On your answer sheet, write in or circle the correct letter for each question.

8Ba

1 In which kingdom do all the organisms have many cells and their cells have no cell walls?

A plant kingdom

B animal kingdom

C United Kingdom

D fungus kingdom

2 Characteristics of conifers include having:

A needle-shaped leaves.

B flowers.

C flat leaves.

D a lack of xylem tissue.

3 *Primula vulgaris* is the scientific name for wild primroses. What genus do wild primroses belong to?

A plants **B** *Primula vulgaris*

C *vulgaris* **D** *Primula*

4 We should preserve biodiversity:

A to stop it going off.

B so that it is easier to tell organisms apart.

C to stop organisms producing hybrids.

D because many organisms may be useful to us.

8Bb

1 Asexual reproduction needs:

A sperm cells and egg cells.

B two parents.

C only one parent.

D no parents.

2 Strawberry plants can reproduce using:

A runners. **B** sprinters.

C joggers. **D** walkers.

3 Which of these is an example of inherited variation in plants?

A having a disease

B flower colour

C being eaten by slugs

D being used as a vegetable

4 In fertilisation:

A a fertilised egg cell grows into an embryo.

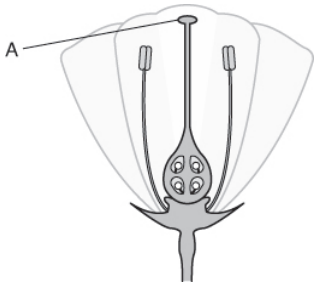
B a male and a female gamete fuse.

C male gametes are produced.

D a plants grows in some animal droppings.

8Bc

1 On the diagram, the part labelled **A** is the:



A stigma. **B** style.

C ovary. **D** anther.

2 In a flower, the anther:

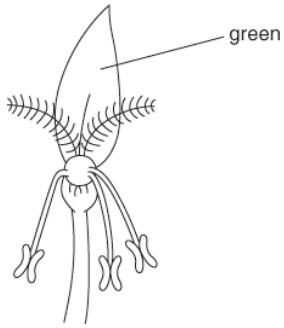
A receives pollen grains.

B makes pollen grains.

C makes nectar.

D contains the egg cells.

3 The flower in this drawing is pollinated by:



A an insect.

B the wind.

C an insect or the wind.

D bacteria.

4 If self-pollination occurs:

A the offspring will not have variety.

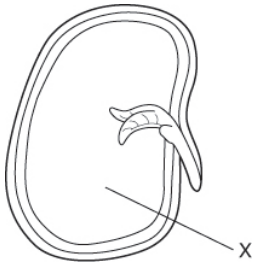
B offspring can never be produced.

C a plant will die.

D the bees will die.

8Bd

1 What part of the seed is labelled **X**?



A food store **B** seed coat

C embryo **D** zygote

2 The seeds inside an apple are dispersed by:

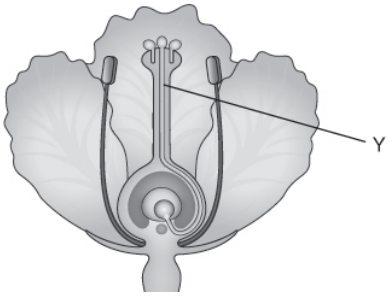
A the wind.

B insects.

C animals that eat them.

D being carried on the fur of animals.

3 In the diagram, the part labelled **Y** is:



A a food store. **B** a nectary.

C an egg cell. **D** a pollen tube.

4 Why is seed dispersal important?

A so that plants can reproduce asexually

B so that plants can reproduce sexually

C so that offspring do not compete with their parents

D so that animals have something to eat

8Be

1 Which of these resources is always needed for germination?

A water **B** light

C carbon dioxide **D** nitrogen

2 During germination, some of the food store in the seed is turned into glucose for:

A photosynthesis.

B respiration.

C competition.

D dispersal.

3 The raw materials for photosynthesis are:

E water and oxygen.

F oxygen and glucose.

G carbon dioxide and water.

H glucose and water.

4 Bees and apple trees are interdependent because:

A bees and apple trees both make things that humans like to eat.

B bees feed on apples.

C bees and apple trees are the same species.

D they both make use of the other.

Quick Quiz Answer Sheet

Name _____ **Class** _____ **Date** _____

The Quick Quiz is to see how much you already know about a subject. It also gives you some idea of the things you will soon be learning about.

Record your answers in the answers column. Shade in or tick the ones you get right.

Topic		Answers	I can already…
8Ba	**1**		Describe the characteristics of organisms in the five kingdoms.
	2		Describe how organisms are further classified in their kingdoms.
	3		Identify the genus and species names from a scientific name.
	4		Explain why biodiversity is important.
8Bb	**1**		State the difference between asexual and sexual reproduction.
	2		Recall ways in which plants reproduce asexually.
	3		Identify and give examples of inherited variation.
	4		Describe what happens during fertilisation.
8Bc	**1**		Identify the main parts of a flower.
	2		Describe the functions of the main parts of a flower.
	3		Work out whether a plant is wind- or insect-pollinated.
	4		Explain why plants avoid self-pollination.
8Bd	**1**		Identify the different parts of a seed.
	2		Identify different kinds of fruits and describe how they disperse seeds.
	3		Describe what happens after pollination and before fertilisation.
	4		Explain the importance of seed dispersal.
8Be	**1**		Recall the resources needed for germination.
	2		Describe what happens to the different parts of a seed during germination.
	3		Describe what happens in photosynthesis.
	4		Describe examples of interdependence.

Quick Quiz:	**/20**	At the start: 0–5 = I didn't know much; 6–10 = I knew something; 11–15 = I knew a fair bit; 16–20 = I already knew a lot

8Ba – Classification and biodiversity

Word	Pronunciation	Meaning
animal		A member of the animal kingdom. Animals are multicellular and have cells without cell walls.
bacterium		A type of prokaryote microorganism. Plural is bacteria.
biodiversity	*bi-O-die-**ver**-sit-ee*	The range of different species of organisms in an area.
characteristic	*kar-ack-ter-**iss**-tick*	A feature of an organism.
classify		To sort things into groups.
conifer		Group of plants with needle-shaped leaves, and which reproduce using seeds found in cones.
extinct		An organism that no longer exists is extinct.
fern		Group of plants that reproduce using spores and often have many small waterproof leaves.
flowering plant		Group of plants with large, flat leaves, and which reproduce using seeds found in fruits. Fruits and seeds form inside flowers.
fungus		A member of the fungus kingdom. A fungus can be multicellular or unicellular but does not make its own food. Plural is fungi.
genus		A group of similar organisms. The genus name is the first word in the scientific name for a species (the second word is the 'species name').
kingdom		There are five kingdoms into which organisms are divided: plants, animals, fungi, protoctists and prokaryotes.
moss		Group of plants that reproduce using spores, and which have many thin leaves but no roots or xylem tissue.
plant kingdom		A group of organisms that have cells with cell walls made of cellulose and that are able to photosynthesise.
prokaryote	*prO-**ka**-ree-oat*	A member of the prokaryote kingdom. Prokaryotes are all unicellular and have cells that lack nuclei.
protoctist	*prO-**tock**-tist*	A member of the protoctist kingdom. Many protoctists are unicellular.
species	***spee**-shees* or ***spee**-sees*	A group of organisms that can reproduce with each other to produce offspring that will also be able to reproduce.

8Ba – Accuracy and estimates (WS)

Word	Pronunciation	Meaning
accuracy	***ack**-U-rass-ee*	A measure of how close a value is to its real value.
estimate		An approximate answer, often calculated from a sample or using rounded values.
population	*pop-U-**lay**-shun*	The number of a certain organism found in a certain area.
quadrat		A square frame, thrown randomly on the ground, which is used to sample plants in an area.
random		When there is the same chance of one event occurring as there is for any other events in the same set.
sample		To take a small part of a something to investigate. You use a sample to draw conclusions about what the larger whole is like.

8Bb – Types of reproduction

Word	Pronunciation	Meaning
asexual reproduction	*ree-prod-**uck**-shun*	Producing new organisms from one parent only.
fertilised egg cell	***fert**-ill-i-zed*	What is produced when two gametes fuse.
fertile		Able to produce offspring.
gamete		A cell used for sexual reproduction.
hybrid		An organism produced when members of two different species reproduce with each other.
inherited		A feature that an organism gets from a parent is inherited.
inherited variation		Differences between organisms passed on to offspring by their parents in reproduction.
runner		A stem that grows from certain plants (e.g. strawberry), from which new plants grow using asexual reproduction.
sexual reproduction	*ree-prod-**uck**-shun*	Reproduction that needs two individuals to produce a new organism of the same type.
tuber	***tyew**-ber*	The swollen part of an underground stem used as a storage organ and as a method of asexual reproduction in some plants (e.g. potato).
variation	*vair-ee-**ay**-shun*	The differences between things.
zygote	***zY**-goat*	Another term for 'fertilised egg cell'.

