**Pyramids of biomass: FIT Task**

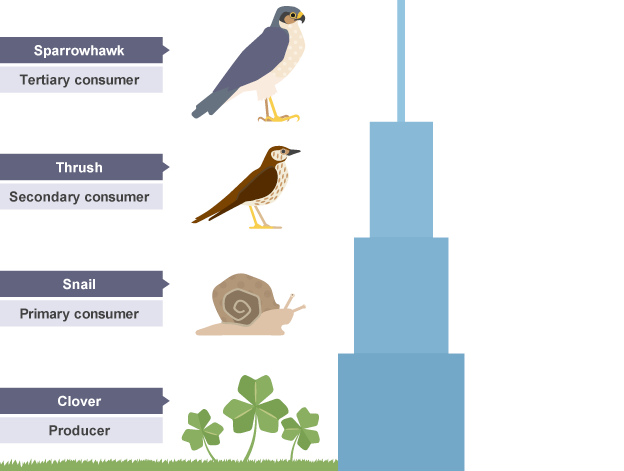
We can measure the amount of biomass at different trophic levels in a food chain. The total biomass of each trophic level is often represented as a modified bar chart called a pyramid of biomass. In a food chain from a healthy ecosystem the biomass at each trophic level must reduce. An example of a food chain is:

clover → snail → thrush → sparrow hawks

So in an ecosystem the clover has more biomass than all the snails, which have more biomass than all the thrushes and so on. We say that pyramids of biomass are always perfectly shaped. If this is not the case, then the ecosystem is likely to be unhealthy and in danger.

***Pyramids of biomass must be drawn with the:***

1. bars equally spaced around the midpoint
2. bars touching
3. bar for the producer at the bottom
4. length of each bar is proportional to the amount of biomass available at each trophic level



**FIT Task**

**Q1)** Revisit the Pyramids of Biomass exam question. Draw the Pyramid of Biomass axis from the question sheet and complete the questions**.**

**Q2)** Complete the pyramids of biomass questions.

***Self-assess using purple pen from the mark schemes.***

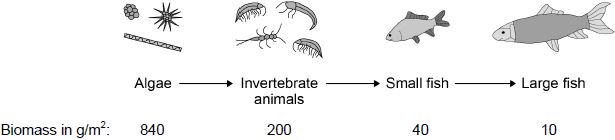
***Email if any questions/ further support required CSE@tda.education***

**Q1. Figure 1** shows:

•   a food chain for organisms in a river

•   the biomass of the organisms at each trophic level.

**Figure 1**

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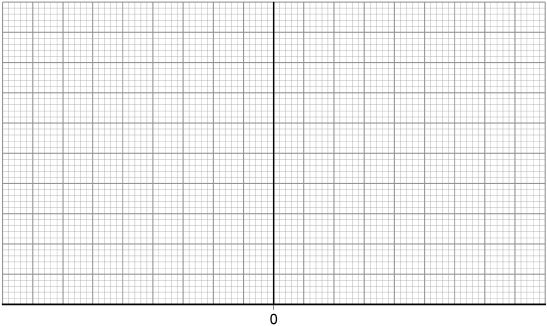
(a)  Draw a pyramid of biomass for the food chain in **Figure 1** on **Figure 2**. You should:

•   use a suitable scale

•   label the x-axis

•   label each trophic level.

**Figure 2**

****

**(4)**

(b)  Calculate the percentage of the biomass lost between the algae and the large fish.

Give your answer to 2 significant figures.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Percentage loss = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(3)**

