Stewards Academy

Science KS3:

Year 8

Blended Learning Booklet

Unit 7: Earth

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 8 Overview
Science

Next Year

End of Year Assess-ment

End of Unit Test

Electromagnets and their uses

Magnets and magnetic fields

Electrostatic charge

Models of electrical circuits

Series and Parallel circuits

Voltage, resistance and current

UNIT 6

End of Unit Test

Metal extraction and recycling

The carbon cycle

Global warming and climate change

The solar system

The rock cycle

Rock types,

Structure of the Earth

UNIT 5

End of Unit Test

Exo- and endo-thermic

Law of conservation of mass

Thermal decomposition

Combustion

Modelling waves

End of Unit Test

UNIT 4

Acids and alkalis

Neutralisation

Metals and non-metals

Chemical reactions of metals

Waves, energy and radiation

The eye and colour vision

Light waves

The ear and hearing

Sound waves

UNIT 3

End of Unit Test

DNA , genes and inheritance

UNIT 2

Variation

Adaptation

Reproduction

Human lifecycle

Natural selection

End of Unit Test

Critique claims and justify opinion

Evaluating scientific sources

Scientific communication

Analysisng and evaluating data

Identifying variables

UNIT 1

Year 8

Electromagnets

I will be able to use models to explain how an electric circuits work. I will be able to identify different circuit components and make circuits designed to do different jobs. **I will be able to** explain how static charge accumulates on an object and ho this can cause lightening or r electric shocks. **I will be able to** explain how permanent and temporary magnets are made and how they are both surrounded by a magnetic field. **I will be able to** make an electromagnet, explain how to alter its strength and be able to describe several uses for electromagnets.

Earth

I will be able to explain how everything we have has been created from materials from the Earth. **I will be able to** describe the Earth's structure, how rocks are formed and explain our Earths position in the Solar System and how this influences life on Earth. **I will be able to** explain how metals are extracted from rocks and are a finite resource that we should make sure we recycle so they don't run out. Finally, **I will be able to** state the composition of the atmosphere and the causes and effects of global warming

Reactions

I will be able to explain how useful chemical reactions can be in making medicines, fabrics and building materials. Specifically, **I will be able to** describe the reactions of acids and metals in detail. **I will be able to** explain exactly what happens to atoms in chemical reactions and how energy changes are observed during a chemical reaction.

Waves

I will be able to explain what sound is and how we are able to hear. I will be able to explain how sound can vary in loudness and pitch. **I will be able to** explain the difference between sound and light waves and how our eyes enable us to see. **I will be able to** explain different properties of waves and name some other types of wave.

Genes

I will be able to describe all stages of the human lifecycle, including how humans reproduce and how our features are inherited from our parents through our DNA. That all organisms show variation and this can help them survive. **I will be able to** explain how organisms have evolved and understand that this occurs though inheritance and natural selection.

The Enquiry Process

I will be able to explain why controlling variables is important, evaluate and interrogate investigations, be able to communicate scientific ideas appropriately. **I will be able to** critically evaluate scientific claims and weigh up the risks and benefits of new inventions/discoveries

ZOOM IN...

MY LEARNING JOURNEY:

Subject: Earth Year: 8 Unit: 5

AIMS:

Students will learn about the structure of the Earth and how materials are recycled in the rock cycle. The topic continues to explore how metals are extracted from the Earth and how we must recycle these resources to prevent them running out. We explore the atmosphere and consider the causes and effects of global warming. Finally students learn about how the Earth fits into the Solar System and galaxy, also how relative movement of the earth affects observations we make of the Sun and the night sky.

DEVELOPING COURAGE

C That we can act to preserve our own future on Earth
O To learn about other planets
U Understand how changes to the Earth occur slowly ober long eriods of time
R Learning the stages of the rock cycle
A How humans are affecting their environment
G Work togther to protect our environment
E Investigating the solar system