8Bc – Pollination

Word	Pronunciation	Meaning
anther		A male reproductive organ in plants that produces pollen grains.
carpel		The set of female reproductive organs in plants (ovary, style and stigma).
cross-pollination	*poll-in-**ay**-shun*	When pollen is transferred from one plant to a different plant of the same species.
filament		A male reproductive organ in plants that supports the anther.
nectary		A part of a flower that produces a sweet nectar, on which some animals like to feed.
ovary		Female reproductive organ in which egg cells are produced.
ovule		Contains an egg cell in plants. An ovary contains ovules.
petal		White or coloured section of a flower.
pollen grain		The container for the male gamete in plants.
pollination	*poll-in-**ay**-shun*	The transfer of pollen from an anther to a stigma.
self-pollination	*poll-in-**ay**-shun*	When pollen is transferred from a flower on a plant to a stigma in the same flower or to another flower on the same plant.
sepal		A leaf-like structure that protects a flower bud.
stamen	***stay**-men*	The set of male reproductive organs in plants (anther and filament).
stigma		Part of the female reproductive organs in a plant. It is where pollen lands.
style		Part of the female reproductive organs in a plant that connects the stigma to the ovary.

8Bc – Air quality (STEM)

Word	Pronunciation	Meaning
concentration		The amount of something found in a certain volume of a liquid (often measured in g/litre or g/cm^3).

8Bd – Fertilisation and dispersal

Word	Pronunciation	Meaning
cell division	***sell***	The splitting of a cell to form two identical cells.
competition	*com-pet-**ish**-un*	There is competition between organisms that need the same things as each other. We say that they compete for those things.
egestion	*ee-**jes**-jun*	When faeces are pushed out of the anus.
embryo	***em**-bree-O*	The tiny new life that grows by cell division from a fertilised egg cell.
faeces	***fee**-sees*	Waste food material produced by the intestines.
fertilisation	*fert-ill-i-**zay**-shun*	Fusing of a male gamete with a female gamete.
fruit	***froot***	Something used to carry the seeds of flowering plants. Fruit can be fleshy or dry.
germinate		When a seed starts to grow.
pollen tube		A tube that grows from a pollen grain down through the stigma and style and into the ovary.
seed		A small part of a plant formed by sexual reproduction that can grow into a new plant.
seed coat		The tough outer covering of a seed.
seed dispersal		The spreading of seeds away from a parent plant.
zygote	***zy**-goat*	Another term for ‘fertilised egg cell’.

8Be – Germination and growth

Word	Pronunciation	Meaning
biomass		The mass of organisms living in an area.
byproduct		A substance produced by a chemical reaction that is not the desired product of the reaction. For example, the desired product of photosynthesis is glucose, and oxygen is a byproduct.
chlorophyll		The green substance found inside chloroplasts.
chloroplast	*__klor__-O-plast*	A green disc containing chlorophyll. Found in plant cells. Where the plant makes food, using photosynthesis.
dormant		If something is dormant its life processes are very slow.
interdependent		Organisms that depend on one another are said to be interdependent.
life cycle		The series of changes in an organism as it grows, matures and reproduces.
mineral salt		A compound containing an important element that is needed in small quantities for health (e.g. calcium). Plants get their mineral salts from the soil; animals get them from food.
mitochondrion	*my-tow-__kon__-dree-on*	A small structure (organelle) in the cytoplasm of cells, where aerobic respiration occurs. Plural is mitochondria.
photosynthesis	*fO-tow-__sinth__-e-sis*	A process that plants use to make their own food. It needs light to work.
resource	*rez-__ors__*	Something needed by an organism. For example, plants need light as a resource and animals need food as a resource.
respiration	*res-per-__ay__-shun*	A process in which energy is released from substances so it can be used by an organism. All organisms respire.
starch		A type of insoluble carbohydrate found in plants.
word equation	*eck-__way__-shun*	An equation in which the names of the reactant(s) are written on the left side, there is an arrow pointing from left to right and the names of the product(s) are written on the right side.

Name _____ **Class** _____ **Date** _____

			
Name: feverfew *Tanacetum parthenium* Used by Ancient Greek doctors to treat swelling.	Name: oxlip *Primula elatior* A favourite food for deer.	Name: wild daffodil *Narcissus pseudonarcissus* An extract has been used to treat epilepsy.	Name: primrose *Primula vulgaris* An extract of its roots is used in some skin-toner liquids.

You are going to use the information about the plants to:

a describe how organisms are classified

b explain how scientific names are useful

c explain the importance of biodiversity.

1 Write notes about what you would say to answer one or more of the questions.

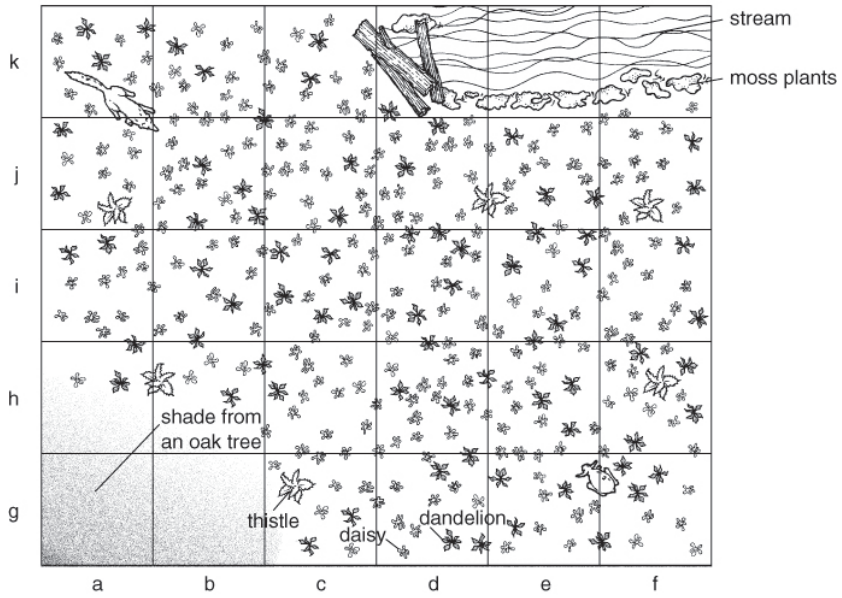
2 Compare your notes with a partner. Alter your notes so that you are both happy with what you would say to answer each question.

3 Get together with other pairs and take turns to read out your answers.

4 For each question, decide which pair had the best answer and why.

Name _____ **Class** _____ **Date** _____

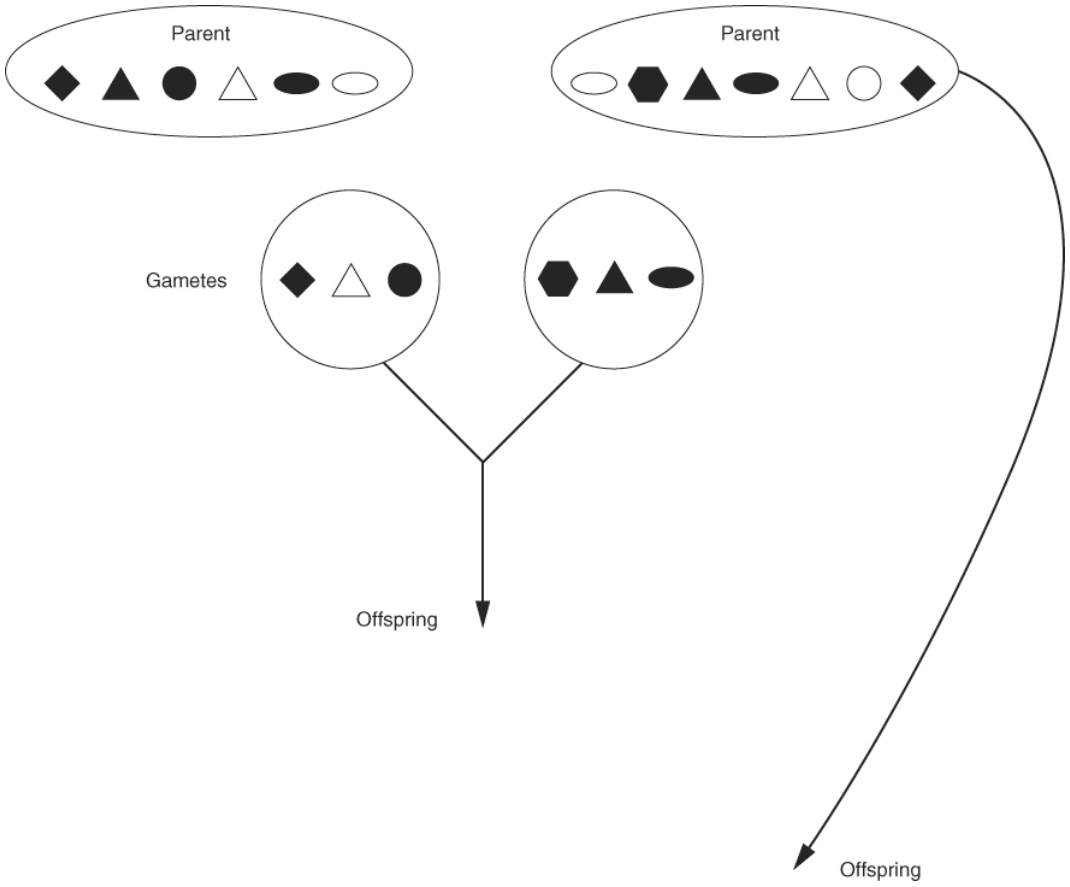
You need to take samples to estimate the population of daisy plants on this lawn.



