

## Solutions

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Each answer shows the steps, then the **result**.

### 2.1

- a producer **makes its own food** (usually by photosynthesis)

### 2.2

- arrows show the **direction of energy flow**

### 2.3

- 10% is the energy **passed on** to the next trophic level
- any **two** of: heat from respiration / faeces / urea

### 2.4

- fox: **secondary consumer**
- grass: **producer**

### 2.5

- only about **10%** passes to each next level
- after four or five levels **too little energy** is left

### 3.1 B

- the rabbit eats the producer, so it is a **primary consumer**
- A is grass; C is the fox; D is bacteria/fungi

### 3.2

(a)

- animals that ate rabbits would have **less food** and may decrease
- plants the rabbits ate may **increase**

(b)

- **overharvesting** (e.g. overfishing) or introducing a foreign species

### 3.3

(a)

- producer: **lettuce**
- secondary consumer: **thrush**

(b)

- arrows show the **direction of energy transfer** (eaten → eater)

(c)

- caterpillars **rise**: less competition for lettuce

- hawks **fall** (or stay similar): thrushes have lost a food source

(d)

$$\frac{290 \text{ kJ}}{48\,000 \text{ kJ}} \times 100 = \mathbf{0.60\%}$$

(e)

- energy is lost at **each of the two transfers**
- as heat from respiration, in faeces and in excretory products
- not all of each organism is eaten, so only a **small fraction** reaches the thrushes