

Key concept: 7C Cells

Sub units:

1. 7C.1 Cell structure
2. 7C.2 Specialised cells



Working scientifically (WS) is a fundamental part of learning science. It is a combination of all the activities that scientists do and is an important part of learning about and learning through science.

Complete the tasks for each **sub unit** to develop your **WS skills** as well as your **A01** skills (recall knowledge and understanding).

Then tackle the mixed up problems for the **key concept** using the **recall – detect and solve approach** to develop your **A02 skills** (applying your knowledge and understanding).

Name:

Tutor group:

Science teacher:

Completion date for booklet:

Biology

Key concept: 7C Cells

Sub unit: 7C.1 Cell structure

Working Scientifically Skill: Match model features with an animal cells organelles.

Theme: Scientists choose specific objects to study and use models to simplify understanding.

Week:

Date:

Signed,
Stamped,
or
acknowledged by your
teacher.

Task: Homemade giant animal cell pizza

All living things are made of tiny building blocks called cells. You're made of billion or maybe trillions of tiny pieces that come in all different varieties, as is almost everything you have ever eaten. Fried chicken? Cells. Cheeseburger? Cells. Veggies? Cells all the way through! Since you're so experience at eating cells already, maybe it is time for you to make a giant one, pizza style!



Ingredients

1. Pizza dough or plain pizza base.
2. Pizza sauce or tomato puree
3. Grated or sliced cheese
4. 1 x Tomato
5. Mushrooms



Part	What I used	Why I used it.
Membrane		
Nucleus		
Cytoplasm		

Activity 1: Make your own animal cell pizza

1. Pre heat your oven at 200 degrees Celsius.
2. Place onto the plain pizza base the ingredients as sown in the below.
3. Put the pizza directly onto the middle shelve
4. Cook for about 12 – 14 minutes
5. Allow to cool down, and enjoy!

Activity 2:

What is the **same** about your model and a real cell?

What is **different** about your cell and a real cell?

If you made your cell again, how could you make it better?

Biology

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Working Scientifically Skill: Match model features with an animal cells organelles.

Theme: Scientists choose specific objects to study and use models to simplify understanding.

What facts can you recall about Cell structure?

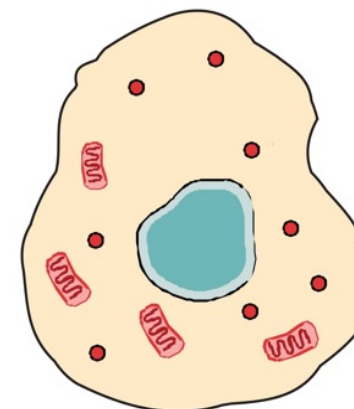
Use your knowledge organiser for guidance.

AO1: Demonstrate knowledge and understanding of:

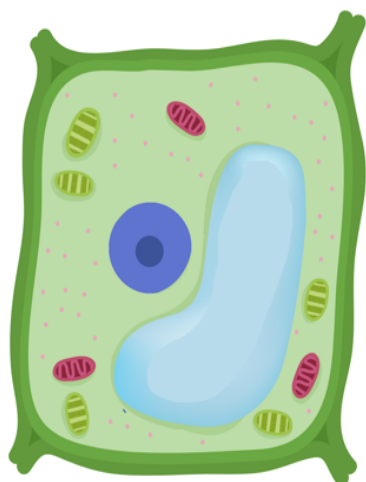
- 1) scientific ideas
- 2) scientific techniques and procedures.

What is the function (job) of the mitochondria?

Label the organelles of this animal cell



Label the organelles of this plant cell



What is the function (job) of the chloroplasts?

What is stored within the nucleus?

Which of the organelles listed in the table do bacterial cells not have?

Complete the functions (jobs) of these organelles listed below.

Cell membrane	
Cytoplasm	
Nucleus	
Cell wall	
Vacuole	

What 3 organelles do plant cells have that animal cells don't have?

What organelles do bacterial cells have that both plant and animal cells have?

