Section 6 Diversity of organisms

Chapter 30 Classification

Page 269

1. **a** *Many cells*. Plants, Animals
   b *Nuclei*. Protoctista, Fungi, Plants, Animals.
   c *Cell walls.* Plants.
   d *Hyphae*. Fungi.
   e *Chloroplasts*. Plants, some Protoctista.

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1. Snails and earthworms are primary consumers but earthworms may play a part as decomposers. They are both eaten by secondary consumers, e.g. birds.
2. Withdrawal into their burrows and retraction into their shells protects earthworms and snails from predators and desiccation.
3. At low temperatures the chemical reactions in cells slow down and this affects the whole animal and particularly movement.

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1. **a** *Warm-blooded*. Birds, mammals.
   b *Four legs*. Amphibia, Reptiles, Mammals.
   c *Lay eggs*. Fish, Amphibia, Reptiles, Birds.
   d *Internal fertilisation*. Reptiles, Birds, Mammals.
   e *Parental care*. Reptiles, Birds, Mammals.
2. This is an unfair question. The text does not give criteria for all the groups listed on p.274 and it is not feasible to construct a dichotomous key for the whole animal kingdom.

Page 281 (Left hand column)

1. Beetle. Animal, arthropod, insect.
   Sparrow. Animal, vertebrate, bird.
   Weasel. Animal, vertebrate, mammal, (carnivore).
   Gorilla. Animal, vertebrate, mammal, (primate).
   Pine tree. Plant, vascular plant, conifer.
   Buttercup. Plant, vascular plant, flowering plant (dicotyledon).
   Moss. Plant, bryophyte, moss.
2. Although both plants are in the same genus (*Lamium*), they are different species (*album* and *purpureum*) so you would not expect them to cross-pollinate successfully.
3. Bracken propagates vegetatively by means of underground rhizomes (p.79) which are too deep in the soil to be affected by fire.
4. Trees, shrubs and ‘flowers’ are vascular plants. They are so called because they have well developed vascular systems consisting of xylem and phloem (pp 54-6).

Page 281 (Right hand column)

1

1. Flagella or cilia present….2
   No flagella or cilia ……Amoeba
2. Flagella present ……3
   Cilia present …….4
3. Two flagella……..Chlamydomonas
   One flagellum……Euglena
4. Stalk present …….Vorticella
   No stalk …….Paramecium

2.

1. Yellow flowers ……2
   Flowers not yellow ……..…3
2. Large flowers on individual stalks…….. daffodil
   Small flowers on a prickly bush ……. gorse
3. Flowers green ……. couch grass
   Flowers not green…….…... 4

4 Flowers white…….…. snowdrop
Flowers; a range of colours……. lupin

This is an 'artificial' key because it depends not on genuine classificatory data but on a superficial characteristic, in this case, colour.

3.

1. Little or no vascular tissue present…….2
   Vascular tissue present……...3
2. Flat leaflike form….. …….Liverworts
   Vertical stem with small leaves……..Mosses
3. Reproduce by spores …..……Ferns
   Reproduce by seeds ……4

4 Seeds not enclosed in fruit ……. Conifers
Seeds enclosed in fruits……5

5 Seeds with one cotyledon…….Monocotyledons
Seeds with two cotyledons….. ……Dicotyledons

Chapter 31 Micro-organisms

Page 286

1. Only cytoplasm and DNA are present in both bacterial cells and plant cells.
2. If the population of 5 bacteria doubles every 20 minutes, after 4 hours it will have reached 20480.
3. a The virus particle contains no cytoplasm, no cell membrane and no nucleus.

b Viruses do not feed, respire, grow, excrete, move or respond to stimuli which are characteristics of living organisms. They do reproduce but only by rearranging their host's cytoplasm. (See page 292).

4. In the bacterium, the nucleus divides and then the cytoplasm is shared between the two cells. In the virus there is no nucleus or cytoplasm. New virus particles are built by using the host's cellular material.

Page 288

1. Fungal hyphae are growing in or on the material which is going mouldy. The hyphae are penetrating the tissue, digesting and absorbing the products of digestion.
2. Bread, wood and leather are derived from living organisms and contain materials which can be digested and used as food. Glass and plastic are man-made and do not contain any substances which could be used as nutrients.
3. Toadstools are the 'fruiting bodies' of fungi which are living in the soil. Fungi do not photosynthesize and so have no need of light. Green plants must have sufficient light in order to photosynthesize and grow.

Page 290

1. If the discs contain different antibiotics, the extent of the clear zone reflects the effectiveness of the antibiotic against that particular bacterium. If the discs contain different concentrations of the same antibiotic the clear zones show the effectiveness of the different concentrations. (In fact the former is the case).

