Stewards Academy

Science KS3:

Year 7

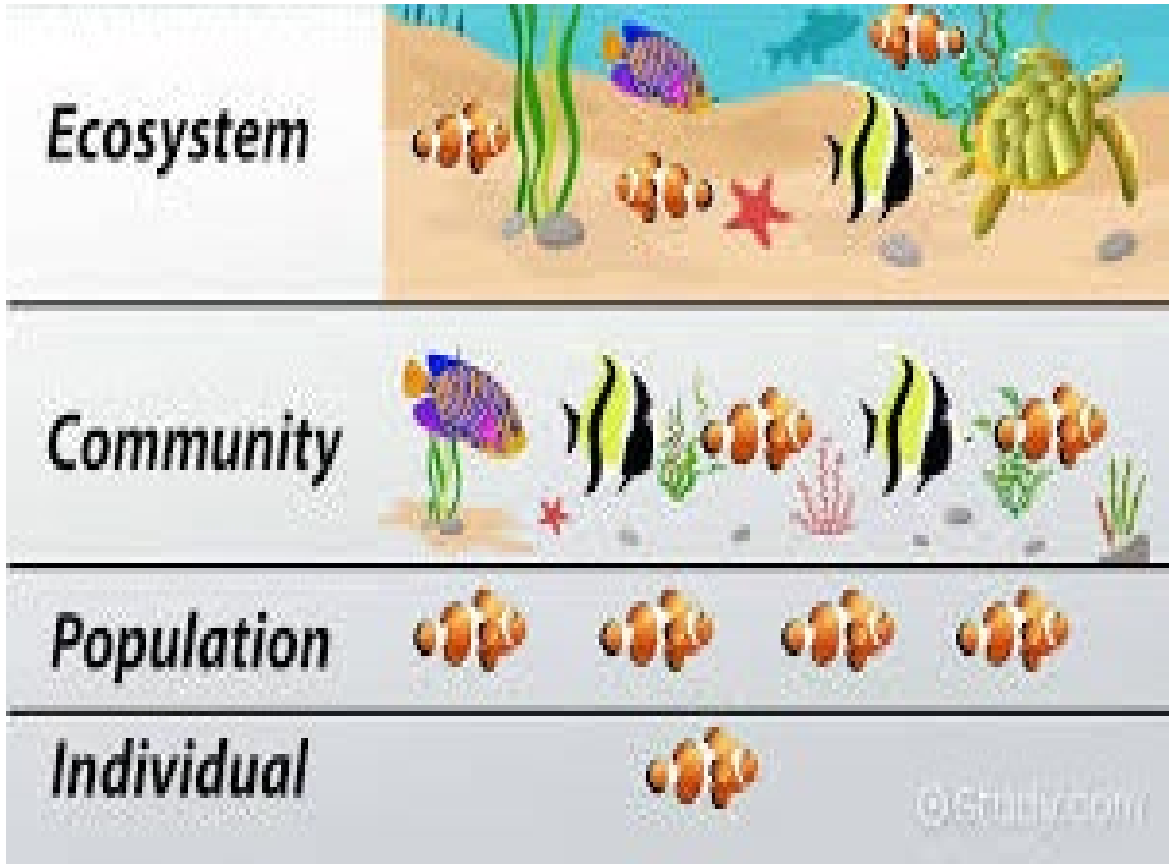
Blended Learning Booklet

Unit 5: Ecosystems

Name:

Form:

- *Aim to complete three lessons each week.*
- *Use the online text book to help you*
- https://www.kerboodle.com/app
- *Login using your user name (1st initial followed by surname all lower case eg Joe Blogs = jblogs)*
- *Password (initially the same as your user name) should be reset to stewards lower case*
- *Institution code is fu0*
- *Complete the work described in the four part lesson*
- Use the mark schemes provided to self assess your work and make corrections in blue pen.



Big Picture – Year 7 Overview
Science

Next Year

End of Year Assess-ment

End of Unit Test

Energy transfer

Energy and temperature

Work energy and machines

Cost of energy

Energy and Power

Energy resources

UNIT 6

Energy

I will be able to explain that there is energy in food and fuel and that it is measured in Joules. **I will be able to** explain how energy from non-renewable or renewable resources can be used to provide electricity**. I will be able to** use equations to link energy and power and to calculate the unit cost of energy. **I will be able to** state the Law of conservation of energy, describe 3 methods of heat transfer and how to prevent heat transfer using an insulator.

End of Unit Test

Plant structure and function

Photo-synthesis

Microbial Bio-technology

Respiration

Flowers and pollination

Ecosystems

I will be able to explain that plants are able to make their own food by photosynthesis and that animals are consumers eating other organisms to take in energy. **I will be able to** explain that plants and animals are linked through food chains and webs which show the relationships between organisms in an ecosystem. **I will be able to** explain the processes and the importance of respiration and photosynthesis and how these are linked ,as well as how plants are uniquely adapted to carry out photosynthesis

Ecosystems and competition

Food chains and webs

UNIT 5

End of Unit Test

The periodic table. Groups 1, 7 & 0

Compounds and chemical formulae

Atoms and elements

Separation techniques

Matter

I will be able to use the particle model to explain how particles are arranged in solids, liquids and gases and how a substance can change between these states. **I will be able to** use the particle model to explain the process of diffusion and gas pressure. **I will be able to** recognize a pure substance and be able to describe methods for separating mixtures. **I will be able to** identify substances as elements or compounds and know that the periodic table shows how the elements are grouped together.

Pressure in solids, liquids and gases

End of Unit Test

UNIT 4

States of matter

Particle model

Pure substances and mixtures

Solutions and solubility

Squashing, stretching and turning

Forces

I will be able to explain that a forces are a push or a pull that can change the speed, direction or shape of an object. **I will be able to** explain how some forces such as gravity act at a distance (non-contact) and some such as friction and drag require objects to touch (contact). **I will be able to** use an equation to calculate speed and be able to represent changing speeds on a graph. Finally **I will be able to** use and equation to link force and pressure.

