**Q 2016 1**

Explain the following terms.

1. Ecology.
2. Symbiosis.
3. Nutrient recycling.
4. Contest competition.
5. Edaphic.
6. Biotic.

**MS 2016 1**

|  |  |
| --- | --- |
| **1.** | **2(7) + 3(2) i.e. best five answers from (a) – (f)** |
| (a) | *Ecology:* The study of (the various interactions between) organisms and their environment |
| (b) | *Symbiosis:* (A relationship) between species in which at least one benefits |
| (c) | *Nutrient recycling:* Reuse (of nutrients) |
| (d) | *Contest competition:* A struggle for a resource in which only one wins |
| (e) | *Edaphic:* (Relating to) soil |
| (f) | *Biotic:* (Relating to) living (organisms) |

**Q 2016 10**

(a) (i) What is the precise meaning of the term *niche* as used by ecologists?

1. From your investigations of a **named** ecosystem, give **one** example **each** of:
   1. A safety hazard.
   2. A source of error. **(9)**
2. In the course of your studies you carried out an investigation of an ecosystem.
   1. In the case of this **named** ecosystem, explain how you carried out **each** of the following.
      1. Collection of fauna using a named method.
      2. Identification of the collected fauna.
      3. A quantitative study of a **named** plant species.

In your answer explain how you ensured that the sample was random.

* 1. Why is it essential to use a random sampling technique?
  2. Suggest **two** abiotic factors that could affect the distribution of the named plant species.
  3. State **one** way in which human activity can have an impact on your named ecosystem.

### (27)

1. A typical grazing food chain, consisting of four trophic levels, is shown below. Each letter represents a different species.

A → B → C → D

* 1. What is meant by the term *trophic level*?
  2. Explain why food chains are generally short.
  3. Which letter represents the secondary consumer?
  4. Give a possible reason why the population of C may decline naturally.
  5. Suggest a possible consequence for the population of A if the population of C was significantly reduced. Explain your answer.
  6. Suggest how members of species D might respond, if the population of C was significantly reduced.
  7. A food web is a series of interconnected food chains. Suggest how it may be possible for the secondary consumer, in the food chain above, to be a primary consumer in another food chain.

**MS 2016 10**

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| --- | --- | --- | --- | --- | --- |
| **10.** | (a) | (i) | *Niche:* An organism’s role **or** an organism’s function (in the ecosystem). | | **3** |
|  |  | (ii) | *If answers do not match named ecosystem, maximum of 3 marks* | |  |
|  |  |  | 1. | *Safety hazard:* Any valid hazard (e.g. wet grass or broken glass) | **3** |
|  |  |  | 2. | *Source of error:* Any valid error (e.g. miscounting **or** misidentification) | **3** |
|  | (b) | (i) | 1. | *Animal collection method:* Pitfall trap **or** mammal trap **or** beating tray **or** pooter |  |
|  |  |  |  | **or** picked up **or** any named suitable method | **3** |
|  |  |  | 2. | *Identification:* (Identification) key **or** photograph(s) **or** picture(s) | **3** |
|  |  |  | 3. | *Quantitative method details:* (place) quadrat/ count named plant or note presence |  |
|  |  |  |  | of named plant/ repeat/ tabulate or record/ how result expressed | **2(3)** |
|  |  |  |  | How random | **3** |
|  |  | (ii) | *Why random:* To prevent bias | | **3** |
|  |  | (iii) | *Abiotic factors:* pH/ temperature/ light intensity/ water current/ air current (or | |  |
|  |  |  | wind)/ dissolved oxygen/ mineral content/ % air in soil/ % water in soil/ | |  |
|  |  |  | % humus/ salinity/ (degree of) exposure/ slope/ aspect/ altitude/ soil type | | **2(3)** |
|  |  | (iv) | *Human activity:* Pollution **or** conservation **or** waste management **or** any valid example | | **3** |
|  | (c) | (i) | *Trophic level:* Position on the food chain **or** feeding level **or** energy level | | **3** |
|  |  |  |  | **or** feeding stage |  |
|  |  | (ii) | *Why chains short:* Little (10%) energy passed on to next level | |  |
|  |  |  |  | **or** large amount (90%) of energy lost at each level | **3** |
|  |  | (iii) | *Secondary consumer:* \*C | | **3** |
|  |  | (iv) | *Why C might decline:* Predation **or** increase in D **or** disease **or** lack of food | |  |
|  |  |  |  | **or** lack of B **or** migration | **3** |
|  |  | (v) | *Consequence:* (Population A) falls | | **3** |
|  |  |  | *Explanation:* Population of primary consumers increases **or** population | |  |
|  |  |  |  | of B increases (which eat large amount of producer A) | **3** |
|  |  | (vi) | *How D might respond:* Migrate **or** switch prey | | **3** |
|  |  | (vii) | *How possible primary consumer in other food chain:* It may be an omnivore **or** explained | | **3** |

**Q 2015 2**

1. (a) What do ecologists mean by the term *scramble competition*?
2. Give **one** example of a factor, other than light, which may be a source of competition among plants.
3. Give **one** example of a factor, other than food, which may be a source of competition among animals.
4. Caterpillars have mouth parts that are suitable for chewing on leaves, whereas the adult form, the butterfly, has long sucking mouth parts. Suggest how having different types of mouth parts reduces competition between the adults and the young of such species.
5. Answer the following questions in relation to a quantitative survey of a species of small herbaceous plant.
   1. Name the method that you would employ.
   2. How would you ensure that your sampling was random?
   3. Name **one** edaphic factor that could affect the distribution of this plant in the ecosystem.

**MS 2015 2**

2. 8 + 7 + 5(1)

1. All (individuals) get some of a (scarce) resource
2. Water **or** minerals **or** space
3. Water **or** mate(s) **or** shelter **or** territory (or space)
4. Different food **or** feed on different parts of the plant
5. (i) Frequency **or** cover **or** transect **or** quadrat
   1. Throw (object) over shoulder (and place quadrat) **or** random numbers matched to a Grid
   2. pH **or** temperature **or** air content **or** water content **or** mineral content **or** humus content **or** soil type **or** particle size **or** soil texture **or** soil microorganisms

**Q 2015 13**

1. (a) Explain the following words as used in ecology:
   1. Ecosystem.
   2. Community.
   3. Fauna. **(9)**
2. Answer the following questions in relation to the ecosystem you have studied.
   1. All organisms have adaptations that help them survive and thrive. Some adaptations are structural, other adaptations are behavioural.

**Behavioural adaptations** are the **techniques** by which organisms enhance their survival.

Name **one** predator from a **named** ecosystem that you have studied **and** give **one** adaptive

**technique** of the predator.

* 1. 1. What is meant by the term *variation*?

2. Give a reason why there might be variation in the height of a mature plant species in the ecosystem.

D

C

B

A

* 1. In relation to this diagram of a pyramid of numbers,
     1. name appropriate organisms at A, B, C and D.
     2. indicate which organism is most likely to be a herbivore.
  2. What is the significance of energy loss at each stage in a food chain in relation to:
     1. the length of the food chain?
     2. the number of organisms at the final trophic level?
  3. If a niche becomes vacant in an ecosystem for a decomposer species, suggest why some other decomposer species may not be able to occupy the vacant niche.