Chapter 32 Feeding

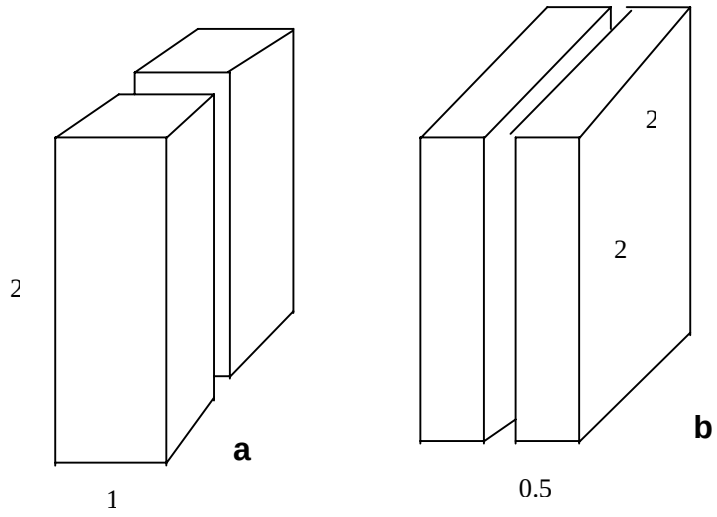
Page 297

1. **a** *Apple tree*; autotrophic.
   b *Toadstool*; saprotrophic.
   c *Human*; heterotrophic
   d *Mosquito*; heterotrophic.
   e *Streptococcus*; saprotrophic.
2. Plants need sunlight.
3. Digestion and absorption take place in the alimentary canal.

Chapter 33 Breathing

Page 300

1. It depends on how you cut the shape



If you cut it like **a** each half will have a surface area of $4(2x1) + 2(1x1) = 10cm^2$. The volume will be $2cm^3$. The ratio of surface area to volume is $10cm^2/2cm^3$.

If you cut it like **b** each half will have a surface area $2(2x2) + 4(2x0.5) = 12cm^2$. The volume will be $2\ cm^3$. The surface area/volume ratio is $12cm^2/2cm^3$.

2. Judging by the scale, the bacterium is about 0.00125mm wide. The maximum diffusion distance will be half this figure, namely 0.0006mm (approximately).
3. A frog is most likely to use its lungs during and after a period of activity.
4. Most large animals, active or not, are unable to exchange gases through their skins. They therefore have need of organs specialised for gaseous exchange. The distances from these organs to all the tissues of the body are too great for diffusion to be effective. A circulatory system allows the gases to be carried from the respiratory surface to all parts of the body and vice versa.
5. In a fish, a fresh supply of water containing dissolved oxygen passes continuously in one direction over the gills so that a fresh supply is in direct contact with the exchange surface.

In the lungs the air is only intermittently exchanged with the atmosphere and there is always a 'stagnant' layer through which the oxygen has to diffuse before coming into contact with the respiratory surface.
6. **a** In mammals, the muscular activity takes place in the intercostal muscles and the diaphragm.
b In fish, the muscular activity takes place largely in the floor of the mouth.

Chapter 34 Reproduction

Page 304

1.

		flowering plants	mammals
a	male reproductive organs	*anthers*	*testes*
b	female reproductive organs	*ovaries*	*ovaries*
c	male gametes	*pollen nucleus*	*sperms*
d	female gametes	*egg cells in ovules*	*ova*
e	place where fertilisation occurs	*ovules*	*oviduct*
f	zygote grows into	*seed*	*embryo, foetus*

2. *Butterfly.* The butterfly lays fertile eggs so fertilisation must be internal.
Mussel. Mussels are isolated from each other and are sedentary. Fertilisation is external with eggs and sperms being shed simultaneously into the sea
Trout. Trout have no external genitalia. Fertilisation must be external.
Sparrow. Birds lay fertile eggs so fertilisation must be internal.
Earthworm. Although earthworms couple together to reproduce. the sperms are stored separately from the ova and not released until the ova are placed in a cocoon, Thus fertilisation is external. (This detail is not in the text and there is no way you could reason it out.)
3. Courtship is a behaviour pattern which is principally a characteristic of birds. Mammals have ways of indicating they are ready to mate but this cannot really be described as 'courtship'. Animals which have external fertilisation have ways of ensuring that sperms and eggs are released at the same time, but this is not courtship. The question is flawed.

Page 305

1. **a** Asexual reproduction in fungi involves the rapid production and release of large numbers of spores which can be distributed over a wide area and will grow rapidly into new individuals. Asexual reproduction in flowering plants takes place by relatively slow vegetative growth from the parent plant, eventually leading to the development of new plants not far from the parent.
b A spore is a single haploid cell. A seed is a multicellular structure consisting of diploid cells.

2. If the mutant plant is self pollinated it will not breed true and the offspring will be very varied (pp.193, 201). If it can be reproduced vegetatively, the offspring will be identical and the mutant characteristic will be retained.
3. The farmer will have to consider the cost of making the crosses and waiting for the next generation to see if any of the offspring had the combined characteristics. There may be offspring with characteristics which are undesirable and which will attract lower prices when sold. He would have to spend money to keep the pigs isolated so that they could not interbreed. The hybrid pigs will not breed true and may need many generations to stabilise the variation. He will also have to calculate whether the lean, long-backed pigs will attract a higher price.
4. Asexual reproduction does not involve gametes, meiosis, or zygotes.
5. We use asexual reproduction in plants to produce new plants with all the characteristics of their parents, e.g. potatoes, strawberry plants. We also eat the products of asexual reproduction such as potatoes and onions.
6. Birds exhibit parental care, in some cases by building nests and feeding their young. Ground-nesting birds do not feed their young but do show protective behaviour. Most fish do not exhibit parental care and their eggs are often left unattended. As a result, many eggs and very many small offspring are eaten before they can reach adult size and develop effective escape reactions.