Friction and drag

Gravity

Speed

Introduction to forces

UNIT 3

End of Unit Test

Digestive system

Organisms

I will be able to explain How cells are the basic building blocks of life for both plants and animals. How some organisms can exist as simple single celled organisms and how in others cells are organized into tissues, organs and organ systems to create more complex multicellular organisms. **I will also be able to** explain the structure and function of some of these organ systems and how they are affected by different lifestyle choices

UNIT 2

Using a microscope & Plant and animal cells

Uni-cellular organisms

Drugs, alcohol and smoking

Breathing and gas exchange

Nutrients, healthy diet and food tests

End of Unit Test

The Enquiry Process

I will be able to plan and carry out a scientific investigation. This procedure will include being able to write a hypothesis, design a method, collect and analyse data and finally be able to critically evaluate the whole process.

Evaluating data and methods

Analysing patterns in data

Collecting, recording and presenting data

Planning scientific investigations

Asking scientific questions

UNIT 1

Year 7

ZOOM IN...

MY LEARNING JOURNEY:

Subject: Ecosystems: Year 7 Unit: 5

In this unit students learn how organisms are adapted to survive in their environment and how they must adapt to cope with change to avoid becoming extinct. They will learn that evolution is on going adaption and is important for the survival of a species. This unit also describes the link between respiration and photosynthesis that is vital to life on this planet. Finally respiration of microbes and their use in Biotechnology is explored

DEVELOPING COURAGE

C The link between photosynthesis and respirations provided a stanble environment for life on Earth.

O To explore microbial world and how it is useful in biotechnology

U Understanding how impotant bees and other pollinators are to life on Earth

R Learning how to explain Darwins theory of evolution

A How ecosystems are perfectly balanced and should be disrupted

G Share our scientific knowledge

E Understanding how all things living and non-living are interconnected

UP NEXT

Energy

- Fuels
- Energy resources
- Cost of energy
- Dissipation
- Work and power
- Temperature
- Energy transfer

CAREERS

- Ecologist
- Physical trainer
- Gardener
- Bread maker
- Brewer

PREVIOUS LEARNING

Students should have an understanding of how food chains show the feeding relationships between animals. That environments can change and pose a danger to living things. That plants need light, space, water and minerals to grow. How water is transported within plants. That different parts of flowering plants have different functions. That pollen needs to be transferred between plants so that seeds can be made, leading to new plants. .

WHAT WE KNOW/ REMEMBER

- .....
- .....
- .....
- .....
- .....

RECOMMENDED READING

1. The Ecology Book: Big Ideas Simply Explained by Tony Juniper,
2. Why People Need Plants by Carlton Wood & Nicolette Habgood,
3. The Bee Book Hardcover by Charlotte Milner.

PERSONAL OBJECTIVES

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Lesson 1: Book 1 – Food chains and webs (9.1.1)

Connection

Have a look at the topic overview and the zoom in.

Populate what you know and your personal objectives.

Activation

LI: Describe what food webs and chains show

1. Make a note of the date, title and the LI
2. Key words – producer, consumer, predator, prey food chain, food web
3. Read pages 182 to 183
4. https://www.youtube.com/watch?v=FFloV2J-eKI
5. Copy the diagram of the food chain (p182) OR the food web (p183)
6. Answer Questions A, B, C, D
7. Have a go at “How much energy?”

Demonstration

Attempt Summary questions
In 15 mins answer as many questions as you can.
Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:
Single chemistry bottle question is for all students
Double chemistry bottle question are for students looking to extend their knowledge
Triple chemistry bottle question is for students looking to challenge themselves.

Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Lesson 1: Answers **9.1.1 Food Chains and Webs**

Connection

1. N/A
2.
3.

Activation & Demonstration

In-text questions	**A** It is a diagram that shows what an organism eats. It shows the flow of energy between organisms. **B** A predator eats other animals, whereas prey are eaten by other animals. **C** A set of linked food chains.
Activity	**How much energy?** First level = 1000 kJ, Second level = 0.1 x 1000 kJ = 100 kJ, Third level = 0.1 x 100 kJ = 10 kJ 10 kJ would be passed to the top predator.
Summary questions	**1** food chain – diagram showing the slow of energy through organisms food web – diagram showing linked food chains predator – animal that eats another animal prey – animal that is eaten (4 marks) **2a** giraffe/impala/zebra (1 mark) **b** acacia tree/grass (1 mark) **c** acacia tree (1 mark) **d** Credit any suitable answer. For example, grass → impala → leopard → lion (1 mark for correct order of organisms, 1 mark for arrows in correct direction) **3** 1 mark for all arrows pointing in correct direction. 1 mark for two food chains correctly interlinked. 1 mark for third food chain correctly interlinked. **4** Example answers (6 marks): Grasshopper eats grass, field mouse eats grasshopper, owl eats field mouse. The producer is the grass. The herbivore is the grasshopper. The carnivores are the field mice and the owls. The predators are the field mice and the owls. The prey are the grasshoppers and the field mice. The top predator is the owl. 500 kJ of energy are transferred to the grasshopper. 50 kJ are transferred to the field mouse. 5 kJ are transferred to the owl.

Lesson 2: Book 1 – Disruption to food chains and webs (9.1.2)

Connection

Q1. Why are plants called producers?

Q2. What is a predator?

Q3. What does a food web show?

