Stewards Academy

Science KS3:

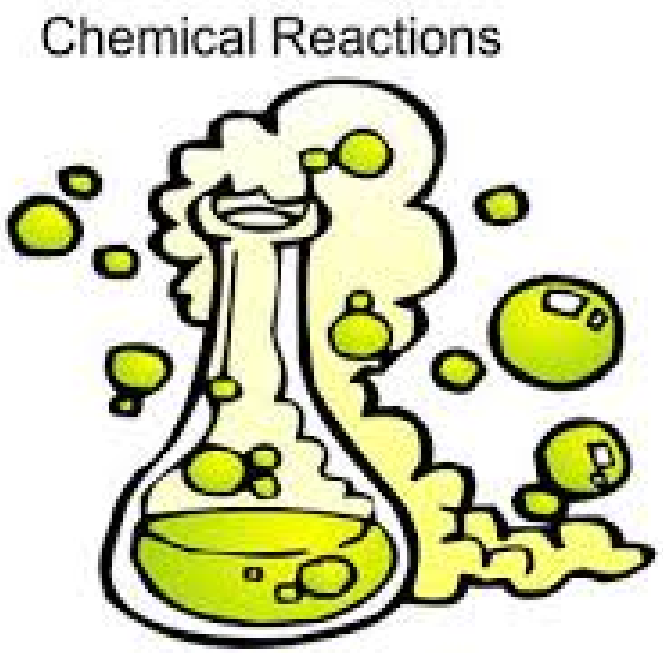
Blended Learning Booklet

Unit 6: Reactions

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

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.

UNIT 6 → Voltage, resistance and current → Series and Parallel circuits → Models of electrical circuits → Electrostatic charge → Magnets and magnetic fields → Electromagnets and their uses → End of Unit Test

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

UNIT 5 → Structure of the Earth → Rock types, → The rock cycle → The solar system → Global warming and climate change → The carbon cycle → Metal extraction and recycling → End of Unit Test

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.

UNIT 4 → Chemical reactions of metals → Metals and non-metals → Neutralisation → Acids and alkalis → End of Unit Test → Exo- and endo-thermic → Law of conservation of mass → Thermal decomposition → Combustion

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.

UNIT 3 → Sound waves → The ear and hearing → Light waves → The eye and colour vision → Waves, energy and radiation → Modelling waves → End of Unit Test

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.

UNIT 2 → Variation → Adaptation → Reproduction → Human lifecycle → Natural selection → DNA , genes and inheritance

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

UNIT 1 → Identifying variables → Analysisng and evaluating data → Scientific communication → Evaluating scientific sources → Critique claims and justify opinion → End of Unit Test

Year 8

ZOOM IN...

MY LEARNING JOURNEY:

Subject: Reactions : 8 Unit: 2

Explain the principles behind and detect patterns in chemical reactions
Using the particle model to show how atoms are rearranged in chemical reactions and explain in detail the reactions between acid and alkalis, the reactivity of different methods and the reactants and products of combustion reaction and its impact on the environment.

DEVELOPING COURAGE

C Become confident with using hazardous substances
O To carry out practical investigations
U Work safetly with others during practicals
R Follow the practical instructions veru carefully
A The patterns that can be seen in chemistry
G Share our knowledge
E Understanding new subtances are formed

UP NEXT

Waves

- Sound waves
- The ear and hearing
- Light waves
- Reflection and refraction
- The eye and vision
- Seeing in colour
- Electromagnetic spectrum

CAREERS

- Synthetic Chemist,
- Scientific Advisor
- **Chemical manufacturing**

PREVIOUS LEARNING

Pupils will need to have some experience of materials being made up of tiny particles and that chemical reactions cause change.

WHAT WE KNOW/ REMEMBER

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

RECOMMENDED READING

1. Brain Box Chemical reactions word links cards.
2. Beginners guide to the periodic table G. Arbuthnott.
3. The Element in the Room M. Barfield.

PERSONAL OBJECTIVES

- .....
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Lesson 1: Book 1 – Chemical Reactions (6.1.1)

Connection

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

Populate what you know and your personal objectives.

https://www.youtube.com/watch?v=x49BtB5dOwg

Activation

LI: Describe the characteristics of chemical reactions

1. Make a note of the date, title and the LI
2. Key words – Chemical reaction, reversible, physical change
3. https://www.youtube.com/watch?v=n6wpNhyreDE
4. Read pages 110 - 111
5. Answer Questions A, B, C, D
6. From the cartoons on pages 110 and 111 list 4 things that indicate a chemical reaction is occurring

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 **6.1.1 Chemical Reactions**

Connection

N/A

Activation & Demonstration

In-text questions	**A** A change take makes new substances and that is not easily reversible. **B** Any three from: flames/sparks, smells, chemicals getting hotter or colder, bubbles, fizzing. **C** paracetamol, polyester, cement **D** dissolving and changes of state
Activity	**Reaction, reaction, reaction** Possible points include: • Some reactions cause bangs. • Some reactions produce gases with bad smells. • Many reactions do not cause bangs or produce gases with bad smells, for example, cooking foods, reactions in humans, burning gas in cooking.
Summary questions	**1** always, are not, always, state, are (5 marks) **2a** chemical (1 mark) **b** physical (1 mark) **c** physical (1 mark) **3** Magnesium burns with a very bright flame. (1 mark) **4** Extended response question (6 marks). Example answers: Chemical changes make new substances. Physical changes do not make new substances. Chemical changes are not reversible. Physical changes are reversible. Chemical changes include burning reactions. Physical changes include changes of state, dissolving, and mixing.

Lesson 2: Book 1 – Acids and alkalis (6.1.2)

Connection

Q1. What changes might you observe in a chemical reaction?

Q2. State two uses of chemical reactions.

