

Examples



Workout

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- Question 1: Hannah wants to estimate the number of eels in a lake.  
She catches and rings 50 eels.  
She returns the 50 eels to the lake.  
The next day Hannah catches 400 eels.  
Of these 400 eels, 10 are ringed.

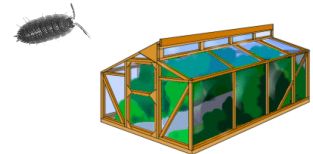
$$\begin{array}{r} 50 \times \frac{400}{10} \\ = 2000 \end{array}$$



Work out an estimate for the total number of eels in the lake.

- Question 2: Tom wants to estimate the number of woodlice in a greenhouse.  
He catches and marks 32 woodlice.  
The woodlice are then returned to the greenhouse.  
The next day Tom catches 20 woodlice.  
8 of these are marked.

$$\begin{array}{r} 32 \times \frac{20}{8} \\ = 80 \end{array}$$



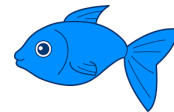
Work out an estimate for the total number of woodlice in the greenhouse.

- Question 3: A scientist wants to estimate the total number of fish in a pond.  
On Thursday, she catches 180 fish.  
These fish are marked and returned to the pond.  
On Friday, the scientist catches 305 fish.  
45 of these fish are marked.

$$\begin{array}{r} 180 \times \frac{305}{45} \\ = 1220 \end{array}$$

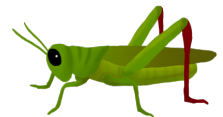
Fish randomly  
distributed after  
release

- (a) Work out an estimate for the total number of fish in the pond  
(b) What assumptions have you made?



- Question 4: Darren wants to estimate how many grasshoppers live in a field.  
He catches and marks 24 grasshoppers.  
He then releases the grasshoppers.  
The next day, Darren returns to the same field and captures 51 grasshoppers.  
7 of these have been marked.

$$\begin{array}{r} 24 \times \frac{51}{7} \\ = 174.85 \\ = 175 \end{array}$$



Work out an estimate for the total number of grasshoppers in the field.

## Capture Recapture

Video 391 on [www.corbettmaths.com](http://www.corbettmaths.com)

Question 5: Heather has a large jar of jelly beans.

Heather wants to find an estimate for the total number of jelly beans in the jar. She takes out all the jelly beans and marks 200 of them. Heather mixes the jelly beans and puts them back into the jar.

Heather then takes 140 jelly beans from the jar. 3 of the jelly beans are marked. Heather then puts all the jelly beans back into the jar.



- (a) Work out an estimate for the number of jelly beans in the jar.  
 (b) What assumptions have you made?

*Marked beans randomly distributed*

### Apply

Question 1: Charlotte wants to work out an estimate of the number of fish living in a pond. She captures X fish and tags them.

Charlotte returns the fish to the pond. The next day Charlotte catches 50 fish. Of these 50 fish, 32 are tagged.

$$X \times \frac{50}{32} = 125$$

Charlotte's estimate of the number of fish in the pond is 125.

Work out how many fish Charlotte tagged, X.

$$X = \frac{125 \times 32}{50}$$

$$X = 80$$

Question 2: Ronan wants to estimate the number of honey bees in a beehive.

On Wednesday, Ronan catches 660 honey bees from the beehive. He marks the honey bees and then releases them.

On Thursday, Ronan catches 400 honey bees and notes how many were marked.

Ronan then calculates his estimate as 22,000 honey bees in the beehive.

How many of the 400 honey bees caught on Thursday were marked?

$$660 \times \frac{400}{y} = 22000$$

$$660 \times 400 = 22000y$$

$$y = \frac{660 \times 400}{22000}$$

$$y = 12$$

*Let y be number of marked bees on Thu*



## Capture Recapture

Video 391 on [www.corbettmaths.com](http://www.corbettmaths.com)

Question 3: Rhys has a large tub of yellow counters.  
Alex has a large tub of blue counters.

40 yellow counters are taken from Rhys' tub and placed into Alex's tub.  
40 blue counters are taken from Alex's tub and placed into Rhys' tub.

Rhys randomly selects 100 counters from his tub.  
8 of the 100 counters are blue.

$$B : Y$$

$$8 : 92$$

Alex randomly selects 50 counters from his tub.  
48 of the 50 counters are blue.

$$48 : 2$$

$$= 96 : 4$$

All the counters are then placed into one tub.

$$= 192 : 8$$

Work out an estimate for the ratio of yellow to blue counters in the tub.

*Alex has twice as many counters so*  $4:8$   
 $= 100:200$   
 $= 1:2$

Question 4: A scientist wants to estimate the number of lions living in a region.

On Thursday, he locates and tags some lions.  $x$   
On Friday he returns and locates 10 less lions than he had on Thursday.  
He notices that 4 of the lions are tagged.

$$x \times \frac{(x-10)}{4}$$

*Est*  $\frac{x^2 - 10x}{4}$

The scientist works out an estimate for the total number of lions living in the region.

He notices that the number of lions that he had caught on Thursday, was a fifth of the total number of lions.

$$x = \frac{1}{5} \left( \frac{x^2 - 10x}{4} \right)$$

$$5x = \frac{x^2 - 10x}{4}$$

How many lions live in the region?

$$20x = x^2 - 10x$$

$$0 = x^2 - 30x = x(x-30)$$

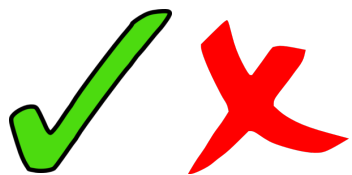


$$\Rightarrow x = 0$$

$$\text{or } x = 30$$

Total Lions  
 $5x = 150$

Answers



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