#### (27)

1. Using your knowledge of ecology, suggest why caution is advised regarding each of the following practices.
   1. The release of non-native animals into the Irish countryside.
   2. Using fishing nets of very small mesh size.
   3. Hedgerow cutting in spring and summer.
   4. Spreading slurry on farmland. **(2**

**MS 2015 13**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **13.** (a) | (i) | *Ecosystem:* | Organisms (interacting) with their environment | **3** |
|  | (ii) | *Community*: | All (or groups) of organisms found in an ecosystem | **3** |
|  | (iii) | *Fauna:* | \*Animals | **3** |
| (b) | (i) | Named predator **and** matching ecosystem | | **3** |
|  |  | Matching (behavioural) adaptive technique | | **3** |

|  |  |  |  |  |
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| (ii) | | 1.  2. | Differences within a population (or within a species or between individuals)  Differences in a named factor | **3**  **3** |
| (iii) | | 1. | D = Parasite  C = Named larger carnivore | **3, 2, 0** |
|  |  | B = Named smaller herbivore  A = Named (large) producer | |  |
|  |  | 2. B **or** herbivore named in (iii) B, above | | **3** |
|  | (iv) | 1. Limits the length (or described) | | **3** |
|  |  | 2. Limits the number (or described) | | **3** |
|  | (v) | May not be suitably adapted (or described) | | **3** |
| (c) | (i) | Can become pests **or** can spread disease **or** native organisms have | |  |
|  |  | reduced or no immunity to their parasites **or** eat native plants **or** eat | |  |
|  |  | native animals **or** eat crops **or** compete with native species | |  |
|  |  | or extinction of native species | | **6** |
|  | (ii) | Young (or small) fish trapped **or** reduced reproduction rates (or | |  |
|  |  | depletes fish stocks) **or** extinction of species | | **6** |
|  | (iii) | Disrupts (bird) nesting **or** endangering animals **or** disrupts food | |  |
|  |  | chains (or described) | | **6** |
|  | (iv) | Toxic **or** risk of infection **or** pollution of waterways (or described) | | **6** |

**Q 2014 1**

From your knowledge of ecology explain the following terms:

* 1. Biosphere.
  2. Niche.
  3. Biotic factor.
  4. Trophic level.
  5. Competition.
  6. Symbiosis.

**MS 2014 1**

|  |  |  |
| --- | --- | --- |
| **1.** | **2(7) + 3(2) i.e. best five answers from (a) – (f)** | |
| (a) | *Biosphere* | Parts of the earth where life (or organisms) exists |
| (b) | *Niche* | The (functional) role of an organism **or** a role explained |
| (c) | *Biotic factor* | A living factor (in an ecosystem) |
| (d) | *Trophic level* | Feeding level **or** energy level **or** position in food chain |
| (e) | *Competition* | The struggle for a resource (or named resource) |
| (f) | *Symbiosis* | Relationship between two species involving benefit. |

**Q 2014 15**

*Phytoplankton* is the collective term covering the small photosynthetic organisms which are part of aquatic ecosystems. The solid line in the graph below shows the fluctuation in phytoplankton numbers in a lake over a twelve month period. The broken lines show the variations over that period in temperature, light and nutrient levels



Nutrients

Light

Phytoplankton

Temperature

1. What does the graph tell you about the phytoplankton population?
2. Why do you think that **nutrient** levels are high in winter **and** then drop sharply in spring?
3. Give an example of an inorganic nutrient, necessary for phytoplankton growth, that you would expect to find in lake water.
4. *Zooplankton* is the collective term for the small animals present in the lake. **Copy the graph for phytoplankton into your answer book** and then, on the same axes and using a dashed

(---) line, show how the numbers of zooplankton would vary over the twelve month period. Briefly explain the graph that you have drawn.

1. Other than the effect of the zooplankton, suggest why the phytoplankton population drops in late autumn.
   1. **Read the passage below and answer the questions that follow**.

European rabbits were introduced by settlers into Australia in 1859. Within 70 years the rabbit population grew enormously across most of the continent. The rapid spread of the rabbit led to the destruction of large areas of vegetation, leading to the extinction of many plant species. Loss of vegetation leads to soil erosion as the exposed soil is washed or blown away, removing valuable soil nutrients required for new plants to develop. This soil is typically deposited in waterways, causing siltation and destroying aquatic ecosystems. Farmers battled the problem, fencing their properties with special netting, using poisons, digging out warrens and finally introducing the *Myxoma* virus as a form of biological control. This virus, a benign parasite of the Brazilian forest rabbit, was lethal for European rabbits. It quickly reduced Australia’s rabbits to a mere 5% of former numbers. However, this solution was not long-lasting and rabbit numbers recovered.

1. Describe a procedure for estimating rabbit numbers in an ecosystem.
2. Suggest **one** reason for the initial rapid increase of the rabbit population.
3. Give **two** possible effects on an ecosystem of the extinction of a plant species.
4. Suggest **one** advantage **and one** disadvantage of biological control of a pest organism.
5. Suggest **one** reason why the rabbit numbers recovered.

**MS 2014 15**

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| --- | --- | --- | --- | --- |
| **15.** | (a) | (i) | Decreases (or low) in winter / increases (or high) in spring **or** |  |
|  |  |  | decreases (or low) in spring / fluctuating (or low) in summer |  |
|  |  |  | / increases (or high) in autumn **or** decreases (or low) in autumn | **3(2)** |
|  |  | (ii) | Plankton absorb (or use) (nutrients) / |  |
|  |  |  | low plankton numbers (in winter) / |  |
|  |  |  | increasing (or high) plankton numbers (in spring) / |  |
|  |  |  | (extra) nutrients from dead organisms ***Any three*** | **3(2)** |
|  |  | (iii) | e.g. Nitrate [*accept* nitrogen] | **2** |
|  |  | (iv) | *Graph:* |  |
|  |  |  | Phytoplankton 2014 B |  |
|  |  |  | *Features to look for in Graph:* |  |
|  |  |  | Zooplankton numbers lower than phytoplankton / |  |
|  |  |  | curve more or less matches the phytoplankton curve / |  |
|  |  |  | speak shifted to the right / |  |
|  |  |  | autumn peak shifted to the right | **4(2)** |
|  |  |  | *Explanation:* |  |
|  |  |  | Zooplankton eat phytoplankton / (in a food chain) predator numbers |  |
|  |  |  | are smaller than prey numbers **or** explained / time lag required |  |
|  |  |  | for numbers to change | **2(2)** |
|  |  | (v) | Low temperature **or** low light (intensity) | **4** |

|  |  |  |  |  |  |
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| **15.** | (b) | (i) | *e.g. Capture-recapture*: how captured / how marked / animal welfare | |  |
|  |  |  | comment / release same place / recapture / count / | |  |
|  |  |  | formula **or** calculation described | | **6(2)** |
|  |  | (ii) | No predator **or** plenty of food **or** warm climate | | **3** |
|  |  | (iii) | Soil erosion / less nutrients / siltation / destroying aquatic ecosystems / | |  |
|  |  |  | decrease in consumer numbers / increase in numbers of other plant(s) | |  |
|  |  |  | / change of animal species | | **2(3)** |
|  |  | (iv) | *Advantage*: | No (harmful) chemicals **or** specific (target pest) | **3** |
|  |  |  | *Disadvantage*: | Possible extinction (of a species) **or** may not be |  |
|  |  |  |  | specific (or explained) **or** immunity develops **or** |  |
|  |  |  |  | balance of nature disturbed (or explained) | **3** |
|  |  | (v) | Immunity (to the virus evolved) | | **3** |

