25 Interdependence of living organisms - *answers*

1 *Carnivores*: dog, shark, lion, eagle, seal, grass snake.
Herbivores: cow, rabbit, sheep, deer, giraffe, horse.

2 *Producers*: tree, phytoplankton, grass, wheat.
Primary consumers: caterpillar, mouse, locust, goat.
Secondary consumers: falcon, pike, cat, otter.

3 (a) Microscopic green algae, shrimps, marine worms, starfish, gull.
(b) The producers are the microscopic green algae and seaweed.
(c) Primary consumers: shrimps, acorn barnacles, limpets, mussels, periwinkles, top shells.
Secondary consumers: crabs, prawns, marine worms, goby, blenny, starfish, dog whelk and sometimes octopus and gull.
Tertiary consumers: octopus, gull and sometimes starfish.
(d) If the mussels are killed the starfish will (i) decrease in numbers, (ii) eat more marine worms. The gull population may decline and gulls may eat more dog whelks. Each of these events will affect most of the other steps in the food web.

4 Trout eat aquatic insects, many of which eat microscopic algae (phytoplankton) which make their food by photosynthesis. Potatoes are stem tubers containing food which the potato plant made in its leaves (by photosynthesis). Mushrooms feed on decaying organic matter which comes from (i) dead plants which had made their food by photosynthesis or (ii) remains or faeces of animals which fed on plants, or on animals which ate plants which photosynthesised.

5 (c) On average, only 1 % of the sun's energy is used in photosynthesis.

6 (b) On average, 10% of food given to cattle is converted to flesh and bone.

7 In a food chain, *energy* passes from one *trophic level* to another. The *biomass* of the *consumers* is always less than that of the *producers* because most of the food eaten by the *consumers* is used to produce *energy* rather than new growth.

8 Bacteria and fungi are the principal decomposers.

9 (a) animals, (b) respiration, (c) carbon dioxide, (d) photosynthesis, (e) respiration, (f) eaten by.

10 (a) Carbon dioxide is removed from the air by the photosynthesis of green plants and by being absorbed by the sea.
(b) Respiration, decay and combustion of carbon- containing compounds add to the carbon dioxide in the air.

11 (a) Nitrifying bacteria in the soil convert ammonia and other nitrogenous substances (e.g.urea) into nitrates.
(b) Nitrogen-fixing bacteria (in the soil or in root nodules) convert gaseous nitrogen into nitrogenous compounds.
(c) Denitrifying bacteria in the soil, decompose nitrogenous compounds to produce gaseous nitrogen.

Interdependence of living organisms - *answers* (continued)

12 Nitrates are removed from the soil by plant roots, by being washed out in rainwater and by the activities of denitrifying bacteria.

13 (a) (i) clouds, (ii) plants, (iii) sea.
(b) Humans are likely to interrupt the water cycle (1) between rivers and the sea (by irrigation and domestic and industrial use), (2) between soil and rivers (by drainage schemes, afforestation or deforestation), (3) between plants and clouds (by deforestation).

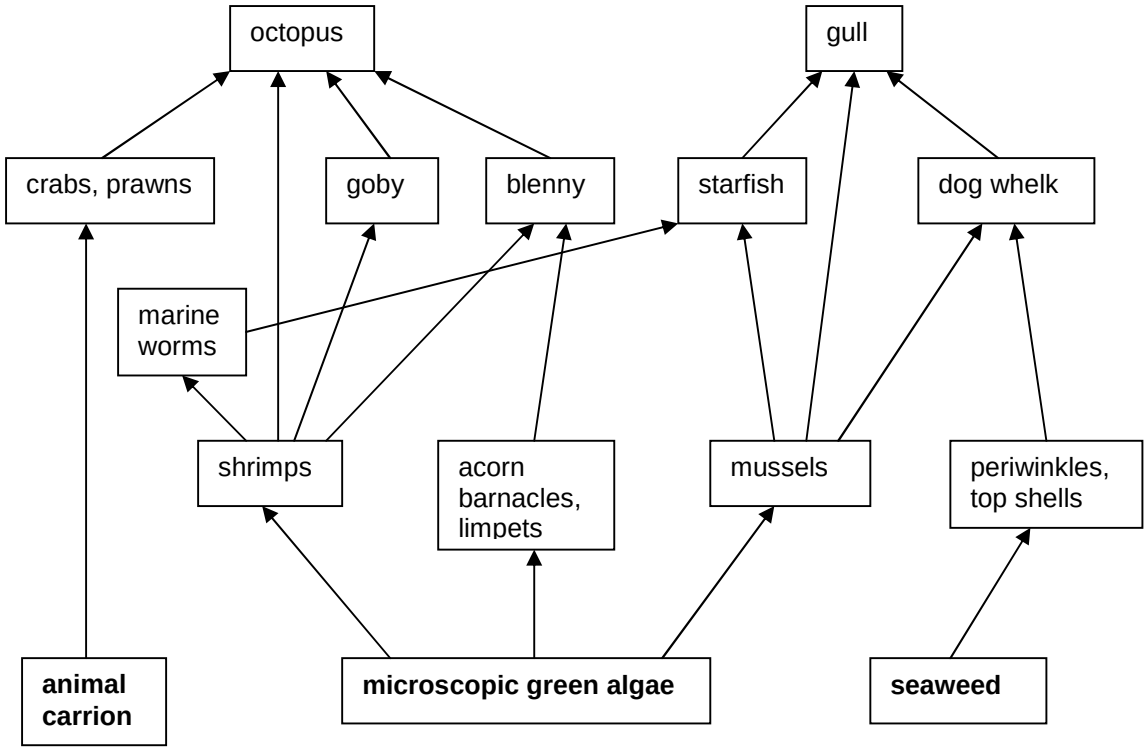
14 (a) (i) Soil quality is improved by adding organic manure or compost and artificial fertilisers, by adding lime (to reduce acidity), by ploughing (to improve aeration and drainage), by draining (to reduce waterlogging).
(ii) Farmers try to select crop plants which have a high yield and which are resistant to diseases.
(b) Farmers irrigate their crops and try to eliminate weeds and pests.