Activation

LI: Describe how toxins can accumulate in a food chain and the effect this can have on different populations

1. Make a note of the date, title and the LI
2. Key words – interdependence, population, bioacumulation
3. Read pages 184 to 185
4. https://www.youtube.com/watch?v=N80av1SCugY
5. Copy the diagram to show bioaccumulation of toxins from fish in the polar bear (p185)
6. Answer Questions A, B, C,

Demonstration

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Consolidation

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Lesson 2: Answers **9.1.2 Disruption to Food Chains and Webs**

Connection

1. They can make their own food

2. An animal that eats other (prey) animals.

3. The feeding relationships between organisms in an environment.

Activation & Demonstration

In-text questions	**A** bees (or any other appropriate answer) **B** The population of consumers will decrease. **C** The build-up of (toxic) chemicals through a food chain.
Activity	**Interpreting food webs** Credit sensible suggestions for what would happen to other organisms in the food web if disease reduced the population of frogs.
Summary questions	**1** interdependence, decrease, bioaccumulation (3 marks) **2a** Rabbit population would increase as it has no predators/it will not get eaten (2 marks) **b** The hawk and fox population may decrease as they have reduced food supplies. The insect population may increase as they have fewer predators. (4 marks) **3** Any three from: Insects act as pollinators. This ensures seeds are produced to produce future crops. This also ensures fruits are produced. If insect numbers decrease, the amount of foods produced would drop. (3 marks) **4** Extended response question (6 marks). Example answers: Insecticide runs into river. Taken up by plankton. DDT accumulates in fish when they eat the plankton. One fish eats lots of plankton, but not enough to cause death. DDT accumulates in birds when they eat the fish. One bird eats many fish. DDT level is now so high/concentrated that it causes death in the bird.

Lesson 3: Book 1 – Ecosystems(9.1.3)

Connection

Q1. What do we call the relationship between organisms in a food web?

Q2. What is a consumer?

Q3. How does bioaccumulation occur?

Activation

LI: Describe how different organisms coexist withing and ecosystem

1. Make a note of the date, title and the LI
2. Key words – ecosystem, community, habitat, environment, niche
3. Read pages 186 to 187
4. https://www.youtube.com/watch?v=KkMiIRb-Kz4
5. Copy the diagram to show organisms coexisting in an ecosystem page (187)
6. Answer Questions A, B, C,

Demonstration

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Consolidation

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Lesson 3: Answers **9.1.3 Ecosystems**

Connection

1. Interdependent

2. Organisms that eat other organisms (herbivore or carnivore)

3. Toxins are present in low levels at the bottom of the food chain. The concentration of them builds up at each trophic level until it reaches a toxic level in the top predators

Activation & Demonstration

In-text questions	**A** name given to plants and animals found in a particular location, and the area/habitat in which they live. **B** The area in which an organism lives. **C** A particular place or role occupied by an organism within an ecosystem.
Activity	**Scientific glossary** Credit key words from this chapter given with definitions. Each key word should be accompanied by an example or a diagram where possible.
Summary questions	**1** ecosystem – living organisms in a particular area, and the habitat they live in community – plants and animals found in a particular habitat habitat – place where a plant or animal lives niche – particular place or role that an organism has in an ecosystem (4 marks) **2** Bees and birds have different niches. They eat different things. Bees require nectar from flowers, whereas birds live off insects living on the leaves. (2 marks) **3** Extended response question (6 marks). Examples answers: A nice is the place or role that an organism has in a habitat. For example, many organisms live in an oak tree (or suitable example). Not every organism lives in the same part of the tree. Microorganisms at the base of the tree break down old leaves. This gives the tree further nutrients to absorb for growth. Insects live in the tree trunk. The insect larvae are food for birds that may live in the canopy. Squirrels and bees also live in the canopy. Bees gather pollen and nectar when the tree is in blossom. Squirrels gather acorns as food. The activities of each organism do not conflict each other, and so different organisms can co-exist.

Lesson 4: Book 1 – Competition (9.1.4)

Connection

Q1. What is an ecosystem?

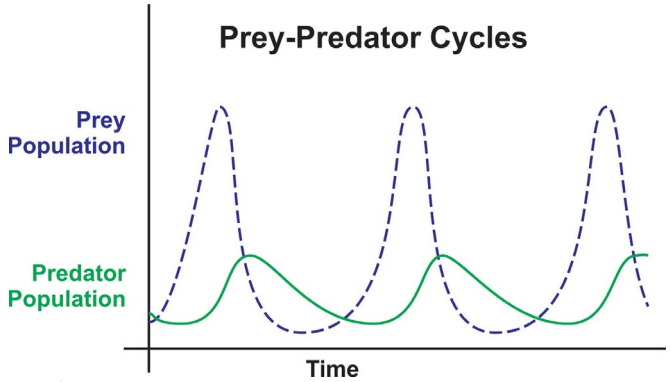
Q2. What is a community?

Q3. How is a habitat different to a niche?

Activation

LI: Describe how different organisms coexist within an ecosystem

1. Make a note of the date, title and the LI
2. Key words – competition
3. Read pages 188 to 189
4. https://www.youtube.com/watch?v=L24Kp72V67g
5. Copy the predator prey graph from this slide
6. Answer Questions A, B, C,



Demonstration

Attempt Summary questions
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Consolidation

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Lesson 4: Answers **9.1.4 Competition**

Connection

1. A combination of the living and the non living parts of a particular location

2. All of the different plants and animals found within an ecosystem

3. A habitat is generally where an organism lives but a niche is the specific part within the habitat

Activation & Demonstration

In-text questions	**A** food, water, space, and mates **B** light, water, space, and minerals **C** Interdependence means that changes in the population of one animal directly affects the population of the other.
Activity	**Predator-prey graphs** Graph of fox populations against rabbit population should resemble that of the snowshoe hare and the Canadian lynx in the student book. When the population of the rabbit is high, the fox population increases. This reduces the number of rabbits, which in turn reduces the number of foxes, and the whole cycle starts again.
Summary questions	**1** compete, resources, mates, light (4 marks) **2** When there are lots of prey, the population of predators increases. The large predator population will cause the prey population to decrease. There is now not enough food for all the predators so the predator population decreases. The prey population will now increase as fewer are being eaten. The cycle starts again. (3 marks) **3a** Example answers (6 marks): Initially, the population of European ladybirds will increase significantly because they can feed on aphids and other ladybird species. Eventually their food supply will decrease, which will lead to starvation for many seven-spotted ladybirds. The population of seven-spotted ladybirds will decrease, which allows the population of aphids to increase. The cycle then starts again. (Students must include a correct predator-prey graph).

Lesson 5: Book 1 – Flowers & Pollination (9.2.1)

Connection

Q1. What do animals compete for?

Q2. What do plants compete for?

Q3. what has to happen before a predator population can increase? Why?