|  |  |  |  |  |  |
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| **15.** | (c) | (i) | War / famine / contraception / birth rate **or** death rate **or** longevity / | |  |
|  |  |  | natural disaster (or example) / disease **or** health care | | **3(2)** |
|  |  | (ii) | Better nutrition **or** better food distribution **or** better farming | |  |
|  |  |  | **or** improved food preservation techniques / | |  |
|  |  |  | new technology **or** improved living conditions / | |  |
|  |  |  | **or** improved medicine or improved hygiene | | **2(2)** |
|  |  | (iii) | Decrease **or** increase **or** stays the same | | **1** |
|  |  | (iv) | Reduce / reuse / recycle | | **3 (1)** |
|  |  | (v) | Any harmful addition to the environment | | **2** |
|  |  | (vi) | Decomposition (or explained) | | **2** |
|  |  | (vii) | 1. | *Plants:* absorb nitrates / synthesise protein / absorb CO2 / |  |
|  |  |  |  | synthesise carbohydrate (or photsynthesise) / respire / die | **3(2)** |
|  |  |  | 2. | *Animals:* consume plants / assimilate protein / assimilate. |  |
|  |  |  |  | carbohydrate / produce nitrogenous waste / respire / die | **3(2)** |

**Q 2013 Q 2**

Answer the following questions in relation to food chains.

1. Where in a food chain are primary producers found?
2. What term is used to describe organisms that feed on primary producers?
3. Why are most food chains short (i.e. only consist of a few trophic levels)?
4. What deduction may be made if the organisms at the start of the chain are less numerous than those that feed upon them?
5. (i) Can a parasite be the first member of a food chain?

(ii) Explain your answer.

1. Energy enters food chains in the form of light. In which form do you think most energy is lost from food chains?

**MS 2013 Q 2**

1. First (level)
2. Primary consumer(s) **or** herbivore(s)
3. (Large) energy loss (from one level to next) **or** small energy transfer
4. Producers are large **or** primary consumers are parasites
5. (i) No

(ii) (Parasites) are not producers **or** (parasites) are consumers (or explained)

1. Heat

**Q 2013 7**

(a) Distinguish between the terms *habitat* and *ecosystem* by writing a sentence about each.

(b) Answer the following questions in relation to a **named** ecosystem which you have investigated.

(i) How did you investigate a **named** abiotic factor, other than temperature or pH?

(ii) How were you able to identify the animals that you found in the ecosystem?

(iii) When conducting a quantitative survey of plants, how did you ensure that your sample was random?

(iv) In the case of a **named** animal **and** a **named** plant give an example of an adaptation to its habitat that you observed.

As part of your study of your selected ecosystem you constructed a pyramid of numbers. (v) Name the species that occupied the top of your pyramid.

(vi) What is the main prey of the species referred to in part (v)?

**MS 2013 7**

|  |  |
| --- | --- |
| **7.** (a) (i) Where an organism (or plant and animal) lives  (ii) Organisms (interacting) with their environment | **3**  **3** |
| 1. (i) Factor   How investigated   * 1. Key **or** (guide) book **or** illustrations   2. Method described must demonstrate randomness   3. Named animal + adaptation Named plant + adaptation   4. Named (species) of carnivore **or** of omnivore **or** of parasite   5. Matching named prey | **3**  **3**  **3**  **3**  **3**  **3**  **3**  **3** |

**Q 2013 15**

**Read the article below and answer the questions that follow:**

Cigarettes are bad for your health. But that’s only if you smoke them. If you use them to line your nest, they might actually do some good. Scientists have recently found that birds that decorate their nests with discarded cigarette butts full of nicotine are less bothered by parasites.\* When building a nest, birds tend to make do with the materials at hand. Twigs and leaves are popular choices. Some fresh green leaves give off strong smells. So how can city birds manage? Apparently, some reach for the fibres found in used cigarette filters.

Scientists got to wondering whether this habit might provide the birds with benefits other than bedding. So they investigated the nests of finches and sparrows that were living on the campus of the National University of Mexico, which is in the heart of Mexico City. The scientists used heat traps to lure the parasites and then counted them. Most of the nests contained cellulose fibres from broken cigarette filters. They found that nests with the most used cigarette filter fibres had the lowest number of parasites, in this case, blood sucking mites. For these birds, a butt a day might keep the mites away!

1. Name **one** bird from the study **and** name its parasite.
2. Explain the term *ectoparasite*.
3. Suggest **one** negative effect on birds or chicks of living in parasite-infested nests.
4. Apart from an effect on parasite numbers, suggest a reason for the use of the filter fibres in nest building.
5. State **one** benefit to a plant of giving off strong smells.
6. Suggest what might be trapped in used cigarette filters.
7. Suggest how the scientists might have measured the amount of cigarette filter fibre in one nest.
8. The scientists put unused cigarette filters beside the birds’ nests. Suggest a reason for this.
9. The nests containing unused filters showed a normal parasite load. Suggest **one** reason for this observation.

(b)

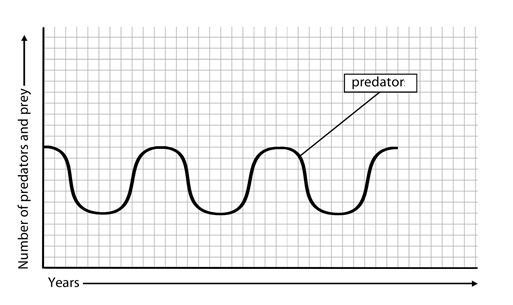
(i) Draw a large labelled diagram to illustrate the main features of the nitrogen cycle.

(ii) Outline **two** biological similarities between the nitrogen cycle and the carbon cycle.

(iii) Suggest why continual monitoring of the environment is valuable.

(iv) In the case of each of the following pairs of terms, distinguish between the members of each pair by writing a sentence about each term.

1. Contest competition and scramble competition.
2. Edaphic and aquatic.
3. Climate and weather

( c) The graph below shows the fluctuations in the population of a predatory species over many years.

1. **Copy the graph into your answer book.**

Then, on the same axes and using a dashed line (- - - -), show how you think the population of the predator’s main prey species might vary over the same timespan.

1. Give an explanation of the graph that you have drawn for the **prey** species.
2. Do you think that population graphs for a host species and its main parasite would show similar fluctuations? Explain your answer.

(iv) Suggest a role for parasites in the overall scheme of nature.

(v) 1. Name **two** predators.

