}$ (35/6 ↓, ×35/6 ↑)

$\frac{70}{12} = \frac{35}{6}$

$60 \times \frac{35}{6} = 350$

350

None of the tags fell off

(Total for Question 4 is 3 marks)

5 Safur wants to estimate the number of deer in a forest.

He catches a sample of 40 deer, tags them and releases them back into the forest.

The following week, he tables a second sample of 40 deer.

5 of these deer have been tagged.

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

$\frac{40}{x} = \frac{5}{40}$ (×8 on the right, ×8 on the left)

$40 \times 8 = 320$

320

(2)

(*b*) Write down an assumption you have made.

None of the tags fell off

(1)

(Total for Question 5 is 3 marks)