Answers

8D Unicellular organisms

8Da Unicellular or multicellular

Student Book

1: 8Da The Black Death

L3–4 **1 a**

L3 movement, growth

L4 reproduction, sensitivity, respiration, excretion, nutrition

L5 b tiny organisms/an organism that you need a microscope to see

L4 **2** any three of: fungi, plants, animals, protoctists

L5 **3** They decomposed.

L5 **4** any sensible answer, e.g. baking, brewing

L6 **5** to get enough raw materials/or to take waste away

L6 **6** anaerobic respiration because oxygen would be hard to get

2: 8Da Unicellular or multicellular

L5 **1** movement – locomotor system; reproduction – reproductive system; sensitivity – nervous system; growth – locomotor system; respiration – gas exchange system, circulatory system; excretion – urinary system; nutrition – digestive system

L5 **2** They are made of a lot of cells.

L4 **3** (aerobic) respiration

L5 **4** diffusion

L5 **5 a** circulatory system

L6 **b** There are so many cells that it would take too long for materials to diffuse through all the cells to get to every cell.

L4 **6** fungi

L6 **7** unicellular – it is a prokaryote because it has no mitochondria and all prokaryotes are unicellular

L6 **8** protoctists, plants

L7 **9 a** They do not carry out any of the life processes on their own.

L7 **b** They are not living organisms.

Activity Pack

8Da-1 Unicellular and multicellular

L3 **1 a** growth

L3 **b** movement

L4 **c** excretion

L4 **2** all organisms

L5 **3 a** made of one cell

L5 **b** bacteria – unicellular; humans – multicellular; plants – multicellular; yeasts – unicellular; prokaryotes – unicellular

L6 **4 a** Arrows show particles X diffusing throughout, and into the cell.

L6 **b** diffuse, materials, organisms, tissues, systems

L6 **5** nucleus, mitochondria

8Da-3 Diffusion and cells

L6 Suggested order of the diagrams is W, Z, X, Y.

Suggested links (but students may have used the diagrams and sentences in other ways):

W Particles are in a constant state of motion.

Z The particles diffuse through the water.

X The particles diffuse into the cells.

Y The particles take longer to diffuse into cells surrounded by other cells.

So, cells in tissues need a system to supply them with raw materials.

Diffusion may not allow bigger cells to get enough raw materials.

The particles take longer to diffuse evenly inside bigger cells.

So, cells in most organisms are small rather than big.

8Da-4 Microorganisms

L3–4 **1**

Life process	Meaning
movement	being able to move all or a part of itself
reproduction	producing more living things like itself
sensitivity	sensing and reacting to things around it
growth	increasing in size
respiration	using a chemical reaction to release energy
excretion	getting rid of waste materials that it makes
nutrition	needing food

L5 **2** unicellular: bacteria, yeast; multicellular: cat, daffodil, mouse, oak tree

L6 **3** plants, protoctists, animals, fungi, prokaryotes

L5 **4** The particles are in a constant state of motion and so spread out evenly. This means that there is an overall movement of particles from areas in which there are many to areas in which there are fewer.

L5 **5 a** circulatory system

L5 **b** It would take too long to diffuse.

8Da-5 Unicellular vs multicellular

L5 **1 a** The number of cells (a unicellular organism is made of one cell and a multicellular organism is made of many cells).

L4 **b** movement, reproduction, sensitivity, growth, respiration, excretion, nutrition

L5 **2 a** diffusion

L6 **b** The particles are constantly moving and so spread out evenly. This means that there is an overall movement of particles from areas in which there are many to areas in which there are fewer.

L6 **c** It is smaller and so has a greater surface area.

L6 **d** Diffusion will not allow the cell to take in enough of the raw material to supply the whole cell.

L5 **e** Diffusion would not be fast enough to allow raw materials like glucose to move from the small intestine to all cells in the body.

L7 **3 a** prokaryotes

L7 **b** plants

L7 **c** protoctists

L7 **d** prokaryotes

L7 **e** animals

L7 **4** They can only 'live' when inside another living cell. Or, on their own they do not carry out all the life processes.