2.Give **one** adaptive technique in the case of **each** predator.

|  |  |  |
| --- | --- | --- |
| **15.** (a) | 1. Finch (or sparrow) + (blood sucking) mites 2. (Organism living on) host (or explained) / causing damage 3. Disease **or** death **or** weakened (birds) 4. Readily available **or** shortage of normal material **or** similar to normal building material **or** suitable material **or** insulator 5. Repulsion (or described) **or** attraction (or described) 6. Tar **or** nicotine (or other named substance) **or** bacteria 7. By weighing it 8. Control (or explained) 9. No (mite)-repelling (or mite-killing) chemicals **or** absence of named chemical | **3** |
| **2(3)** |
| **3** |
| **3** |
| **3** |
| **3** |
| **3** |
| **3** |
| **3** |

|  |  |  |
| --- | --- | --- |
| **15.(b)**  (i) | * + Nitrogen gas to usable compounds /   + Plant protein to animal protein /   + Excretion releasing N compounds /   + Death and decomposition /   + Dead organic matter to ammonium   + Ammonium to nitrite /   + Nitrite to nitrate /   + Nitrates to plant protein /   + Nitrogen compounds to nitrogen gas /   + One example of bacterial involvement /   + Role of lightning   ***Any six***   1. Fixation (or explained) / bacteria (or micro-organisms) involved / death and decay / nutrition (or described) / excretion 2. To be able to detect change(s) **or** to remedy effect of change   **or** to detect levels of pollutants (or example)  *Contest:* one gets all (of the resource)  *Scramble:*all get some (of the resource)  *Edaphic:*to do with soil  *Aquatic:*to do with water  *Climate:*long-term (prevailing) conditions  *Weather:*short-term (atmospheric) conditions | **6(2)** |
| **2(2)** |
| **2** |
| **2** |
| **2** |
| **2** |
| **2** |
| **2** |
| **2** |

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| **15.** (c) | 1. *Graph:* Out of sync.   Most prey peaks higher than predator peaks   1. Explanation of time lag Explanation of bigger prey numbers 2. Yes (or No) + explanation 3. Population control 4. Name predator 1 Adaptative technique Name predator 2 Adaptative technique | **3** |
| **3** |
| **3** |
| **3** |
| **3** |
| **3** |
| **3** |
| **3** |
| **3** |
| **3** |

**Q 2012 11**

(a) (i) Distinguish between a food chain and a food web.

Include a clear reference to each in your answer.

(ii) What do ecologists mean by a *pyramid of numbers*? **(9)**

1. Organisms that are introduced into new environments outside their natural ranges are referred to as exotic species. In some cases these introductions have been deliberate and in other cases accidental e.g. when a species kept in captivity in a new country escapes and gives rise to a wild population. Worldwide, the great majority of deliberate attempted introductions have been unsuccessful.
2. Suggest a reason for attempting to establish an exotic species in a new country.
3. Suggest **two** reasons why the great majority of attempted introductions have been unsuccessful.
4. Use your knowledge of the life cycle of flowering plants to suggest how an exotic plant may escape from captivity.
5. Use the knowledge that you have gained in your studies of ecology to suggest how the introduction of an exotic species may:
   1. impact negatively on an existing community.
   2. impact positively on an existing community.
6. It has been stated that an exotic species has a good chance of becoming established in a new environment if there is a vacant niche.
   1. Explain the term *niche* in this context.
   2. Do you agree with the above statement?

Explain your answer.

1. **Name the ecosystem** which you investigated during your study of ecology.
   1. Explain the terms
      1. *Flora,*
      2. *Fauna.*
   2. Name **one** animal from your named ecosystem **and** describe how you carried out a quantitative study of that animal.
   3. Suggest **one** way in which marking an animal might endanger it.

Ecosystems are subject to changes, both natural and artificial.

* 1. Mention **one** of **each** type of change as it applies to your named ecosystem. **(24)**

**MS 2012 11**

|  |  |  |
| --- | --- | --- |
| **11.** (a) | (i) Chain: One species at each trophic (or feeding) level  **or** described **or** diagram | **3** |
| Web: Interconnected food chains **or** described **or** diagram **or** more than one species at each trophic (or feeding) level | | **3** |
| (ii) (Diagram) that shows the number of organisms at each trophic level | | **3** |
|  | |  |
| (b) | (i) Food source **or** biological control **or** aesthetic **or** sporting **or** other | **3** |
| (ii) Failure to adapt / example of failure to adapt / preyed upon / insufficient numbers / dispersal / competition ***Any two*** | | **2(3)** |
| (iii) Seed dispersal **or** fruit | | **3** |
| (iv) 1. Increased competition **or (**increased) predation **or** example of increased competition **or** example of increased predation  2. Control of nuisance species **or** food **or** shelter **or** other | | **3** |
| **3** |
| (v) 1. Role of organism (in an ecosystem) **or** explained e.g. „how it fits‟ | | **3** |
| 2+3. Yes, because it is adapted (or is suited) **or** explained  **OR**  No, because it is not adapted (or is not suited) **or** explained | | **6, 0** |
|  | |  |
| (c) Name of investigated ecosystem: | |  |
| (i) 1. \*Plants | | **2** |
| 2. \*Animals | | **2** |
| (ii) Named animal (must match named ecosystem and method if given) | | **2** |
| Details of method: | | **6(2)** |
| (iii) More conspicuous (to predators) **or** social outcast **or** toxic marker | | **2** |
| (iv) *Natural:* relevant matching example | | **2** |
| *Artificial:* relevant matching example | | **2** |

**Q 2012 4**

(a) (i) What does an ecologist mean by the term *conservation*?

(ii) Suggest a reason why nature reserves are important for conservation.

1. (i) Explain the term *pollution*.
2. Pollution may result from domestic, agricultural or industrial sources.

Select **one** of these areas **and** state an effect that may be produced by a **named** pollutant.

1. How may the pollution referred to in (ii) be controlled?
2. In relation to the incineration of domestic waste, suggest:
   1. an advantage of the process.
   2. a disadvantage of the process.

**MS 2012 4**

|  |  |  |  |
| --- | --- | --- | --- |
| **4.** |  |  | **2(7) + 6(1)** |
|  | (a) | (i) | Management of environment **or** management of species (or organism(s)) |
|  |  | (ii) | To allow species to develop **or** (maintaining) biodiversity  **or** prevent extinction **or** protection |
|  | (b) | (i) | Harmful addition to the environment (or named part of environment) |
|  |  | (ii) | *Pollutant:* Any relevant pollutant |
| *Effect:* Must match pollutant | | | |
|  |  | (iii) | Matching control measure for pollutant from (ii) |
|  | (c) | (i) | *Advantage:* Amount of waste greatly reduced **or** useable heat  **or** reduced landfill |
|  |  | (ii) | *Disadvantage:* Harmful products |

**Q 2011 3**

Choose suitable terms from the list below that most closely match each of the following descriptions:

***population; producers; competition; predation; community; symbiosis; decomposers; parasitism***

* 1. A situation in which one organism lives on or in a second species, feeding on it and causing it harm.
  2. Organisms capable of making their own food.
  3. All the members of a species living in an area.
  4. Micro-organisms and other organisms that return nutrients to the environment by decay.
  5. A situation in which two organisms of different species live together and at least one benefits.
  6. A struggle between organisms for a scarce resource.
  7. One organism killing and eating another organism.

**MS 2011 3**

|  |  |  |
| --- | --- | --- |
| **3. 6(3) + 2** | | |
|  | (a) | Parasitism |
|  | (b) | Producers |
|  | (c) | Population |
|  | (d) | Decomposers |
|  | (e) | Symbiosis |
|  | (f) | Competition |
|  | (g) | Predation |

**Q 2011 10**

1. (a) (i) Distinguish between *contest competition* and *scramble competition* by writing a sentence about each.