Q3. Which one of these symbols would you find on a container with acid or alkali in it?
https://www.youtube.com/watch?v=7uHlDdkbcoU

Activation

LI: Describe differences between concentrated and dilute solutions of an acid

1. Make a note of the date, title and the LI
2. Key words – acid, alkali, corrosive, concentrated
3. https://www.youtube.com/watch?v=V5Mq_cL9Bck
4. Read pages 112 - 113
5. Answer Questions A, B, and C
6. Draw the symbols to indicate corrosive and irritant on page 112

Demonstration

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Consolidation

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Lesson 2: Answers **6.1.2 Acids and Alkali's**

Connection:

1. Changes in temperature, smell and colour. Bubbles, light or sound energy transfers.

2. Medicines, plastic products etc

3. Corrosive OR irritant.

Activation & Demonstration

In-text questions	**A** hydrochloric acid, ethanoic acid, citric acid **B** Corrosive solutions can burn your skin, and they can burn your eyes. **C** A concentrated solution has more acid particles per litre than a dilute solution. Alternatively, credit suitable hazards. For example, concentrated acids burn skin and eyes but dilute acids only hurt if they make contact with open cuts.
Activity	**Safe handling** Control risks by wearing eye protection and avoiding contact with skin, perhaps by wearing gloves. Mop up spills immediately. Credit any reasonable decision, supported by a suitable reason.
Summary questions	**1** taste sour, corrosive, more, more (4 marks) **2** 20 g of alkali in 250 cm^3 of solution is equivalent to (20 x 2 = 40 g) of alkali in 500 cm^3 of solution. The other solution has 10 g of alkali in 500 cm^3 of solution. So the first solution is more concentrated. (3 marks) **3** Extended response question (6 marks). Example answer: Both acids and alkalis can be corrosive, depending on the concentration. This means that both acids and alkalis can, at certain concentrations, burn the skin and eyes. In both acids and alkalis, the more acid or alkali particles there are in a certain volume of solution, the more concentrated the solution. Acids taste sour. Alkalis taste soapy.

Lesson 3: Book 1 – Indicators and pH (6.1.3)

Connection

1. Why do some acids have ‘corrosive’ labelled on them?

2. What colour changes would you see if red litmus paper and blue litmus paper are placed in an acid?

Activation

LI: Identify the best indicator to use to distinguish between solutions of different pH

1. Make a note of the date, title and the LI
2. Key words – Chemical reaction, reversible, physical change
3. https://www.youtube.com/watch?v=ckbsHM2igT0
4. Read pages 114 - 115
5. Answer Questions A, B, and C
6. Make a poster of the pH scale page 114

7. Practical: Test the pH of different substances

Demonstration

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

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Lesson 3: Answers **6.1.3 Indicators and pH**

Connection:

1. They can cause skin burns.

2. Red litmus - no colour change. Blue litmus – turns red

Activation & Demonstration

In-text questions	**A** An indicator is a solution that contains a dye that changes colour to show whether a solution is acidic or alkaline. **B** The colour of the litmus paper changes from blue to red. **C** The pH scale is a measure of how acidic or alkaline a solution is.
Activity	**Acidity** milk, urine, black coffee, orange juice, vinegar, lemon juice
Summary questions	**1** less than, less, more than, 7.0 (4 marks) **2** Universal indicator, since it is different colour in solutions of pH 4 and pH 6. (2 marks) **3** Its pH is 6, and the substance is acidic. (2 marks) **4** The chart should correctly show the colours of dilute hydrochloric acid and dilute sodium hydroxide solution in five indicators, for example universal indicators, litmus, red cabbage, hibiscus flowers, and beetroot. (6 marks)

Lesson 4: Book 1 – Acid Strength (6.1.4)

Connection

1. What is an indicator?
2. What is the pH scale?

Activation

LI: Identify factors that affect the pH of an acid

1. Make a note of the date, title and the LI
2. Key words – strong acid, weak acid
3. https://www.youtube.com/watch?v=xfOFbSt_Q7s
4. Read pages 116 – 117
5. Draw and label the strong acid and weak acid diagrams including the orange labelled text.
6. Answer Questions A, B
7. Copy table 1 (Jordan and Ruby's pH table). Add the bullet points under the table explaining what the table shows in your own words.
8. Answer question C

Demonstration

Attempt Summary questions
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Lesson 4: Answers **6.1.4 Acid Strength**

Connection

1. Indicators are chemicals which change to specific colours when placed in an acid or an alkali.

2. The pH scale is an indication of how acidic or alkaline a solution is.

Activation & Demonstration

In-text questions	**A** Strong acids: hydrochloric acid, sulfuric, and nitric. Weak acids: ethanoic acid and citric acid. **B** Jordan **C** The solution of pH 1.
Summary questions	**1** strong, weak, all, only some of (4 marks) **2** Sulfuric acid because it is a strong acid and ethanoic acid is a weak acid. All the molecules have split up in sulfuric acid, but only some of those in ethanoic acid have split up. (2 marks) **3a** Wear eye protection and avoid splashing onto skin. (2 marks) **b** On dilution the pH increases. Do not change the safety precautions, even though the hazards are slightly reduced, since it is better to take too many precautions than too few. (3 marks)

Lesson 5: Book 1 – Neutralisation (6.1.5)

Video:
https://www.youtube.com/watch?v=_cB2vSaalXg&t=9s

Connection

Q1 Name one strong acid and one weak acid

Q2. What is the difference between strength and concentration of an acid?

https://www.youtube.com/watch?v=rznIgkRcZZE

Activation

LI: State what products are formed when an acid reacts with a metal

1. Make a note of the date, title and the LI
2. Key words – “neutralisation”, “base” and “alkali”
3. Read pages 118 – 119
4. Draw the Venn diagram to compare (differences and similarities) between alkalis and bases
5. Sketch graph from data logger page 119
6. Answer questions A, B, C

7. Practical: Have a go at “Data logging”

Demonstration

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Consolidation

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Lesson 5: Answers **6.1.5 Neutralisation**

Connection:

1. strong: sulfuric or hydrochloric weak: ethanoic or citric

2. concentration: the amount of acid particles dissolved in one litre of water. Strength: the number of acid particles that are split up.