8Da-6 Surface area : volume ratios

L5 **1 a** As the sphere gets bigger, the volume increases at a faster rate than the surface area.

L7 **b** As they get bigger, they have more volume and so need more raw materials but the surface area does not increase enough to be able to supply the additional raw materials. Some students may have also talked about getting rid of waste (or both taking in raw materials and getting rid of waste).

L5 **2 a**

Radius (mm)	Surface area:volume ratio
1	3.25
2	1.47
3	1.00
4	0.75
5	0.60
6	0.50

L7 **b** so that they can take a lot of raw materials – enough to supply the whole cell

L7 **3** Low ratio. The higher the ratio, the more heat the organism will lose to its surroundings. In cold habitats, animals need to conserve heat.

L7 **4** On cold days we curl up, making our surface area:volume ratios smaller so that we lose less heat to the surroundings. We do the opposite on hot days.

L5 **5 a** 0.12 (This is a ratio and so should not have units.)

L7 **b** Possibilities include that it has a very slow rate of respiration/growth and so only needs a very slow supply of raw materials. Or it may have ways of moving the cytoplasm ensuring that raw materials are quickly transported from the outer parts of the cell to all parts of the cell.

L7 **c** nucleus, mitochondria, chloroplasts

8Db Microscopic fungi

Student Book

1: 8Db Microscopic fungi

L4 **1** Microscopes were not good enough until then to be able to see the organisms.

L4 **2** Ethanol was not produced if there was no yeast.

L5 **3 a** Daughter cells are identical to the parent cell.

L6 **b** *Students' own drawings*, showing two cycles of budding; the buds can both come off the first parent cell, or the parent cell can bud and that daughter cell can then bud.

L5 **4** carbon dioxide

L6 **5** If there is air then there is oxygen and this means that the yeast will use aerobic respiration. Aerobic respiration releases more carbon dioxide and so will make the bread rise further/faster.

L5 **6** mitochondria

L5 **7** ethanol (alcohol)

L5 **8** to stop aerobic respiration occurring, since only anaerobic respiration produces ethanol

L5 **9** anaerobic respiration/fermentation

L5 **10 a** warmth, food (sugar, glucose), moisture

L7 **b** Food/sugar/glucose because it takes a long time for water to evaporate at the temperatures at which yeast grow, and heat is produced when cells respire so their surroundings will be warm.

2: 8Db Modal verbs

L5 **1 a** 1 might, could, must, will; 2 must, will; 3 must; 4 could; 5 might; 6 will (not)

L5 **b** 1, 2, 3, 6

L6 **c** e.g. These things are swimming so they may be living things. I could call them 'animalcules'.

L6 **2 a** Broth will go off if microorganisms get into it.

L6 **b** e.g. Spontaneous generation might still be correct for microorganisms other than those that feed on broth.

L6 **3 a** Microorganisms must cause diseases.

L6 **b** Microorganisms might/may cause diseases.

Activity Pack

8Db-1 Microscopic fungi

L5 **1 a** white loaf and baguette circled

L5 **b** They have bubbles in them caused by carbon dioxide from yeast respiration.

L4 **c** any sensible example (e.g. beer, wine)

L5 **2** tube 4

L5 **3 a** Y

L5 **b** It does not use oxygen.

L5 **c** When there is no oxygen, but there is water and the temperature is suitably warm.

L5 **d** X: glucose + oxygen → carbon dioxide + water

Y: glucose → carbon dioxide + ethanol (accept alcohol)

L5 **4 a** budding

L5 **b** limiting factor

8Db-6 Bread and beer

L4 **1 a** The higher the temperature the greater the volume increase.

L5 **b** Respiration is faster at higher temperatures (and so more carbon dioxide is produced at higher temperatures, which increases the volume of the dough).

L4 **c** Dough B rises more than dough A at higher temperatures.

L5 **d** Dough B contains more *sugar* and so there is more *respiration* occurring, which means that more *carbon dioxide* is produced.

L4 **e** Dough C volume increases more than dough A at all temperatures.

L5 **f** Dough C contains more yeast and so there is more respiration occurring, which means that more carbon dioxide is produced.