(ii) Name a factor, other than competition, that controls wild populations. **(9)**

1. What deduction is it possible to make from each of the following observations?
   1. In a particular area the population of a predator did not decline following a big reduction in the population of its main prey.
   2. Mortality levels resulting from infection by a particular virus tend to decline over the years.
   3. Where some members of a species remain in the same general area throughout life and some members are migratory, mortality levels tend to be higher in the migratory part of the population.
   4. There is a greater variety of herbaceous (non woody) plants in areas where grazing species, such as rabbits, are more plentiful than in areas where grazing species are less plentiful.
   5. In some species of migratory ducks in the northern hemisphere it is found that the wintering grounds of the males lie further south than those of the females. **(27)**
2. (i) In relation to a study of an ecosystem distinguish clearly between *qualitative* and *quantitative* surveys by writing a sentence about each.
3. How were you able to identify the different plants in the ecosystem that you investigated?
4. Describe how you carried out a quantitative survey of the major plant species.
5. Give **two** possible sources of error that may have arisen in the course of your survey. **(24)**

**MS 2011 10**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **10.** | (a) | (i) | *Contest:* (Results in) winner takes all (of a limited resource)  *Scramble:* (Results in) each gets some (of a limited resource) | **3**  **3** |
|  |  | (ii) | disease **or** parasitism **or** predation **or** hunting **or** reference to other named environmental condition | **3** |
|  | (b) | (i) | Different prey |  |
|  |  | (ii) | (Host) immunity develops **or** comment on natural selection (or described)  **or** most virulent strains die off **or** vaccination |  |
|  |  | (iii) | Hazards encountered on migration (or particular example of a hazard) |  |
|  |  | (iv) | (Grazing results in) reduced competition (or described) |  |
|  |  | (v) | Accept any ***biological knowledge-based*** statement that would provide a plausible rationale for a differential migratory pattern |  |
|  | (c) | (i) | *Qualitative*: What is present  *Quantitative*: How many present | **3**  **3** |
|  |  | (ii) | Key(s) **or** illustrations | **3** |
|  |  | (iii) | Quadrat / random / how random / count (or estimate) / many times / calculate (or record) ***Any 3***  **OR**  Transect / stations / intervals / count (or estimate) / how (counted) / result described ***Any 3*** | **3(3)** |
|  |  | (iv) | Misidentification / non-random (quadrat distribution) / not enough times / unsuitable quadrat size / miscount (or miscalculation) ***Any 2*** | **2(3)** |

**Q 2010 5**

5. Explain each of the following terms from your study of ecology.

(a) Biosphere ……………………………………………………………………………………………....

(b) Ecosystem ……………………………………………………………………………………………..

(c) Habitat …………………………………………………………………………………………………

(d) Symbiosis ……………………………………………………………………………………………...

(e) Biotic factor ……………………………………………………………………………………………

(f) Food Web ……………………………………………………………………………………………..

(g) Fauna ………………………………………………………………………………..…………………

**MS 2010 5**

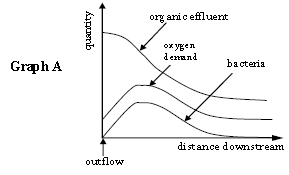
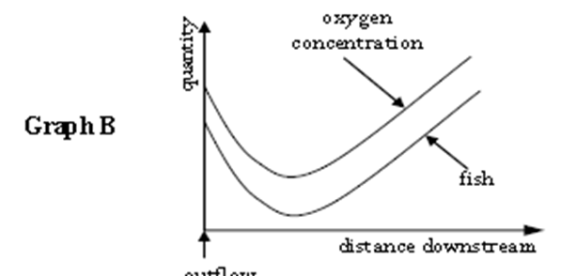
|  |  |  |  |
| --- | --- | --- | --- |
| **5.** |  | **6 (3) + 2** |  |
|  | (a) | Part(s) of earth that supports life |  |
|  | (b) | Organisms and their (interactions with) environment |  |
|  | (c) | (Place) where a species (or an organism) lives |  |
|  | (d) | Relationship between (different) species in which at least one benefits |  |
|  | (e) | Living (organism’s influence on another organism) |  |
|  | (f) | Interconnected food chains **or** more than one species at each trophic level |  |
|  | (g) | Animals |  |

**Q 2010 12**

12. (a) (i) Where are primary producers found in a pyramid of numbers?

(ii) Using named examples, construct a simple inverted pyramid of numbers. (9)

(b) A paper factory pumps liquid effluent into a river. The effluent contains sugar. Oxygen demand is the amount of oxygen needed by organisms living in a river. Oxygen concentration is the amount of oxygen dissolved in the river water.

Graph A shows changes in water conditions for several kilometres downstream from the factory outflow.

oxygen demand

(i) To which kingdom do bacteria belong?

(ii) Give one reason why the number of bacteria increases immediately downstream from the outflow.

* 1. Give one reason why the number of bacteria then decreases further downstream from the outflow.
  2. Describe how the oxygen demand changes as the number of bacteria in the water changes.

(v) Give a reason for your answer to part (iv).

Graph B shows the changes in oxygen concentration and the number of fish in the same river.

(vi) Explain why the curve for fish numbers is the same shape as that for oxygen concentration.

(vii) The oxygen concentration in the river water eventually increases with distance from the outflow. Suggest two ways by which this oxygen may enter the water.

(c) In your answer book, say whether each of the following statements is true or false and give a reason for your choice in each case

(i) Food chains are usually short.

(ii) The herbivores in an ecosystem normally live long lives.

(iii) The only remaining natural ecosystems in Ireland, for example mountain land above the heather line and salt marsh, are ones for which mankind has no use.

1. HIV / AIDS has orphaned many children in sub-Saharan Africa.

**MS 2010 12**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **12.** | (a) | (i) | Base **or** bottom | **3** |
|  |  | (ii) | Pyramid showing any inversion (*at least two levels*) | **3** |
|  | Any two named organisms in inverted relationship | **3** |
|  |  |  |  |  |
|  | (b) | (i) | Monera **or** Prokaryotae | **3** |
| **Graph A** | | (ii) | Availability of organic effluent **or** sugar **or** more food | **3** |
|  |  | (iii) | Decrease of organic effluent **or** sugar decreased **or** less food | **3** |
|  |  | (iv) | (Oxygen demand) increases as bacteria increase |  |
|  |  | **3** |
|  | (Oxygen demand) decreases as bacteria decrease |  |
|  |  | **3** |
|  | [*allow 6 marks for relationship is directly proportional*] |  |
|  |  | (v) | More bacteria need more O2 **or** fewer bacteria need less O2 | **3** |
| **Graph B** | | (vi) | Fish need O2 (for respiration) | **3** |
|  |  | (vii) | Agitation (weirs, waterfalls) / photosynthesis / from atmosphere | **2(3)** |
|  |  |  |  |  |
|  | (c) | (i) | True | **3** |
|  |  | Energy lost at (or between) levels **or** described | **3** |
|  |  | (ii) | False | **3** |
|  | Usually eaten by 2nd level consumers (or carnivores) | **3** |
|  |  | (iii) | True |  |
|  | Use causes change **or** no abuse **or** no economic value | **3** |
|  | **or** | **3** |
|  | False |  |
|  | Valid reason |  |
|  |  | (iv) | True | **3** |
|  | Premature death of parents **or** poor living conditions | **3** |
|  | **or** poor health care **(**or example) **or** poor education |  |
|  | **or** an example of a cultural reason |  |

**Q 2009 3**

1. Define *predation*.
2. Give an example of predation by naming a predator and its prey.
3. Explain the term *niche*.
4. Name an anabolic process carried out by plants.
5. Explain the term *edaphic*.
6. Give an example of an edaphic factor.