25 Interdependence of living organisms

1 Classify the following animals as either carnivores or herbivores.
cow, rabbit, dog, shark, sheep, deer, lion, eagle, giraffe, seal, grass snake, horse

2 Classify the following as producers, primary consumers or secondary consumers.
caterpillar, falcon, mouse, tree, phytoplankton, pike, cat, grass, locust, goat, otter, wheat

3 The diagram represents a food web that might occur on a rocky seashore.



(a) Pick out a food chain that includes shrimps and ends with gulls.
(b) Which are the producers?
(c) Name a primary, secondary and tertiary consumer in the food web.
(d) What might happen to the food web if all the mussels were killed by a pollutant?

4 A meal consists of grilled trout, potatoes and mushrooms. Explain how each item is ultimately the product of photosynthesis.

5 On average, what percentage of the sun's energy, which reaches the surface of the Earth, is used for photosynthesis?
(a) 100% (b) 10% (c) 1% (d) 0.1 %

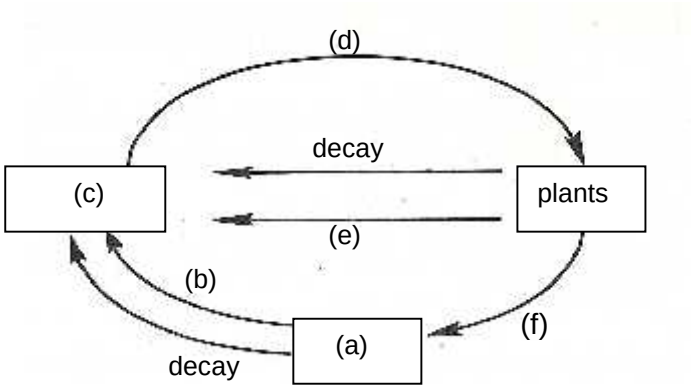
6 On average, what percentage of the food given to cattle is converted to flesh and bone?
(a) 100% (b) 10% (c) 1 % (d) 0.1 %

7 Choose the most appropriate words from the list below to complete the following paragraph.
In a food chain, …… passes from one …… to another. The ……of the …… is always less than that of the ……because most of the food eaten by the …… is used to produce ……rather than new growth.
biomass, sunlight, trophic level, photosynthesis, producers, energy, consumers, decomposers

Interdependence of living organisms (continued)

8 Which two major groups of organisms make up the bulk of the decomposers?

9 The diagram represents part of a simplified carbon cycle. Write the name of the organisms, substances or processes represented by the letters (a)-(f).



10 What processes (a) remove and (b) add to the carbon dioxide in the air?

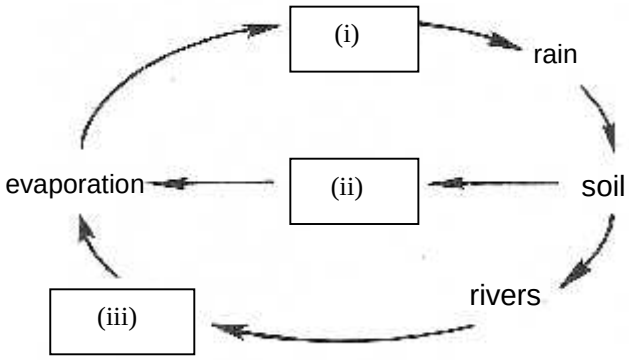
11 What part do (a) nitrifying, (b) nitrogen-fixing and (c) denitrifying bacteria play in the nitrogen cycle?

12 What processes remove nitrates from the soil?

13 The diagram represents a simplified water cycle.

(a) Say what might be represented by (i) - (iii).

(b) At which three points in the cycle are humans most likely to interfere?



14 (a) In what ways do farmers try to improve the quality of (i) their soil, (ii) their crop plants?

(b) What other steps do farmers take to maximise the yield from their crops?