Activation

LI: Describe how new plants are made by pollination

1. Make a note of the date, title and the LI
2. Key words – petal, pollination, pollen, ovules
3. Read pages 190 to 191
4. https://www.youtube.com/watch?v=nTVOH8-xb1I
5. Draw and label the parts of a flower
6. Answer Questions A, B, C, D

Demonstration

Attempt Summary questions
In 15 mins answer as many questions as you can.
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Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Lesson 5: Answers **9.2.1 Flowers and Pollination**

Connection

1. Food, water, space, mates

2. Light, water, space, minerals

3. The prey population has to increase 1st so the predators have enough food to be able to reproduce and support their young

Activation & Demonstration

In-text questions	**A** attract insects **B** anther **C** wind, insects, or other animals **D** sweet, sugary fluid (that bees use to make honey)
Activity	**Cartoon strip** The cartoon strip should include the following steps: Brightly coloured petals to attract insects; an insect visiting the flower; pollen transferred from the anther to the insect; insect moves to another plant; pollen is transferred from insect to stigma
Summary questions	**1** anther – produces pollen filament – holds up the anther stigma – this is sticky to 'catch' the pollen grains style – holds up the stigma ovary – contains ovules petal – brightly coloured to attract insects (6 marks) **2a** transfer of pollen from anther to stigma (2 marks) **b** Cross-pollination is when pollen from one flower is transferred to stigma of another. Self-pollination is when pollen is transferred to the stigma in the same flower. (2 marks) **3** Extended response question (6 marks). Example answers: Insect pollinated (maximum of three marks) Large, brightly coloured petals and sweetly scented; usually contain nectar, a sweet sugary fluid; smaller quantities of pollen produced; pollen is often sticky or spiky, to stick to insects; anthers and stigma held firm inside the flower, so insects can brush against them; stigma has a sticky coating, so pollen sticks to it Wind pollinated (maximum of three marks) Small petals, often brown or dull green; no nectar; pollen produed in large quantities as lots never reach another flower; pollen is very light, so it can be blown easily; anthers are loosely attached and dangle out of the flower, to release the pollen into the wind; stigma hangs outside the flower to catch drafting pollen.

Lesson 6: Book 2 – Aerobic respiration (9.3.1)

Connection

Q1. Why are petals important for plant reproduction?

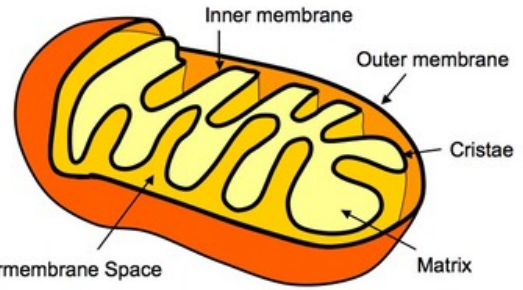
Q2. Give 3 ways pollination can occur.

Q3. Why is a loss of bees and other pollinating insects a problem?

Activation

LI: Describe aerobic respiration using a word equation

1. Make a note of the date, title and the LI
2. Key words – aerobic respiration, plasma, haemoglobin
3. Read pages 146 to 147
4. https://www.youtube.com/watch?v=ZkqEno1r2jk
5. https://www.youtube.com/watch?v=6Je1WoO6ISo
6. Draw and label the parts of the mitochondrion
7. Answer Questions A, B, C, D, E



Demonstration

Attempt Summary questions
In 15 mins answer as many questions as you can.
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Consolidation

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Lesson 6: Revision Answers **9.3.1 Aerobic Respiration**

Connection

1. Petals attract insects (needed for pollination)

2. wind, insects, other animals

3. Insect pollination is important in producing foods such as fruit, vegetables and nuts.

Activation & Demonstration

In-text questions	**A** (aerobic) respiration **B** glucose + oxygen carbon → dioxide + water (+ energy) **C** in the mitochondria **D** red blood cells or haemoglobin **E** plasma
Activity	**Defining respiration** Answers should include a definition and a description of aerobic respiration. Students could include the word equation for aerobic respiration. Students should swap answers with a partner, and discuss ways to improve their answers.
Summary questions	**1** mitochondria, respiration, glucose, energy, water (5 marks) **2** Aerobic respiration occurs in the mitochondria. Mitochondria are found in cells. Oxygen reacts with glucose. It releases carbon dioxide and water, together with energy. (4 marks) **3** Example answers (6 marks): Inhaling fills alveoli in the lungs with oxygen. Oxygen diffuses into the bloodstream. Oxygen is carried to the cells in the red blood cells/haemoglobin. Glucose is taken in through food. Food is digested and glucose is absorbed through the wall of the small intestine. Glucose is carried to the cells in the blood (plasma). Respiration occurs in the mitochondria of cells, releasing carbon dioxide and water. Waste carbon dioxide is carried to the lungs in the blood plasma. Carbon dioxide is exhaled. Excess water is lost as water vapour in exhaled breath, or in urine.

Lesson 7: Book 2 – Anaerobic respiration (9.3.2)

Connection

Q1. What is the word equation for aerobic respiration?

Q2. where does aerobic respiration occur in the cells?

Q3. How does glucose and oxygen get to the cells for them to carry out respiration?