**MS 2009 3**

|  |  |  |  |
| --- | --- | --- | --- |
| **3.** |  | **6(3) + 2** |  |
|  | (a) | Killing (or catching) and eating another animal |  |
|  | (b) | Predator named |  |
|  |  | Its prey named |  |
|  | (c) | Organism's role in ecosystem **or** explained |  |
|  | (d) | Photosynthesis **or** protein synthesis |  |
|  | (e) | (To do with) soil |  |
|  | (f) | Particle size **or** soil type **or** pH **or** air content **or** water content **or** mineral content **or** temperature **or** humus content |  |

**Q 2009 11**

1. (a) (i) What does an ecologist mean by the term *conservation*?

(ii) Give an outline of **one** conservation practice used in agriculture **or** fisheries **or** forestry.

#### (9)

1. Read the following passage about foxes and answer the questions that follow:

Red foxes are found in many ecosystems. A pair of foxes will occupy a territory and will defend it from other foxes in the breeding season. Territory boundaries are marked with scent and urine. Red foxes are usually solitary and hunt alone except during the breeding season, when they hunt in family groups. The young accompany the parents while hunting and foraging in order to learn skills. Red foxes do not hibernate and are active all year round though they are nocturnal in habit. They are omnivores but they prefer animals such as small rodents, frogs, insects and birds. Preferred plant foods include acorns, grasses, fruits and berries. In urban areas they scavenge for discarded human food. They also eat roadkill whether in a rural or urban setting. (Adapted from: Ontario Ministry of Natural Resources fact sheet: Red fox ecology, 6th June 2007)

* 1. Give **two** activities of adult foxes, apart from breeding itself, which are associated with the breeding season.
  2. How is the territorial boundary marked?
  3. How do young foxes learn to hunt?
  4. Suggest a reason why wheelie bins are making life more difficult for urban foxes.
  5. What is meant by the term *omnivore*?
  6. Suggest an advantage to the fox of being “nocturnal in habit”.
  7. In general, are urban foxes or rural foxes more successful at finding food? Give a reason for your answer. **(27)**

1. (i) In relation to ecological surveys, explain the meaning of the terms:
   1. *Qualitative*.
   2. *Quantitative*.
2. In the course of your ecological studies you investigated an ecosystem. Name this ecosystem and describe how you conducted a **quantitative** survey of plants present in it.
3. How did you present the results of your survey?
4. Suggest a possible source of error in your survey.

**MS 2009 11**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **11.** | (a) | (i) | The management of the environment **or** of organisms | **3** |
|  |  | (ii) | Example / conservation benefit | **2(3)** |
|  |  |  |  |  |
|  | (b) | 1. | Occupying territory / defending territory / marking territory boundaries  / hunting in family groups **or** foraging in family groups | **2(3)** |
|  |  | 2. | With scent and urine | **3** |
|  |  | 3. | By accompanying the parents (on hunting trips) | **3** |
|  |  | 4. | They make waste food harder to get at **or** explained | **3** |
|  |  | 5. | Eats plants and animals | **3** |
|  |  | 6. | Avoids competition **or** more prey **or** enhance survival **or** less visible | **3** |
|  |  | 7. | Valid reasoned argument | **6** |
|  |  |  |  |  |
|  | (c) | (i) | 1. The types of organisms present | **3** |
|  |  | 2. Numbers of individuals **or** number of species | **3** |
|  |  | (ii) | Name of ecosystem | **3** |
|  | Quadrat / random / how random achieved / many times / |  |
|  | count **or** estimate / record |  |
|  | **OR** |  |
|  | Belt (or line) transect / stations / at intervals / place quadrat / count **or** | **3(3)** |
|  | estimate / record |  |
|  |  | (iii) | (Bar) chart **or** table **or** graph | **3** |
|  |  | (iv) | Not enough samples taken **or** example of human error | **3** |

**Q 2008 Q 7**

(a) (i) What is a habitat?

(ii) What is an ecosystem?

1. Answer the following questions by reference to a named ecosystem that you have investigated.

Name of ecosystem

* 1. List **three** abiotic factors that you investigated.
  2. For each of the three abiotic factors that you have listed describe how you carried out the investigation.
  3. In the case of a named organism give an adaptation feature that you noted.
  4. Briefly explain how the adaptation feature that you have given in (iii) is of benefit to the organism.

**MS 2008 Q 7**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **7.** | (a) | (i)  (ii) | (place) where organism (or species) lives organisms and their environment | **3**  **3** |
|  |  |  |  |  |
|  | (b) | name of ecosystem: | | **3** |
|  |  | (i) | any three abiotic factors | **3(1)** |
|  |  | (ii) | how investigated (what used **or** how) | **3(3)** |
|  |  | (iii) | organism name matching ecosystem adaptation feature matching organism | **3**  **3** |
|  |  | (iv) | benefit | **3** |

**Q 2008 Q 10**

1. (a) (i) What does an ecologist mean by competition?

(ii) Distinguish clearly between contest competition and scramble competition. **(9)**

1. Read the following extract, study the graph below and answer the questions that follow.

“The application of pesticides to strawberry plants in an attempt to destroy cyclamen mites that were damaging the strawberries killed both the cyclamen mites and the carnivorous mites that preyed on them. But the cyclamen mites quickly re-invaded the strawberry fields while the mites that preyed on them returned much more slowly. The result was that the cyclamen mites rapidly increased in density and did more damage to the strawberries than if the pesticide had never been applied.” (Adapted from W.T. Keeton and J. L. Gould. *Biological Science.* New York: W.W. Norton & Co., 1993)

**Number of mites (A)**

**Number of mites(B)**



A

B

2500

100

2000

80

1500

60

1000

40

500

20

0

0

**Time**

* 1. Which graph, A or B represents the carnivorous mites? Explain your answer.
  2. What term is used to describe the relationship between the cyclamen mites and the carnivorous mites?
  3. Suggest **two** reasons why the cyclamen mite managed to quickly re-invade the strawberry fields.
  4. Suggest an alternative to the use of pesticides for controlling the cyclamen mite population.
  5. Draw a pyramid of numbers to include each of the organisms mentioned in the extract above.
  6. Apart from competition and the factor illustrated in the above example, state another factor that limits population growth. **(27)**

1. (i) Waste management is a matter of growing concern in Ireland as the population expands. Outline **three** problems associated with waste disposal.
2. Give an example of waste produced in agriculture or fisheries or forestry and describe how it is managed.
3. Suggest **two** methods of waste minimisation.
4. Give one example of the use of micro-organisms in waste management.