Biology

Key concept: 7C Cells

Sub unit: 7C.2 Specialised cells

Working Scientifically Skill: Match model features with a nerve cells different parts.

Theme: Scientists choose specific objects to study and use models to simplify understanding.

Week:

Date:

Signed,
Stamped,
or
acknowledged by your
teacher.

Task: Homemade nerve cell

Nerve cells are very important to us. They carry messages to and from the brain. They are designed to carry out this job by being really long. You are going to make your own homemade nerve cell using materials that are lying around your home.



Activity 1: Build a simple model of a nerve cell

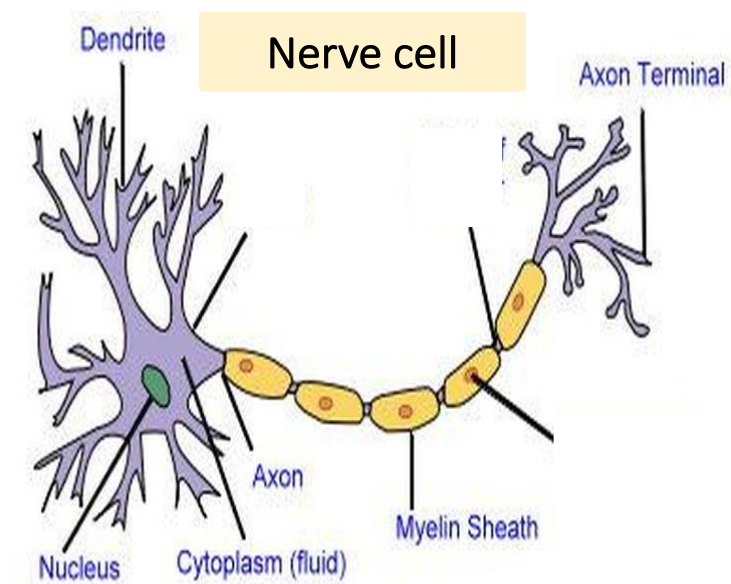
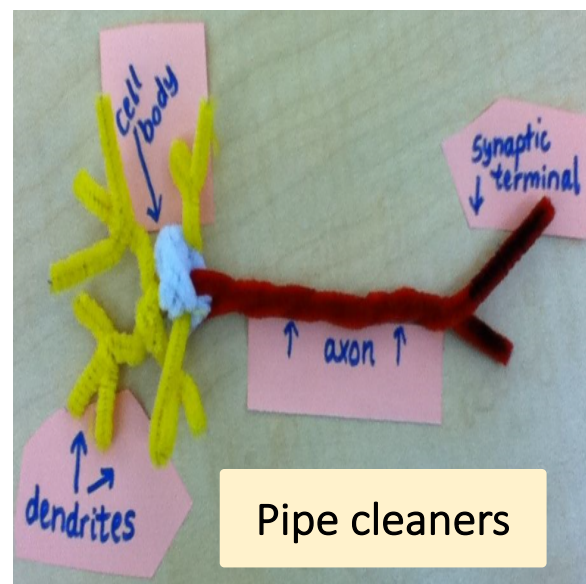
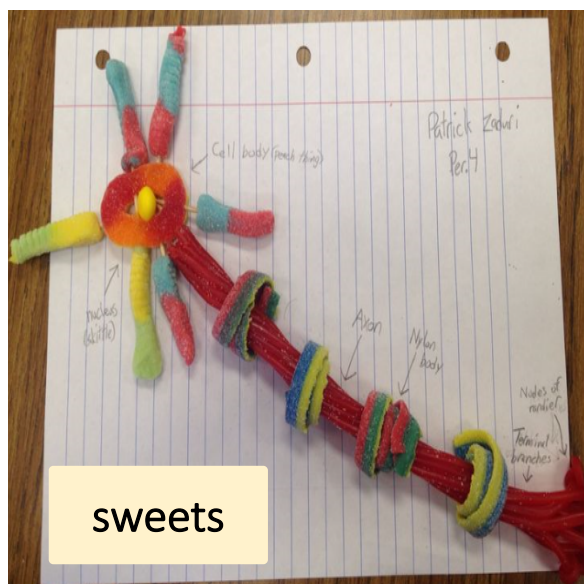
1. Build your simple nerve cell.
2. Label the different parts of your nerve cell.
3. What did you use to represent the various parts?