L4 **2** any sensible example (e.g. wine) but not bread or beer

L5 **3 a** 1st equation: water; 2nd equation: ethanol

L5 **b** fermentation

L6 **c** Ethanol/alcohol is not made if the yeast get oxygen.

L6 **d** To get more oxygen into the dough. Aerobic respiration produces more carbon dioxide than anaerobic respiration.

8Db-7 Making bread

L4 **1 a** flour, sugar, water and yeast (NB: sugar is not often added, a simplification has been made here to aid understanding. See Background information.)

L4 **b** folding and squashing the dough

L4 **c** To get air trapped inside it. The yeast cells use the oxygen in aerobic respiration.

L4 **2** It cuts the dough into loaf-sized pieces.

L4 **3** fungus

L4–5 **4 a**

L5 aerobic

L4 respiration

L5–6 **b** glucose + oxygen → carbon dioxide + water

L5 **5** Reactions occur faster when it is warmer and so respiration occurs faster, producing more carbon dioxide.

L4 **6 a** an oven

L4 **b** They are killed.

L4 **7** *Students' own questions*.

8Db-8 Yeast populations

L5 **1 a** when yeast/microorganisms use anaerobic respiration

L5 **b** glucose → carbon dioxide + ethanol/alcohol

L5 **c** It doesn't need oxygen.

L6 **2** Drawing of budding, as shown on Worksheet 8Db. Labels should mention the terms 'parent cell' and 'bud'.

L4 **3 a** 250

L4 **b** 4000

L4 **c** 5000

L6 **4** 4200

L6 **5** 1000 cells per day

L6 **6 a** The rate of growth would be lower because reactions occur more slowly at lower temperatures, and with slower rates of respiration, less energy is released for reproduction.

L6 **b** The rate of growth would be greater because there would be more sugar available for all the cells for respiration.

L7 **7** The food/sugar started to run out.

L7 **8** a limiting factor

L7 **9** any sensible suggestion (sugar was all used up, ethanol poisoned them)

8Db-9 Populations

L6 **1** Drawing of budding. Labels should mention the terms 'parent cell' and 'bud'.

L7 **2** lag phase: 0–3 days; log phase: 4–8/9 days; stationary phase: 10–11 days; death phase: 11–14 days.

L7 **3 a** The death rate is the same as the reproduction rate.

L7 **b** The amount of food (sugar). It is not oxygen, as the yeast is fermenting.

L7 **4 a** ethanol (alcohol)

L7 **b** Bubble air through the mixture so that aerobic respiration occurs, which does not produce ethanol/alcohol.

L6 **5** 1000 cells per day.

L7 **6 a** stationary and death phases

L7 **b** log phase

L7 **7 a** two from: contraception, (epidemic) diseases, drought, famine, natural disaster, legal restrictions, war etc.

L7 **b** There will be so many people that food/resources will start to run out, or overcrowding will spread disease at faster rates and lead to more conflict.

L7 **8 a** To stop a country becoming overcrowded and running out of resources for its population.

L7 **b** *Students' own answers.*

8Dc Bacteria

Student Book

1: 8Dc Bacteria

L5 **1 a** yeast and bacteria

L5 **b** glucose/nutrients

L6 **2** the beige/brown/larger cells – because you can see their budding scars or because they are much bigger than the blue-coloured, smaller bacteria

L6 **3** e.g.

	budding	binary fission
asexual	✓	✓
creates two cells	✓	✓
creates cells of the same size	✗	✓

L5 **4 a** They had the resources they needed – warmth, glucose, moisture.

L6 **b** It would have slowed it down because the enzymes (needed to break down substances and make new substances) work more slowly at lower temperatures.

L7 **5** an S-shaped curve, similar to that shown for yeast on page 57; award additional credit for correctly labelled axes and a title

L5 **6 a** anaerobic respiration

L5 **b** lactic acid

L5 **c** It makes it sour and thickens it.

