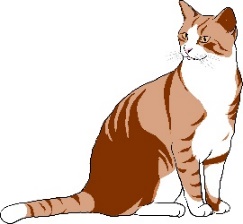
**Food web**

Lucy made this food web diagram.

cat



thrush



chaffinch

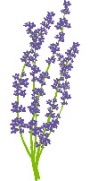


bee



caterpillar

lavender



cabbage

The food web diagram shows feeding relationships in Lucy’s garden.

How many food chains are shown in Lucy’s food web diagram?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **A** | None |  | **E** | Four |
| **B** | One |  | **F** | Five |
| **C** | Two |  | **G** | Six or more |
| **D** | Three |  |  |  |

*Biology> Big idea BOE: Organisms and their environments > Topic BOE1: Interdependence of organisms > Key concept BOE1.1: Food chains and food webs*

|  |
| --- |
| **Diagnostic question** |
| **Food web** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | Feeding relationships within a community of organisms can be modelled using food chain and food web diagrams. |
| Observable learning outcome: | Recognise that food web diagrams represent several interconnected food chains within a community of organisms |
| Question type: | Simple multiple choice |
| Key words: | food web, food chain, producer, consumer, prey, predator |

**What does the research say?**

Food chains and food webs are models – they are simplified representations of feeding relationships in a community of organisms (Griffiths and Grant, 1985). However, ample research suggests school-age children struggle to interpret food chains and food webs.

Confusion about the direction and meaning of the arrows in a food chain is a commonly reported misunderstanding (Gallegos, Jerezano and Flores, 1994; Gotwals and Songer, 2010), and suggests that students interpret the arrow to mean “eats” (Allen, 2014). Most of the students in the study by Barman et al. (1995) placed the arrows the wrong way around (e.g. from predator to prey) when asked to assemble a food chain using pre-printed cards, yet when presented with a correct depiction of a food web they did not question the direction of the arrows even though in most cases they contradicted the students’ own constructions.

Research has shown that when students are asked to predict possible effects of a change in a population within a food web, they tend to focus only on single food chains within the web, struggle to trace changes through more than one chain, struggle to think about the impact of a change in a population more than one trophic level away, and are more able to trace changes upwards through a chain than downwards (Webb and Boltt, 1990; Leach et al., 1992; Gotwals and Songer, 2010).

Food webs are key concepts that enable the development of understanding of more complex ecological principles and environmental issues, including population management and food security (Alexander, 1982). As Allen (2014) has pointed out, “Anyone who is not able to fully appreciate the far-reaching impacts of changes to a single population may trivialize a media report about an endangered species, only believing that species alone is under threat, when the likelihood is that many members of an ecosystem will be adversely affected”.

**Ways to use this question**

Students should complete the question individually. This could be a pencil and paper exercise, or you could use the PowerPoint presentation with an electronic voting system or mini white boards.

*Differentiation*

You may choose to read the question and answers to the class, so that everyone can focus on the science. In some situations it may be more appropriate for a teaching assistant to read for one or two students.

**Expected answers**

The expected answer is **F** – Five.

There are two food chains from cabbage to cat, i.e.:

cabbage ---> caterpillar ---> chaffinch ---> cat

cabbage ---> caterpillar ---> thrush ---> cat

…plus three food chains from lavender to cat, i.e.:

lavender ---> bee ---> thrush ---> cat

lavender ---> caterpillar ---> chaffinch ---> cat

lavender ---> caterpillar ---> thrush ---> cat

**How to respond - what next?**

Misunderstandings that could lead to incorrect answers may include e.g.:

* It is a food web, not a food chain – so the number of food chains is **none**.
* All of the organisms make up one food chain with branches – so the number of food chains is **one**.
* There are just **two** food chains – one from the cabbage and one from the lavender.
* There are **three** food chains – two at the edges plus one that zig-zags up the middle.
* There are four levels of organisms, therefore **four** food chains.
* It is possible to go backwards along an arrow between interconnecting food chains, e.g. from caterpillar to lavender, or from thrush to caterpillar – therefore there are **six or more** food chains.

If there is a range of answers, you may choose to respond through structured class discussion. Ask one student to explain why they gave the answer they did; ask another student to explain why they agree with them; ask another to explain why they disagree, and so on. This sort of discussion gives students the opportunity to explore their thinking and for you to really understand their learning needs. Responses often work best when the activities involve paired or small group discussions, which encourage social construction of new ideas (meaning making) through dialogue.

The following BEST ‘response activity’ provides a number of questions as stimulus for small group discussion, and could be used in follow-up to this diagnostic question:

* Response activity: Food web discussion

A number of authors have suggested ways to increase student engagement and help develop their understanding of food chains and food webs, including challenging students to draw or paint their own food web art from observations in the field (Conkey and Green, 2018). The following BEST ‘response activity’ describes such as activity, and could be used in follow-up to this diagnostic question:

* Response activity: Food web art!

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