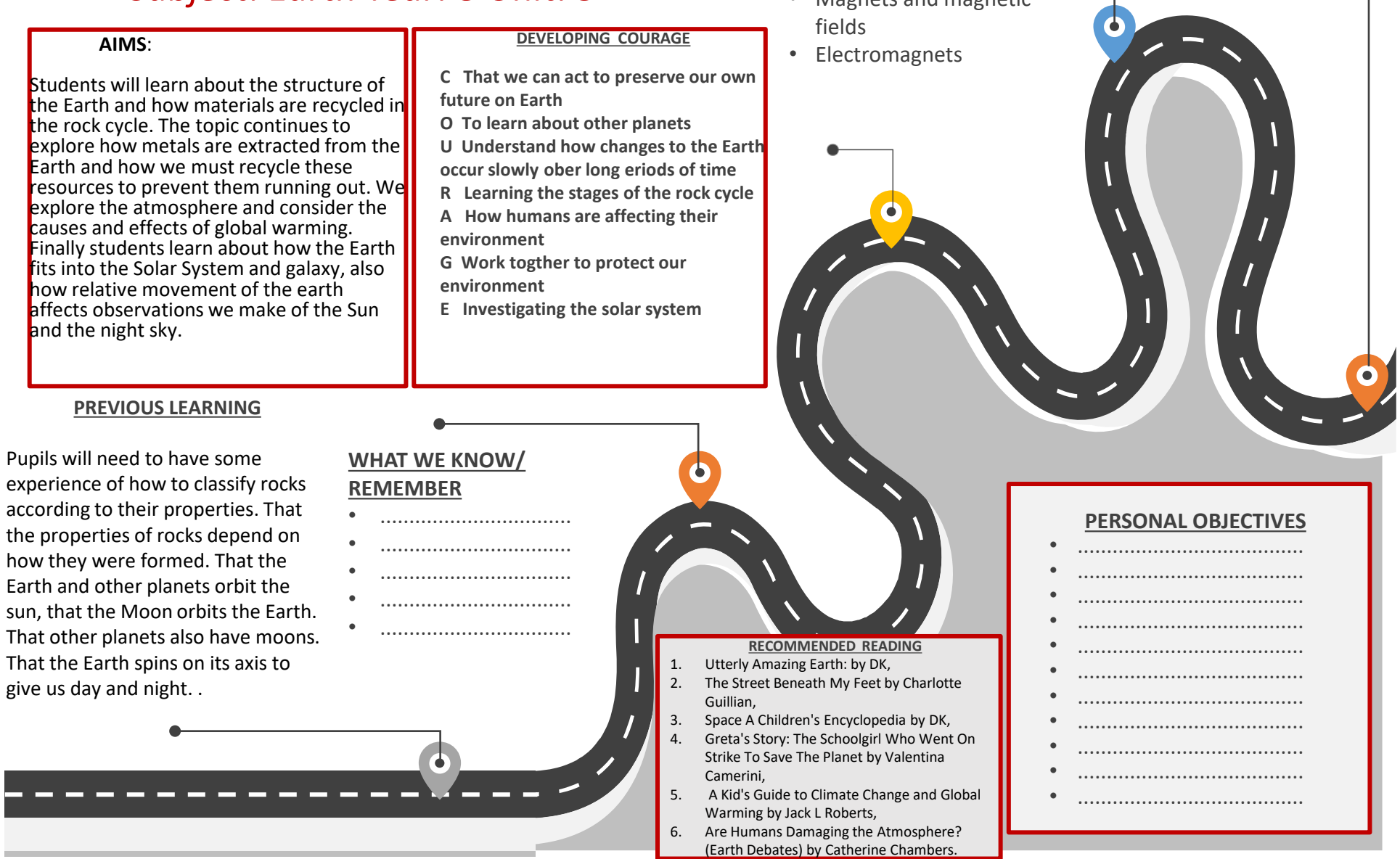
UP NEXT

Electromagnets

- Potential difference, current & resisitance
- Electrical circuits
- Electrical charge
- Magnets and magnetic fields
- Electromagnets

CAREERS

- Geologist
- Quarry manager
- Recycling centre manager
- Climate scientist



PREVIOUS LEARNING

Pupils will need to have some experience of how to classify rocks according to their properties. That the properties of rocks depend on how they were formed. That the Earth and other planets orbit the sun, that the Moon orbits the Earth. That other planets also have moons. That the Earth spins on its axis to give us day and night. .

WHAT WE KNOW/ REMEMBER

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

RECOMMENDED READING

1. Utterly Amazing Earth: by DK,
2. The Street Beneath My Feet by Charlotte Guillian,
3. Space A Children's Encyclopedia by DK,
4. Greta's Story: The Schoolgirl Who Went On Strike To Save The Planet by Valentina Camerini,
5. A Kid's Guide to Climate Change and Global Warming by Jack L Roberts,
6. Are Humans Damaging the Atmosphere? (Earth Debates) by Catherine Chambers.

PERSONAL OBJECTIVES

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

Lesson 1: The structure of the Earth

Connection

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

Populate what you know and your personal objectives.

Activation

LI: Name the three rock layers of the earth, compare the layers of the earth

1. Make a note of the date, title and the LI
2. Key words – crust, mantle, core, minerals
3. Read pages 138, 139
4. https://www.youtube.com/watch?v=JGXi_9A__Vc
5. Copy the diagram "The structure of the earth" and give a description of each layer
6. Answer Questions A, B, 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

Lesson 1: Answers **7.1.1 The structure of the Earth**

Connection Activation & Demonstration

1. N/A
2.
3.

In-text questions	**A** From the outer layer: crust, mantle, core **B** naturally occurring elements or compounds **C** oxygen, silicon, aluminium, iron, calcium, sodium
Activity	**Questioning the crust** Questions should be linked to the data in the pie chart, ideally asking for quantitative comparisons.
Summary questions	**1** crust, solid, nickel, liquid (4 marks) **2** It is not possible to observe the mantle directly, since it is not technically possible to gather samples of the mantle in normal circumstances, nor to dig through the crust to reach. For this reason, indirect methods, such as studying shock waves from earthquakes and examining materials brought to the surface by volcanoes, are used instead. (2 marks) **3** Extended response question (6 marks). Example answers: The crust and mantle are both made up of solid rock. The mantle can flow and the crust cannot flow. Like the crust, the inner core is solid. The outer core is the only liquid layer of the Earth.

Lesson 2: Sedimentary Rocks

Connection

Q1. Name the four main layers of the earth.

Q2. What is the main element in the earths crust?

Q3. How do scientists study the inside of the earth?

Activation

LI: Describe how sedimentary rocks are formed, explain why a sedimentary rock has a particular property based on how it was formed

1. Make a note of the date, title and the LI
2. Key words – sedimentary, porous, weathering, sediment, erosion, transport, deposition, strata
3. Read pages 140 - 141
4. https://www.youtube.com/watch?v=I0SbAzT8JxA
5. Name the four stages in making sedimentary rocks and give a detailed explanation of each one
6. Answer Questions A, B, C,

Demonstration

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Consolidation

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Lesson 2: Answers **7.1.2 Sedimentary rocks**

Connection

1. Crust, mantle, inner core, outer core

2. Oxygen

3. Scientists can study the inside of the earth by studying shock waves from earthquakes

Activation & Demonstration

In-text questions	**A** igneous, sedimentary, metamorphic **B** Sedimentary rocks are porous. They are usually soft can be scratched easily. **C** weathering, transportation (erosion), deposition, compaction/cementation
Activity	**Sedimentary sequence** Give credit for accuracy, clarity, and engagement of audience during the talk. Talks should include the individual stages of the sedimentary rock formation process: weathering (physical, chemical, or biological), transportation (by water, ice, wind, or gravity), compaction/cementation.
Summary questions	**1** Weathering breaks rock into pieces. Erosion breaks rock into smaller pieces and moves them away from their original rock. Transportation moves sediments far away from their original rock. Deposition is the settling of sediments. Compaction involves the weight of sediment above making sediments stick together. (5 marks) **2** Physical weathering can occur as a result of changes in temperature. For example, in freeze-thaw weathering, water gets into a crack in a rock. When it is very cold, the water freezes. The ice pushes against the sides of the crack. This happens many times, and breaks the rock. Chemical weathering happens when acids in rain react with substances in the rock. Biological weathering happens when plants and animals break up rocks. (6 marks) **3** The rocks are made up of layers/strata. They might have been formed as sediments were laid down in layers, perhaps under water in a lake or sea. (3 marks)

Lesson 3: Igneous and metamorphic rocks

Connection

Q1. Name the three rock types?