Stuck for ideas?

You might create your model:

- With layers of coloured paper or collage.
- Using recyclable materials, such as cereal boxes or loo rolls.
- Using different sweets to represent each part.

Part	Represented by
Nucleus	
Cytoplasm	
Dendrite	
Axon	
Myelin sheath	
Axon terminal	



Biology

Key concept: 7C Cells

Sub unit: 7C.2 Specialised cells

Working Scientifically Skill: Match model features with a nerve cells different parts.

Theme: Scientists choose specific objects to study and use models to simplify understanding.

What facts can you recall about specialised cells?

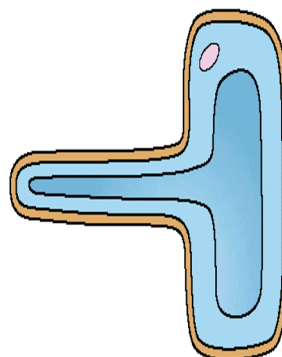
Use your knowledge organiser for guidance.

AO1: Demonstrate knowledge and understanding of:

- 1) scientific ideas
- 2) scientific techniques and procedures.

Complete the sentences about root hair cells.

Have a l_____ s_____ area to a _____
 lots of w_____
 They are the only plant cells that don't contain any chloro_____.
 Their job is to a_____ w_____ and minerals from the s_____.

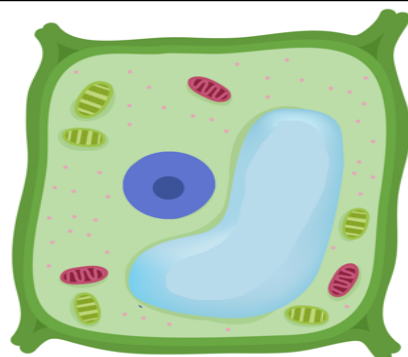


Complete the sentences about palisade leaf cells.

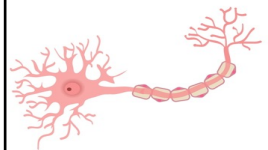
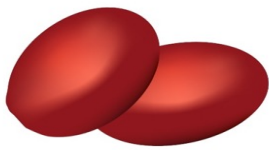

These cells are found in the l_____.
 They have a l_____ surface area to catch as much s_____ as possible. They are packed with lots of chloro_____ to absorb sunlight. Their job is to make f_____ by photosynthesis.



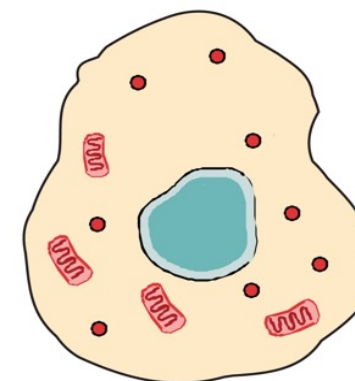
Label the organelles of this plant cell



Fill in the gaps on these specialised animal cells.

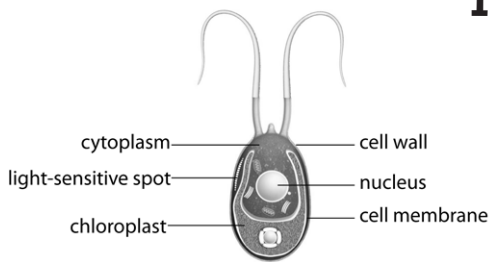
Adaptation	Specialised cell	Picture
Shape	Nerve cells are very _____. This feature is to carry messages around the _____.	
Missing parts	Red blood cells have no _____. They are designed to carry more _____.	
Extra parts	Sperm cells have a _____ that moves so it can swim towards the _____.	