Activation & Demonstration

In-text questions	**A** A base is any substance that neutralises an acid. An alkali is a base that is soluble in water. **B** 7 cm^3 **C** Neutralisation reactions are useful for adjusting soil pH to make the soil suitable for particular crops, and for increasing the pH to make the soil suitable for particular crops, and for increasing the pH of lakes whose pH is low as a result of acid rain.
Activity	**Data logger details** The pH decreases gradually at first until, when 7 cm^3 of acid has been added, the pH is 13. Then the pH decreases rapidly to pH 5 on the addition of just 2 cm^3 of acid. Then the pH decreases gradually on addition of more acid solution until the pH value is 1.
Summary questions	**1** neutralisation, base, indicator, data (4 marks) **2** Agriculture – to ensure soil pH is correct for desired crops. (2 marks) Acidic lakes – adding a base to neutralise excess acid. (2 marks) **3** Example answer: Pour some diulte acid into a flask. Add a few drops of universal indicator. (3 marks) **4** Extended response question (6 marks). Example answers: Different crops grow well in soils of different pH. It is useful to measure soil pH to know which plants are more likely to grow well in the soil. Farmers can add acid to a soil to make it more acidic (reduce the pH). Farmers can add bases to a soil to make it less acidic (increase the pH).

Lesson 6: Book 1 – Making salts (6.1.6)

Connection

Q1 State what happens in a neutralisation reaction.

Q3. List two examples of bases

https://www.youtube.com/watch?v=qIOMlwBoe_4

Activation

LI: State what products are formed when an acid reacts with a base

1. Make a note of the date, title and the LI
2. Key word – salt,
3. Read pages 120 – 121
4. Answer questions A, B
5. Produce a poster describing how to make copper sulfate salt crystals (page 121)

6. Practical: Have a go at “Making magnesium crystals”

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: Answers **6.1.6 Making salts**

Connection:

1. An acid reacts with a base that cancels it out

2. Sodium hydroxide and copper oxide

Activation & Demonstration

In-text questions	**A** Substance in which hydrogen atoms of an acid are replaced by atoms of a metal element. **B** sodium chloride
Activity	**Making magnesium salts** **1)** Add excess amount of small pieces of magnesium (ribbon) to dilute hydrochloric acid in beaker. until some remains unreacted. 2) Filter mixture to remove excess Mg ribbon 3) Pour the solution (MgCl) into an evaporating dish. 5) Heat with a Bunsen burner until half of the water has evaporated. 6) Leave dish and its contents in a warm, dry place for the rest of the water to evaporate, leaving magnesium chloride crystals in the dish.
Summary questions	**1** metal, metal, hydrogen, water (4 marks) **2** Example answers (6 marks): Add copper oxide (credit hydroxide) to dilute hydrochloric acid in a beaker, one spatula measure at a time. Continue to add copper oxide until some remains unreacted in the mixture. Filter the mixture to remove the excess copper oxide. Keep the solution (filtrate). This has separated excess reactant (copper oxide) from a solution of the product (copper chloride). Pour the filtrate into an evaporating dish. Place the evaporating dish over a water bath on a tripod and gauze, and heat with a Bunsen burner until about half the water evaporated. Leave the evaporating dish and its contents in a warm, dry place for the rest of the water to evaporate. Copper chloride crystals remain in the evaporating dish. **3** magnesium sulfate and hydrogen (2 marks) **4** zinc nitrate and water (2 marks) **5** The acid with the higher pH is the one that reacts less vigorously, so acid Y has the higher pH. (2 marks)

Lesson 7: Book 1 – More about elements (6.2.1)

Connection

Q1 Give two examples of salts.

Q2 Name the products of when an acid is neutralised by a base

https://www.youtube.com/watch?v=uPkEGAHo78o&t=507s

Activation

LI: Identify some elements from their physical and chemical properties

1. Make a note of the date, title and the LI
2. Key word – element, chemical symbol
3. Read pages 122 – 123
4. Answer questions A, B
5. Copy the table showing properties of metals and non metals (bottom page 123)

6. Demo giant periodic table & draw a line on a copy of the periodic table to separate metals and non-metals

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 **6.2.1 More about elements**

Connection:

1. cobalt nitrate and sodium chloride

2. salt and water

Activation & Demonstration

In-text questions	**A** A substance that cannot be broken down into simpler substances. **B** The Periodic Table lists the elements. In the Periodic table, elements with similar properties are grouped together. **C** Six from: low melting point, poor conductor of electricity, poor conductor of heat, dull, brittle, not sonorous, low density
Activity	**Platinum propaganda** Points to include: Platinum has many uses. Platinum is rare. For these reasons, platinum is expensive. Recycling platinum can make money for car scrapyard owners. Recycling platinum increases the likelihood of there being enough platinum to meet future demand important uses, such as heart pacemakers and catalytic converters.
Summary questions	**1a** iron, nickel, cobalt (or any other three magnetic elements) (3 marks) **b** mercury, bromine (2 marks) **2** iron – metal; oxygen – non-metal; chlorine – non-metal; mercury – metal. (4 marks) **3** A typical metal has high boiling and melting points, but the boiling and melting points of non-metals are low. Metals are good conductors of heat and electricity, but non-metals are not. Most metals are shiny, but most non-metals are dull. Metals tend to have densities and non-metals have low densities. A typical metal is malleable and ductile, but a non-metal is brittle. Many metals are sonorous, but non-metals are not. (6 marks) **4** Mercury (1 mark) **5** Extended response question (6 marks). Example answers: Uses of platinum include jewellery, catalytic converters, hard disks, making heart pacemakers. Jewellery – platinum suitable because it is so shiny, not damaged by air or water, can be made into different shapes. Heart pacemakers – platinum suitable because it is not damaged by air and water and can be made into different shapes.

Lesson 8: Book 1 – Chemical reactions of metals and non-metals (6.2.2)

Connection

Q1 What is the Periodic Table?

Q2. Name two properties of a non-metal element

https://www.youtube.com/watch?v=Bzu6iQe4wEY&t=10s

Activation

LI: Name the substances formed when metals and non-metals react with oxygen

1. Make a note of the date, title and the LI
2. Key word – chemical property, oxidation
3. Read pages 124 – 125
4. Answer questions A, B, C, D
5. Add particle diagrams to answer D to describe what happens during oxidation.

