Energy flow through ecosystems - Answers

1. What is the difference between a producer, a consumer and a decomposer?

   The way they obtain energy: Producers convert energy from the sun into stored chemical energy, consumers obtain energy by consuming other organisms, decomposers obtain energy from dead matter.

2. Why do most food chains only have three or four trophic levels?

   Because energy transfer is inefficient: Not all available energy is fixed by producers and not all available energy is absorbed by consumers. Energy is lost at each stage through respiration, excretion and death.

3. This diagram shows the amount of energy (in kJ m^{-2} yr^{-1}) at different points in an ecosystem. Fill in the blank values.

   a) 16 000 b) 7 500 c) 130

4. How are these figures consistent with the principles of energy transfer through ecosystems?

   Only around 10% of energy is transferred to the next trophic level (16% from producers, 12% from primary consumers and 9% from secondary consumers)

5. How is energy stored at each stage in a food chain?

   In biomass - as chemical energy.

6. What is the difference between Gross Primary Productivity (GPP) and Net Primary Productivity (NPP)?

   Energy lost in respiration - Gross Primary Productivity (GPP) is the total amount of energy fixed as biomass through photosynthesis in a given area over a given time. Net Primary Productivity (NPP) is the GPP minus the energy used by the producer in respiration.

7. The diagram shows the transfer of energy through a cow. Figures are in kJ x 10^{6} yr^{-1}

   a) Complete the equation below using the letters C,F,R and U.

   P= C-R-U-F or P= C- (R+U+F)

   b) Calculate the value of P

   3.74

7. Keeping cattle in barns leads to higher energy efficiency. Why?