Q2. Would does porous mean?

Q3. Name the four stages in making sedimentary rocks and give a detailed explanation of one of them.

Activation

LI: Describe how igneous and metamorphic rocks are formed, explain why igneous and metamorphic rocks have particular properties based on how they were formed

1. Make a note of the date, title and the LI
2. Key words – igneous, metamorphic, durable, magma, lava
3. Read pages 142, 143
4. https://www.youtube.com/watch?v=dK2bF8LIZFA
5. State the conditions needed to produce large and small crystals in igneous rocks
6. Answer Questions A, B, C,

Demonstration

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Consolidation

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Lesson 3: Answers **7.1.3 Igneous and metamorphic rocks**

Connection

1. Sedimentary, igneous, metamorphic

2. Porous means that there are gaps between the grains in the rocks that allows water to pass through

3. Weathering – this is when the rocks are broken down through , physical, chemical or biological means.

Erosion – The broken down rock or sediment is transported by wither, wind, water or ice.

Deposition – The sediment settles and they build up in layers.

Compaction and cementation – This is when the weight of the layers above squash the sediment together and they are stuck together by another substance.

Activation & Demonstration

In-text questions	**A** hard, durable, and not porous **B** Marble is formed when limestone below the Earth's surface is heated. Slate is formed when high underground pressure squashes mudstone. **C** Not porous and made up of layers so easily split into thin sheets.
Activity	**Granite quarry** Years = 1971 – 1740 = 231; weeks = 231 x 52 = 12 012; mass/week = 6 000 000 ÷ 12 012 = 500 tonnes/week
Summary questions	**1** metamorphic, igneous, igneous, metamorphic, non-porous, crystals, hard (7 marks) **2** Igneous rocks form when liquid rock cools and freezes. When liquid rock freezes slowly the particles have time to arrange themselves into big crystals. This is how granite is formed. When liquid rock freezes quickly the crystals are small because there is less time for particles to arrange themselves into crystals. This is how basalt is formed. (3 marks) **3** Granite forms when liquid rock freezes. Its particles arrange themselves to form crystals. There are no gaps between the crystals, so granite is non-porous. (4 marks) **4** Rock X has bigger crystals. This means that when it was formed from magma its particles had more time to arrange themselves into crystals. For this reason rock X formed more slowly. (3 marks)

Lesson 4: The rock cycle

Connection

Q1. Name two examples of igneous and metamorphic rocks

Q2. Describe what causes the difference in crystal size in igneous rocks?

Q3. Describe how metamorphic rocks are formed?

Activation

LI: list the processes that interconvert sedimentary, igneous, and metamorphic rocks, construct a labelled diagram to explain the processes of rock formation

1. Make a note of the date, title and the LI
2. Key words – rock cycle, uplift
3. Read pages 144,145
4. https://www.youtube.com/watch?v=xM40aV3Q_DA
5. https://www.youtube.com/watch?v=rkGVE6wNAzo
6. Draw and label the rock cycle diagram from page 144
7. Answer Questions A, B,

Demonstration

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Consolidation

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Lesson 4: Answers **7.1.4 The rock cycle**

Connection

1. Igneous – granite, obsidian metamorphic – marble, slate

2. When molten rock cools slowly the crystals are large and when the molten rock cools quickly the crystals are small

3. Metamorphic rocks are made by putting other rocks under high pressure and heat.

Activation & Demonstration

In-text questions	**A** One from: weathering breaks down existing rock, sediments join together to make new rock, lava freezes to make rock, high pressure and/or high temperature deep within the crust alters rocks of all types. **B** Uplift is the process by which huge forces inside the Earth push rocks upwards.
Activity	**Rock route** Paragraphs should describe processes of the rock cycle, be clearly organised, and have events in the rock cycle occurring in a logical order.
Summary questions	**1** rock cycle, recycled, uplift, mountains, limestone (5 marks) **2a** melting (1 mark) **b** cooling and freezing (2 marks) **c** cementation or compaction (1 mark) **3a** Like rock being heated and melted underground to become magma. (2 marks) **b** Like igneous rock being formed from magma. (2 marks) **c** Like sediments falling to the bottom of a lake or sea. (2 marks)

Lesson 5: Ceramics

Connection

Q1. Describe a path though the rock cycle

Activation

LI: Describe properties of ceramics

1. Make a note of the date, title and the LI
2. Key words – ceramic
3. Read pages 146, 147
4. https://www.youtube.com/watch?v=9DopxIV4Css
5. List the physical and chemical properties of ceramic (p 146 bullet point and sentence below)
6. Answer Questions A & C

Demonstration

Attempt Summary questions
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Consolidation

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Lesson 5: Answers **7.1.5 Ceramics**

Connection

1. Any path is acceptable.

Example: Rocks on a mountaintop are weathered by rain and are transported to a lake by a stream. They get compacted over time and buried. Deep underground they undergo heating and pressure. Near by magma causes the rocks to melt and eventually they are pushed out by an eruption where they cool and solidify.