Activation

LI: Describe anaerobic respiration using a word equation

1. Make a note of the date, title and the LI
2. Key words – anaerobic respiration, oxygen debt,
3. Read pages 148 to 149
4. https://www.youtube.com/watch?v=40Wp3-ntNis
5. Answer Questions A, B, C, D, E

Demonstration

Attempt Summary questions
In 15 mins answer as many questions as you can.
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Consolidation

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Lesson 7: Answers **9.3.2 Anaerobic Respiration**

Connection

1. Glucose + oxygen -> carbon dioxide + water

2. Mitochondria

3. Oxygen absorbed through the respiratory system, glucose absorbed through the digestive system and carried to the cells by the circulatory system (oxygen on the red blood cells and glucose dissolved in the plasma)

Activation & Demonstration

In-text questions	**A** glucose → lactic acid (+ energy) **B** Aerobic respiration releases more energy and doesn't cause muscle cramps (from lactic acid). **C** glucose → ethanol + carbon dioxide (+ energy)
Activity	**Fermenting sugar** Students use boiling tubes of sugar solution that have been kept in different temperature water baths. The rate can be measured by counting how many carbon dioxide bubbles are produced per minute.
Summary questions	**1** anaerobic, oxygen, energy, lactic acid, cramp, fermentation, ethanol (7 marks) **2** Anaerobic respiration is without oxygen, produces lactic acid, does not produce water, produces less energy per glucose molecule. Aerobic respiration is with oxygen, does not produce lactic acid, does produce water, has more energy per glucose molecule. (4 marks) **3** anaerobic/very little oxygen is present under the surface of the skin (2 marks) **4** Example answers (6 marks): A marathon runner requires energy over a long period of time. A sprinter requires a lot of energy in a short period of time. A person can only respire anaerobically for a short period of time but can respire aerobically for a long period of time. A sprinter requires extra energy for a short period of time. A sprinter cannot take in enough oxygen to respire aerobically to produce the required amount of energy. If a runner respires anaerobically for a longer period of time, lactic acid would build up in their muscles. This would cause cramp.

Lesson 8: Book 2 – Biotechnology (9.3.3)

Connection

Q1. What is the word equation for anaerobic respiration?

Q2. What is an advantage and a disadvantage of anaerobic respiration?

Q3. what do we call anaerobic respiration carried out by microorganisms and how is it different to anaerobic respiration carried out by animals?

Activation

LI: Describe how bread beer and wine are made

1. Make a note of the date, title and the LI
2. Key words – biotechnology
3. Read pages 150 to 151
4. https://www.youtube.com/watch?v=mhwUc84xBZA
5. https://www.youtube.com/watch?v=qoxY0z8ukUQ
6. Answer Questions A, B

Demonstration

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Consolidation

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Lesson 8: Answers **9.3.3 Biotechnology**

Connection

1. Glucose -> lactic acid

2. Advantage - extra energy provided in the absence of sufficient oxygen during vigorous exercise. Disadvantage – only a small amount of energy and it causes lactic acid to build up creating cramps (also an oxygen debt the lactic acid needs oxygen to be broken down)

3. Fermentation - the glucose is broken down to ethanol and carbon dioxide (not lactic acid)

Activation & Demonstration

In-text questions	**A** The use of biological processes or organisms to create useful products. **B** carbon dioxide
Activity	**Useful microorganisms** Credit correct description of how anaerobic respiration is used to make bread, beer, or wine.
Summary questions	**1** microorganism, alcoholic, fermentation, enzymes, carbon dioxide (5 marks) **2** Bread made without yeast will be flatter in appearance and will not contain air bubbles. This is because fermentation will not have occurred, so carbon dioxide is not made. This means that the bread will not rise. (3 marks) **3** Example answers (6 marks): Apples are squeezed/crushed (to release the juice). Yeast is added. The container with the juice and yeast is sealed. This keeps out oxygen and microorganisms. Yeast ferments the sugar in the apple juice. The mixture is left until the sugar has fermented into alcohol/cider. Sediment is removed from the liquid (by filtration). The liquid is bottled or put into barrels.

Lesson 9: Book 2 – Photosynthesis (9.4.1)

Connection

Q1. What is biotechnology?

Q2. How is fermentation useful for making bread?

Q3. How is fermentation useful for making wine?

Activation

LI: Describe the process of photosynthesis

1. Make a note of the date, title and the LI
2. Key words – producer. Photosynthesis, chlorophyll
3. Read pages 152 to 153
4. Draw and label the diagram of the plant at the top of page 153. Draw it large enough so you can label a leaf with the information from the diagram at the bottom of page 153
5. https://www.youtube.com/watch?v=D1Ymc311XS8
6. https://www.youtube.com/watch?v=C1_uez5WX1o
7. Answer Questions A, B, C, D

Demonstration

Attempt Summary questions
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Consolidation

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Lesson 9: Answers **9.4.1 Photosynthesis**

Connection

1. Use of biological processes or organisms eg fermentation/ yeast to produce useful products

2. The yeast respire by anaerobic respiration, the carbon dioxide produced causes the bread to rise (the alcohol evaporates)

3. The yeast respire by anaerobic respiration, the ethanol produced from the sugar in the grape juice creates and alcoholic drink.

Activation & Demonstration

In-text questions	**A** An organism that makes its own food. **B** carbon dioxide + water $\xrightarrow{\text{light}}$ glucose + oxygen **C** chloroplasts **D** Root cells have hairs to increase rate of diffusion of water. The stem has hollow tubes to transport water all over the plant.
Activity	**Hypothesis** Credit hypotheses along the lines of: If a plant is placed in the dark for a week, photosynthesis will decrease/ glucose and oxygen will not be produced. Students should include a suitable plan for testing this hypothesis. **Definitions** Producer – organism that makes its own food. Photosynthesis – process by which plants make their own food. Consumer – organism that has to eat other organisms to gain energy.
Summary questions	**1** algae, producers, photosynthesis, carbon dioxide, glucose, light (6 marks) **2** Photosynthesis provides energy for plants to grow. Animals cannot make their own food. Animals have to eat plants to gain energy. (3 marks) **3a** Yes because sunlight is available. (1 mark) **b** No because no sunlight is available. (1 mark) **c** No because there is no sunlight. There are no chloroplasts in the root hair cells. (2 marks) **4** Example answers (6 marks): Carbon dioxide and water are the reactants. Carbon dioxide enters through the stomata in the leaves. Water enters through root/root hair cells by diffusion/osmosis. Water travels up the xylem to leaves (transpiration). Light is also required for photosynthesis to occur. Light is trapped in chlorophyll/ chloroplasts in leaf cells. Oxygen and glucose are the products. Oxygen comes out through stomata. Glucose is taken to all cells in the plant (via the phloem). The plant cells use glucose to provide energy.

Lesson 10: Book 2 – Leaves (9.4.2)

Connection

Q1. What is a producer?

Q2. What is the word equation for photosynthesis?