Label the organelles of this animal cell





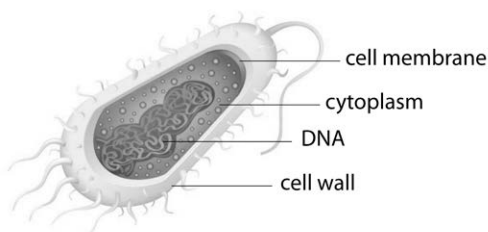
Mixed up problems



- 1** The diagram shows a unicellular organism called Chlamydomonas. It lives in pond water. Which part of the cell could help it get food? Explain your answer.

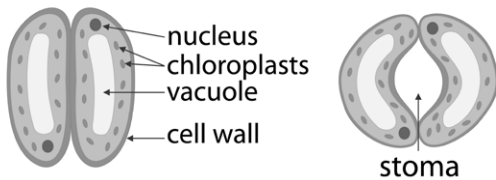
- 2** Dinesh looks at cells down a microscope. The eyepiece lens has a magnification of 10X. The low power objective lens is 5X and the high power lens is 10X. What is the total magnification of the cells that Dinesh views with the low power lens?
- A** 5X **B** 15X **C** 50X **D** 100X

- 3** The diagram shows a cell. It is not a plant or an animal cell. Explain why not.

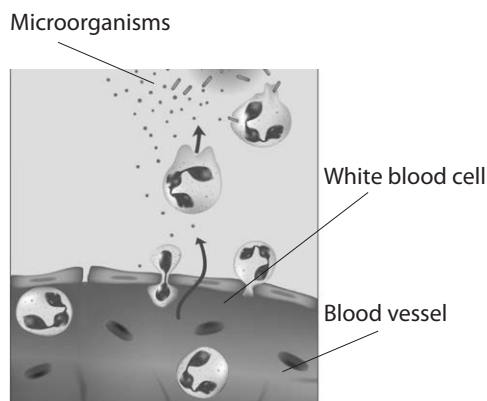




- 4** The image shows guard cells. They are found on the underside of a leaf where they surround a hole called a stoma. This lets gases enter and leave the leaf. Suggest the function of guard cells. Give a reason.



- 5** White blood cells destroy microorganisms that cause disease. The white blood cells need to travel to the site of infection. Use the diagram to explain one way that a white blood cell is adapted for this function.



- 6** Pryesh is 7. He has a mitochondrial disease. Some of the mitochondria in his cells do not work. Explain why he is shorter than his friends of the same age.

Hints

Contact Forces

1.1 Find missing forces

- Q2. Write down the total force upwards and downwards.
- Q3. Write down the total force left and right.
- Q4. Write down the total force upwards and downwards.

1.2 Explain floating & sinking

- Q2. How does removing mass affect density?
- Q3. Try putting the densities in order.
- Q4. Think why the balloon sinks in air.

1.3 Calculate density

- Q2. What is the meaning of a high density?
- Q3. Remember the formula for density.
- Q4. How does volume affect density?

1.4 Friction factors

- Q2. How much does the force change each time?
- Q3. Which shows friction doubles when weight doubles?
- Q4. What other factors could affect friction and the results?

1.5 Friction and motion

- Q2. How does air resistance change as she speeds up?
- Q3. How does drag change as the ball gets faster?
- Q4. When are the weight and air resistance balanced?

1.6 Mixed up problems

- Q1. What is the total upwards force to balance weight?
- Q2. Remember the formula for density.
- Q3. Try putting the densities in order.
- Q4. How will friction change for the same weight?
- Q5. Is the force to move the trainer exactly 2.5 or 3 N?
- Q6. What is air resistance on the Moon?

Electric circuits

2.1 Complete loops

- Q2. How many bulbs are in the loop of switch D?
- Q3. Are the heater and fan in the same loop?
- Q4. Which loops are complete with this combination?