Demonstration

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Consolidation

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Connection

1. The periodic table lists the elements and groups them in order of similar properties.

2. Poor electrical conductor; brittle

Activation & Demonstration

In-text questions	**A** Any three from: shiny, malleable, ductile, high melting point, high boiling point, good conductor of heat, good conductor of electricity. **B** A typical metal oxide is solid at 20°C and is a base. A typical non-metal oxide is a gas at 20°C and is an acid. **C** Sulfur and oxygen. **D** A reaction in which a substance reacts with oxygen to make one or more oxides.
Summary questions	**1** Metal properties: high melting point, forms oxides that are bases. Non-metal properties: brittle, forms oxides that are acids. (4 marks) **2a** copper + oxygen → copper oxide carbon + oxygen → carbon dioxide (2 marks) **b** Product in first reaction is a base, and product in second reaction is an acid. (2 marks) **3** Diagram showing a number of spheres (for example eight) arranged in two or more rows to represent magnesium, as well as four pairs of spheres to represent oxygen atoms. Product showing magnesium and oxygen atoms arranged alternatively in rows. The total number of atoms of each element in the reactant and product should be the same. (3 marks) **4** The change is a physical change. In the first picture gallium is in the solid state, and in the second picture it is in the liquid state. This means that the process that has occurred is melting, which is a physical change. (4 marks)

Lesson 9: Book 1 – Metals and acids (6.2.3)

Connection

Q1 List two properties of a metal.

Q2 Write a word equation for the reaction of zinc with oxygen

https://www.youtube.com/watch?v=M8qTcBz0wEM

Activation

LI: Compare the reactions of metals and non-metals with acids.

1. Make a note of the date, title and the LI
2. Key word – salt
3. Read pages 126 – 127
4. Answer questions A, B
5. Copy the 3x equations to show zinc iron and lead reacting with hydrochloric acid - page 126 include particle diagram top of page 127
6. Copy the equation for magnesium reacting with sulfuric acid and zinc reacting with nitric acid - page 127
7. Practical: Reactions metals and acids

Demonstration

Attempt Summary questions
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Consolidation

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Lesson 9: Answers **6.2.3 Metals and acids**

Connection:

1. shiny, good conductors of electricity, sonorous etc

2. Zinc + oxygen -> zinc oxide

Activation & Demonstration

In-text questions	**A** metal salt and hydrogen gas **B** magnesium sulfate
Activity	**Sulfuric similarities** Plan should include appropriate apparatus list, method, risk assessment, and consideration for different variables. An example method would be to place different metals that are known to react vigorously with HCl in H_2SO_4 to see if bubbles are produced at a similar rate.
Summary questions	**1** a salt, hydrogen, lead, magnesium, silver (5 marks) **2** Iron chloride and hydrogen. This is because all metal-acid reactions result in a salt and hydrogen being made. Hydrochloric acid forms chloride salts. (3 marks) **3** Reactants: diagram showing iron particles arranged in rows; diagram showing hydrochloric acid, with hydrogen and chloride particles in water. There should be the same number of atoms of each element in the reactants and products. (3 marks) **4a** magnesium + nitric acid → magnesium nitrate + hydrogen (1 mark) **b** tin + hydrochloric acid → tin chloride + hydrogen (1 mark) **c** zinc + sulfuric acid → zinc sulfate + hydrogen (1 mark)

Lesson 10: Book 1 – Metals and oxygen (6.2.4)

Connection

Q1 Name the products formed when a metal reacts with an acid.

Q2. What is the name of the salt produced when magnesium reacts with sulfuric acid?

https://www.youtube.com/watch?v=-xVgs60LmXg

Activation

LI: Compare the reactions of different metals with oxygen

1. Make a note of the date, title and the LI
2. Key word – oxidation, reactivity
3. Read pages 128 – 129
4. Answer questions A, B, C
5. Copy equation for zinc and copper reacting with oxygen – page 128
6. Copy table for reactivity – page 129

7. Practical: Reaction of metals with oxygen

Demonstration

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

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Lesson 10: Answers **6.2.4 Metals and oxygen**

Connection:

1. Salt and water
2. magnesium sulfate

Activation & Demonstration

In-text questions	**A** The reaction of any substance with oxygen, in which the substance combines with oxygen. **B** Two from: magnesium, zinc, and iron **C** magnesium, zinc, iron, lead, copper, and gold
Activity	**Fair test?** Jamilla should hold each metal sample using tongs over the Bunsen flame and take note of how long it takes for the metal to ignite. The metal that burns most vigorously is most reactive, whilst the one that does not burn will be the least reactive. Some metals may not burn but may gain oxide coating. These metals are less reactive than those that burn. Possible improvements: Use the same mass of metal with the same surface area. Testing reactivity with acid as well, since metals demonstrate the same reactivity trends whether burning is oxygen or reacting with acid.
Summary questions	**1** magnesium, oxides, copper, gold (4 marks) **2** Potassium oxide will be made in an explosive/very vigorous reaction. This is because the reactivity trends of metals are the same whether burning in oxygen or reacting with acid. (4 marks) **3** Gold is an unreactive element. It does not burn and its surface atoms do not react with oxygen. This means that its ability to conduct electricity is never compromised by a layer of oxide on its surface. The surface atoms of magnesium react with oxygen from the air to form a layer of magnesium oxide. Magnesium oxide does not conduct electricity. (4 marks) **4** The surface atoms of sodium have reacted with oxygen from the air to make sodium oxide. This happens because sodium is a very reactive element. (2 marks)

Lesson 11: Book 1 – Metals and water (6.2.5)

Connection

Q1. Why is gold used for electrical connections?

Q2. Name the product formed when a metal reacts with oxygen.

https://www.youtube.com/watch?v=jI__JY7pqOM

Activation

LI: State what the reactivity series is and what it shows.