**(24)**

**MS 2008 10**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **10.** | (a) | (i) | struggle between organisms (animals or plants) for resource **or** for named resource (in short supply) | **3** |
|  |  | (ii) | (contest) – one organism loses the resource and (scramble) – each organism gets some of resource | **6** |
|  |  |  |  |  |
|  | (b) | (i) | B  smaller numbers **or** B peak occurs after A peak | **3**  **3** |
|  |  | (ii) | predator-prey (relationship) **or** predation | **3** |
|  |  | (iii) | reduced competition / predator eliminated **or** reduced / food available / development of resistance (to pesticide) / immigration | **2(3)** |
|  |  | (iv) | biological control **or** genetically modified (GM) plant **or** example **or** crop rotation **or** example | **3** |
|  |  | (v) | Pyramid:  strawberry plants at base  cyclamen mites and carnivorous mites in correct order and shape | **3**  **3** |
|  |  | (vi) | disease **or** parasitism **or** food availability **or** pollution **or** other valid named factor | **3** |
|  |  |  |  |  |
|  | (c) | (i) | disease / pollution / toxins / smell / unsightly / other valid named problem | **3(3)** |
|  |  | (ii) | waste described **or** named matched management described | **3**  **3** |
|  |  | (iii) | reduce consumption / reduce packaging / recycle / reuse | **2(3)** |
|  |  | (iv) | landfill sites / sewage treatment plants / digesters / compost heaps | **3** |

**Q 2007 Q 2**

(a) In ecology what is meant by a trophic level?

* 1. Complete the pyramid of numbers by naming an organism in each case of A, B, C and D.

**D**

**c**

**B**

A

1. Which letter represents the producer in the pyramid?
2. Comment on the relative sizes of an individual producer and an individual primary consumer in the pyramid

**MS 2007 Q 2**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q 2.** | **(a)** | feeding level **or** energy level **or** position in food chain | **5** |
|  | **(b)** | name A + B | **3** |
|  |  | C = parasite **or** scavenger **or** decomposer **or** correctly named | **2** |
|  | **(c)** | A | **5** |
|  | **(d)** | (producer) larger **or** consumer smaller | **5** |

**Q 2007 12**

1. (a) Explain the following terms that are used in ecology: niche, edaphic factor, symbiosis. **(9)**
2. (i) What is the function of the nitrogen cycle?
3. What is meant by nitrogen fixation?
4. What is meant by nitrification?
5. Describe, using words and/or labelled diagrams, the events of the nitrogen cycle
6. (i) What term do ecologists use to describe an animal which kills and eats other animals?
7. What term is used to describe the animal that is killed and eaten?
8. If the population of the animals in (ii) declines suggest **two** possible consequences for the animals in (i).
9. Give **four** factors that influence the size of the human population. **(24**

**MS 2007 12**

|  |  |  |
| --- | --- | --- |
| **Q 12.** | **(a)** *niche*: – role of organism **or** explained | **3** |
|  | *edaphic factor:* – soil factor | **3** |
|  | *symbiosis*: – (close) relationship between two species involving benefit | **3** |

* 1. **(i)** to make (nitrogen) available or described / for use by organisms or described **2(3)**
     1. N2 converted to compound **or** named **3**
     2. ammonia to nitrites or to nitrates **or** nitrites to nitrates **3**
     3. fixation / lightning / plant protein / animal protein / death **or** excretion / decomposition / ammonia produced / ammonia to nitrites / one role of

bacteria / denitrification **or** explained **5(3)**

|  |  |
| --- | --- |
| **(c) (i)** predator\* | **3** |
| **(ii)** prey\* | **3** |
| **(iii)** starvation **or** death / migration / decline in population / change food source/ |  |
| [*allow* increased competition] | **2(3)** |
| **(iv)** famine or food availability / birth control / war / disease / birth rate / death |  |
| rate **or** longevity / degree of medical care / natural disaster or example | **4(3)** |

**Q 2006 Q2**

Answer the following questions in relation to your study of ecology.

* 1. What is the biosphere?
  2. What is meant by a qualitative survey?
  3. Construct a grazing food chain containing at least four trophic levels in the space below
  4. In your food chain in (c) identify each of the following.

1. A predator
2. A producer
3. A secondary (second order) consumer
4. A primary (first order) consumer

**MS 2006 Q2**

|  |  |  |
| --- | --- | --- |
| **2.** (a) | where life can exist **or** all the ecosystems of the earth [*must not define habitat]* | **4** |
| (b) | descriptive (survey) / species, **or** organisms, **or** types, present or implied | **4** |
| (c) | food chain with four organisms | **4** |
| (d) | predator / producer / secondary consumer / primary consumer | **4(2)** |

**Q 2006 Q 9**

|  |  |  |
| --- | --- | --- |
| **9.** (a) | (i)  (ii) | What is meant by the term ‘fauna’?  In ecological studies what is a key? |
|  |  |  |
| (b) | (i) | Name **five** plants in the ecosystem that you have studied. |
|  | (ii) | In the space below draw up a simple key which could be used to identify each of these plants. |

1. Name **five** animals in the ecosystem that you have studied.

1. In the space below draw up a simple key which could be used to identify each of these animals.

**MS 2006 Q 9**

|  |  |  |  |
| --- | --- | --- | --- |
| **9**. (a) | (i) | animals | **3** |
|  | (ii) | a guide to identification **or** explained | **3** |
| (b) | (i)  (ii) | five plants  reasonable attempt at key design  **[or** distinguishing features shown or stated 5(1)] | **2(2) + 3(1)**  **5** |
|  | (iii)  (iv) | five animals  reasonable attempt at key design  **[or** distinguishing features shown or stated 5(1)] | **2(2) + 3(1)**  **5** |

**Q 2006 Q 10**

1. (a) The figure below shows the relative sizes of a lemming population (histogram or bars) and the percentage phosphorus in forage (curve) over a number of years.

**0.6**

**0.5**

**0.4**

**% Phosphorus**

**0.3**

**0.2**

**0.1**

**0**

**1 2 3 4 5 6 7 8 9**

**Year**

* 1. What relationship is indicated between the percentage of phosphorus in forage and the size of the lemming population?
  2. Suggest an explanation for this relationship. **(9)**

1. Describe how you carried out a quantitative survey of a **named** animal in the ecosystem that you have studied. **(27)**
2. (i) Explain what is meant by pollution.
3. Give an account of the effects of a **named** pollutant of domestic, agricultural or industrial origin.
4. Describe **one** way in which the pollution that you have indicated in (ii) might be controlled.
5. Outline the problems associated with the disposal of waste. Suggest **two** ways of minimising waste.

**MS 2006 Q 10**

1. (a) (i) lemmings increase as phosphorus increases **3**

lemmings decrease as phosphorus decreases **3**

**(or** phosphorus increases lemmings increase/ phosphorus decreases as lemmings decrease) [*population proportional to phosphorus = 6]*

(ii) (forage) more nutritious with increased phosphorus / P allows increased survival rate / P allows increased reproductive rate / P important

for energy **or** protein **or** named structure, **or** molecule, **or** process **/**

lemmings releasing phosphorus / dietary requirement **3**

1. named animal **3**

*METHOD*

matched ecosystem / capture / how / count / mark or tag / how/

release / where/ recapture / count marked ones / formula **or** calculation shown

# OR

matched ecosystem / chose area **or** transect / quadrat / type / size **or** length of line / at random **or** stations / how **or** where / count **or** note presence / several times / calculation **/** how result expressed

*any eight* **8(3)**

1. (i) harmful addition to the environment **3**
2. name **3**

effect of named pollutant **3**

1. matching control **3**
2. *problems* – may be toxic/ non-biodegradable/ pollute groundwater/

no land-fill available / costly / incineration (causes toxins) /valid example

*any two* **2(3)**

*minimising* – reduce **or** example(s) **or** recycle **or** example(s) **or**

re-use **or** example(s) *any two* **2(3)**

**Q 2005 12**

1. (a) (i) What does an ecologist mean by competition?

(ii) Competition is generally more intense between members of the same species than between members of different species. Comment on the validity of this statement.