Activation & Demonstration

In-text questions	**A** Ceramic materials are compounds. They include metal silicates, metal oxides, metal carbides, and metal nitrides. **B** Four physical properties from: hard, brittle, stiff, solid at room temperature, strong when forces press on them but break easily when stretched, are electrical insulators. **C** Three from: buildings, electrical power-lie insulators, jet-engine turbine blades, plates, bowls, mugs, or jugs.
Activity	**Splendid ceramics** The article should include information on the usefulness of ceramics presented in an interesting way for a general audience. Possible areas of focus: What are ceramics? Properties of ceramics and where these properties come from. Use of ceramics in technical equipment and in everyday lives.
Summary questions	**1** silicates, oxides, brittle, hard, high, insulators (6 marks) **2** Materials B, D, and possibly E could be ceramics. This is because they have relative hardness and high melting points. (4 marks) **3** Both granite and brick are non-porous. Granite is harder than brick, although both are difficult to scratch. Both are stiff and melt at high temperatures. (3 marks)

Lesson 6: The Night Sky

Connection

Q1. Give two examples of products that are made of ceramics

Q2. Give three properties of ceramics

Q3. Pick one property of ceramics and explain why it is useful

Activation

LI: Describe objects you can see in the night sky

1. Make a note of the date, title and the LI
2. Key words – artificial satellite, orbit, earth, moon, natural satellite, planet, sun, solar system, star, galaxy, milky way, exoplanet, universe, lightyear
3. Read pages 148 -149
4. https://www.youtube.com/watch?v=Op3AYaJc0Xw
5. https://www.youtube.com/watch?v=qTSWVjo1S94
6. Answer Questions A, B, C, D
7. Draw the diagram “there are two ways of showing the distance to the sun”

Demonstration

Attempt Summary questions
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Consolidation

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Lesson 6: Answers **The night sky**

Connection

1. Pottery, Clay

2. Hard, Brittle, Stiff, High Melting Point, Strong, Electrical Insulators, Do not react with water, acids or alkalis

3. Used as building material because they are strong and durable, Used in cups as it does not react with acids, alkalis in food, etc..

Activation & Demonstration

In-text questions	**A** the Moon **B** A body that gives out light, and which may have a solar system of planets. **C** A galaxy contains millions of stars. **D** The distance light travels in a year.
Summary questions	**1** star, exoplanets, (8) minutes, (4) years (4 marks) **2** The distances are very large (1 mark) The distances in km would take a long time to write down/have lots of zeros (1 mark) Writing light years is much simpler/uses smaller numbers. (1 mark) **3** Extended response question (6 mark). Example answers: It takes fractions of a second for light to reach us from objects in orbit around the Earth, such as satellites or the International Space Station. Light takes minutes to reach us from planets close to us in the Solar System, such as Mercury, Venus, Mars and Jupiter. Light takes hours to reach us from distant planets in the Solar System. Light takes years to reach us from stars in the Milky Way galaxy. Our nearest star is about 4 light-years away. Light takes millions of years to reach us from other galaxies.

Lesson 7: The Solar system

Connection

Q1. Put these in order of size from smallest to largest

Universe, Moon, Planet, Star, Galaxy

Q2. What is the speed of light?

Q3. What is the name of our galaxy and the name of our nearest large galaxy

Activation

LI: Describe the model of the solar system

1. Make a note of the date, title and the LI
2. Key words – asteroid, dwarf planet
3. Read pages 150, 151
4. https://www.youtube.com/watch?v=KsF_hdjWJjo
5. Starting from the sun, list the planets in order use the red box "Remember that order" page 150 to help you
6. Answer Questions A & C

Demonstration

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Consolidation

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Lesson 7: Answers **7.2.2 The solar system**

Connection

1. Moon, planet, star, galaxy, universe

2. 300,000 km/s

3. Our galaxy – Milky Way

Our closest large galaxy - Andromeda

Activation & Demonstration

In-text questions	**A** There are eight planets in the Solar System. **B** Mercury, Mars, Venus, Earth, Neptune, Uranus, Saturn, Jupiter **C** It is reflected.
Activity	**Remember that order!** Students should choose a suitable mnemonic with the correct initial letters.
Summary questions	**1** four, four, asteroid belt, dwarf, great (5 marks) **2** Diagram to include: Sun with Earth and Mars in orbit. Lines drawn from Earth to Mars at different positions of Earth and Mars around the Sun. Lines projected to show that Mars appears to go backwards. All the planets orbit the Sun due to the force of gravity. The orbits are ellipses. The planets travel at different speeds. This means sometimes they are moving one way in the sky, and at another time they move in the opposite direction. (4 marks) **3** Extended response question (6 marks). Example points: As you move away from the Sun the temperature decreases. Less light reaches objects that are further away. Less energy is transferred from the Sun to objects that are further away. More distant planets should be colder than nearer planets. Venus should be colder than Mercury because it is further from the Sun. It is hotter than Mercury because it has an atmosphere that traps energy transferred from the Sun.

Lesson 8: The Earth

Connection

Q1. Why is Pluto not a planet?

Q2. Describe why the temperature of Neptune is much lower than Mercury?

Q3. What is the difference between the four inner planets and the four outer planets

Activation

LI: explain why places on the earth experience different daylight hours and seasons

1. Make a note of the date, title and the LI
2. Key words – axis, day, night, year, season, constellation
3. Read pages 152, 153
4. https://www.youtube.com/watch?v=l64YwNI1wr0
5. Answer Questions A, B
6. Draw and label the diagram “when the Earth spins” page 152
7. Draw the diagram “The suns light is spread out over a larger area in winter” page 153

Demonstration

Attempt Summary questions
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Consolidation

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Lesson 8: Answers **7.2.3 The Earth**

Connection

1. Pluto is too small to be planet and is known as dwarf planet

2. Neptune is much further away from the sun than mercury and so is much colder

3. The four inner plants are called the terrestrial planets and are made up of rock, the four outer plants are galled the gas giants are mostly made from hydrogen and helium.