L5 **7** photo A – *Lactobacillus delbrueckii*; photo B – *Salmonella typhimurium*; drawing D – *Vibrio cholerae*; photo E – *Streptococcus pyogenes*

L6 **8** cell wall – for support and protection; flagellum – for movement; cytoplasm – for cell reactions, including respiration; cell membrane – to control what comes into and goes out of the cell; chromosome – contains the information to control the cell; students are not expected to know the function of the slimy layer, which can be used to help movement, protect the cell and help it to attach to surfaces

L5–6 **9**

	human aerobic	human anaerobic	bacterial anaerobic	yeast aerobic	yeast anaerobic
releases energy	✓	✓	✓	✓	✓
requires oxygen	✓			✓	
produces carbon dioxide	✓			✓	
produces lactic acid		✓	✓		
requires glucose	✓	✓	✓	✓	✓

(Students who have not covered Unit 8C at this point are unlikely to have included anaerobic respiration in humans.)

2: 8Dc Pie charts

L4 **1 a** the causes of death in two time periods

L5 **b** It dropped from one year to the next.

L6 **c** more – the blue sector covers more than half of the circle

L6 **d** more – the blue sector covers more than three-quarters of the circle

L6 **2** The pie chart should look like the one using the 1855 data. The angles are: diseases 212°; wounds 130°; other causes 18°.

L6 **3 b** (**a** would be best plotted on a line graph and **c** would be best plotted on a scatter graph)

Activity Pack

8Dc-1 Bacteria

L5 **1** glucose

L5 **2 a** glucose → lactic acid

L5 **b** It does not require oxygen.

L6 **3 a**

	Bacteria	Yeast
asexual	✓	✓
binary fission	✓	
budding		✓

L6 **b** Enzymes work faster when it is warmer.

L5 **4** They make it sour.

L6 **5** soft cell wall – helps support and protect the cell; flagellum – moves the cell; cytoplasm – where respiration occurs; chromosome – contains the information to control the cell

8Dc-5 Bacterial pie charts

L4 **1 a** firmicutes

L4 **b** actinobacteria

L4 **c** It increased (by about three times).

L5 **2** Two pie charts using the following data:

Bacterium	Degrees for yoghurt X	Degrees for yoghurt Y
Bifidobacterium lactis	72	99
Lactobacillus acidophilus	108	72
Lactobacillus bulgaricus	36	81
Streptococcus thermophilus	144	108
Totals	360	360

L6 **3** Q (P is best plotted on a bar chart and R on a scatter graph).

8Dc-6 Bacterial cell model

L6

Refer to diagram D on page 57 of the Student Book.

8Dc-7 Bacterial questions

L5 **1** glucose, moisture, warmth

L5 **2 a** Respiration that does not need oxygen.

L5 **b** lactic acid

L5 **3** It gets thicker.

L5 **4 a** *Coccus*

L5 **b** *Salmonella*

L5 **c** *Streptococcus*

L5 **d** *Spirillum*

L6 **5 a** swim/move

L6 **b** one of: soft cell wall – for support and protection; cytoplasm – for cell reactions, including respiration; cell membrane – to control what comes into and goes out of the cell; chromosome – contains the information to control the cell

8Dc-8 Yoghurt and bacteria

L5 **1 a** warmth, moisture, sugar/glucose/nutrients

L5–6 **b**

Bacteria grow faster when it is warmer L5 because the enzymes that make new substances work faster at higher temperatures L6.

L5 **c** anaerobic respiration by microorganisms

L5 **d** lowers the pH, thickens it, reduces the amount of carbohydrate

L5 **e** Lactic acid lowers the pH. The lowered pH causes proteins to clump together to thicken the milk. Respiration reduces the amount of carbohydrate.

L6 **2 a** They do not have flagellae.

L6 **b** (circular) chromosome

L6 **c** controls the cell

L6 **d** cytoplasm

L6 **e** Drawing should show one bacterium splitting into two equally, and then each of those bacteria growing. If students have included the circular chromosome, make sure that it is a similar size in all the cells.

8Dc-9 Bacterial cell walls

L6 **1** anaerobic respiration

L6 **2** protection and support

L6 **3** to control what goes into and out of the cell

L7 **4 a** It is permeable to crystal violet because this substance can get into the cytoplasm of the cells.

b It is permeable to iodine because this substance can get into the cytoplasm of the cells.

c It is not permeable to CVI because this layer has to be removed using ethanol to wash the CVI out of Gram-negative bacteria.

