

Solutions

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

2.1

- the main energy source for almost all food chains is the **Sun**

2.2

- most energy is lost as **heat** (from respiration)

2.3

- any **three** of: heat from respiration / faeces / urea / parts not eaten

2.4

- only about **10%** of the energy is passed on
- so **less biomass** can be supported at each higher level

2.5

- eating crops is **one transfer** instead of two
- each transfer loses about 90%, so a shorter chain **supports more people**

3.1 B

- about **10%** of energy passes to the next trophic level
- A is too low; C and D are too high

3.2

(a)

- energy is **lost at each level**
- after a few levels **too little is left** to support another

(b)

- eating plants is **one** trophic level
- eating meat **adds a level**, so it is less efficient

3.3

(a)

$$\frac{180\,000 \text{ kJ}}{2\,400\,000 \text{ kJ}} \times 100 = \mathbf{7.5\%}$$

(b)

$$\frac{9\,000 \text{ kJ}}{180\,000 \text{ kJ}} \times 100 = \mathbf{5.0\%}$$

(c)

- any **three** of: heat from respiration / faeces / urea / parts not eaten

(d)

- grow **crops for people** instead of grazing cattle
- this **removes one transfer**
- about 90% is lost at each transfer, so **more energy reaches people**

(e)

- only 9 000 kJ reaches humans, and about 90% of that would be lost again
- about 900 kJ is **too little** for a fourth level