Write a set of step-by-step instructions on how to do this.

Name _____ **Class** _____ **Date** _____

Add labels to the diagrams below to highlight the differences between sexual and asexual reproduction.



Name _____ **Class** _____ **Date** _____

Tick (✓) each statement to show whether it is true or false.

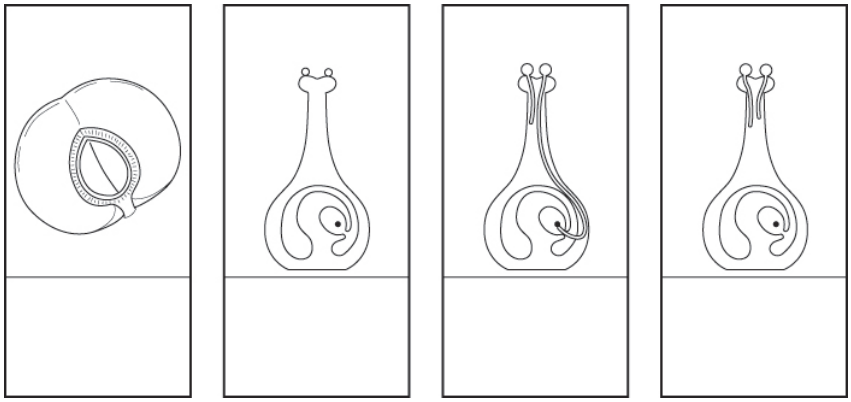
For the false statements, write a corrected version of the statement underneath.

Statement	**True**	**False**
Pollination is the carrying of pollen from an anther to a stigma.	☐	☐
The female parts of a flower include the ovary, stigma and filament.	☐	☐
Insect-pollinated flowers often produce a scent and have green flowers.	☐	☐
Pollen grains from wind-pollinated plants are usually small and light.	☐	☐
The anther produces ovules.	☐	☐
The ovule contains a male gamete.	☐	☐
The stigmas of wind-pollinated plants are feathery to trap pollen in the air.	☐	☐
Some plants avoid self-pollination by having both male and female parts in the same flower.	☐	☐
Pollen grains contain a gamete, which contains half the instructions for a new plant.	☐	☐
Plants try to avoid self-pollination so that their offspring do not have variation.	☐	☐

Name _____ **Class** _____ **Date** _____

1 **a** Number the diagrams below in the order in which they happen.

b Draw lines from the label boxes to the diagrams to explain what is happening in each.



The nucleus from the male gamete fuses with the nucleus in the egg cell.	The ovary swells and becomes the fruit. The ovules become seeds.	The pollen grain grows a pollen tube, which grows towards the ovule.	A pollen grain lands on a stigma.

c Circle the box that contains a description of 'fertilisation'.

d Label the diagrams with their parts. Label as many parts as you can.

e How does this fruit disperse its seeds?

_____

f Why is it important that plants disperse their seeds?

_____

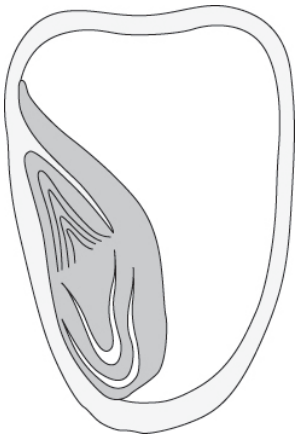
2 In the space below, draw and label the inside of a seed.

Name _____ **Class** _____ **Date** _____

1 Bees pollinate crops like apples, plums, raspberries and blackcurrants. Write one paragraph to explain how bees, apple trees and humans all depend on one another.

2 The drawing shows a wheat seed. Add labels to the seed to explain what the different parts are and what they are used for during germination and growth. Use the words in the box in your labels. You could cross each one off after you have used it.

germination	photosynthesis	resource	respiration



Name _____ **Class** _____ **Date** _____

Draw a ring around a number of stars for each statement. If you are very confident about a statement, draw your ring around all the stars. If you do not know anything about a statement, do not draw a ring.

Topic	At the end of the unit:		
8Ba			
	Assign organisms to their kingdoms based on their characteristics (animals, plants, fungi, protoctists, prokaryotes).	UK NC, CEE	* * * * *
	Describe how the plant and animal kingdoms are subdivided.	UK NC, CEE	* * * * *
	Interpret scientific organism names.	UK NC, CEE	* * * * *
	Explain why biodiversity is important.	UK NC	* * * * *
8B Working Scientifically			
	Use a sample to calculate an estimate.	UK NC, CEE	* * * * *
	Explain the effects of small and large sample sizes.	UK NC, CEE	* * * * *
8Bb			
	State how asexual reproduction is different to sexual reproduction, and recall some ways in which plants reproduce asexually.	UK NC	* * * * *
	Identify inherited variation and explain its cause.	UK NC, CEE	* * * * *
	Describe what happens during fertilisation.	UK NC, CEE	* * * * *
8Bc			
	Identify and describe the functions of the parts of a flower.	UK NC, CEE	* * * * *
	Describe what happens in pollination and use flower shape or pollen type to work out how a plant is pollinated.	UK NC, CEE	* * * * *
	Explain how and why plants avoid self-pollination.	UK NC	* * * * *
8Bd			
	Identify the different parts of a seed and explain their functions.	UK NC, CEE	* * * * *
	Identify different kinds of fruits and describe how they disperse seeds.	UK NC, CEE	* * * * *
	Describe the events that occur after pollination, leading to embryo formation.	UK NC, CEE	* * * * *
	Explain the importance of seed dispersal.	UK NC, CEE	* * * * *
8Be			
	Describe the life cycle of a flowering plant.	UK NC, CEE	* * * * *
	Recall how germination occurs.	UK NC, iLS, CEE	* * * * *
	Describe what happens in photosynthesis and respiration.	UK NC, iLS, CEE	* * * * *
	Describe examples of interdependence and how changes in a population or community affect other populations.	UK NC, CEE	* * * * *

Kingdoms

Organisms are **classified** into **kingdoms**, which are subdivided into smaller and smaller groups. The last two groups are **genus** and **species**. These words give each species its scientific name.

Plants have green leaves, have cell walls made of cellulose and can **photosynthesise**. This kingdom has four main groups: **flowering plants** (reproduce using flowers), **conifers** (reproduce using cones), **ferns** (reproduce without flowers or cones) and **mosses** (no roots).

Some main groups in the animal kingdom are:

- **vertebrates** (with backbones), which are divided into **mammals** (hair, have live young), **reptiles** (dry scales, lay leathery eggs), **fish** (slimy scales, lay jelly eggs), **amphibians** (moist skin, lay jelly eggs) and **birds** (feathers, lay hard-shelled eggs)
- **invertebrates**, including **molluscs** (fleshy pad to move) and **arthropods** (jointed limbs)
    - arthropods include insects (6 legs, 3-part body) and arachnids (8 legs, 2-part body).

Biodiversity

The range of species in an area is called **biodiversity**. We should preserve biodiversity because:

- organisms depend on one another (they are **interdependent**)
- we won't be able to make use of organisms if they become **extinct**
- more biodiverse areas recover better from natural disasters.

Asexual reproduction in plants

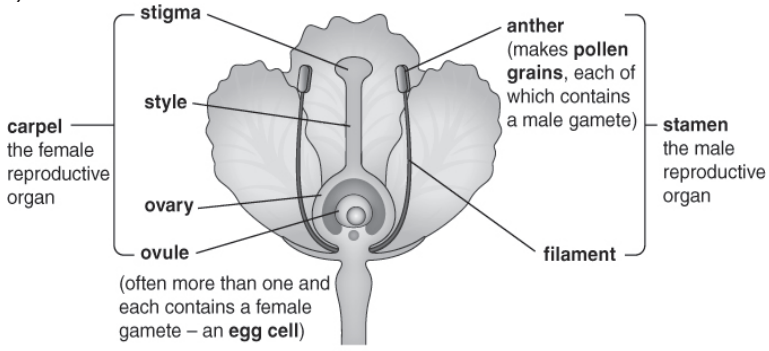
- Some plants can reproduce using **asexual reproduction**. This is when *one* parent plant is able to produce offspring (e.g. by using **runners** in strawberries or **tubers** in potatoes).