Q3. how does the plant get the reactants it needs for photosynthesis?

Activation

LI: Describe the structures that make up a leaf and describe their function

1. Make a note of the date, title and the LI
2. Key words – stomata
3. Read pages 154 to 155
4. Make a list of the 4 bullet points at the top of page 154
5. Draw the diagram that shows the cross section of the leaf (bottom page 155)
6. https://www.youtube.com/watch?v=_lsGbv2daLM
7. Answer Questions A, B, C, D

Demonstration

Attempt Summary questions
In 15 mins answer as many questions as you can.
Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:
Single chemistry bottle question is for all students
Double chemistry bottle question are for students looking to extend their knowledge
Triple chemistry bottle question is for students looking to challenge themselves.

Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Lesson 10: Answers **9.4.2 Leaves**

Connection

1. Plants are producers as they are bale to make their own food.

2. Carbon dioxide + water -> glucose + oxygen

3. Water is absorbed by the roots (root hair cells) and carbon dioxide is absorbed through the leaves (stomata).

Activation & Demonstration

In-text questions	**A** They contain chlorophyll. **B** top of the leaf **C** To reduce evaporation of water. **D** They allow gases to diffuse into and out of the leaf. They close to prevent water loss.
Activity	**Observing stomata** For the labelled diagram of the underside of a leaf, labels should include: stomata, guard cells, veins, and, possibly, the waxy cuticle.
Summary questions	**1** stomata – allow gases to diffuse into and out of the leaf waxy layer – reduces amount of water evaporating guard cells – open and close stomata veins – transport water to cells in leaf cells in palisade layer – main site of photosynthesis (5 marks) **2** To prevent water evaporating. (1 mark) **3** Example answers (6 marks): Leaves contain chlorophyll, which traps light. Leaves are thin, which allows gases to diffuse in and out of the leaf easily. Leaves have a large surface area to absorb as much light as possible. Leaves have veins/xylem to transport water to cells. Leaves have a palisade layer/cells with more chloroplasts near the top of the leaf, to maximise the absorption of sunlight. Leaves have stomata to allow carbon dioxide into (and oxygen out of) the leaf. **4** Example answers (4 marks): During the day high levels of carbon dioxide diffuse into the plant for photosynthesis. A small amount leaves as a result of respiration. At night very little carbon dioxide enters the plants as it is not needed for photosynthesis. Higher levels leave the plant as a waste product of respiration. Respiration takes place constantly so oxygen is always entering the plant but more leaves during the day than the night as photosynthesis only occurs during the day.

Lesson 11: Book 2 – Investigating photosynthesis (9.4.3)

Connection

Q1. how are leaves adapted for photosynthesis?

Q2. Where in a plant cell does photosynthesis occur?

Q3. name 3 main layers within a leaf

Activation

LI: List factors that affect the rate of photosynthesis and represent these changes on a graph

1. Make a note of the date, title and the LI
2. Key words – iodine
3. Read pages 156 to 157
4. Draw the diagram that shows how we can show that photosynthesis is occurring (bottom page 156)
5. https://www.youtube.com/watch?v=YtvyFOvbgu8
6. https://www.youtube.com/watch?v=BelfTMtue74
7. Answer Questions A, B, C – include the 3 graphs on page 157 when you answer C

Demonstration

Attempt Summary questions
In 15 mins answer as many questions as you can.
Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:
Single chemistry bottle question is for all students
Double chemistry bottle question are for students looking to extend their knowledge
Triple chemistry bottle question is for students looking to challenge themselves.

Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Connection

1. **Green** (chlorophyll), **thin** (to get carbon dioxide in easily) **large surface area** (absorb maximum light) **veins** (transport water- xylem and glucose – phloem)

2. In the chloroplasts (contain chlorophyll)

3. Waxy layer, palisade layer, spongy layer

Activation & Demonstration

In-text questions	**A** So you can more easily see if the leaf changes colour when iodine is added. **B** Place a glowing splint in the test tube. The splint will relight in the presence of oxygen. **C** light intensity, carbon dioxide, temperature
Summary questions	**1** water, ethanol, chlorophyll, iodine, blue-black (5 marks) **2** The temperature is higher and/or the light intensity is greater, so the rate of photosynthesis is greater. This causes the plant to grow more quickly. (2 marks) **3a** Example answers (6 marks): Place pondweed in a beaker of water or in a beaker of water under an upturned funnel and test tube filled with water. Place a light source *x* cm from the beaker. Count the bubbles released per minute/unit time, or measure the time taken to displace the water from the test tube. Move the light source *y* cm further from the beaker and repeat the experiment. Repeat for (at least) five different distances from the beaker. Repeat whole experiment to collect three sets of results. The more bubbles released per unit time, the greater the rate of photosynthesis, or the less time taken to displace the water from the test tube, the greater the rate of photosynthesis. **b** Sketch of a graph showing rate of photosynthesis against light intensity. (1 mark)

Lesson 12: Book 2 – Plant minerals (9.4.4)

Connection

Q1. how can you tell if a plant is making glucose by photosynthesis?

Q2. How can you measure the rate of photosynthesis?

Q3. give 3 factors that can affect the rate of photosynthesis.

Activation

LI: Describe how fertilisers are important and how plants use the minerals they provide.

1. Make a note of the date, title and the LI
2. Key words – nitrates, phosphates, potassium, magnesium, deficiency, fertiliser
3. Read pages 158 to 159
4. Copy the 4 bullet points at the bottom of page 158 explaining how nutrient deficiencies affect plants
5. https://www.youtube.com/watch?v=D1n9b1SauBc
6. Answer Questions A, B, C, D

Demonstration

Attempt Summary questions
In 15 mins answer as many questions as you can.
Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:
Single chemistry bottle question is for all students
Double chemistry bottle question are for students looking to extend their knowledge
Triple chemistry bottle question is for students looking to challenge themselves.

Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Lesson 12: Answers **9.4.4 Plant Minerals**

Connection

1. Test the leaf for starch - should turn blue black with iodine

2. Count the bubbles or measure the volume of oxygen produced by pond weed (in a specific time)

3. Light intensity, amount of carbon dioxide and the temparature

Activation & Demonstration

In-text questions	**A** nitrates, phosphates, potassium, and magnesium **B** Dissolved in soil water, absorbed through root hair cells. **C** A plant is not receiving enough of a particular mineral. **D** Chemical product containing plant minerals.
Activity	**Mineral deficiency** Leaflet should include prompts for farmers in their diagnosis of plants using a labelled diagram of a healthy plant. Prompts include nitrate deficiency (plant will have poor growth and older leaves are yellowed), magnesium deficiency (plant leaves will turn yellow), phosphorus deficiency (plant will have poor root growth, and younger leaves look purple), and potassium deficiency (plant has yellow leaves with dead patches).
Summary questions	**1** minerals, hair, xylem, magnesium, nitrates (5 marks) **2** Nitrates make amino acids, amino acids join together to make proteins, proteins are needed for growth. (3 marks) **3** Example answers (6 marks): Plants take minerals from the soil. Minerals are absorbed into the plant through root hairs. Plants use minerals for growth. Plants normally return minerals back to the soil when they die/leaves are shed. If crops are removed, the minerals are not returned to the soil. Fertilisers contain minerals. Examples are nitrates, phosphates, and potassium. A supply of minerals is needed for healthy plant growth. Nitrates are used to make amino acids, and subsequently proteins. Magnesium is needed to make chlorophyll.

Lesson 13 & 14: Revision - Ecosystems

Connection

Q1. What are the 4 key nutrients required by plants?

Q2. What happens to plants if these are missing?

Why are fertilisers important?

Activation

LI: Practice some Big Idea questions about Energy

1. Make a note of the date, title and the LI
2. Read page 197 for Book 1 questions and page 161 for Book 2 questions
3. Use the previous pages of the book and your notes to help you answer the questions

Demonstration

Work with others on your table to answer as many of the questions as you can.

In 45 mins answer as many questions as you can.
Self-mark the questions you have done making any necessary corrections in blue pen

Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Lesson 13: Revision Answers **Ecosystems – Part 1 Checkpoint**

Connection

1. nitrates, phosphates, potassium, magnesium

2. **nitrates**- poor growth, **phosphates** – poor roots purple leaves, **potassium** – yellow leaves dead patches, **magnesium** – yellow leaves

3. Used by farmers to make sure their crops grow well and don't suffer from any mineral deficiencies

Activation & Demonstration

End-of-Big Idea questions	**1a A** filament, B anther, C petal, D stigma, E style, F ovary (6 marks) **b** brightly coloured/smell/nectar (1 mark) **2a** corn → mouse → owl (1 mark) **b** corn (1 mark) **c** Producers have energy transferred from glucose. Consumers have energy transferred from the organisms they eat. (2 marks) **d** The spider population would increase as fewer organisms eat them. (2 marks) (Alternatively, spider population stays the same/decreases as shrew and mice population increase due to no predators, so eat the excess spiders.) **3a** Any two from: Pollen produced in large quantities. Pollen is very light. Anthers are loosely attached and dangle out of the flower. Stigma hangs outside the flower. (2 marks) **b** Any two from: large, brightly coloured petals, sweetly scented, contain nectar, smaller quantities of pollen produced, anthers and stigma held firmly inside the flower. (2 marks) **c** Pollen is transferred from the anther to the stigma. (2 marks) **d** Any four from: Pollen tube grows. Pollen tube grows down the style into the ovary. Nucleus of the pollen grain travels down the pollen tube. Joins with the nucleus of the ovule/fertilisation. Ovary becomes a fruit. Ovules turn into seeds. (4 marks) **4a** The mice population would increase as there are no predator/nothing would eat them. (2 marks) **b** The grasshopper population would decrease as shrews and spiders would need to eat more of them to survive. (2 marks) **c** Mice and shrews occupy different niches because they eat different foods. (2 marks). **d** Any three from: toxic chemical builds up in the food chain. Owls eat many other organisms so owls receive a higher dose of the toxic chemical. High levels can cause death to an organism. Correct use of term bioaccumulation. (3 marks) **5** This is an extended response question. Students should be marked on the use of good English, organisation of information, spelling and grammar, and correct use of specialist terms. The best answers will be organised clearly in paragraphs, describing the main structures, and linking these ideas to their functions (maximum of 6 marks). Examples of correct scientific points: petals – brightly coloured attract insects sepals – special leaves which protect unopened buds stamen – male reproductive part anther – produces pollen filament – holds up the anther carpel – female reproductive part stigma – sticky to 'catch' grains of pollen style – holds up the stigma ovary – contains ovules

End-of-Big Idea questions	**1a** (aerobic) respiration (1 mark) **b** mitochondria (1 mark) **c** oxygen, carbon dioxide (2 marks) **2a i** aerobic (1 mark) **ii** anaerobic (1 mark) **iii** anaerobic (1 mark) **iv** aerobic (1 mark) **b** Appropriate situation stated such as during a sprint. The body requires extra energy to be produced quickly. (2 marks) **3a** oxygen (1 mark) **b** carbon dioxide and water (2 marks) **c** Bubbles would stop/decrease, photosynthesis would stop, as there is no light. (3 marks) **d** Stomata allow carbon dioxide into the leaf and allow oxygen out of the leaf. (2 marks) **4a** stomata (1 mark) **b** As you increase the concentration of carbon dioxide, the rate of photosynthesis increases until a certain point at which the rate plateaus. (2 marks) **c** Carbon dioxide is a reactant/needed for photosynthesis. It combines with water to produce glucose and oxygen, therefore increasing the availability of carbon dioxide increases the rate of photosynthesis. (3 marks) **5a** Minerals are absorbed into root (hair) cells by diffusion. They travel through the xylem/water vessels to different parts of the plant. (3 marks) **b** Magnesium deficiency means less chlorophyll. Chlorophyll absorbs light for photosynthesis. (2 marks) **c** large surface area, contains lots of chloroplasts/chlorophyll, chloroplasts concentrated in top of leaf/palisade layer. (3 marks) **6** Examples answers (6 marks): Fermentation is a type of anaerobic respiration. It occurs in some microorganisms/yeast. These microorganisms respire in the absence of oxygen. Energy is transferred from glucose. glucose → ethanol + carbon dioxide (+ energy) The ethanol product can be used in alcoholic drink production. The carbon dioxide product is used in bread production/to make dough rise.