1. Make a note of the date, title and the LI
2. Key word – reactivity series
3. Read pages 130 – 131
4. Answer questions A, B, C
5. Copy the reactivity series showing metals in order of reactivity – page 131
6. Copy equation for potassium and water - page 130

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 11: Answers **6.2.5 Metals and water**

Connection:

1. Gold is an unreactive metal/lower down the reactivity series

2. metal oxide

Activation & Demonstration

In-text questions	**A** calcium hydroxide and hydrogen gas **B** sodium + water → sodium hydroxide + hydrogen **C** zinc
Activity	**Tim's tin** From Tim's data, tin is less reactive than magnesium but more reactive than copper. In order to learn more about the reactivity of tin, Tim should repeat the reaction with hydrochloric acid using metals tested. This is because metals follow similar reactivity trends for all these reactions.
Summary questions	**1** (6 marks) Any six from: Sodium reacts very vigorously with water. Sodium is near the top of the reactivity series. Sodium is more reactive than copper. Iron is more reactive than copper. Gold is less reactive than copper. Gold does not react with oxygen, water, or acid. Gold is unreactive. **2** Products: lithium hydroxide and hydrogen Word equation: lithium + water → lithium hydroxide + hydrogen (2 marks) **3** Extended response question (6 marks). Example answers: Nickel is less reactive than iron. Iron reacts with water and air but nickel does not. Iron reacts more vigorously with acid than nickel. Nickel is more reactive than lead. Neither nickel nor lead react with water and air, but nickel reacts with acid whereas lead does not. **4** Calcium and metals above it in the reactivity series react vigorously with cold water. Copper and metals below it in the reactivity series do not react with cold water or steam. The metals between calcium and copper react with steam but not cold water. (4 marks)

Lesson 12: Book 1 – Metals Displacement reactions (6.2.6)

Connection

Q1.Name the products of the reaction of calcium with water.

Q2. Name a metal that reacts with steam but not water.

https://www.youtube.com/watch?v=ubCCy4_AOmQ

Activation

LI: Use word equations to describe acid-metal displacement reactions

1. Make a note of the date, title and the LI
2. Key word – reactivity series
3. Read pages 132 - 133
4. Answer questions A, B
5. Copy the equation to show displacement of copper by magnesium – page 132
6. Copy the diagram showing zinc displacing copper - page 133
7. Write a short paragraph to explain how displacement occurs.
8. Practical: Displacement reactions

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
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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 12: Answers **6.2.6 Metal displacement reactions**

Connection

1. calcium hydroxide and hydrogen

2. magnesium

Activation & Demonstration

In-text questions	**A** A reaction where a more reactive element displaces a less reactive element from a compound. **B** Copper is less reactive than magnesium (lower in the reactivity series)
Activity	**Planning paragraphs** Credit suitable prose to explain displacement reactions. Possible information to include in each paragraph: What a displacement reaction is. Displacement of metal salts. Displacement of metal oxides. Using the reactivity series to predict displacements.
Summary questions	**1** In a displacement reaction, a **more** reactive metal pushes out a **less** reactive metal from its compound. For example, **aluminium** displaces **iron** from **iron** oxide. (5 marks) **2** Reaction a, c, and d will occur, since the element on its own is more reactive (positioned higher in the reactivity series) than the metal found in the compound. (4 marks) **3** Diagram showing a number of spheres (for example eight) arranged in two or more rows to represent magnesium, as well as eight spheres of copper and eight spheres of oxygen arranged alternatively in rows to represent copper oxide. Two products – one showing magnesium and oxygen atoms arranged alternatively in rows, the other showing copper atoms only, arranged in rows. The total number of atoms of each element in the reactant and product should be the same. (3 marks) **4** Metal X is above lead in the reactivity series, since it displaces lead from lead oxide. It is below aluminium because it does not displace aluminium from aluminium oxide. Metal X could be iron or zinc. (3 marks)

Lesson 13: Book 2 – Atoms in chemical reactions (6.3.1)

Connection

Q1. Write a word equation for the reaction of iron and copper sulfate

Q2. What is this type of reaction called?

https://www.youtube.com/watch?v=2S6e11NBwiw

Activation

LI: Describe the model of chemical change and conservation of mass

1. Make a note of the date, title and the LI
2. Key word – conserved
3. Read pages 90 - 91
4. Answer questions A. B
5. Draw and label the particle model showing what happens when nitrogen reacts with oxygen.

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
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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 13: Answers **6.3.1 Atoms in chemical reactions**

Connection:

1. iron sulfate and copper

2. Displacement reaction (iron displaces the copper from its compound because it is more reactive than copper)

Activation & Demonstration

In-text questions	**A** nitrogen + oxygen → nitrogen monoxide **B** Two nitrogen atoms in the reactants and products, and two oxygen atoms in the reactants and products.
Summary questions	**1** rearranged, different, the same (3 marks) **2** Particle diagram showing two hydrogen molecules (each made up of two hydrogen atoms) and one oxygen molecule (made up of two oxygen atoms) at the start; two water molecules (each made up of two hydrogen atoms and one oxygen atom) at the end. (3 marks) **3** Particle diagram showing one oxygen molecule (made up of two oxygen atoms) and two nitrogen monoxide molecules (each made up of one nitrogen atom and one oxygen atom) at the start; two nitrogen dioxide molecules (each made up of one nitrogen atoms and two oxygen atoms) at the end. (3 marks)

Lesson 14: Book 2 – Combustion (6.3.2)

Connection

Q1. What do we mean when we say atoms are ‘conserved’ in a reaction?

Q2. Use a particle diagram to model the meaning.

https://www.youtube.com/watch?v=xd1alir07q4

Activation

LI: Identify factors that affect the pH of an acid

1. Make a note of the date, title and the LI
2. Key word – fuel, combustion, fossil fuel, non-renewable, renewable
3. Read pages 92 - 93
4. Answer questions A, B, C
5. Copy equation showing methane reacting with oxygen. Add diagram below - page
6. Draw diagram to show hydrogen reacting with water
7. Write a sentence to explain why using hydrogen as a fuel might be better than using methane.
8. Practical: Demo combustion of hydrogen and other substances

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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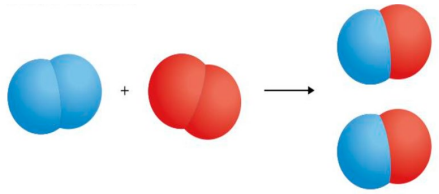
Consolidation

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

Lesson 14: Answers **6.3.2 Combustion**

Connection:

1. The number of atoms of each element in a reaction stays the same. They get rearranged to form new products.

2. 

▲ This particle diagram shows what happens when nitrogen reacts with oxygen.