Activation & Demonstration

In-text questions	**A** Take a picture of the night sky over many hours. The stars make circular tracks. **B** east
Activity	**Spin and orbit** For example, one day is the time it takes for the Earth to spin once. The half of the Earth where sunlight does not reach is night. One year is the time it takes the Earth to orbit the Sun once. **February 29th?** 21 600 x 4 = 86 400 so 86 400 ÷ (24 x 60 x 60) days = 1 day
Summary questions	**1** east, west, spins, year, orbit the Sun, longer, higher (7 marks) **2a** It is hotter because the days are longer so the Sun warms the Earth for longer. The rays from the Sun are more concentrated than they are in winter. (2 marks) **b** The Sun is higher in the sky at the Equator than it is in the UK because of the tilt of the Earth's axis. (2 marks) **3** Extended response question (6 marks). Example answers: You would have seasons. Days and nights would be equal length throughout the year. Shadow length at noon would be the same throughout the year. The height of the Sun in the sky at noon would be the same throughout the year. There would be no difference between on the Sun's rays spreading out over a bigger area in the winter than the summer.

Lesson 9: The Moon and changing Ideas

Connection

Q1. Why does the earth have day and night?

Q2. Why does the earth have seasons?

Q3. Why do we have leap years?

Activation

LI: explain why you see phases of the moon

1. Make a note of the date, title and the LI
2. Key words – phases of the moon, geocentric model, heliocentric model
3. Read pages 154, 155
4. https://www.youtube.com/watch?v=NCweccNOaqo
5. Draw the first diagram showing the different phases of the moon page 154
6. Answer Questions A, B, C, D

Demonstration

Attempt Summary questions
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Consolidation

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Lesson9: Answers 7.2.4 The moon and changing ideas

Connection

1. The side of the earth that faces the sun is called daytime, the side of the earth that faces away from the sun

2. The earth is tilted and the hemisphere that is pointed towards the sun it will be summer, and the hemisphere that is pointed away from the sun it will be winter. These change as the earth orbits the sun

3. The earths revolution around the sun is not exactly 365 days and so every four years we need to add an extra day to the calendar.

Activation & Demonstration

In-text questions	**A** full moon, waning gibbous, last quarter, waning crescent, new moon, waxing crescent, first quarter, waxing gibbous **B** Half the Moon is lit up at all times **C** geocentric **D** heliocentric

Activity	**Farewell, Moon** Distance = your age x 3.8 cm/year = 11 years x 3.8 cm/year = 41.8 cm
Summary questions	**1** full, new, geocentric, heliocentric (4 marks) **2** In the geocentric model objects in the Solar System/Universe orbit the Sun. Galileo observed objects that orbited something else – the moons of Jupiter. (2 marks) **3a** You see all the phases when a planet passes between the Earth and the Sun, such as Mercury and Venus. You see all the outer planets as gibbous or full because they do not pass between the Earth and the Sun. (2 marks) **b** The light from the Sun hits the Earth at an angle close to 90° when you are at the Equator. It hits the Earth at an angle when you are in the UK. The Sun is higher in the sky when you are at the Equator than when you are in the UK. (2 marks)

Lesson 11: Global Warming

Connection

Q1. List the phases of the moon

Q2. What is the difference between geocentrism and heliocentrism?

Q3. Name a piece of evidence used in favour of heliocentrism

Activation

LI: state how an increase in greenhouse gases has increased the temperature on the earth

1. Make a note of the date, title and the LI
2. Key words – atmosphere, greenhouse effect, greenhouse gas, global warming
3. Read pages 108, 109
4. https://www.youtube.com/watch?v=sTvqIijqvTg
5. https://www.youtube.com/watch?v=OWXoRSIxyIU
6. Turn the pie chart showing the common gases in the atmosphere into a table
7. Draw and label the diagram showing how the suns light is reflected and absorbed by the earth
8. Answer questions A, B, C

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 11: Revision Answers **7.3.1 Global warming**

Connection

1. New moon, crescent, first quarter, gibbous, full, gibbous, third quarter, crescent

2. Geocentrism is where the earth is at the centre of the solar system and heliocentrism is where the sun is at the centre of the solar system

3. Venus has phases just like the moon, and moons orbit Jupiter

Activation & Demonstration

In-text questions	**A** nitrogen – 78%, oxygen – 21%, argon – 1%, carbon dioxide – 0.04% **B** carbon dioxide and methane **C** The gradual increase in the surface temperature of the Earth.
Summary questions	**1** atmosphere, nitrogen, methane, carbon dioxide, greenhouse effect, global warming (6 marks) **2** Any two activities that affect the amounts of carbon dioxide in the atmosphere, for example, driving petrol- and diesel-fuelled cars, travelling in aeroplanes, cutting down forests, forest fires, livestock farming, generating electricity by burning fossil fuels. (2 marks) **3** Both graphs show an overall increase over time since 1960. This might suggest a link between increasing concentrations in the atmosphere and an increase in the global average air temperature. (3 marks)

Lesson 12: The carbon cycle

Connection

Q1. What percentage of the earths atmosphere is nitrogen?

Q2. Describe the greenhouse effect?

Q3. How has the temperature on earth changes over the last 150 years?

Activation

LI: List the processes that recycle carbon naturally

1. Make a note of the date, title and the LI
2. Key words – respiration, combustion, fossil fuel, photosynthesis, carbon cycle, carbon sink
3. Read pages 110, 111
4. https://www.youtube.com/watch?v=va6p8-7iYKI
5. Write the equation for respiration, combustion and photosynthesis
6. Draw and label the diagram of the carbon cycle
7. Answer Questions A, B, 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

Lesson 12: Answers **7.3.2 The carbon cycle**

Connection

1. 78%

2. The suns transfers energy to the atmosphere and that energy is stored in the gas molecules. Some gases store more energy than others

3. The temperature has increase over the last 150 years. The amount of carbon dioxide in the atmosphere has also increased

Activation & Demonstration

In-text questions	**A** respiration and combustion **B** photosynthesis and dissolving of carbon dioxide in the oceans **C** oceans, soil, and areas of vegetation, such as forests
Activity	**A question of balance** Credit any four sensible methods of reducing the amount of carbon dioxide added to the atmosphere. Give credit for relevant explanations. For example: Burn smaller quantities of fossil fuels by replacing fossil fuels in cars or generating electricity using renewable sources, because fossil fuels release carbon dioxide during combustion. Plant more trees (or other plants) to remove carbon dioxide from the atmosphere during the process of photosynthesis.
Summary questions	**1** respiration, combustion, photosynthesis, dissolving, sinks, soil (6 marks) **2** Route around the carbon cycle, including the names of two carbon sinks, described clearly and in detail. Students must name the processes by which the carbon atom moves from one store to the next and include a diagram to summarise the route of the carbon atom. (5 marks) **3** Credit sensible game that correctly describes possible routes around the carbon cycle. Each game must have an accompanying set of rules. (6 marks)

Lesson 13: Climate Change

Connection

Q1. Name two ways that carbon is pulled out of the atmosphere?

