

High School Biology

Energy transfers in food chains worksheet

Use this equation to complete the following questions:

$$\text{efficiency} = \frac{\text{energy used for growth (output)}}{\text{energy supplied (input)}}$$

Remember to show your workings, and present your final answer as a percentage.

You will need to include the units.

1. In a woodland ecosystem an oak tree receives 3,000,000 kJ of energy from the Sun and uses 150,000 kJ to produce biomass. The caterpillars that feed on the oak tree then consume 150,000 kJ but use 22,500 kJ for growth. The owl that feeds on the caterpillars consumes 22,500 kJ and uses 2,000 kJ for growth.

a) What is the energy efficiency of the oak tree converting light energy into biomass?

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b) What is the energy efficiency of the caterpillars feeding off the tree?

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c) What is the energy efficiency of the owl feeding on the caterpillars?

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d) What is the energy efficiency of the whole food chain?

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2. What would the input be if the output was 70,000 kJ and the efficiency was 12%?

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- 3 What would the output be if the efficiency was 3.5% and the input was 1,050 kJ?

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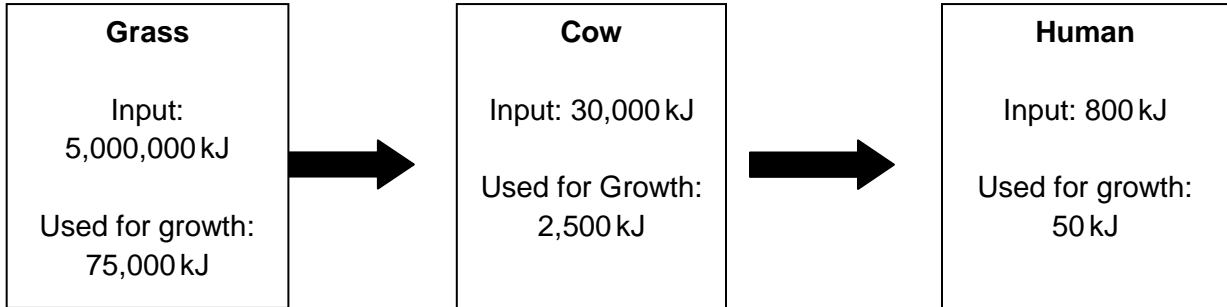
4. What would be the percentage of energy wasted if the input was 2,000,000 kJ and the output was 4,000 kJ?

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6. Calculate the efficiency for each stage in this food chain:



a) Grass

b) Cow

c) Human

d) What percentage of energy is wasted by the grass?

e) What percentage of energy is wasted by the human?