Sexual reproduction in plants

Reproduction produces new living things (**offspring**). **Sexual reproduction** needs two parents to produce **sex cells** or **gametes**. The gametes fuse to produce a **fertilised egg cell** or **zygote**. The zygote uses **cell division** to grow into an **embryo**, which can grow into an adult and become a parent (completing its **life cycle**).

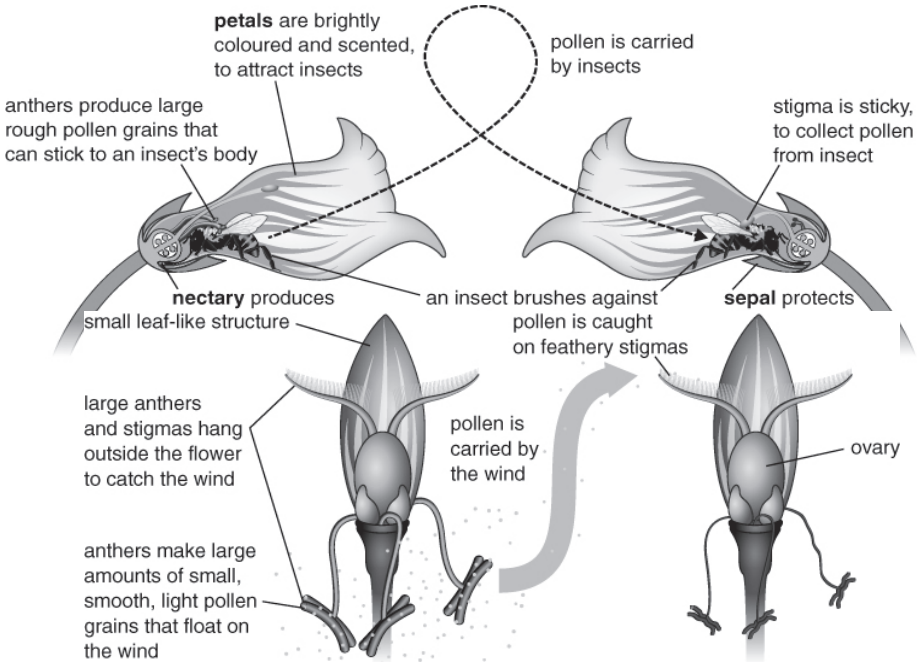
The offspring from sexual reproduction contain **characteristics** from both parents. The differences in these characteristics is **inherited variation**.

Gametes are produced by **reproductive organs**. In plants, these are contained inside **flowers**.

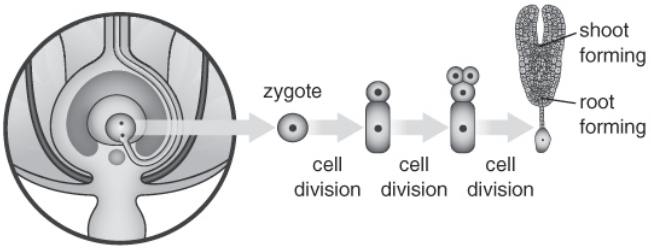


The **pollen grains** made in the anther need to be carried to the **stigma** of another flower. Pollen can be carried by animals (such as insects).

Pollen can also be carried by the wind. The carrying of pollen from an anther to a stigma is called **pollination**.



Once on the stigma, a pollen grain grows a **pollen tube,** which enters the **ovule** containing an **egg cell**. The nucleus from the male gamete inside the pollen grain joins with the nucleus inside the egg cell to form a zygote. This is called **fertilisation**. The zygote grows into an embryo and the ovule becomes a seed, containing the embryo and a food store.



A part of the flower forms a **fruit**. This is used for **seed dispersal**, which stops the new plants competing with the parent plants for water, nutrients, light and space.

- Some fruits are eaten by animals and the seeds come out in their **faeces** (e.g. apples).
- Some fruits are carried on the fur of animals (e.g. burdock).
- Some fruits are carried by the wind (e.g. dandelion).
- Some fruits explode, scattering the seeds (e.g. lupins).

When conditions are right, seeds **germinate**. The **resources** needed are water, oxygen and warmth (WOW). Water allows chemical reactions to start, which break down the food store and allows cells in the embryo to swell up. Oxygen is needed for **respiration**, to release energy from the food store. Warmth is needed to speed up the chemical reactions.

The root grows first then the shoot. Finally, new leaves open and **photosynthesis** can start in the **chloroplasts**. The glucose from photosynthesis is turned into **starch** to be stored. The mass of material produced is **biomass**. Photosynthesis can be summarised as a **word equation**:

$$\text{carbon dioxide} + \text{water} \xrightarrow[\text{chlorophyll}]{\text{light energy}} \text{oxygen} + \text{glucose}$$

A growing plant needs light, air, water, warmth and nutrients called **mineral salts** (LAWWN). The energy for growth comes from **respiration**, a process in which oxygen is used to release energy from glucose. It happens in the **mitochondria** of cells and can be summarised as:

glucose + oxygen → carbon dioxide + water (+ energy)

Accuracy, estimates and sampling

We can take a small sample of a larger population and use it to **estimate** what the larger population is like. Plant populations in an area can be estimated by taking samples using a **quadrat**. The more samples we take the more **accurate** the estimate is likely to be but the longer it will take to do.

Plant food (Plenary 4 in Topic 8Be)

In the table below, examples of how progression bands might be interpreted for this activity are given. It is suggested that a student needs to demonstrate work at a progression band in two different strands to achieve that band.

	Recalling	Explaining	Using knowledge	Using evidence	Applications and implications
Developing	Students name two or more plants that humans use. *Exemplar: named fruits and/or vegetables, cotton, lavender.*	Students draw the life cycle of a plant.			Students describe two or more ways in which humans use plants. *Exemplar: food, textiles, dyes, perfumes, fuel.*
Developing +	Students state the difference between sexual and asexual reproduction. *Exemplar: sexual reproduction needs two parents but asexual reproduction needs only one.* Students recall the resources needed for germination. *Exemplar: water, oxygen, warmth.* Students recall the resources needed for plant growth. *Exemplar: light, air, water, warmth and nutrients called mineral salts.* Students identify the parts of a flower.	Students describe what happens in pollination. *Exemplar: pollen grains are carried from an anther to a stigma.*	Students explain why plants need oxygen. *Exemplar: plants need oxygen for respiration.*		Students describe what would happen if seeds or plants don't get enough water. *Exemplar: plants wilt if they don't get enough water.*

	Recalling	Explaining	Using knowledge	Using evidence	Applications and implications
Securing	Students recall ways in which plants reproduce asexually. *Exemplar: strawberries have runners, potato plants have tubers.* Students give examples of inherited variation. *Exemplar: flowers of the different plants may inherit different colours.*	Students describe the functions of at least three different parts of a flower. *Exemplar: the stigma receives pollen, the anther makes pollen, the ovary contains an ovule in which the egg cells are found.* Students describe what happens to different parts of a seed during germination. *Exemplar: the food store gets smaller as it is used up.*	Students identify different fruits and described how they disperse their seeds. *Exemplar: strawberries are fruits that have tiny seeds in them. When animals eat strawberries, the seeds come out in their droppings and can then grow.* Students explain why plants need light and air to continue to grow well. *Exemplar: plants make their food using photosynthesis, which requires carbon dioxide, water and light.*	Students use information about the structure of a flower or of pollen grains to work out whether a plant is insect- or wind-pollinated. *Exemplar: the pollen is very small and light, which means that it is likely to be carried on the wind.*	
Securing +	Students correctly use the terms species and hybrid. *Exemplar: a species is a group of plants that can reproduce with one another to produce offspring that can also reproduce.*	Students describe fertilisation as the fusion of a nucleus from the male gamete with the nucleus from the female gamete. Students explain how inherited variation is caused. *Exemplar: in terms of half the information contained within the gametes coming from the male and half from the female.* Students explain how different parts of a seed are formed and their functions. *Exemplar: the zygote uses cell division to become the embryo.*	Students describe how organisms are interdependent. *Exemplar: bees depend on flowers for nectar/pollen for food, and the flowers depend on the bees for pollination.*	Students describe how to interpret the scientific name of a plant. *Exemplar: in terms of genus and species.* Students describe how a change in the population of one organism may cause a change in the population of another. *Exemplar: there are fewer bees today, and this means that fewer flowers can get pollinated and produce fruit. It's important you don't remove flowers that attract insects like bees from your garden.*	Students explain why preserving biodiversity is important. *Exemplar: organisms are interdependent; extinct organisms may have been useful to us in the future; more biodiverse areas recover better from natural disasters.* Students explain the importance of pollination for the production of foods.