L8 **5** Y because it has an outer membrane (and thin cell wall).

L8 **6** *Escherichia coli* and *Pseudomonas aeruginosa* – colourless cells; *Staphylococcus aureus* – purple cells

L8 **7** to make it easier to see the cells of Gram-negative bacteria

L8 **8** It allows hospitals to do a test to help work out what bacterium might be infecting a patient and so work out how best to treat the patient.

8Dd Protoctists

Student Book

1: 8Dd Protoctists

L5 **1 a** mitochondria

L5 **b**

	A *Amoeba*	B *Paramecium*	C alga
nucleus	✓	✓	✓
cell surface membrane	✓	✓	✓
cytoplasm	✓	✓	✓
storage vacuoles	✓	✓	✓
cilia	✗	✓	✗
flagella	✗	✗	✓
mitochondria	✓	✓	✓
cell wall	✗	✓	✓
pseudopods	✓	✗	✗
eyespot	✗	✗	✓

L6 **c** chloroplast

L6 **2** towards the top left of the photo because that is the direction in which the pseudopods are stretching

L6 **3** *Student's drawing* should show one *Amoeba* cell splitting into two equally and then each of those cells growing. If a nucleus is included, it should be a similar size in all the cells.

L5 **4** Photosynthesis traps energy which is then stored in plants. Eating plants is how animals get their energy.

L6 **5** **a** carbon dioxide, water

L6 **b** glucose

L5 **6** **a** two from: warmth, moisture, glucose/nutrients, oxygen

L5 **b** light (for photosynthesis)

L5 **7** As the light from the Sun decreases, they swim closer to the light in order to continue photosynthesising quickly.

L5 **8** **a** mussel

L5 **b** algae

L6 **c** It is lost in respiration (e.g. for moving) and as undigested waste.

L7 **d** Energy is lost at each step of the food chain so going along a food chain there is less and less energy available for the animals and as a result the populations of the animals are smaller and smaller, reflected by the lengths of the bars on the pyramid of numbers.

L7 **9** Energy from the Sun is transferred by light. The energy is trapped by chlorophyll. The energy is transferred to glucose as it is being produced in the chloroplast.

L7 **10** They had eaten fish containing a large amount of toxin. The toxin was produced by photosynthetic protoctists and because the toxin is not broken down, it moves through the organisms in a food chain, becoming more and more concentrated.

Activity Pack

8Dd-1 Protoctists

L5 **1** **a** moisture, warmth, oxygen

L5 **b** carbon dioxide, light

L6 **2**

	Amoeba	*Paramecium*	alga
cell surface membrane	✓	✓	✓
cell wall	✓	✓	✓
cilia		✓	
flagella			✓
mitochondria	✓	✓	✓
pseudopods	✓		

L6 **3** a molecule that contains carbon atoms joined together

L5 **4** to get more light for photosynthesis

L5 **5** **a** carnivore: stickleback; consumer: water flea and stickleback; herbivore: water flea; producer: algae

L5 **b** stickleback

L5 **c** the Sun

L5 **d** in wastes and respiration (for moving)

8Dd-4 Protoctist cell model

L6 Refer to diagram D on page 61 of the Student Book for labelling of a similar protoctist.

8Dd-6 Algae and others

L4 **1** **a** protoctists

L4 **b** temperature

L5 **c** The higher the *temperature*, the *more/faster* the algae grew.

L5 **d** EITHER oxygen for aerobic respiration OR carbon dioxide for photosynthesis

L6 **e** chlorophyll/chloroplasts

L6 **f** for photosynthesis, to make their own food

L5–6 **2** The answer can be presented as either a food chain or a pyramid of numbers.

algae → pond snail → minnow → grey heron

L6 **3** X uses a flagellum, Y uses cilia, Z uses pseudopods

8Dd-7 The protoctists

L4 **1** **a** They feed on other organisms/they do not make their own food.

