

Q1.

Invertebrate animals are used to monitor pollution in streams. The photograph shows scientists collecting a sample of invertebrates from a stream.



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This is the method that they use.

- A 1 m² area of the bed of the stream is marked out.
- A net 1m wide is held by one person on the downstream side of the marked-out area.
- The other person uses their boots to gently move stones in this area of the stream bed. They do this for three minutes. This dislodges invertebrates which are then caught in the net.
- The invertebrates are then identified and counted.

(a) Name **two** control variables (variables which must be kept the same) in this investigation.

1. _____
2. _____

(2)

(b) Suggest **two** reasons why the results from a sample might not be accurate.

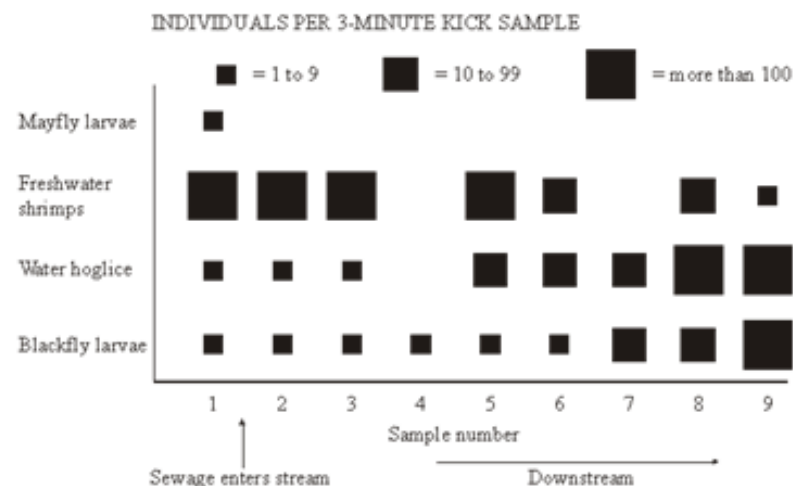
1. _____
2. _____

(2)

The technique described above was used to investigate the effect of sewage on stream invertebrates.

- Sample 1 was taken upstream of the point where the sewage entered the stream.
- Samples 2–9 were taken at regular intervals downstream of the sewage inflow.

The graph shows the results.



(c) What was the range of the number of blackfly larvae that could be found in sample 7?

(1)

(d) Describe, as fully as you can, how the number of water hoglice changed downstream from where sewage entered the stream.

(2)

(e) Which of the four invertebrates is the best indicator species for water which is not polluted by sewage?

Give the reason for your answer.

(2)

(Total 9 marks)

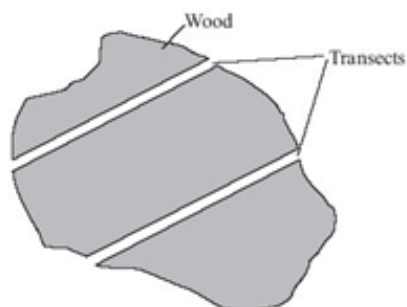
Q2.

Red squirrels live in trees. They eat seeds from the cones of conifer trees. Squirrels store cones in 'larders' on the ground. These larders provide food through the winter. Each red squirrel makes and defends one larder.

Scientists monitor squirrel numbers to find the best habitats for the squirrel's survival. In one investigation, scientists estimated the numbers of squirrels in different types of woodland. Each woodland contains a different species of conifer tree.

Here is their method.

- Ten woods of each type of woodland were surveyed.
- In each wood scientists measured out two transects (strips), each 800 m long and 10 m wide.
- A scientist walked slowly down the centre of each transect, recording the number of squirrel larders he could see.



(a) (i) How many transects all together did the scientists survey in each type of woodland?
 Number of transects _____

(1)

(ii) What was the total area surveyed in one wood?

 Area _____ m²

(1)

(b) Name one variable that was controlled in this investigation.

(1)

(c) (i) The scientists recorded the number of larders instead of the number of squirrels they saw.
 Explain how this could have increased the accuracy of the investigation.

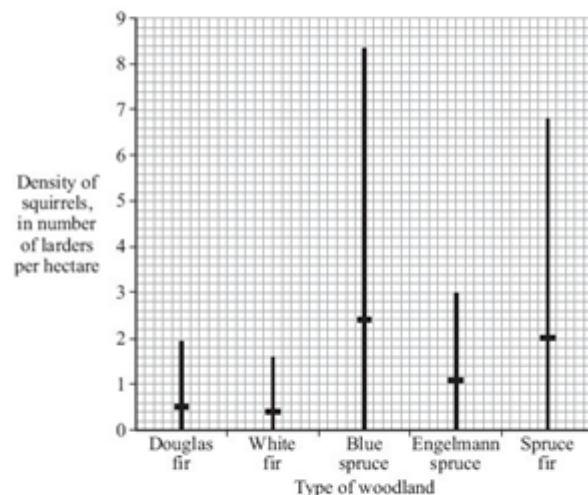
(ii) This method of counting the number of larders could have led to an inaccurate estimate of the number of squirrels.

Explain how.

(1)

(2)

(d) The results of the investigation are shown in the graph.



The horizontal mark on each bar represents the mean number of larders per hectare of woodland.

The range of the number of larders observed for Douglas fir woodland was 0 to 1.9 per hectare.

(i) What was the range of the number of larders per hectare in the Spruce fir woodland?

(1)

(ii) The highest mean number of larders per hectare was found in Blue spruce woodland.

Suggest one explanation for this.

(1)

(Total 8 marks)