	Recalling	Explaining	Using knowledge	Using evidence	Applications and implications
Exceeding	Students recall how plants prevent self-pollination. *Exemplar: all the anthers on the plant mature and release pollen before the stigmas can receive pollen.*	Students explain how seeds are prevented from germinating. *Exemplar: such as by having a very strong seed coat.*	Students explain why seeds are prevented from germinating. *Exemplar: the seed needs to have a period of cold (such as you would get in winter) and this ensures that the seed only germinates in spring when there will be enough resources available for plant growth.*		Students explain why plants avoid self-pollination. *Exemplar: so that the offspring will have variation and then if, for example, the conditions changed in the area some of the plants would naturally have characteristics that helped them to survive.*

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Tracey and Mark are opening a shop called 'Plant Food', which will sell seeds, fruits and vegetables. They want people to be able to buy things but also to be able to sell produce that they grow in their gardens or allotments. The shop needs a poster and a website. These could:

- explain how to interpret the scientific names of plants
- describe how to grow plants from seeds
- describe how and why plants make seeds and fruits
- describe how we can use different parts of plants
- explain why it is important to maintain biodiversity when growing plants.

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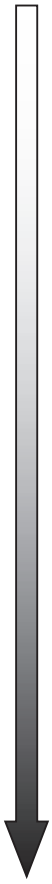
Now that you have completed the activity, circle the number of stars next to each of these sentences to describe how well you did.



I have…	
drawn a plant's life cycle.	* * * * *
described ways in which humans use plants.	* * * * *
named plants that humans use.	* * * * *
described the difference between sexual and asexual reproduction.	* * * * *
described what happens in respiration.	* * * * *
recalled the resources needed for germination and plant growth.	* * * * *
identified the parts of a flower.	* * * * *
described what happens in pollination.	* * * * *
described the functions of the different parts of a flower.	* * * * *
recalled ways in which plants reproduce asexually.	* * * * *
identified different fruits and described how they disperse seeds.	* * * * *
given examples of inherited variation.	* * * * *
described what happens in photosynthesis.	* * * * *
described what happens to the parts of a seed during germination.	* * * * *
recalled the differences between wind- and insect-pollinated plants.	* * * * *
described what happens in fertilisation.	* * * * *
correctly used the terms species and hybrid.	* * * * *
explained why preserving biodiversity is important.	* * * * *
explained how inherited variation is caused.	* * * * *

What could you do to improve? _____

_____

WSI Assessment: Spinners (Exploring 2 in Topic 8Bd)

	Planning	Obtaining (DAPS)	Presenting	Considering	Evaluating
Developing	Students identify an aim (*e.g. to see if some shapes of spinner are better than others*). They identify a prediction or make a simple prediction (without a reason) (*e.g. this could be by selecting an appropriate prediction from a set of choices*). They outline a simple method to find out what happens (*e.g. 'I will make different spinners and drop them and time how long they take to fall'*). They identify at least one appropriate control variable from a list of choices (*e.g. length of 'wing', mass, shape of wing*).	Following instructions, or with help, students make some observations.	Students record results clearly (*e.g. in a table given to them*).	Students provide a simple description of what was found, linking cause and effect (*e.g. 'the ones with longer wings were better'*). They may use incorrect terminology.	Students make a simple suggestion as to how to improve the investigation (*e.g. 'I could use more spinners'*).

	Planning	Obtaining (DAPS)	Presenting	Considering	Evaluating
Developing +	Students make a prediction with a reason, and recognise that experimentation is an appropriate way of testing this prediction (*the reasoning may contain errors, e.g. 'the ones with round ends on the wings will take longer to fall because that's the shape of a sycamore maple spinner'*). They plan to use simple, appropriate apparatus (*e.g. a stopwatch for timings*). They decide on an appropriate approach including deciding whether to use a fair test. In fair tests, they plan to control at least one variable (*e.g. mass, type of paper, drop height*). They plan to change one variable and measure another (*e.g. change wing length and time the fall time*). They write a method as a series of steps, including what they will look for. They state one way in which they and/or others around them will remain safe (*e.g. not climbing on furniture to do the drops*).	Students use simple apparatus appropriately (*e.g. stopwatches to record times*). In fair tests, they vary one factor while keeping others the same (which may require some assistance). If questioned, they are able to state clearly the intervals between measurements (*e.g. 1 cm differences in the lengths of the wings*) and the range of measurements (*e.g. 0 cm length to 10 cm length of wing*). Following instructions, they take action to control obvious risks to themselves (*e.g. not to lean out across railings to watch their spinner fall*).	Students record their data using ordered tables or labelled diagrams or clearly laid out descriptions. Where appropriate, they clearly show the intervals between measurements and the range of measurements. They plot simple bar charts where possible (*bar charts may have small errors, such as missing units, axes labelled incorrectly and slightly inappropriate scales. However, the bars should be plotted accurately* (*e.g. a wing shape versus time taken to fall*).	Students draw a straightforward conclusion and identify the evidence that they have used (*e.g. 'The spinners with longer wing lengths took a greater time to fall and so fell the slowest'*). They communicate their conclusions using appropriate scientific language (*e.g. using words such as 'evidence', 'conclusion', 'seed dispersal'*).	Students suggest improvements in their work, giving simple reasons (*e.g. 'The spinners took longer and longer to fall with longer and longer wings so I don't know if there is a wing length which is best. So I should carry on adding length to the wings to see if this pattern continues or not'*).

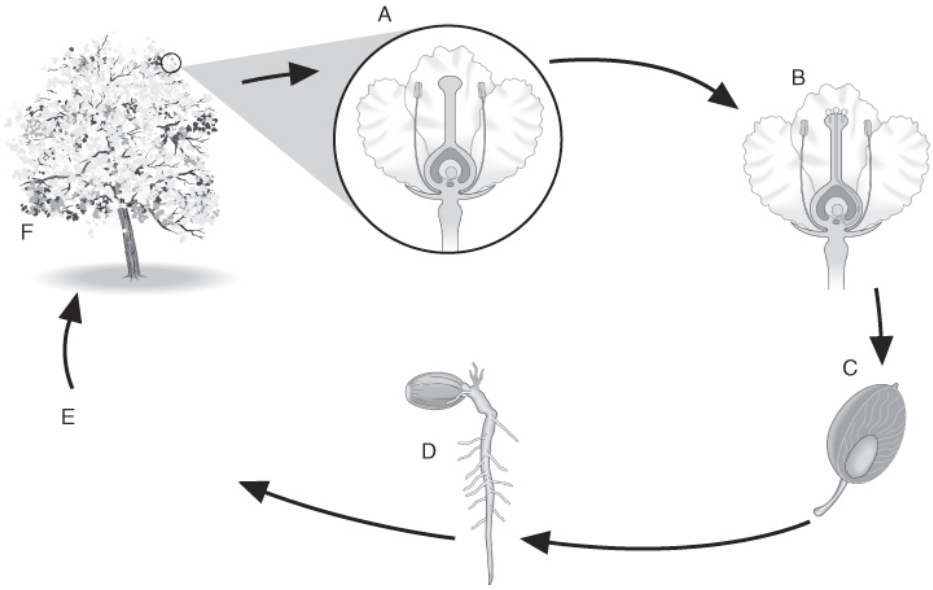
	Planning	Obtaining (DAPS)	Presenting	Considering	Evaluating
Securing	Students state a prediction with a reason using scientific knowledge (*e.g. 'Spinners with longer wings have more area and so there is more air resistance, which will make them fall more slowly'*). They state what they will look for and explain why they will look for these things (*e.g. 'I will time the length of the fall for each spinner. The longer the time it takes to fall the more likely it is to be blown away by the wind and so the better shape it makes for a fruit for seed dispersal'*). They plan a systematic approach, which includes the number of measurements that they will take and the overall range of measurements. They state some ways in which they will remain safe and how they will ensure others stay safe (*e.g. not climbing on furniture to do the drops and to make sure no one is too near the drop site*).	Students record readings accurately. They identify when measurements should be repeated and carry out those repeats.	Students use more complex bar charts, frequency diagrams, scatter graphs, pie charts or line graphs to present data, as appropriate (*e.g. any simple bar charts will be drawn accurately with all the appropriate features. Or a scatter graph may be attempted with wing length on the x-axis and fall time on the y-axis*).	Students analyse their findings and draw conclusions making clear use of their evidence (*e.g. at Level 4, students are pointing out the evidence that they have used. Here, they need to clearly show how they have used their evidence. 'The spinners all fell the same distance and so those that took longest are more likely to be blown by the wind, which is better for seed dispersal'*). They point out inconsistencies and anomalies in their data. They communicate their ideas using some scientific and mathematical conventions and terminology (*e.g. using words such as 'speed'*).	Students evaluate their working methods to make practical suggestions for improvements, which are backed up with scientific reasons (*e.g. 'I kept cutting bits off my wings but I forgot that this will also affect the mass of the spinner, reducing it. So, I should repeat the experiment and attach the cut-off pieces to the bottom of the spinner so that each one is the same mass'*).