L5 **b** two of: oxygen, warmth, minerals

L6 **c** using cilia

L4 **d** *Paramecium* (award additional credit if the word is italicised or underlined)

L6 **e** As the population of *Paramecium* increases it provides more food for the *Didinum* and so their population can then increase.

L6 **f** Too many *Paramecium* are being eaten and so their population starts to fall.

L6 **g** With fewer *Paramecium*, the food source for the *Didinum* population becomes a limiting factor and the population starts to fall.

L6 **h** chloroplast

L6 **i** three of: soft cell wall – for support and protection; cytoplasm – for cell reactions, including respiration; cell membrane – to control what comes into and goes out of the cell; nucleus – contains the information to control the cell; vacuole(s) – for storing substances

L5–6 **j** The answer can be presented as either a food chain or a pyramid of numbers.

Chlamydomonas → *Paramecium* → *Didinum*

L5 **2 a** The *Chlamydomonas* move towards the light because more light allows faster photosynthesis.

L6 **b** three from: light, carbon dioxide, water, warmth

L6 **c** Energy from the Sun is transferred by light to a chloroplast in a *Chlamydomonas* cell, chlorophyll traps the energy and uses it to help make glucose, which stores the energy in the cell.

L6 **d** carbon dioxide + water → glucose + oxygen

8Dd-8 Toxins and eutrophication

L5 **1 a** The more light they can get, the faster they will photosynthesise.

L6 **b** flagellae

L6 **c** Energy from the Sun is transferred by light to a chloroplast in a *Gambierdiscus toxicus* cell, chlorophyll traps the energy and uses it to help make glucose, which stores the energy in the cell.

L5–6 **d** The answer can be presented as either a food chain or a pyramid of numbers.

Gambierdiscus → small fish → large fish → humans

L7 **e** The poison from *Gambierdiscus* does not break down so stays in the bodies of the small fish. The large fish eat many small fish and so get many doses of poison. The large fish contain enough of the poison to poison humans.

L6 **2 a** Photosynthesis produces oxygen, which fish need for (aerobic) respiration.

L6 **b** The respiration of many bacteria uses up all the oxygen in the lake, so not leaving enough for the fish to respire.

L7–8 **c** [Topic sentence] Using too much fertiliser can kill fish in ponds and lakes. [Supporting sentences in chronological order] Fertilisers contain substances that help plants and algae grow well. When these substances wash out of farmland into bodies of water, the algae and plants in the water grow very quickly. Eventually there is so much algae that they block the light getting to water plants. These then die. The large amount of dead plant material encourages the growth of bacteria, and these use up the oxygen in the water. This can mean that fish are not able to get enough oxygen from the water for respiration. [Summary sentence] This sequence of events, caused by fertiliser getting into bodies of water, causes the fish to die.

8De Decomposers and carbon

Student Book

1: 8De Decomposers and carbon

L5 **1** an organism that breaks down dead organisms and animal wastes

L5 **2** pieces of wood

L6 **3** They break down the bodies of dead things and so remove them. They recycle nutrients, making them available for other organisms.

L5 **4 a** enzymes

L5 **b** The molecules in their food are too big/insoluble to absorb.

L5 **c** absorption

L5–6 **5** gases produced by the respiration of microorganism decomposers:

L5 carbon dioxide

L6 methane/hydrogen

L5 **6 a** Respiration releases energy, some of which makes the compost heap increase in temperature.

L6 **b** Bacteria produce lactic acid when they respire anaerobically. (Carbon dioxide from aerobic expiration is also acidic.)

L5 **7** yeast

L6 **8** list of organic compounds (e.g. carbohydrate, protein, fat, glucose, starch); carbon dioxide does not contain a chain of carbons and so is not organic

L6 **9** diagram to show how respiration and photosynthesis are the reverse of one another

L7 **10** We are burning more fossil fuels. We have cut down forests that remove carbon dioxide from the atmosphere.

2: 8De Black Death hypotheses

L4 **1 a** bacteria are prokaryotes, humans are animals

L5–6 **b**

L5 prokaryotes are unicellular, animals are multicellular

L6 prokaryotes do not have a nucleus but a circular chromosome; prokaryote cells have cell walls but animal cells do not; prokaryote cells do not contain mitochondria but animal cells do

L4 **2 a** Microorganisms decompose the softer tissues.