#### (9)

1. Read the following extract and then answer the questions below.

“A migratory flight involves preparation. The initial stimulus for spring migration among birds wintering in European latitudes comes from the increase in day length past an initial threshold. Physiological changes encourage the deposition of fat, particularly beneath the skin (subcutaneous) and inside the abdomen (visceral). Fat is the vital fuel used by migrating birds, which often have to cross long stretches of sea or perhaps desert where feeding opportunities are either non-existent or very limited.

Wildfowl preparing for migration, therefore, increase their food intake in order to lay down that vital fat and this shows itself in increased time spent feeding. Conveniently, for plant-eating species such as the grazing geese and wigeon, the onset of spring growth in the plants means higher levels of nutrients in the growing tips on which the birds feed.”

[From Wildfowl, Ogilvie and Pearson, 1994 Hamlyn Limited]

* 1. What is the stimulus for spring migration?
  2. Suggest **two** reasons why birds migrate.
  3. What is the “vital fuel” used by migrating birds?
  4. Give **two** locations in the body in which this vital fuel may be found.
  5. Suggest what happens to this fuel in the body tissues of the birds.
  6. In which part of plants do wigeon find the highest level of nutrients?
  7. Suggest a reason for the nutrient levels being highest in this part of the plant

1. (i) Give an account of how you carried out a quantitative survey of a named plant species in an ecosystem that you have studied. In your answer describe how you recorded the results of your survey.

(ii) As a result of a disease, a species of plant disappeared from an ecosystem.

Suggest **three** possible effects of the disappearance of this plant on the populations of other plants and animals in the ecosystem. **(24)**

MS 2005 12

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| --- | --- | --- | --- |
| **12.** (a) | (i)  (ii) | Rivalry (fight) for resource or named resource / organisms requiring limited resources  True (stated or implied) / because requirements are the same or explained | **3**  **2(3)** |
| (b) | (i) | ‘increase in day length’ | **3** |
|  | (ii) | food / climate (weather) / to breed any two | **2(3)** |
|  | (iii) | ‘fat’ | **3** |
|  | (iv) | ‘beneath skin’ / ‘inside abdomen’ or around organs or named organ | **2(3)** |
|  | (v) | converted to carbohydrate /used for energy (respiration) | **3** |
|  | (vi) | ‘(growing) tips’ | **3** |
|  | (vii) | meristematic tissue or explained / region of high metabolic activity | **3** |
| (c) | (i) | Named plant  Choose sample area or transect (line or belt) / quadrat / random throw or along transect/ many times or at stations/ count or observe any three | **3**  **3(3)** |
|  |  | Method of recording data/ calculate percentage cover or frequency or density / presentation of results | **3** |
|  | (ii) | Any three valid effects | **3(3)** |

Q 2004 5

**5.** (a) What is meant by pollution?

Give an example of a human activity that results in the pollution of air or water

Suggest a means of counteracting this pollution.

(b) Explain conservation in relation to wild plants and animals.

Suggest **two** reasons for conserving wild species.

(i) (ii) State **one** conservation practice from agriculture **or** fisheries **or** forestry

MS 2004 5

**Q 5. (a) 2(5) + 5(2)**

* Any harmful (undesirable) (addition to) the environment (or named ecosystem)
* Any correct example of human activity
* Counteracting method (must relate to example given above) [*allow “clean up”]*
* ***Explain conservation:*** Retention of viable populations (e.g. stopping extinction) **or** their habitats **or** comment on management **or** any one explained [allow *‘wise use of environment]*
* and **(ii) NB *any two reasons for conservation*** aesthetic / recreational / food supplies / possible sources of drugs /source of other materials / species right to existence **/** prevent extinction / biodiversity **or** balance / **or** any 2 correct examples

[*Note: group term + example = 1 point; 2 examples = 2 points]*

* ***One conservation practice:***

Control of fertiliser usage **or** control of mesh size **or** plant trees **or** any valid example explained

Q 2004 10

1. (a) Explain the following terms that are used in ecology: biosphere, habitat, niche. **(9)**
2. In ecological studies it is found that the distribution of organisms is influenced by abiotic and biotic factors.
   1. Distinguish between the underlined terms.
   2. Name an ecosystem that you have investigated and give an example of an abiotic factor that influences the distribution of a named plant in the ecosystem.
   3. In the case of your named ecosystem give an example of a biotic factor that influences the distribution of a named animal.
   4. What is meant by a pyramid of numbers? Construct a pyramid of numbers from organisms in the ecosystem that you have studied.
   5. What term is used by ecologists to describe the organisms that form the base of the pyramid? **(24)**
3. Lemmings are small rodents that are widespread in northern latitudes. The graph shows the fluctuations in lemming numbers in northern Manitoba between 1929 and 1943.

**numbers per hectare**

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[Adapted from J. P. Finerty (1980). *The Population Ecology of Cycles in Small Mammals*. Yale University Press, New Haven.]



**Lemming Population**

**45**

**40**

**35**

**30**

**25**

**20**

**15**

**10**

**5**

**0**

**1928**

**1930**

**1932**

**1934**

**1936**

**year**

**1938**

**1940**

**1942**

1. The graph indicates that population peaks occur at fairly regular intervals. What is the approximate average time between these peaks?
2. What is the mean maximum population density (numbers per hectare) for the period covered by the graph?
3. What is a predator? The Arctic fox is a predator of the lemming. Copy the graph into your answer book and draw on it a graph to show how you would expect the population of the Arctic fox to have varied in northern Manitoba during the period 1929 – 1943.
4. Suggest **two** factors other than predation that might account for the declines in lemmings shown in the graph.
5. Suggest **two** factors that may have been responsible for the fairly regular increase in lemming numbers shown in the graph. **(27)**

MS 2004 10

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| **SECTION C**  **Q 10.** | ***Answer any four questions*** |  |
| **(a)** | **Biosphere**: Parts of the earth that support life | **3** |
|  | **Habitat:** Place where organism(s) live(s) | **3** |
|  | **Niche:** Role of organism (in an ecosystem) **or** explained e.g. ‘how | it fits’ **3** |
| **(b)** | **(i)** Abiotic factors are non-living **and** biotic factors are living | **3** |
|  | **(ii)** Example of abiotic factor named or group e.g. climatic | **3** |
|  | Named plant | **3** |
|  | **(iii)** Example of biotic factor named | **3** |
|  | Named animal | **3** |

*[If ecosystem not named or incorrectly named can only get* ***either*** *animal* ***or*** *plant mark, NOT both]*

* **Pyramid of numbers:**

Shows numbers of different organisms in a food chain (**or** in trophic levels

**or** named trophic levels) **3**

Pyramid **3**

* Producers **or** autotrophs **3**

**(c) (i)** 3.5 – 4.5 years **3**

**(ii)** 33 – 39 **3**

* **Predator:** an animal (or organism) that eats another animal **3**

**Graph:** showing lower numbers **and** out of phase **3 + 3**

* **Why decline:** food shortage / disease / migration/ correct climatic change **or** example /decrease in reproductive rate / other correct reason e.g. lack of space, competition, **or** human activity e.g. trapping, poisoning etc

***any two* 2(3)**

* **Why increase:** (increased) food supply/ decline in predator numbers/

increase in reproductive rate / correct climatic change **or** example / migration / other correct example e.g. more space ***any two* 2(3)**