	Planning	Obtaining (DAPS)	Presenting	Considering	Evaluating
Securing +	Students plan an appropriate approach selecting and using secondary sources of information (*e.g. finding data from secondary sources on natural wing lengths or spinner shapes*). They take account of some less obvious variables that need to be controlled (*e.g. altering the wing lengths without changing the overall mass of the spinner*). They state the number and range of measurements that they will make, justifying their choices (*e.g. explain that repeating measurements may help them to spot any mistakes, and make reference to measurements that do not fit the main trend*). They identify hazards and describe how to reduce the risks from those hazards, both to themselves and to others (*e.g. there is a hazard to eyes from falling spinners if students look up. The risk of harm is reduced by eye protection*).	Students collect data with an appropriate degree of accuracy (*e.g. use timings to the nearest second rather than the 1/100ths of a second displayed on the stopwatch*).	Students present data using a wide range of neat and accurate charts and graphs (*e.g. they plot a scatter graph correctly with scales chosen to allow the graph to fill most of the graph paper*). They decide whether to include or ignore inconsistencies and anomalies in their charts and graphs, pointing these out where appropriate.	Students analyse findings to draw valid conclusions that are consistent with the evidence (*e.g. 'longer spinner arms have a greater area, and this increases air resistance which therefore slows the speed of the spinner'*). They use scientific concepts in their explanations (*e.g. air resistance*). They account for any inconsistencies in the evidence (*e.g. not all the spinners fluttered in a straight line to the ground and so some were covering a longer distance than the others*). They communicate qualitative and quantitative data effectively using scientific conventions and terminology.	Students consider how good their evidence is in supporting their conclusion (*e.g. 'I can't say that 10 cm was the best length of wing for holding a spinner in the air, because that was the longest wing I used and also the one that fell the slowest. So, I need to do some more experiments with even longer wings'*).

	Planning	Obtaining (DAPS)	Presenting	Considering	Evaluating
Exceeding	Students formulate scientific questions and hypotheses by synthesising information from a variety of sources. They identify variables that cannot easily be controlled and plan appropriate ways to take account of this (*e.g. drafts, movements of students affecting air flow around the drop site*). They explain how their methods will allow them to account for potential sources of error that they have identified, so that they can collect good quality evidence that will allow them to be sure of a conclusion (*e.g. they take many repeat readings and calculate means, making sure that the same pair of students do the dropping and timing each time or using electronic equipment, such as a light gate, to drop and time the spinners*).	Students collect data systematically and with precision and accuracy using a range of apparatus (*e.g. which could include light gates*). They follow risk assessment procedures.	Students present graphical data using lines or curves of best fit (*e.g. a line of best fit is drawn on the scatter graph*).	Students identify limitations in primary and secondary data. They develop and demonstrate quantitative relationships between variables in their conclusions (*e.g. surface area versus speed of fall*). They communicate effectively using a wide range of scientific and technical conventions and terminology. (*This includes using a full range of appropriate symbols and terminology to represent abstract ideas.*) They decide whether to include or exclude anomalous results and explain their choice. They explain how data could be interpreted in different ways. They use rebuttals in their arguments. (*This includes identifying how others might criticise their work and preparing a counter-argument.*)	Students evaluate their evidence to make reasoned suggestions about how their working methods could be improved (*e.g. explanations of why improvements to accuracy, precision, repeatability and reproducibility will allow a more confident conclusion*). They describe how factors that they did not attempt to control may have affected the results, describe how these factors might be better controlled and explain the effects of better controlling them (*e.g. drafts, movement of students, difficulty in dropping the spinner from precisely the same place each time, difficulty of dropping the spinner at the same angle each time*). They consider whether their data is sufficient for the conclusions they have drawn. (*This includes how any identified limitations could affect the validity and certainness of conclusions.*)

Name _____ **Class** _____ **Date** _____

1 The drawing shows the life cycle of a plum tree.



(a) Draw a diagram of the missing stage (part E) on the life cycle drawing.

(1)

(b) Draw lines to match each stage of the life cycle with the word describing what happens at that stage.

Stages of life cycle	What happens at that stage
A	fertilisation
A to B	flowering
B	fruit formation
C	germination
C to D	pollination
D	seed dispersal

(3)

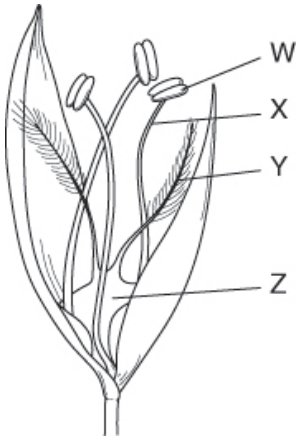
(c) Which process in the plum tree life cycle is the same in humans? Tick **one** box.

- ☐ **A** pregnancy
- ☐ **B** puberty
- ☐ **C** fertilisation
- ☐ **D** fruiting

(1)

(Total for Question 1 = 5 marks)

2 Look at the diagram of the grass flower.
Complete the table to show the names of the parts of the flower and what each part does.



Part	Name of part	What the part does
W		
X		
Y		
Z		

(Total for Question 2 = 4 marks)

3 Plants are in the plant kingdom.

(a) Name **one** other kingdom.

_____

(1)

Here are descriptions of two groups in the plant kingdom.

Group P	**Group Q**
Produce seeds	Produce seeds
Have flowers	Have cones
Have leaves	Have leaves
Have xylem tissue	Have xylem tissue

(b) Give **one** difference between Group P and Group Q.

_____

(1)

(c) Suggest **one** way Group P could be divided into smaller groups.

_____

(1)

(d) One type of plant in group P is called *Ranunculus acris.* What genus does this plant belong to?

_____

(1)

(e) Give **one** reason why using scientific names is useful.

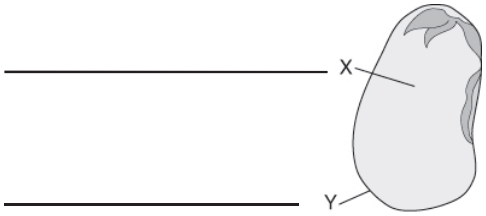
_____

_____

(1)

(Total for Question 3 = 5 marks)

4 The drawing shows a seed.



(a) Complete the drawing by writing labels for X and Y.

(1)

(b) Which part of a plant grows out of the seed first? Tick **one** box.

☐ **A** leaf

☐ **B** flower

☐ **C** stem

☐ **D** root

(1)

(c) What resources does the seed need for growth to happen?

_____

_____

_____

(2)

(d) What type of reproduction produces seeds? Tick **one** box.

☐ **A** asexual

☐ **B** sexual

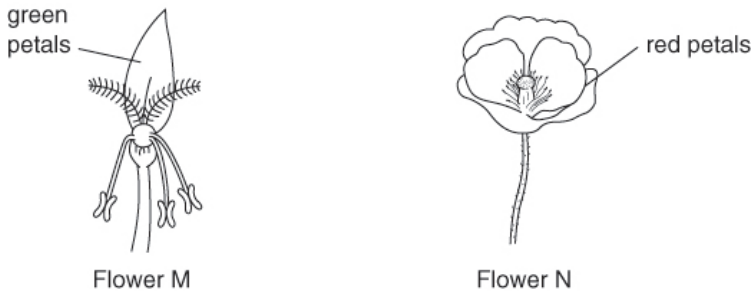
☐ **C** external

☐ **D** internal

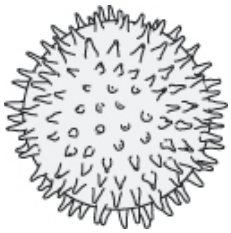
(1)

(Total for Question 4 = 5 marks)

5 The diagrams show two flowers, M and N.



The magnified pollen grain shown below comes from flower N.



(a) Explain how you can tell that the pollen grain is from flower N and not from flower M. Give **two** reasons.

_____

_____

(2)

(b) Give **one** way a pollen grain from flower N would be different from a pollen grain from flower M.

_____

(1)

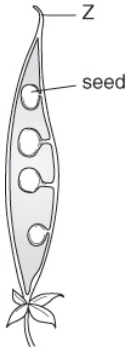
(c) What part of a pollen grain is needed for fertilisation? Tick **one** box.

- ☐ **A** egg
- ☐ **B** male gamete
- ☐ **C** ovule
- ☐ **D** stamen

(1)

(Total for Question 5 = 4 marks)

6 The drawing shows a pea pod. The seed, called a pea, is labelled.



(a) What part of a flower forms the seed? Tick **one** box.