L5 **b** They break down the bodies of dead things and so remove them. They recycle nutrients, making them available for other organisms.

L6 **c** any sensible suggestion, e.g. fewer microbes can reach the dead bodies from the air, there is less oxygen underground for use by aerobic decomposers

L6 **3** Algae need light to survive (for photosynthesis).

L6 **4** no, it does not have a flagellum (or cilia)

L6 **5** *Student's drawing* should show one bacterium splitting into two equally and then each

of those bacteria growing. If students have included the circular chromosome, it should be a similar size in all the cells.

L6 **6** **a** controls the cell

L6 **b** nucleus

L7 **7** S-shaped growth curve drawn and labelled in a similar fashion to that shown on page 57

Activity Pack

8De-1 Decomposers and carbon

L5 **1** **a** all the organisms living in an area

L5 **b** light

L5 **2** protoctists

L5 **3** 1 Enzymes are released; 2 Large organic molecules are broken down; 3 Small organic molecules are absorbed.

L5 **4** glucose, proteins

L6 **5** They break down the bodies of dead things and so remove them. They recycle nutrients, making them available for other organisms.

L6 **6** 1 decay; 2 respiration; 3 feeding; 4 photosynthesis; 5 burning or combustion

8De-3 The carbon cycle

L5 See diagram on page 67 of the Student Book.

8De-4 The importance of decomposers

L5 **1** An *ecosystem* is made up of a *community* (all the different *species* of organism) and physical *environmental* factors (e.g. wind, *temperature*). *Microorganisms* are an important part of an ecosystem because they are *decomposers*; they break down dead organisms and animal wastes in a process called *decay*. This means that *carbon* and nutrients can be recycled and used again by other organisms.

L5 **2** two of: fungi, prokaryotes, protoctists.

L5 **3** Names of two organic compounds (e.g. carbohydrate, protein, fat, glucose, starch). (Carbon dioxide does not contain a chain of carbons and so is not organic.)

L6 **4** clockwise from the top: combustion, respiration (or decay), photosynthesis, respiration (or decay)

8De-5 Natural recycling

L5 **1** **a** glucose

L5 **b** name of one organic compound apart from glucose (e.g. carbohydrate, protein, fat, starch). (Carbon dioxide does not contain a chain of carbons and so is not organic.)

L5 **2** fungi, prokaryotes, protoctists

L5 **3** photosynthesis

L6 **4** See diagram on page 66 of the Student Book.

L6 **5** See diagram on page 67 of the Student Book.

L7 **6** any two from: burning plants/fossil fuels releases more carbon dioxide into the air; removal of trees decreases the amount of carbon trapped; more people on Earth respire more, releasing more carbon dioxide

L7 **7** plant more trees/plants; stop burning fossil fuels

L6 **8** They break down the bodies of dead things and so remove them. They recycle nutrients, making them available for other organisms.

8De-6 Decomposers and food

L7 **a** Microorganisms grow/reproduce more slowly when it is cold. The enzymes in microorganisms do not work very quickly when it is cold, so the decay process is stopped or slowed right down.

L7 **b** The heating kills the decomposers. Further bacteria are not able to enter the container because it sealed. Decay is stopped.

L7 **c** The low pH kills some microorganisms. It also prevents enzymes working. Decay is stopped.

L7 **d** Microorganisms need moisture. Substances cannot move around inside microorganism cells if they are dry. Decay is slowed right down.

L7 **e** Many of the microorganisms are killed. So there are less microorganisms and decay will happen more slowly.

L7 **f** The salt causes water to leave the microorganisms, by osmosis. Substances cannot move around inside microorganism cells if they are too dry. Decay is slowed right down.

L7 **g** Many decomposers need oxygen. If there is no oxygen decay will be slowed.

L7 **h** The sugar causes water to leave the microorganisms, by osmosis. Substances cannot move around inside microorganism cells if they are too dry. Decay is slowed right down.

L7 **i** Many decomposers need oxygen. If there is no oxygen decay will be slowed.