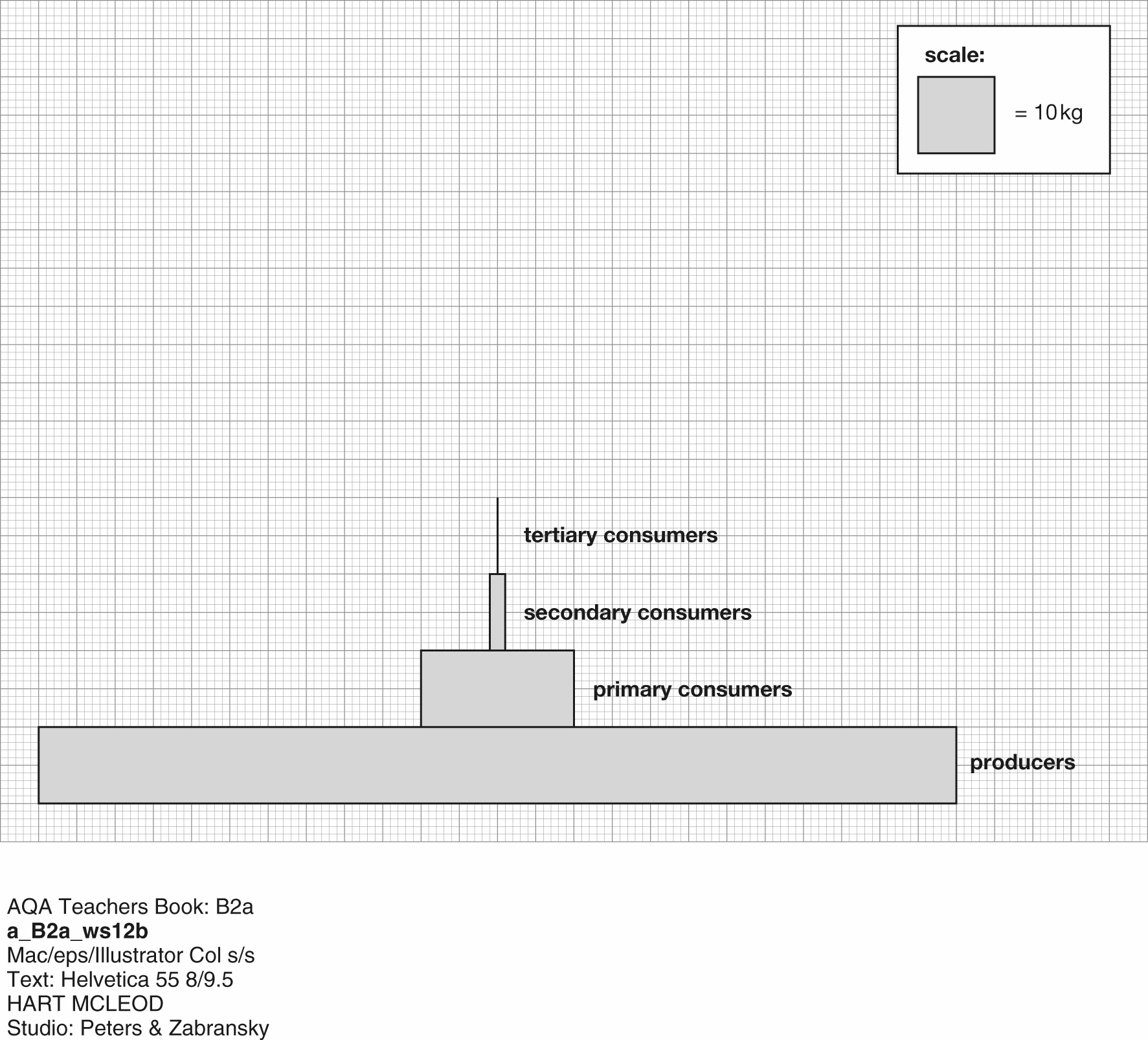
(c)  Give **one** way that biomass is lost between trophic levels.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(1) **(Total 8 marks)**

**Q2**

More about pyramids of biomass

This diagram shows a pyramid of biomass for the organisms in a pond.



Questions

**1** Each 1 cm square represents 10 kg of biomass. What is the biomass of the producers in the pond?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kg

**2** What is the biomass of the primary consumers in the pond?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kg

**3** Suggest the names of some organisms in the pond that could be:

Producers \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Primary consumers \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Secondary consumers \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Tertiary consumers \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4** Which of the organisms you have named in question 3 are herbivores?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