- ☐ **A** ovule
- ☐ **B** petal
- ☐ **C** pollen
- ☐ **D** sepal

(1)

(b) What part of a flower was part Z? Tick **one** box.

- ☐ **A** petal
- ☐ **B** sepal
- ☐ **C** ovule
- ☐ **D** stigma

(1)

Usually a pea pod stays on the plant, slowly dries and the pod twists. Suddenly the pod splits open and the seeds burst out.

(c) Give **two** reasons why the plant does this.

(2)

(d) Describe **one** other way seeds can move away from a parent plant.

(1)

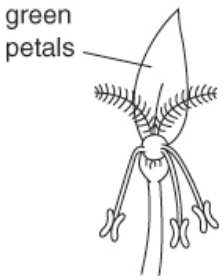
(Total for Question 6 = 5 marks)

7 The number of honey bee colonies in the USA has decreased by about 40% over the past 40 years. Explain why this is worrying for farmers in the USA.

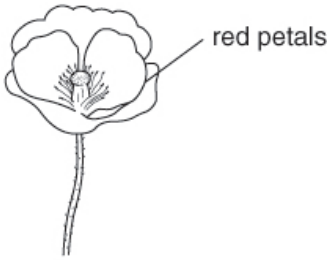
(Total for Question 7 = 2 marks)

Name _____ **Class** _____ **Date** _____

1 The diagrams show two flowers, M and N.

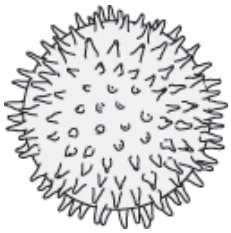


Flower M



Flower N

The magnified pollen grain shown below comes from flower N.



(a) Explain how you can tell that the pollen grain is from flower N and not from flower M. Give **two** reasons.

_____

_____

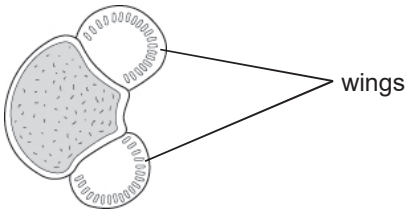
(2)

(b) Give **one** way a pollen grain from flower N would be different from a pollen grain from flower M.

_____

(1)

(c) The drawing below shows a different type of pollen grain.



How is this pollen grain adapted to help pollination?

_____

_____

(1)

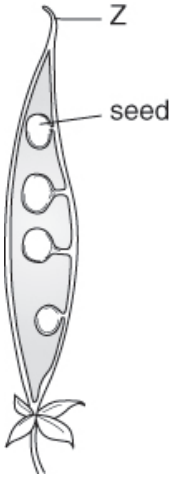
(d) What part of a pollen grain is needed for fertilisation? Tick **one** box.

- ☐ **A** egg
- ☐ **B** male gamete
- ☐ **C** ovule
- ☐ **D** stamen

(1)

(Total for Question 1 = 5 marks)

2 The drawing shows a pea pod. The seed, called a pea, is labelled.



(a) What part of a pea flower forms the seed? Tick **one** box.

- ☐ **A** ovule
- ☐ **B** petal
- ☐ **C** pollen
- ☐ **D** sepal

(1)

(b) What part of a flower was part Z? Tick **one** box.

- ☐ **A** petal
- ☐ **B** sepal
- ☐ **C** ovule
- ☐ **D** stigma

(1)

Usually a pea pod stays on the plant, slowly dries and the pod twists. Suddenly the pod splits open and the seeds burst out.

(c) Give **two** reasons why the plant does this.

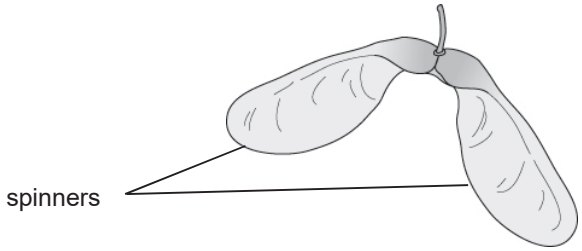
_____

_____

_____

(2)

(d) Some plant fruits have 'spinners' on them, as shown in the drawing.



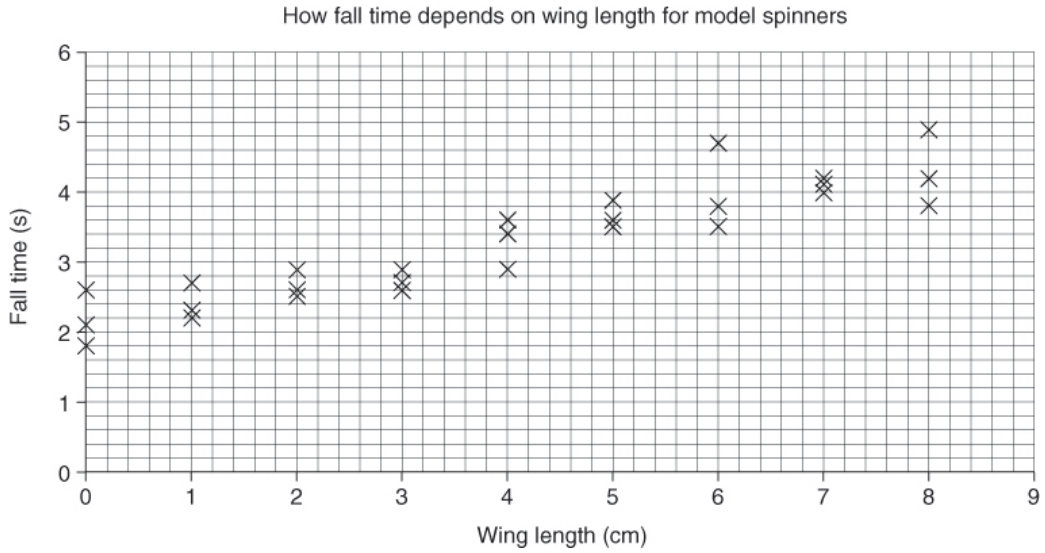
Explain how 'spinners' help to disperse seeds.

_____

_____

(1)

Some students make models of spinners and measure the time the spinners take to fall.
The scatter graph shows their results.



(e) What is the independent variable in this investigation? Tick **one** box.

☐ **A** The size of the model.

☐ **B** The time taken to fall.

☐ **C** The number of times each spinner was dropped.

☐ **D** The length of the wings.

(1)

(f) Describe the relationship shown in the graph.

_____

(1)

(g) Draw a line of best fit on the graph.

(1)

(h) Describe **one** other way seeds can move away from a parent plant.

_____

_____

(1)

(Total for Question 2 = 9 marks)

3 The number of honey bee colonies in the USA has decreased by about 40% over the past 40 years. Explain why this is worrying for farmers in the USA.

(Total for Question 3 = 2 marks)

4 In an experiment, seeds from three different plant species are heated at different temperatures before being planted. The results are shown in the table.

Plant species	Percentage of seeds germinating						
	No heating	45 °C for 4 mins	60 °C for 4 mins	70 °C for 4 mins	80 °C for 4 mins	90 °C for 4 mins	98 °C for 4 mins
A	95	96	100	100	78	0	0
B	3	5	6	6	19	34	14
C	93	90	91	92	91	25	0

(a) Give the letter of the species of plant which would probably germinate after a fire. Give a reason for your choice.

(1)

(b) Fire can weaken the seed coat in some species. Suggest a reason why this helps the seeds germinate.

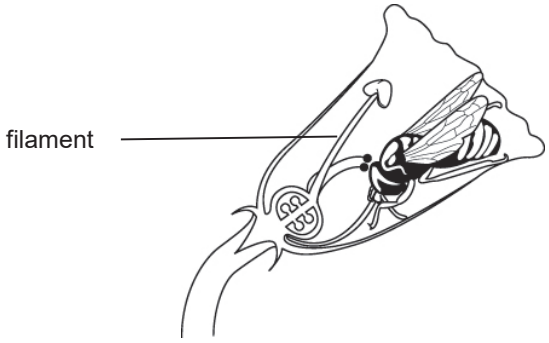
(1)

(c) Explain **two** advantages to seeds if they only germinate after a fire.

(2)

(Total for Question 4 = 4 marks)

5 The diagram shows an insect inside a flower.



(a) Explain how the filament of the flower is adapted for its function.

(1)

(b) Describe how the anther and stigma of the flower could be adapted to prevent self-pollination.

(1)

(c) Explain a disadvantage of self-pollination.

(2)

(d) Explain an advantage of self-pollination.

