Practice Questions: 12/7

**1.** The diagram below shows storages (in percentage of total water) and flows in the global water cycle. The rates of flow are given in 1015 kg yr–1.



(a) (i) What is the source of energy which drives the water cycle? ........................ .

**(1)**

(ii) In which of the processes given in the diagram does this energy enter the cycle?

 **(1)**

(b) (i) What percentage of all precipitation falls directly into the oceans?

 **(1)**

(ii) What percentage of all evaporated water comes from the oceans?

 **(1)**

(c) (i) Assuming the cycle is in steady state, what mass of water flows into the oceans through run-off and groundwater flow per year?

 **(2)**

(d) Name a storage of water in the biosphere that is not shown in the diagram, and explain how water is transferred in and out of this storage.

(e) Identify each of the different processes referred to on the diagram as either transfer or transformation processes.

2. (a) Define the term *feedback*.

(b) Explain, with the help of an example, the term *negative feedback* in relation to an ecosystem.

**3.** (a) Outline the Gaia philosophy.

 (b) Explain the difference between an open system and a closed system.

 (c) What was Biosphere 2? What kind of system was it?

4. Distinguish between *r*-species and *K*-species.

5. A tree can be thought of as a system. Draw and label a systems diagram of a tree that shows inputs, outputs and storages of matter and energy.

6. State **two** functions of producers in an ecosystem.

7. For a **named** ecosystem, draw a food chain with **named** species showing **three** appropriately labelled trophic levels.

**8.** The graph below shows the interdependence of population size of two species of mites. *Eotetranychus sexmaculatus* serves as the food supply for *Typholodromus occidentalis*.

[Source: C B Huffaker, (1958), *Hilgardia*, Volume 27, pages 343–383.
Reprinted by permission of University of California Press.]

(a) Predict when the next population maximum of *T. occidentalis* will occur. Show your working.

 **(2)**

(b) Determine the numbers of both organisms on September 30.

*T. occidentalis*: ............................................................................................................

*E*. *sexmaculatus*:

**(1)**

(c) (i) Identify the five day period for which the rate of increase of *E*. *sexmaculatus* is at its maximum.

 **(1)**

(ii) Determine when the difference in numbers between both populations is at a maximum.

 **(1)**

(d) (i) Calculate the time lag between the maximums of both species in the period from October 5 through November 5.

 **(1)**

(ii) Suggest a reason for this time lag.

 **(1)**

(e) (i) Describe the role that negative feedback might play in this species interaction.