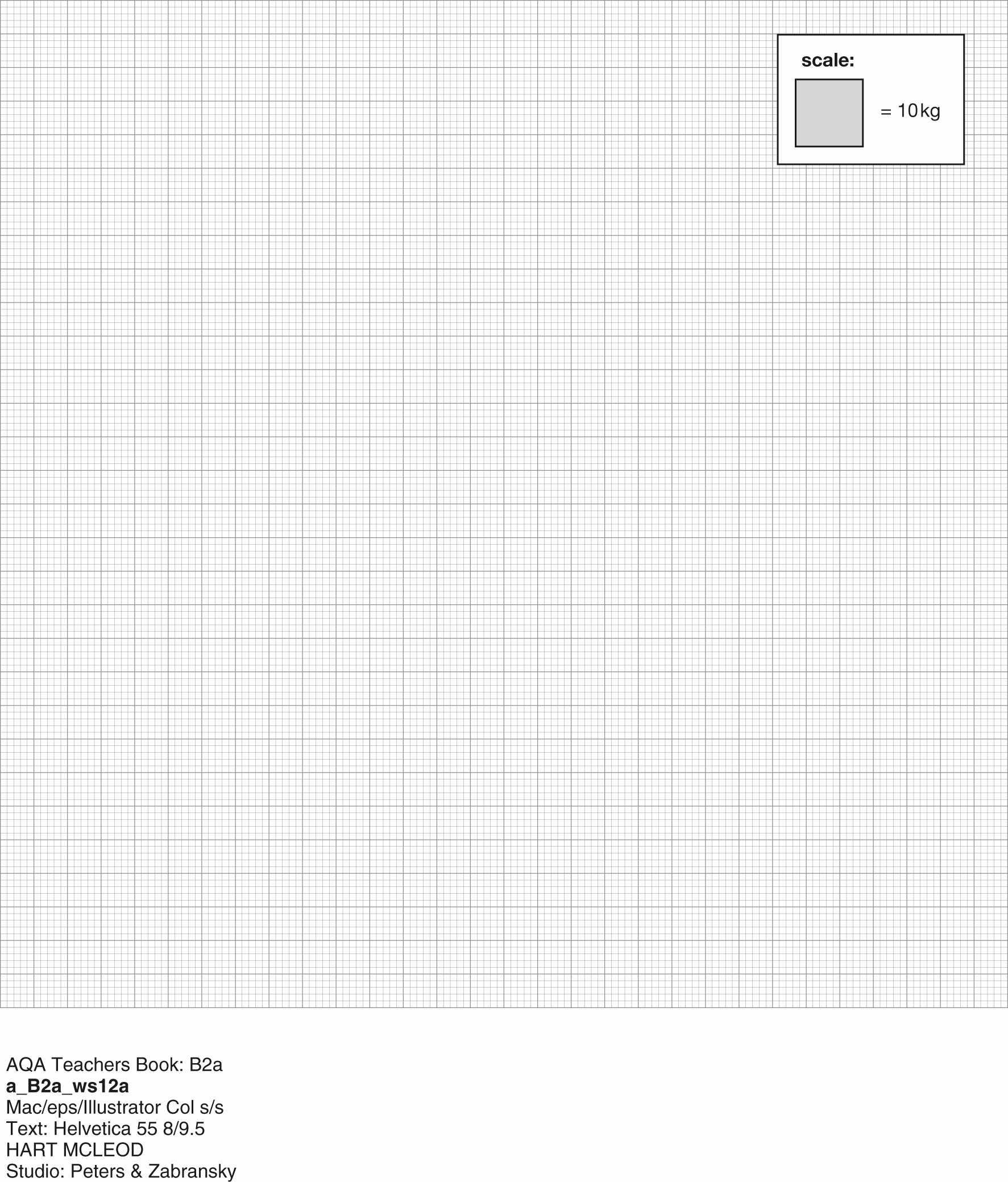
Drawing a pyramid of biomass

**5**

This table shows the mass of the populations of different kinds of organisms in a large pond.

|  |  |
| --- | --- |
| **Organisms** | **Total mass / kg** |
| Producers | 240 |
| Primary consumers | 20 |
| Secondary consumers | 2 |
| Tertiary consumers | 0.2 |

On the grid below, use the data to construct a pyramid of biomass.



**Mark Schemes**

**Q1.**

(a)  *x*-axis: scale + labelled, including units

*scale ≥ ½ width of graph paper label: biomass in g/m2*

**1**

bar widths correct

*± ½-square each side*

*allow 1 mark if 3 correct*

**2**

all 4 bars correctly labelled

*large fish + small fish + invertebrate (animals) + algae*

***or***

*(trophic level) 4 + 3 + 2 + 1*

***or***

*tertiary consumer + secondary consumer + primary consumer + producer*

*ignore bar heights*

**1**

(b)   

*allow equivalent calculation*

**1**

98.809523... / 98.810 / 98.81 / 98.8

**1**

99

*allow answer given to two significant figures from an incorrect calculation in step 2*

