

Solutions

2.1

: grass, grasshoppers, frogs or soil microbes as living component.: water, mineral nutrients or light as nonliving component.

2.2

: $\text{efficiency} = \text{next energy} / \text{previous energy} \times 100\%$.: $600/5000 \times 100\% = 12\%$.

2.3

: $\text{efficiency} = \text{next energy} / \text{previous energy} \times 100\%$.: $60/600 \times 100\% = 10\%$.: the first transfer is 12%, and these defined period values do not establish every ecosystem's transfers.

2.4

: food-to-consumer, grass $\rightarrow$ grasshopper $\rightarrow$ frog.: decomposers help make nutrients available again and matter can cycle.: energy is transferred and dissipated rather than recycled indefinitely back to the producer.

3.1

each: energy budget contains no population counts; change in prey may affect consumers but other foods/conditions matter; no exact matched percentage or next-week timing is supplied; one species' total count does not measure all biodiversity; examine variety of organisms and the chosen diversity measure; obtain comparable repeated observations before claiming a trend.

3.2

Local analytic rubric, 8 $\times$: give correct chain direction; identify producer/consumer relation; state 12% first transfer; state 10% second transfer; reject universal percentage; distinguish matter from energy; avoid exact population prediction; explain need for broader biodiversity evidence; coherent truthful 80–110 word response. Example: "Energy transfers from grass to grasshoppers and then frogs, so the arrows point from food to consumer. The supplied meadow values give twelve percent efficiency for the first transfer and ten percent for the second. These numbers concern defined levels and one period; they do not establish a universal percentage. Decomposers help return nutrients to available forms, but energy is dissipated rather than recycled indefinitely. The record does not provide population trends, so it cannot predict an exact frog decline next week. A grasshopper count alone also cannot describe the variety of organisms needed for a broader biodiversity assessment."