2.2 Ammeter readings

- Q2. i) How do you combine several loops?
- Q3. i) $A1 + A2 = A3$. ii) What happens to current when you add more components?
- Q4. What do you know about current in a loop?

2.3 Bulb brightness

- Q2. Which circuit has more components?
- Q3. Which loops combine?
- Q4. Which loop has more components?

2.4 Batteries to bulbs

- Q2. The resistors are like bulbs, compare it to Q1.
- Q3. i)-iii) Think about the number of batteries per bulb.
- Q4. What is the effect of cancelling out two batteries?

2.5 Mixed up problems

- Q1. Where can the switch be part of both loops?
- Q2. Remember how the currents from each loop combine.
- Q3. Is it position or resistance that affects brightness?
- Q4. Think about the number of batteries per bulb.
- Q5. Which loops are complete when switch Z is open?
- Q6. How do the currents in the three loops combine?

Energy transfer

3.1 Identify energy change

- Q2. Which stores are filled before the catapult fires?
- Q3. How much bigger is the input than output store?
- Q4. What energy store does the fuel (gas) have?

3.2 Energy in/out

- Q2. First calculate the energy in two mastery bars.
- Q3. i) Look at the value with skim milk. ii) Put the answer from i) into the equation: energy in = energy out.
- Q4. Find the total energy for both activities. See how much energy is left from two servings of cereal.

3.3 KE and GPE transfers

- Q2. i) How much GPE has the marble lost when it is half way down? ii) What has happened to the GPE at C?
- Q3. i)-iii) KE is biggest when the speed is fastest. GPE is biggest when the height is greatest.
- Q4. i)-iv) KE is biggest when the speed is fastest. GPE is biggest when the height is greatest.

3.4 Temperature change

- Q2. What is the average of the hot and cold buckets?
- Q3. Will the temperature be closer to the 100 g or 200 g?
- Q4. Is the final temperature closer to the tea or cold water?

3.5 Temperature graphs

- Q2. The line for the beaker that warms quicker is steeper.
- Q3. Start by drawing a dotted line 'if no milk added'. Adding milk makes the temperature drop quickly.
- Q4. The line for the one that cools quicker has a steeper slope.

3.6 Interpret energy diagrams

- Q2. How many squares are there at the start?
- Q3. What store does the energy move to when a car brakes?
- Q4. What device uses a chemical energy store?

3.7 Identify wasted energy

- Q2. i)-ii) What input energy store does a tablet use? Which stores are part of watching a cartoon and which not?
- Q3. i)-ii) Energy is wasted where there is friction.
- Q4. The height relates to the gravitational potential energy.

3.8 Calculate efficiency

- Q2. i) What fraction of energy is transferred to a useful store? ii) The KE is the efficiency x the amount of input energy.
- Q3. What fraction of energy is transferred to a useful store?
- Q4. What fraction of energy is transferred to a useful store?

3.9 Mixed up problems

- Q1. What is the input energy store and the final output store?
- Q2. Calculate how much energy for 100 minutes of standing.
- Q3. i) Calculate the change in GPE. ii) The energy has moved from the GPE to the KE store.
- Q4. Will the temperature be closer to ice or the cold drink?
- Q5. The line starting nearer room temperature is less steep.
- Q6. i)-ii) What else does the fire heat apart from the potato? iii) Compare how much energy is wasted by each.



Hints

Cells

7.1 Functions of cell parts

- Q2. A full vacuole pushes against the cell wall.
- Q3. Ribosomes make proteins to help chemical reactions.
- Q4. Energy for the cell is released from food in mitochondria.

7.2 Using a microscope

- Q2. Mitochondria are tiny structures found inside cells.
- Q3. Compare image with the microscope in question 1.
- Q4. How do you calculate total magnification?

7.3 Identify cells

- Q2. Which labelled features are from plant/animal cells?
- Q3. Which labelled features are from plant cells?
- Q4. Identify what parts each cell has.

