OCR GCSE 21ST CENTURY BIOLOGY B · J257

# BIOLOGY



## EXAM QUESTION PACK

B3.4 HOW ARE POPULATIONS AFFECTED BY CONDITIONS IN AN ECOSYSTEM? (FOUNDATION)

| SCORE | PERCENTAGE |
| --- | --- |
| /33 | % |

STEMUP

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1. The student counted the number of limpets found on three parts of the rocky shore. The data is shown in the table below.

| Part of shore | Number of limpets | | | |
|---|---|---|---|---|
| | Test A | Test B | Test C | Mean |
| Low shore (closest to sea) | 15 | 16 | 17 | |
| Mid shore | 45 | 47 | 49 | |
| High shore (furthest away from sea) | 2 | 1 | 8 | |

(i) The student thinks one of the results is an outlier.

Circle the outlier in the table above.

[1]

(ii) Calculate the mean number of limpets found on the mid shore.

Show your working.

_____ [2]

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2(a). Rainforests are an important ecosystem.

Rainforests obtain their energy from sunlight.

Explain why scientists regard sunlight as a sustainable source of energy.

[2]

(b). Rainforests used to be thought of as closed-loop systems.
Now, large amounts of biomass are removed when timber is harvested.
Explain the effects that the removal of timber has on the closed-loop system.

[2]

(c). Burning is another way that biomass is removed from a rainforest.
Rainforests are burnt to create grassland to keep cattle.
Write down **two** groups of people who might be affected by this action.

Identify the advantage **or** disadvantage to each group.

Group 1

Group 2

[2]

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3. A group of students are doing fieldwork.

Anton wants to find out if the amount of light affects the distribution of plants.

He does this by comparing the plants growing in the middle of a field with those growing under a hedge surrounding the field.

Explain how he will use a quadrat, light meter and identification key to do his investigation.



*The quality of written communication will be assessed in your answer.*

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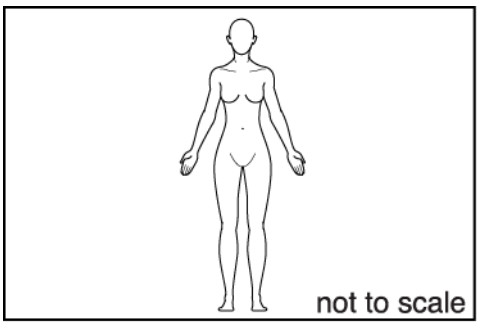
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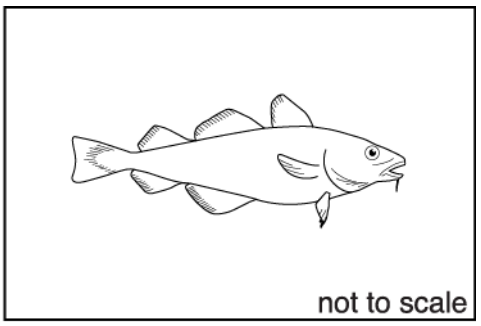
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4(a). A human female usually only produces one egg at a time.

A female codfish can release over 1 million eggs at one time.




Human female




Female codfish

Suggest why there is such a large difference in the number of eggs produced by humans and by codfish.

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[2]

(b). Suggest why the number of eggs produced by the codfish is not wasteful for the ecosystem.

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[1]

(c). Codfish live in a natural ecosystem.
Humans depend on natural ecosystems for 'ecosystem services'.

Write down **one** service provided by the ecosystem in which the codfish lives.