Activation & Demonstration

In-text questions	**A** A fuel is a material that burns to transfer energy by heating. **B** carbon and hydrogen **C** hydrogen and oxygen
Activity	**Fuels for the future** • Petrol and diesel produce carbon dioxide on burning. This is a greenhouse gas. • Burning cooking oil also produces carbon dioxide on burning, but the plants from which the oil was produced removed carbon dioxide from the atmosphere while they were growing. • Burning hydrogen produces just one harmless product, water. • Petrol and diesel are non-renewable. • Used cooking oil and hydrogen are renewable.
Summary questions	**1a** chemical **b** useful **c** burning **d** oxygen (4 marks) **2** Carbon dioxide and water. (2 marks) **3a** Carbon dioxide and water. (2 marks) **b** propane + oxygen → carbon dioxide + water (1 mark) **c** Compounds made up of carbon and hydrogen react with oxygen to make carbon dioxide and water. (2 marks) **4** Suggested comments (Nathan) – burning fuels such as petrol and methane produces carbon dioxide gas, which contributes to climate change. Suggested comments (Riana) – burning hydrogen produces one product, water, which does not contribute to climate change. (6 marks)

Lesson 15: Book 2 – Thermal decomposition (6.3.3)

Connection

Q1. What is the name of the process when fuel is burnt?

Q2. Describe the energy transfer when fuel is burnt.

https://www.youtube.com/watch?v=DVGaNxEM7M8

Activation

LI: Identify factors that affect the pH of an acid

1. Make a note of the date, title and the LI
2. Key word – thermal decomposition
3. Read pages 94 - 95
4. Answer questions A, B, C
5. Draw a particle model showing the decomposition of hydrogen peroxide.

6. Practical: Carry out thermal decomposition

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
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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 **6.3.3 Thermal decomposition**

Connection:

1. Combustion

2. Chemical store of energy is transferred as heat to the surroundings.

Activation & Demonstration

In-text questions	**A** A decomposition reaction is a reaction in which a compound breaks down into simpler compounds or elements. **B** lead oxide and carbon dioxide **C** magnesium oxide, nitrogen dioxide, oxygen
Summary questions	**1** compound, simpler, copper, carbon, oxygen (5 marks) **2** Equations **b** and **c** are decomposition reactions because a compound (zinc carbonate and hydrogen peroxide) breaks down to make two simpler compounds. Equations **a** and **d** are combustion reactions because a substance (calcium, methane) reacts with oxygen. (4 marks) **3** Products: strontium oxide, nitrogen dioxide, oxygen. Strontium nitrate → strontium oxide + nitrogen dioxide + oxygen (6 marks) **4** The nitrates decompose to make an oxide of the Group 2 metal, as well as nitrogen dioxide and oxygen gases. (3 marks)

Lesson 16: Book 2 – Conservation of mass (6.3.4)

Connection

Q1. What is thermal decomposition?

Q2. What is the test used to identify carbon dioxide gas?

https://www.youtube.com/watch?v=2S6e11NBwiw

Activation

LI: Explain observations about mass conservation in a chemical or physical change

1. Make a note of the date, title and the LI
2. Key word – conservation of mass
3. Read pages 96 - 97
4. Answer questions A, B
5. Have a go at “mass matters” (blue box bottom page 96) – predict the masses of reactants and products.

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 16: Answers **6.3.4 Conservation of mass**

Connection:

1. When a substance breaks down on heating to form two or more products.

2. Bubble the gas through lime water. If it turns milky the gas is CO_2

Activation & Demonstration

In-text questions	**A** In a chemical reaction or physical change, the total mass of starting substances is the same as the total mass of substances at the end of the change. **B** Balanced symbol equations show the formulae of reactants and products, how the atoms are rearranged, and the relative amounts of reactants and products.
Activity	**Mass matters** Since the mass of magnesium has doubled, the masses of the other reactant and the product will also double. So the mass of oxygen = (0.16 g) × 2 = 0.32 g and the mass of magnesium oxide = (0.40 g) × 2 = 0.80 g
Summary questions	**1** atoms, equals, conservation (3 marks) **2** Magnesium nitrate decomposes to make solid and gaseous products. The gaseous products escape, so the mass of solid product is less than the mass of solid reactant. (2 marks) **3** 12.5 g − 8.1 g = 4.4 g of carbon dioxide (2 marks) **4** $N_2 + O_2 \rightarrow 2NO$ (3 marks) **5** $2H_2O_2 \rightarrow 2H_2O + O_2$ (6 marks)

Lesson 17: Book 2 – Exothermic and Endothermic (6.4.1)

Connection

Q1. What does 'conservation of mass' mean?

Q2. Write a balanced symbol equation for the reaction of magnesium with oxygen producing magnesium oxide.

Activation

LI: Describe exothermic and endothermic reactions

1. Make a note of the date, title and the LI
2. Key word – endothermic and exothermic
3. https://www.youtube.com/watch?v=0MBVIXufFbM
4. Read pages 96 - 97
5. Answer question A
6. List 3x endothermic changes – bullet points page 98 and 3x exothermic changes – page 99
7. Copy the literacy statement to help you remember the meaning of exothermic and endothermic
8. Practical: Measure temperature change in exothermic and endothermic reaction

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 17: Answers **6.4.1 Exothermic and endothermic**

Connection:

1. The total mass of the reactants is equal to the total mass of products in a reaction.

2. $2Mg + O_2 \rightarrow 2MgO$

Activation & Demonstration

In-text questions	**A** A reaction or other change in which energy is taken in, usually as heat.
Summary questions	**1** energy, exothermic, endothermic, endothermic (4 marks) **2** Calcium chloride and sodium carbonate dissolve exothermically. The data show this because the temperature increases during dissolving. (3 marks) **3** Calcium chloride and sodium carbonate could be used with water in a hand warmer, since, on dissolving, there is an increase in temperature as the substances dissolve exothermically. Potassium chloride and sodium hydrogen carbonate could be used with water in a cold pack, since, on dissolving, there is a decrease in temperature as the substances dissolve endothermically. (4 marks) **4** Example answers (6 marks): Both endothermic and exothermic changes involve energy transfers between the reacting mixture and the surroundings. In an exothermic change energy is transferred to the surroundings. In an endothermic change energy is transferred from the surroundings to the reaction mixture. During an exothermic change the temperature of the reaction mixture increases. During an endothermic change the temperature of the reaction mixture decreases. Credit suitable examples taken from the spread or the practical sheet.