(1)

(Total for Question 5 = 5 marks)

Quick Quiz

	Answers				Marks
Topic	**Q1**	**Q2**	**Q3**	**Q4**	
8Ba	B	A	D	D	4
8Bb	C	A	B	B	4
8Bc	A	B	B	A	4
8Bd	A	C	D	C	4
8Be	A	B	C	D	4

End of Unit Test Mark Scheme Standard (S)

Question	Part	Step	Answer	Mark scheme
1	**a**	**1st**	Seedling, small tree or sapling drawn. Must have at least one leaf.	**1 mark**
	b	**1st**	A – flowering A to B – pollination B – fertilisation C – fruit formation C to D – seed dispersal D – germination	**3 marks** – 3 marks for all six correct, 2 marks for 4 correct, 1 mark for 2 correct, otherwise 0
	c	**1st**	**C** fertilisation	**1 mark**
2		**3rd (name)** **4th (function)**	**W** – anther – makes pollen **X** – filament – supports the anther **Y** – stigma – traps/receives pollen **Z** – ovary – contains ovules/egg cells (accept: phonetic misspellings, e.g. filliment)	**4 marks** – 4 marks for names and functions all correct = step 4; 1 mark for two names correct (to a total of 2), 1 mark for two functions correct (to a total of 2) = step 2
3	**a**	**1st**	animal, fungus, protist/protoctist, prokaryote	**1 mark**
	b	**2nd**	whether they have flowers or cones	**1 mark**
	c	**4th**	any sensible suggestion (e.g. shape of leaves)	**1 mark**
	d	**5th**	*Ranunculus*	**1 mark** – do not accept misspelling
	e	**4th**	It means that scientists all over the world can be sure they are talking about the same plant/prevents confusion.	**1 mark**
4	**a**	**2nd**	**X** food store **Y** seed coat	**1 mark** – for both
	b	**2nd**	**D** root	**1 mark**
	c	**2nd**	water, oxygen, warmth (accept: phonetic misspellings, e.g. oxijen)	**2 marks** – 2 marks for all correct, 1 mark for two correct
	d	**2nd**	**B** sexual	**1 mark**

5	**a**	**4th**	It comes from an insect-pollinated flower because it is spikey. Flower N is insect-pollinated because it has red petals to attract them.	**2 marks** – 1 mark for each point
	b	**4th**	It would be smaller and/or smoother. Some students may mention that some pollen grains have 'wings'.	**1 mark**
	c	**5th**	**B** male gamete	**1 mark**
6	**a**	**5th**	**A** ovule	**1 mark**
	b	**6th**	**D** stigma	**1 mark**
	c	**6th**	To spread its seeds into new areas so that the plant can grow in new areas and spread. To make sure the offspring don't compete with the parent.	**2 marks** – 1 mark for each point
	d	**4th**	Any one of: wind – using spinners or parachutes; fruit – that animals eat; water – carries floating fruits on currents explosions – force of exploding fruits flings out seeds	**1 mark** – a description is needed for the mark. For example, do not accept 'wind'.
7		**6th**	Fewer bees will result in less pollination. Less pollination will result in less fruit/ seeds. Less fruit/seeds will mean lower profits for the farmers.	**2 marks** – 1 mark for each of 2 points up to a max of 2

Final Step Calculation

Marks	Step
0–7	1st or below
8–9	2nd
10–11	3rd
12–15	4th
16–21	5th
22–25	6th
26+	7th

End of Unit Test Mark Scheme Higher (H)

Question	Part	Step	Answer	Mark scheme
1	a	4th	It comes from an insect-pollinated flower because it is spikey. Flower N is insect-pollinated because it has red petals to attract them.	**2 marks** – 1 mark for each point
	b	4th	It would be smaller and/or smoother. Some students may mention that some pollen grains have 'wings'.	**1 mark**
	c	7th	It has wings to help it float in the air/on the breeze.	**1 mark**
	d	5th	**B** male gamete	**1 mark**
2	a	5th	**A** ovule	**1 mark**
	b	6th	**D** stigma	**1 mark**
	c	6th	To spread its seeds into new areas so that the plant can grow in new areas and spread. To make sure the offspring don't compete with the parent.	**2 marks** – 1 mark for each point
	d	4th	The spinner makes the seed fall more slowly, providing more chance for the wind to blow it away from the parent plant.	**1 mark**
	e	6th	**D** The length of the wings.	**1 mark**
	f	5th	The longer the wings, the more time the spinner takes to fall.	**1 mark**
	g	7th	straight line of best fit drawn correctly on the graph	**1 mark**
	h	4th	Any one of: fruit – that animals eat; water – carries floating fruits on currents; explosions – force of exploding fruits flings out seeds	**1 mark** – a description is needed for the mark. Do **not** accept 'water'.
3		6th	Fewer bees will result in less pollination. Less pollination will result in less fruit/ seeds. Less fruit/seeds will mean lower profits for the farmers.	**2 marks** – 1 mark for each of 2 points up to a max of 2
4	a	6th	**B** because this showed the biggest increase in percentage of seeds germinating after heat treatment.	**1 mark**
	b	7th	It allows water into the seed so that cell division and growth can start.	**1 mark**
	c	7th	Any two from: There are lots of nutrients in the soil because of the burnt plant material. There are no adult competitor plants for the seedlings. The seedlings give the species a chance to rapidly cover the whole area in just their species.	**2 marks** – 1 mark for each point up to a maximum of 2 marks
5	a	5th	It is bent to hold the anther in the right place to deposit pollen on the insect.	**1 mark**

	b	**6th**	They could mature at different times so that the stigma will not receive pollen at the same time as the anther is producing pollen.	**1 mark**
	c	**7th**	It will cause the offspring to be identical to the adult and so there will be no variation. This will mean that all the plants in an area have the same characteristics and so a sudden change in conditions may kill all of them.	**2 marks**
	d	**7th**	Self-pollination means that all the offspring plants will have the adaptations necessary to survive in that area (because they will be identical to the parent).	**1 mark**

Final Step Calculation

Marks	Step
0–5	3rd or below
6–8	4th
9–12	5th
13–16	6th
17–20	7th
21+	8th

Quick Check answers

Quick Check	Answers
8Ba	**a** Organisms are classified by looking at their characteristics; they are put into groups based on characteristics; those groups are divided again and again, with those in each group having more and more similar characteristics. Some students may also mention genus and species as the last two groups and how the names of these groups are used to give an organism its scientific name. **b** Genus and species are the last two groups in the classification system; the names of these groups are used to give an organism its scientific name and so you can tell which other organisms have similar characteristics because they are in the same genus; scientists can tell exactly what organism is being referred to using a scientific name. **c** Biodiversity is how many different species live in an area; biodiversity is important because all organisms in an area depend on one another; humans also get lots of things from different species and if we allow them to become extinct we may lose things that may become important in the future; more biodiverse areas are better at recovering from disasters; biodiversity enriches our lives.
8Ba WS	Overall procedure is outlined on Worksheet 8Ba-6.
8Bb	Students' own notes and annotations. They should clearly show that sexual reproduction needs two parents (asexual reproduction needs only one) and produces variety (but asexual reproduction does not).
8Bc	True False: 'statement' *The female parts of a flower include the ovary, stigma and style.* False: 'statement' *Insect-pollinated flowers often produce a scent and have brightly coloured flowers*. True False: 'statement' *The anther produces pollen grains.* False: 'statement' *The ovule contains a female gamete OR The pollen grain contains the male gamete.*

Quick Check	Answers
	True False: 'statement' *Some plants avoid self-pollination by having both male and female parts in the different flowers/on different plants.* True False: 'statement' *Plants try to avoid self-pollination so that their offspring have variation.*
8Bd	**1** **a** From left to right: 4, 1, 3, 2 **b** From left to right: 4 – The ovary swells and becomes the fruit. The ovules become seeds; 1 – A pollen grain lands on a stigma; 3 – The nucleus from the male gamete fuses with the nucleus in the egg cell; 2 – The pollen grain grows a pollen tube, which grows towards the ovule. **c** Far-left box circled (The nucleus from the male gamete fuses with the nucleus in the egg cell). **d** Labels could include: egg cell, fruit, ovary, ovule, pollen grain, pollen tube, seed, stigma, style. **e** Animals eat the fleshy fruit.
8Be	**1** Apple trees, bees and humans are all interdependent. The apple trees rely on bees that visit the flowers and so pollinate them. In turn, the bees rely on the apple trees for nectar/pollen, which they collect for food. Humans rely on the trees for food (apples). In turn, humans spread the seeds of the trees when they transport and eat the apples. Humans collect honey from the bees, and humans may provide hives for the bees to live in; they may even plant apple trees for the bees to collect nectar/pollen from. Award additional credit for paragraphs that have a sound overall structure and good levels of unity, cohesion, coherence and order. **2** The seed should have the seed coat, food store, small root, small shoot and embryo labelled. The seed coat protects the seed. The food store supplies glucose for respiration, which also requires oxygen as a resource. Respiration releases the energy needed for the embryo to grow. After germination, a small root appears. The root absorbs water. The shoot will grow above ground and support the leaves. Photosynthesis will occur in the leaves to make food for the plant. Photosynthesis requires the following resources: light, carbon dioxide and water.