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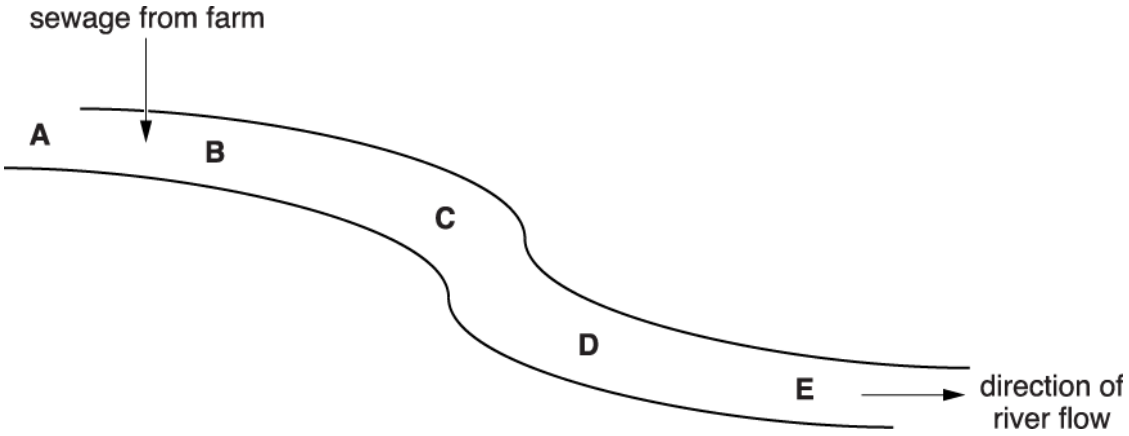
[1]

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5. Sewage (animal waste) from a farm is released directly into a river.




Five samples of water are tested at each site, **A**, **B**, **C**, **D** and **E**.

The number of mayfly nymphs found in each sample is recorded in a table.

Mayfly nymphs are young stages of mayflies.

| | Number of mayfly nymphs found in each sample | | | | |
|---|---|---|---|---|---|
| Sample | Site A | Site B | Site C | Site D | Site E |
| 1 | 12 | 0 | 0 | 6 | 9 |
| 2 | 11 | 0 | 2 | 5 | 11 |
| 3 | 13 | 0 | 1 | 5 | 10 |
| 4 | 11 | 1 | 1 | 6 | 11 |
| 5 | 12 | 0 | 0 | 5 | 2 |
| mean (rounded to nearest whole number) | 12 | 0 | 1 | 5 | |

Joe makes some conclusions from the data.

Which **two** statements, when taken together, correctly explain the data?

Put ticks (✓) in the boxes next to the **two** statements.

The water at site **B** is most polluted. ☐

Mayfly nymphs are adapted to living in polluted water. ☐

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Mayfly nymphs cannot survive well in polluted water. ☐

Pollution in the river increases away from the farm. ☐

Mayfly nymphs are present in the sewage entering the river. ☐

Mayfly nymphs are eaten by fish in the river. ☐

**[2]**

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6. Some farmers spray their crops with insecticides.

Insecticides kill insect pests.

Pests can develop resistance to insecticides.

Each year a farmer sprays his wheat crop with the same insecticide to kill a particular insect pest.

Each year a scientist catches all the insect pests in a 20 $m^2$ area of the crop before it is sprayed.

He tests the pests to see how many are resistant to the insecticide.

These are his results.

| Year | Pests with no resistance | Pests with resistance |
|---|---|---|
| 2008 | 1000 | 1 |
| 2009 | 223 | 14 |
| 2010 | 87 | 65 |
| 2011 | 21 | 392 |
| 2012 | 3 | 965 |
| 2013 | 0 | 2458 |

(i) What percentage of pests were resistant to the insecticide in 2008?

Show your working.

_____ % **[1]**

(ii) What percentage of pests were resistant in 2013?

_____ % **[1]**

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(iii) Suggest how the farmer should use this information when spraying his crops with insecticide.

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[2]

(iv) Suggest why the data collected by the scientist may not be sufficient to draw a valid conclusion.

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[2]

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7. Insecticides called neonics are widely used by farmers.

Neonics kill insect pests that live on crop plants.

Research studies have suggested that use of neonics on crops can cause honey bee populations to decrease.

Other studies have linked neonics to decreases in bird populations.

(i) To try to protect honey bees, the European Union banned the use of neonics on flowering crops.

Suggest why the ban applied to **flowering** crops.

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[1]

(ii) Write down **two** ways in which use of neonics could have caused a decrease in the numbers of birds.

1 ---

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2 ---

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[2]

(iii) Do you support the continued use of neonics on flowering crops?

Justify your answer.

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---[3]

END OF QUESTION PAPER



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