Lesson 18: Book 2– Energy Level diagrams (6.4.2)

Connection

Q1. Describe the energy transfer in an endothermic reaction.

Q2. Give an example of an exothermic reaction.

Activation

LI: Identify whether an energy level diagram is showing an endothermic or an exothermic reaction.

1. Make a note of the date, title and the LI
2. Key word – energy level diagram
3. https://www.youtube.com/watch?v=eJXL0IrbtqE
4. Read pages 100 - 101
5. Answer questions A, B, C
6. Sketch graphs showing melting and freezing as endo and exothermic changes.

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
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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 18: Answers **6.4.2 Energy level diagrams**

Connection.

1. Energy is transferred from the surroundings to the substance.

2. Burning magnesium

Activation & Demonstration

In-text questions	**A** endothermic **B** Melting ice takes in energy from the surroundings. **C** The reactants have more energy.
Summary questions	**1** transferred, exothermic, endothermic (3 marks) **2** Boiling, since the energy of the products is greater than the energy of the reactants. The change is endothermic. (3 marks) **3** Energy level diagram showing the following: ● *x*-axis labelled *progress of reaction* and *y*-axis labelled *energy*. ● Horizontal line on left labelled *liquid water* and horizontal line on right, lower down, labelled *ice*. ● Statement to the effect that the energy of the substance at the end (ice) is less than the energy of the starting substance (liquid water) so the change is exothermic. (3 marks) **4** The energy of the solution is greater than the total energy of the solute and solvent. This shows that energy is taken in during the process, so the reaction is endothermic. Since in endothermic reactions temperature decreases, the process is better used in a cold injury pack. (3 marks)

Lesson 19: Book 2 – Bond energies (6.4.3)

Connection

Q1. Recall the meanings of exothermic and endothermic.

Q2. Draw the energy level diagram for melting ice.

Activation

LI: State what happens to chemical bonds during exothermic and endothermic reactions.

1. Make a note of the date, title and the LI
2. Key word – reactivity series
3. https://www.youtube.com/watch?v=eExCBkp4jB4
4. Read pages 102 - 103
5. Answer questions A , B, C
6. Draw labelled particle diagrams to model bond breaking and bond making in endothermic and exothermic reactions.

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
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Triple chemistry bottle question is for students looking to challenge themselves.

Consolidation

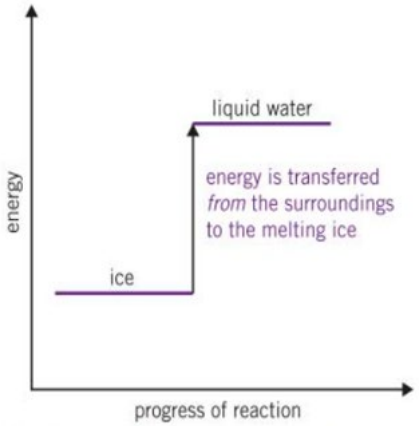
Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Lesson 19: Answers **6.4.3 Bond energies**

Connection

1.: Exothermic reactions transfer energy to the surrounding, endothermic reactions take in energy from the surroundings.

2.



Activation & Demonstration

In-text questions	**A** exothermic **B** The energy released in making chemical bonds is greater than the energy required to break chemical bonds. **C** A substance that speeds up a chemical reaction but is unchanged at the end.
Summary questions	**1** less than (1 mark) **2** Energy level diagram showing the following: • *x*-axis labelled *progress of reaction* and *y*-axis labelled *energy*. • Horizontal line on left labelled *hydrogen and chlorine* and horizontal line on right, lower down, labelled *hydrogen chloride*. • Statement to the effect that the energy of the substance at the end (hydrogen chloride) is less than the energy of the starting substances (hydrogen and chlorine) so the change is exothermic. (3 marks) **3** Energy to break H–H and F–F bonds = (436 + 158) = 594 kJ/mol Energy to make two H–F bonds = (2 × 563) = 1126 kJ/mol. Overall the energy released in making new bonds in the products is more than the energy required to break bonds in the reactants, so the reaction is exothermic. (4 marks)

Lesson 20 & 21: Book 1 & 2 – Revision

Connection

Q1 Is bond breaking endothermic or exothermic?

Q2. How can we work out whether the overall reaction is going to be exothermic or endothermic?

Activation

LI: Practice some Big Idea questions about Reactions

1. Make a note of the date, title and the LI
2. Read page 39 for Book 1 questions and page 43 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 12: Answers **6 Reactions – Part 1 Checkpoint**

Connection:

1. Bond breaking is endothermic

2. Work out the total bond making energy on the reactant side and take it away from or compare it to the bond making energy total on the product side. If the bond making energy on the product side is greater the reaction will be exothermic. (in bond making energy is released to the surroundings to make new bonds)

End-of-Big Idea questions	**1** Sweat – acidic, blood – alkaline, urine – acidic (3 marks) **2a** Two from: same sized pieces of metal, same volume of acid, same concentration of acid. (2 marks) **b** Wear eye protection to prevent corrosive acid entering his eye and causing damage. (2 marks) **c** Zinc – closest to the top of the reactivity series. (1 mark) **d** Hydrogen (1 mark) **3a** sweet cherry (1 mark) **b** blueberry (1 mark) **c** sweet cherry, pineapple, strawberry (3 marks) **d** Add an acidic substance to neutralise some of the alkaline substances in the soil (making the pH suitable for growing strawberries). (2 marks) **4** Points to include: Pour dilute hydrochloric acid into a conical flask/beaker. Add a few drops of universal indicator solution from a teat pipette. Slowly add sodium hydroxide solution from a beaker, a little at a time, to the flask/beaker, whilst stirring with a stirring rod. When the colour of the mixture shows that the mixture is neutral, stop adding the sodium hydroxide solution. (6 marks) **5a** <u>lithium hydroxide</u>, hydrogen (2 marks) **b** magnesium, oxygen (2 marks) **c** <u>zinc chloride</u>, hydrogen (2 marks) **d** sulfuric acid, hydrogen (2 marks) **6a** X and Z – because the metal elements are more reactive than the metals in the compounds. In each case the metal element can displace the metal in the compound. (4 marks) **b** iron + copper oxide → iron oxide + copper OR iron + lead oxide → iron oxide + lead (2 marks)