7.4 Functions of specialised cells

- Q2. The cell can change shape - where might this be useful?
- Q3. It has a very thick cell wall - what is its function?
- Q4. Why might skin need no gaps between its cells?

7.5 How cells are specialised

- Q2. A blood cell changes shape when it meets a bacteria cell.
- Q3. Cilia can help to move particles on the cell's surface.
- Q4. How are the cells walls between phloem cells special?

7.6 Mixed up problems

- Q1. What does each labelled cell part do?
- Q2. What is the magnification of the objective lens he uses?
- Q3. What part from animal and plant cells is missing?
- Q4. What happens to stoma when guard cells change shape?
- Q5. How do white blood cells move to the microorganisms?
- Q6. Energy is needed for growth.

Interdependence

8.1 Interpret food webs

- Q2. Which organism stores the energy from the Sun?
- Q3. The manure is decaying.
- Q4. Draw a food chain for a human being.

8.2 Change in population

- Q2. What do both snails and slugs eat?
- Q3. What do both squid and fish eat?
- Q4. Mountain lions eat a greater variety of food than hawks.

8.3 Explain resources

- Q2. What happens if plants get more water and warmth.
- Q3. What resources affect the growth of plants?
- Q4. What resources for survival are scarce in the desert?

8.4 Effect on population

- Q2. How could the tree affect the population of daisies?
- Q3. Why do butterflies and caterpillars need plants?
- Q4. The lines show the population of both animals increases.

8.5 Explain competition

- Q2. What do both soy plants and weeds need to grow?
- Q3. What do the cheetahs need to survive?
- Q4. What happens to the numbers of stoats?

8.6 Mixed up problems

- Q1. Grass is a producer.
- Q2. Work out what animals kites, snakes and owls eat.
- Q3. Minerals are a resource that plants need.
- Q4. The population of both animals decreases over time.
- Q5. What does fewer plants mean for rhododendrons?
- Q6. How does the heavy metal get into the food chain?

Reproduction

9.1 Sexual vs asexual

- Q2. This is an example of sexual reproduction.
- Q3. There is one parent: what type of reproduction is it?
- Q4. The gametes are egg and sperm: who donated these?

9.2 Human reproductive organs

- Q2. Where does fertilisation take place?
- Q3. One sperm has to meet the egg. It's a difficult journey.
- Q4. How can cilia and mucus help the egg travel?

9.3 Menstrual cycle

- Q2. What is the function of the uterus lining?
- Q3. Is day 18 before or after ovulation?
- Q4. What is happening to the uterus lining on day 24?

9.4 Pregnancy time

- Q2. After ovulation, an egg only survives for 1 day.
- Q3. What happens at the same time the temperature rises?
- Q4. Ovulation happens on day 14.

9.5 Supporting the foetus

- Q2. Instead of one placenta for a foetus, twins have to share.
- Q3. What does the mother's blood supply the foetus with?
- Q4. What is the function of the umbilical cord?

9.6 Mixed up problems

- Q1. How many parents are involved?
- Q2. The sperm needs a tail to swim.
- Q3. What happens to the uterus lining during menstruation?
- Q4. The events don't always happen as in the diagram.
- Q5. The foetus gets less oxygen if its mother smokes.
- Q6. Which stage is asexual reproduction and which sexual?



Answers

Cells

7.1 Functions of cell parts

- Q2. There is not enough water in the vacuole. The empty vacuole cannot push against the cell wall. The cell collapses.
- Q3. If ribosomes are destroyed, the bacteria cannot make proteins and cannot carry out chemical reactions to keep it alive.
- Q4. The more mitochondria a cell has, the more energy it releases. Muscle cells need energy for movement.

7.2 Using a microscope

- Q2. Choose an objective lens with a higher magnification. This increases the total magnification to see smaller structures.
- Q3. The mirror is pointing in the wrong direction. Move the mirror so light reflects up through the slide.
- Q4. The total magnification is 40 X, not 4 X.