Q2. What is a carbon sink and name two different carbon sinks?

Q3. Describe one part of the carbon cycle that humans are responsible for?

Activation

LI: Describe how human activities affect the carbon cycle, state one cause of global warming that scientists have evidence for

1. Make a note of the date, title and the LI
2. Key words – climate change
3. Read pages 112, 113
4. https://www.youtube.com/watch?v=wbR-5mHI6bo
5. List three ways we are causing climate change (bullet points top page 112)
6. List three ways we can prevent climate change (bullet points bottom of page 113)
7. Answer Questions A, B, 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:
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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 13: Answers **7.3.3 Climate change**

Connection

1. Photosynthesis and dissolving in the oceans

2. A carbon sink is where carbon is absorbed and stored, the ocean and the soil are examples

3. Combustion, humans burn fossil fuels to run cars and factories

Activation & Demonstration

In-text questions	**A** Any three suitable answers, for example, burning fossil fuels, burning or cutting down forests, farming animals such as cows. **B** Long-term changes to weather patterns. **C** Lab experiments show that carbon dioxide and methane molecules trap heat, carbon dioxide levels have risen hugely since 1950 compared to the 400 000 years before, the 20 warmest years on record have occurred since 1981.
Summary questions	**1** fossil, warming, climate (3 marks) **2** Any two impacts of global warming on local weather patterns, for example, increases in rainfall, droughts, heat waves. (2 marks) **3** Advantages of the schemes, such as less carbon dioxide gas emitted. Disadvantages of the scheme, such as inconvenience. An overall evaluation of the idea. (3 marks) **4** Natural causes – carbon dioxide from volcanic emissions, respiration. Human causes – burning increasing amounts of fossil fuels, burning or cutting down forests, farming livestock. Since 1960 human impacts have been greater. The sudden increase shown on the graph suggests this. (4 marks) **5** Points in support of the claim, for example, any activities that increase carbon dioxide emissions. Points against the claim, for example, natural events such as changes in the Earth's orbit cause global warming and hence climate change. An overall evaluation of the claim. (6 marks)

Lesson 14: Extracting Metals

Connection

Q1. Give two human activities that add carbon dioxide to the atmosphere?

Q2. Give two impacts of climate change?

Q3. Name two ways that we can prevent climate change?

Activation

LI: State what an ore is, recall the methods of extracting metals

1. Make a note of the date, title and the LI
2. Key words – natural resources, mineral, ore, extraction, electrolysis
3. Read pages 114, 115
4. https://www.youtube.com/watch?v=g2O-nEq33EA
5. https://www.youtube.com/watch?v=fxBIgbRT8fw
6. Copy the list of metals showing part of the reactivity series
7. State why electrolysis is sometimes needed to extract metals
8. Answer Questions A, B, 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

Lesson 14: Answers **7.4.1 Extracting metals**

Connection

1. Burning fossil fuels, cutting down trees, farming animals

2. Ice caps melting, flooding, animal extinction

3. Use renewable resources, using cars less, buying and wasting less

Activation & Demonstration

In-text questions	**A** A naturally occurring rock that contains enough of a mineral to make it worth getting the mineral out of the rock. **B** Separate iron oxide from the compounds it is mixed with, then use chemical reactions to extract iron from iron oxide. **C** carbon + copper oxide → copper + carbon dioxide
Activity	**Ore waste** For an ore of 1000 kg with 16% iron: percentage wasted = 100% − 16% = 84% mass wasted = 0.84 × 1000 kg = 840 kg Ore with 50% iron: percentage wasted = 100% − 50% = 50% mass wasted = 0.5 × 1000 kg = 500 kg
Summary questions	**1** rock, compounds, mixed with (3 marks) **2** Electrolysis, since magnesium is above carbon in the reactivity series. (2 marks) **3** Iron oxide is separated from the compounds it is mixed with in iron ore. Chemical reactions, involving heating iron oxide with carbon, are then used to extract iron from iron oxide. (2 marks) **4** Example answers (4 marks): The mass of iron oxide in each kilogram of iron ore. If the iron can be extracted from the ore profitably. Whether the new source of ore is in an accessible location. If there a suitable location for disposing of the waste materials produced in the process. **5** Example answers (2 marks): Find new uses for the waste products and sell them (they are now no longer waste products, since they can be used). Extract iron only from iron ore which contains a very high proportion of iron.

Lesson 15: Recycling

Connection

Q1. Which metal is more reactive, lead or aluminium?

Q2. Finish the two word equations

$$carbon + iron\ oxide \rightarrow$$

$$carbon + alumium\ oxide \rightarrow$$

Q3. How do we extract metals that are more reactive than carbon?