**1**

*an answer of 99 scores* ***3*** *marks*

(c)  inedible parts / example

*allow eaten by other animals* ***or*** *not all organisms eaten*

**or**

egested / faeces

*allow not digested*

*allow excretion / urine*

*ignore waste*

**or**

respiration / as CO2

*ignore energy losses*

*ignore movement*

**Q2**

**1** 120 kg.

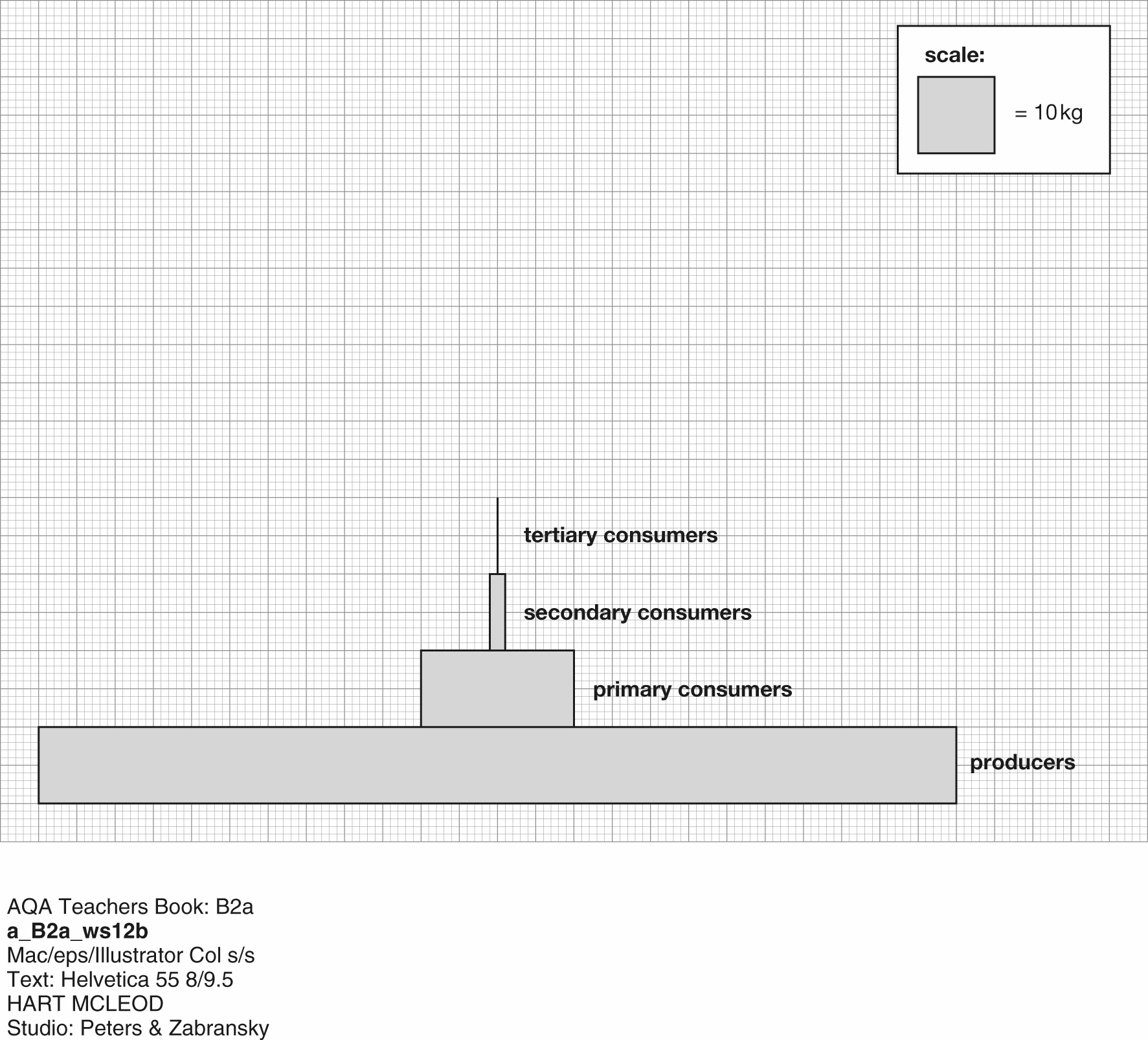
**2** 20 kg.

**3** Possibilities include:

* producers; any water plants
* primary consumers; tadpoles, herbivorous fish, pond snails
* secondary consumers and tertiary consumers; frogs, water boatmen, dragonfly larvae, water beetles, newts

1. The primary consumers are herbivores.

**5**



<https://www.youtube.com/watch?v=sgh1OWm0oTQ>

(Free Science Lessons)

<https://www.bbc.co.uk/bitesize/guides/zs7gw6f/revision/2>