7.3 Identify cells

- Q2. It is a plant cell because it has chloroplasts and vacuoles. Animal cells do not have these parts.
- Q3. It is an animal cell (nerve cell or neurone). It has a cell membrane and nucleus but no features of a plant cell, e.g. cell wall or chloroplasts.
- Q4. A and C could be plant cells. They have a nucleus and a cell wall outside the cell membrane. Cell walls only appear in plant cells.

7.4 Functions of specialised cells

- Q2. B - muscle cell. The cell can change its length. Muscles do this to cause movement.
- Q3. B - to form the outer covering of seeds. The thick cell makes a sclerid cell strong and tough, to protect seeds before they germinate.
- Q4. The cells act as a barrier between outside and inside the body. They are tightly packed so there are no gaps. This prevents microorganisms from entering.

7.5 How cells are specialised

- Q2. White blood cells change shape and 'eat' (destroy) the bacterial cell.
- Q3. The cilia move back and forth to remove any particles and microorganisms in the airways from the lungs.
- Q4. The cell walls between the phloem cells contain tiny holes to allow sap to pass through.

7.6 Mixed up problems

- Q1. The chloroplast. Photosynthesis takes place in chloroplasts.
- Q2. C ($10 \times 5 = 50$).
- Q3. This cell does not have a nucleus. It is a bacterial cell. Its DNA floats in the cytoplasm. In plant and animal cells, DNA is found inside a nucleus.
- Q4. The guard cells control the opening and closing of the stoma.
- Q5. White blood cells change shape to squeeze through gaps in the walls of the blood vessels. This lets them travel to wherever microorganisms are.
- Q6. Some of his mitochondria are not working and not releasing energy from food. Building new tissue for growth requires energy, so Pryesh is less able to grow.

Interdependence

8.1 Interpret food webs

- Q2. Producers store energy from sunlight. When eaten, energy moves to the snail, which is eaten by the frog.
- Q3. Manure is animal waste, and stores energy. Decomposers decay the manure and release energy as heat.
- Q4. Plants are producers, storing energy. It moves to animals (and humans) who store it in cells and tissues.

8.2 Change in population

- Q2. More snails reduces the number of dandelions. Slugs eat dandelions so this means fewer slugs.
- Q3. Squid and fish eat krill. Fewer fish means more krill for the squid, so their numbers could increase.
- Q4. Fewer shrews means lions have 3 organisms to eat. Hawks rely on squirrels and might not get enough.

8.3 Explain resources

- Q2. Plants get more water, warmth and light. This means more food for mice, and then more food for owls.
- Q3. Ring A is thicker so the tree grew more. This might be due to more rain, warmth, light or minerals.
- Q4. Cacti need water and there isn't much in the desert. Plants need long roots to get as much as they can.

8.4 Effect on population

- Q2. The number of daisy plants was lower near the tree. It blocks light and reduces the number of plants.
- Q3. Butterflies have fewer places to lay eggs, which means fewer caterpillars, and butterflies).
- Q4. The number of rabbits increases, then the number of foxes. More rabbits means more food for foxes.

8.5 Explain competition

- Q2. Soy and weeds compete for water and minerals. Removing weeds gives soy access to more resources.
- Q3. Cheetahs eat deer. The faster the cheetah the more deer it will catch and increases its survival chances.
- Q4. There were more weasels with fewer stoats to compete with. Then with more stoats, competition grew.

8.6 Mixed up problems

- Q1. Grass stores energy. When eaten, energy moves to the rabbit. The owl eats the rabbit and gains its energy.
- Q2. i) Kites only eat snakes so fewer snakes means fewer kites. ii) Owls and snakes eat mice. Fewer snakes means more mice and more food for owls.
- Q3. Fertilisers add minerals to soil. Plants can make more proteins and grow better. The farmer earns more.
- Q4. The number of hawks dropped, most in 2006. This is because of fewer mice and so less food.
- Q5. Rhododendron compete for water, light and minerals. Their poison kills other plants, reducing competition.
- Q6. Heavy metals pass up the food chain from phytoplankton, to the fish and eventually to humans.