Activation

LI: State why certain natural resources will run out, explain why recycling some materials is particularly important

1. Make a note of the date, title and the LI
2. Key words – recycling
3. Read pages 116, 117
4. https://www.youtube.com/watch?v=VlRVPum9cp4
5. https://www.youtube.com/watch?v=R7N5a476DKQ
6. Copy the table showing elements and their uses and when they will run out
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:
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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 15: Answers **7.4.2 Recycling**

Connection

1. Aluminium is more reactive

2.

$$carbon + iron\ oxide \rightarrow carbon\ dioxide + iron$$

$$carbon + alumium\ oxide \rightarrow carbon + alumium\ oxide$$

No reaction

3. If the metal is more reactive than carbon we use electrolysis to extract it.

Activation & Demonstration

In-text questions	**A** The Earth's crust or atmosphere. **B** Collecting and processing materials that have already been used so that they can be used again. **C** Resources last longer, less energy is required to produce a certain amount of a material, waste and pollution are reduced. **D** Two from: sorting waste at home is time-consuming, using (fossil) fuels, pollution.
Activity	**Recycle and remake** Energy to extract 1 kg of Al = 255 MJ Energy to recycle 1 kg of Al = 15 MJ; 255 ÷ 15 = 17 So for the same amount of energy used to extract 1 kg of Al from its ore, you can recycle 17 kg of Al. **Bottled fleeces** Answer depends on number of students in school: number of fleeces = 25 bottles × number of students
Summary questions	**1** collecting old glass bottles, melting the glass, and making new bottles collecting and melting poly(propene) bottle tops, and using them to make poly(propene) rope (2 marks) **2** Old aluminium objects are collected and taken to a factory. Machines shred the objects and remove their decoration. A furnace melts the shreds. The liquid cools and freezes in a mould to make an aluminium ingot. This is then heated to 600 °C to soften it. It is rolled into thin sheets which are made into new aluminium objects. (4 marks) **3** Aluminium resources will last longer. Recycling requires less energy than using new materials. Recycling reduces waste and pollution. (3 marks) **4** Any three reasonable suggestions, for example, buying fewer things; taking used items to charity shops; recycling paper, glass, plastic, and cardboard. (3 marks)

Lesson 16 & 17: Revision

Connection

Q1. Give one use of aluminium?

Q2.Where do all our resources come from?

Q3. Give one advantage and one disadvantage of recycling?

Activation

LI: Revise using the End-of-Big Idea questions

1. Make a note of the date, title and the LI
2. List the keywords that you have seen so far in the topic
3. Read pages 157 book 1 and 119 book 2
4. https://www.youtube.com/watch?v=jSYuR7gQrAs
5. https://www.youtube.com/watch?v=HqjwajLN2_Q
6. https://www.youtube.com/watch?v=b7GMpjx2jDQ
7. https://www.youtube.com/watch?v=va6p8-7iYKI
8. https://www.youtube.com/watch?v=Cia48NHeRzY

Demonstration

Attempt the End-of-Big Idea questions
In 30 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:
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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 **Unit 7 Earth – Part 1 Checkpoint**

Connection

1. aeroplanes, kitchen foil etc..

2. Our resources come from the earths crust

3. Recycling means our resources will last longer

Lorries that pick up recycling create pollution and burn fuel

Activation & Demonstration

End-of-Big Idea questions	**1a** One mark for each correct label. (3 marks) **b** heliocentric (1 mark) **c** one from: Jupiter had moons that orbit Jupiter/there are phases of Venus (1 mark) **2a** C (1 mark) **b** Igneous rock is formed from cooled magma that solidified/froze. (3 marks) **c** The sedimentary rocks around the granite were softer, and eroded. (2 marks) **d** Metamorphic rock is made under heating and pressure. The marble shown in the diagram was probably made from sedimentary rock that was heated by the cooling magma (that formed granite). (2 marks) **3a** Temperature of microscope slide (1 mark) **b** Size of crystals (1 mark) **c** To make the investigation fair (1 mark) **d** Small crystals are made quickly. Larger crystals are formed more slowly. (2 marks) **4a** Left: sunrise, east; Right: sunset, west; Centre: noon, south. All correct (2 marks), one or two wrong (1 mark). **b** A path that is lower in the sky at noon (1 mark) and that produces a smaller semicircle (1 mark) **c** The Earth's axis is tilted (1 mark), in summer it is tilted towards the Sun, and in winter it is tilted away from the Sun (1 mark). **5** It would take minutes or hours for the signal to reach the spacecraft. There would be a long delay between asking a question and receiving an answer. (2 marks)
	6 Extended response question (6 marks). Examples of correct scientific points: • Sediments are removed from the surface of a rock by weathering. • Sediments are transported by wind or water. • Sediments are deposited. • Sediment is compacted or cemented to make sedimentary rock. • Rock is heated, without melting. Its particles rearrange to form crystals in a metamorphic rock. • Rock is subjected to high pressures. Its particles rearrange to form crystals in a metamorphic rock. • Liquid rock/magma/lava cools and freezes to make an igneous rock. • Rock melts to form liquid rock/magma/lava.