6 Reactions – Part 2 Checkpoint

End-of-Big Idea questions	**1a** The appearance of the product is different from the appearance of the reactants (suggesting new materials are formed). There is a flame (showing energy is transferred to the surroundings). (2 marks) **b** Atoms are rearranged. (1 mark) **2a** Burning reactions are exothermic – they transfer energy to the surroundings. (2 marks) **b** fuel type/ethanol or propanol (1 mark) **c** amount of water and distance from flame to water (2 marks) **d** ensure results are fair (1 mark) **3** In a thermal decomposition reaction a single compound (the white solid) breaks down into simpler compounds or elements (the brown gas, the colourless gas, and the white solid) when it is heated. (2 marks) **4a** thermal decomposition (1 mark) **b** calcium oxide and carbon dioxide (1 mark) **5** 100 g − 56 g = 44 g (2 marks) **6a** All the representations show a new substance is made. Diagram Z shows how atoms are rearranged. (2 marks) **b** Examples of correct scientific points (6 marks): All three representations show the reactants and products. Equation X gives the names of the reactants and products. Equation Y shows the formulae of the reactants and products, and partially indicates how the reactants and products are rearranged. Equation Y and diagram Z show the relative amounts of each reactant and product. Diagram Z shows how the atoms are rearranged.

Lesson 22: Revision

Connection

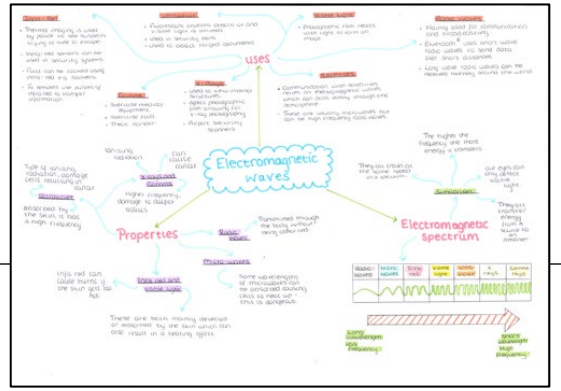
N/A

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



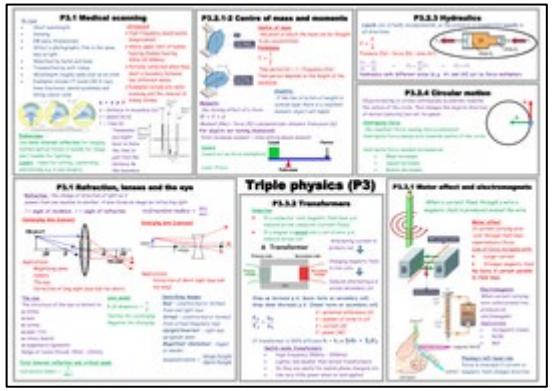
Demonstration

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

Stewards Academy

Science Department | **ASSESSMENT FEEDBACK** | Year 8 – Unit 2

Attainment Band	Types of Reaction & Chemical Energy Knowledge and Understanding
Yellow/Yellow +	• Evaluate the hazards posed by a number of acids and how they may be reduced • Evaluate the hazards posed by a number of alkalis and how they may be reduced • Compare the effectiveness of different indicators • Explain clearly and fluently the advantages of universal indicator over other indicators • Explain the changes to an indicator when acids and alkalis are mixed • Explain and evaluate a model of neutralisation • Predict the reactants and salts made in different neutralisation reactions • Explain and exemplify trends and patterns in the Periodic Table • Select metals most appropriate for a particular use and justify the selection • Compare and constrast the properties of metals and non-metals • Explain observations using word equations and relate chemical symbols to a simple particle model using circle diagrams • Use simple models and equations to explain the mass changes during oxidation reactions • Compare the reactivities of different metals • Write balanced symbol equations for the decomposition of metal carbonates; explain how decomposition of metal carbonates relates to metal reactivity • Write balanced symbol equations for displacement reactions • Use the particle model to explain physical changes and chemical changes • Use energy-level diagrams to compare the energy in the reactants and products of an exothermic reaction and explain the energy changes in the particles • Apply the fire triangle to putting out fires • Explain the Law of Conservation of Mass and how it can be proved • Use a word equation to explain what happens during the thermal decomposition of carbonates • Use simple models and equations to explain the mass changes during thermal decomposition reactions
Blue	• Explain the similarities between all acids, recognise what alkalis have in common and the hazards associated with some • Explain how an indicator may be produced and analyse the data generated • Interpret measurements of pH made using universal indicator, describe the changes to indicators when acids and alkalis are mixed • Explain the formation of a salt and water during neutralisation • Describe the uses of some common salts • Explain how the Periodic Table is organised using the correct terms • Identify similarities and differences between metals and how these relate to their uses • Explain why substances are classified as non-metals • Make accurate observations and explain them using simple models and word equations • Write balanced symbol equations to illustrate oxidation reactions • Explain the reaction between acids and metals • Use data to make inferences about metal reactivity • Use models to explain displacement and relate it to the reactivity series • Explain how mass is conserved in all changes • Explain the energy changes taking place during an exothermic reaction • Describe what is needed for combustion using the fire triangle • Compare the reactants and products of complete and incomplete combustion • Describe what is meant by a thermal decomposition reaction • Explain the differences between oxidation and thermal decomposition reactions
Green	• Recognise and use symbols to represent components in a circuit; investigate electrical conductors and insulators. • Recognise the units of voltage; use different models to describe voltage. • Describe the term 'resistance' and recognise the units; collect reliable data from circuits. • Describe resistance and its effect in a circuit. • Use different models to describe voltage, current and resistance. • Recognise circuits as being series or parallel and identify the features of each. • Make measurements of current and voltage in series circuits and parallel circuits. • Identify if a circuit is arranged in series or parallel or both. • Describe early ideas about magnetism. • Describe the differences between permanent and temporary magnets; describe how to test the strength of a magnet. • Follow a procedure to collect reliable, accurate and valid data. • Record and display ideas about magnetic fields. • Describe some effects of the Earth's magnetic field. • Plan to investigate the strength of electromagnets; describe what an electromagnet is. • Describe different applications of magnets and electromagnets.
White	• Some of the above elements have been achieved.