Lesson 15: Revision - Energy

Connection

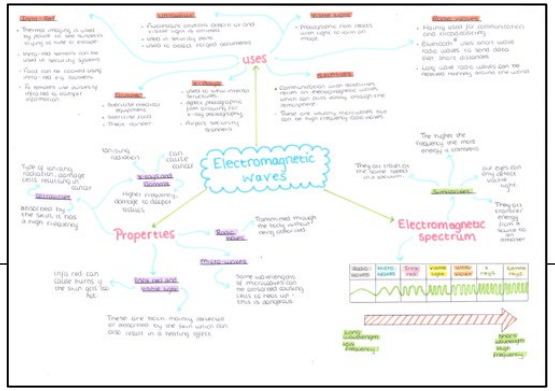
N/A

Activation

LI: Complete a piece of revision work

1. Make a summary sheet OR
2. Make flash cards OR
3. Complete the revision questions from book 1 (page 197) and 2 (page 161)

mind map



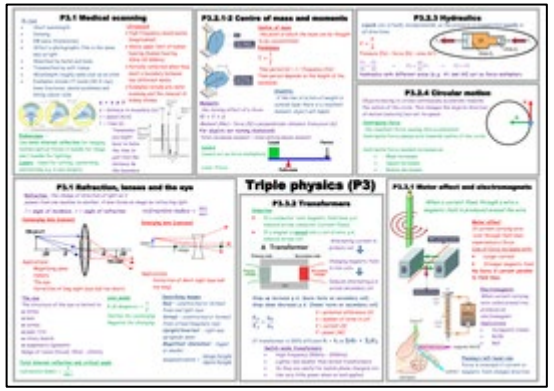
Demonstration

Use your revision work to quiz the person sat next to you OR work in a group to quiz each other.

flash cards

Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher



Summary sheet

Attainment Band	Ecosystem & Bioenergetics Knowledge and Understanding
Yellow/Yellow +	• Analyse and evaluate the impact of changes in a food web • Evaluate a model of predator–prey populations and explain the importance of predators • Communicate, in a creative way, the impact of rainforest destruction on biodiversity • Analyse and evaluate how beak adaptations in seashore birds allow them to survive in the same ecosystem • Critically evaluate the use of pesticides • Analyse and evaluate the risks involved with monoculture – particularly with regard to food security in poorer countries • Explain the importance of respiration in releasing energy and in building up complex molecules • Evaluate the quality of evidence for respiration • Explain what is meant by oxygen debt and why it occurs • Compare the implications of aerobic respiration and anaerobic respiration for the organism • Write a logical method for an investigation of what is produced in anaerobic respiration, taking safety into consideration • Evaluate an investigation carried out into the effect of different sugars on fermentation • Critically evaluate secondary data showing plants growing in different habitats • Critically evaluate the risks involved when testing a leaf for starch • Critically evaluate the structure of different cells related to their function • Analyse stomata density in different temperatures and different concentrations of carbon dioxide • Analyse secondary data and apply learning to new situations • Evaluate the limitations of collected evidence • Evaluate cell structures that allow the movement of water and minerals through a plant
Blue	• Predict the effects of different environmental factors on plant and animal populations – e.g. disease and drought • Explain why prey populations affect predator populations • Explain how organisms help or depend on each other for survival • Explain the concept of resource partitioning • Explain the process of bioaccumulation • Explain why hand-pollination is cost effective for some crops • Recall the word equation for aerobic respiration and describe it as a way of releasing energy from food • Describe some practical experiments on plants that provide evidence for respiration • Explain why some sports rely on anaerobic respiration while others can use aerobic respiration; describe some of the effects on the body of anaerobic respiration • Describe several similarities and differences between aerobic respiration and anaerobic respiration • Describe a piece of evidence to show that anaerobic respiration produces carbon dioxide • Manage variables in an investigation into the effect of different sugars on fermentation, and make a conclusion • Explain the evidence that van Helmont obtained from his experiment • Predict that plants will only photosynthesise in the light and that photosynthesis will only occur in the green areas of leaves where chlorophyll is present; draw up a good plan for an investigation • Explain the functions of the different cells in a leaf; identify the different cells found in the leaf • Explain how stomata open and close to control the movement of gases • Accurately predict the results of investigations of photosynthesis • Explain the roles of nitrogen, phosphorus and potassium in plant growth • Explain how water and minerals are taken in and move through a plant

Stewards Academy
Science Department
ASSESSMENT FEEDBACK
Year 7 – 5

Green	• Describe food webs as a number of interrelated food chains • Describe some ways in which organisms affect their environment • Describe a range of examples of interdependence • Describe the role of niches • Describe how toxins pass along the food chain • Describe the impact of low pollination on crop yield and how this could potentially be avoided • Recall that energy is released in our bodies by aerobic respiration, which uses oxygen and glucose • Recall that plants respire; describe how to demonstrate that water is produced during respiration • Describe anaerobic respiration as requiring no oxygen; know that some sports rely mainly on anaerobic respiration • Describe one similarity and one difference between aerobic respiration and anaerobic respiration • Recall some examples of microbes and know that they carry out anaerobic respiration • Explain simply what is meant by fermentation; follow instructions to investigate the effect of sugars on fermentation • Identify the various ways in which plants are essential to life on Earth • Identify carbon dioxide and water as reactants, and glucose and oxygen as products of photosynthesis • Name the common features of leaves that are adaptations to photosynthesis; explain how the size of leaves relates to the availability of light • Describe the movement of gases into/out of a leaf • Identify the factors that affect the rate of photosynthesis • Identify nitrogen, phosphorus and potassium as essential for healthy plant growth • Identify the passage of water and minerals through a plant; summarise the inputs and outputs for plant growth by a diagram
White	• Some of the above elements have been achieved.