Lesson 16: Answers **Unit 7 Earth – Part 2 Checkpoint**

Connection Activation & Demonstration

1. N/A

End-of-Big Idea questions	**1** 78% = nitrogen 21% = oxygen (2 marks) **2a** Any three of the following, for one mark each fossil fuels (1), land-based organisms (1), atmosphere (1), carbon compounds in oceans and sea life (1), sedimentary rock (1) forest/trees (1) **b** photosynthesis (1 mark) **c** respiration, burning fossil fuels (2 marks) **d** Greater amounts of fossils fuels burnt, releasing carbon dioxide during combustion. Deforestation meaning there are fewer trees to remove carbon dioxide from the atmosphere by photosynthesis. (2 marks) **3a** number of cans × mass of one can = 67 × 14.9 g = 998.3 g (2 marks) **b** 260 MJ − 15 MJ = 245 MJ (2 marks) **c** 245 MJ / 2.45 MJ/h = 100 hours (2 marks) **4** Any suitable descriptions and explanations (6 marks). For example: ● Travelling by car – burning petrol or diesel in the engine produces carbon dioxide gas which enters the atmosphere. ● Burning forests to make room for agriculture – burning wood produces carbon dioxide gas which enters the atmosphere, and fewer trees are available to remove carbon dioxide from the atmosphere for photosynthesis. ● Farming livestock – animals such as cattle produce methane, which enters the atmosphere. **5** Most climate scientists agree with Noah, that human activity is causing global warming, climate change, and flooding. Justification could include (4 marks): Patterns of atmospheric temperature increase and carbon dioxide concentration increase over time are similar. Lab experiments show that carbon dioxide and methane molecules trap heat. Carbon dioxide levels have risen hugely since 1950 compared to the 400 000 years before. Sea levels rose 17 cm in the last century. The 20 warmest years on record have occurred since 1981. **6a** Impacts such as carbon dioxide emissions would decrease, students would get fitter, students would spend more time with their friends on their journey to school, students might get tired carrying heavy bags for long distances. Answer should include an evaluation comment stating whether, on balance, the idea is a good one. (3 marks) **b** Impacts such as carbon dioxide emissions would decrease, people would buy more warm clothes. Answer should include an evaluation comment. (3 marks) **c** Impacts such as carbon dioxide emissions would decrease, there would be more solar panels on roofs and wind turbines in fields, perhaps there would be shortages in electricity supply when it is not windy or sunny. Answer should include an evaluation comments. (3 marks)

Lesson 11: Revision - Earth

Connection

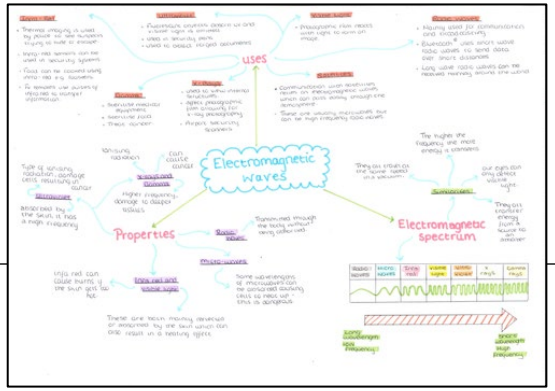
N/A

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



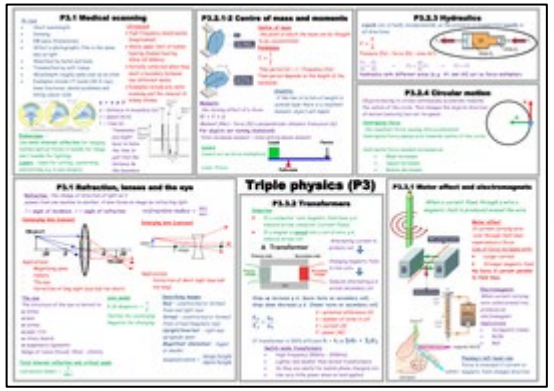
Demonstration

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	Earth & Universe Knowledge and Understanding
Yellow/Yellow +	• Explain how the movement of tectonic plates and volcanoes change the Earth's surface • Explain that slow cooling causes large crystals and fast cooling causes small crystals • Explain how rocks turn into sediments • Explain why the properties of some metamorphic rocks make them suitable for different uses • Explain how the properties of each rock type link to the processes in the rock cycle • Analyse the motion of objects in gravitational fields • Relate ideas about the Sun, stars and galaxies to evidence visible from the Earth • Explain what would happen if the Earth's axis was tilted by a different amount • Explain how the parallax method can be used to measure distance to some stars; explain the implications of an object being light years away • Explain why the atmosphere has changed in terms of oxygen and carbon dioxide proportions • Define 'carbon footprint' and analyse the carbon footprint of different scenarios • Explain new technologies that help in reducing air pollution, and analyse their impact • Identify that the greenhouse effect is natural and that the impact of human activity on it is still debated • Analyse the impact of a development on the environment and justify decisions regarding it • Evaluate the effects of mining metals • Compare the efficiency of recycling glass, paper, aluminium and plastic
Blue	• Describe the characteristics of each layer of the Earth • Explain the relationship between volcano shape, magma pH/ visoosity and rock formation • Describe what a fossil is and explain why these are found in sedimentary rocks • Describe the properties of metamorphic rocks and link this to the way that they are formed • Explain the processes involved in the rock cycle using scientific language • Use the concept of gravity to explain how the Sun, Earth and Moon move in relation to each other • Describe the relationship between the Sun, other stars and galaxies • Explain changes to days and seasons in different hemispheres • Describe how light years can be used to measure distance • Describe how the percentages of different gases in the atmosphere have changed over time • Explain how each of the stages in the carbon cycle affects the amount of carbon in the atmosphere • Explain how air pollution damages the atmosphere and suggest how we can reduce the effects • Explain how global warming affects different ecosystems • Explain how human activities affect the Earth's resources; describe examples, such as overfishing or open-cast mining • Explain what is meant by metal 'extraction' and metal 'ore' • Explain how factors such as cost, pollution, energy needs etc. limit the efficiency of recycling schemes

Stewards Academy
Science Department
ASSESSMENT FEEDBACK
Year 8 – 5

Green	• Describe the structure of the Earth and recall that the Earth's surface is constantly changing • Describe how igneous rocks are formed from molten magma and lava and give examples • Describe sedimentation in layers; name and describe three examples of sedimentary rocks • Describe how metamorphic rocks are formed and give examples • Describe simply how rocks can be changed from one type to another • Describe how the Sun, Earth and Moon move in relation to each other • Describe the differences between the Sun, other stars and galaxies • Describe the implications of the Earth being tilted on its axis • Explain the need for a large unit of astronomical distance • Identify the percentages of the different gases that make up the atmosphere • Use the carbon cycle to describe ways in which carbon enters and leaves the atmosphere • Describe sources of air pollution that affect the atmosphere • Define global warming and describe how it warms up the atmosphere • Name some natural resources (such as wood, rocks, air, water) that the Earth provides and classify them as renewable or non-renewable • Identify different ways of extracting metals • Name some materials that can be recycled and describe the benefits
White	• Some of the above elements have been achieved.