



Go-To Guide to Achieve in Science

GCSE Combined Science

Foundation Tier



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Introduction and Subject content for AQA GCSE Combined Science: Trilogy

Specification at a glance

This qualification is linear. Linear means that students will sit all their exams at the end of the course.

Follow this link to find the full specification:

[GCSE Combined Science: Trilogy Specification Specification for first teaching in 2016 \(aqa.org.uk\)](https://www.aqa.org.uk/qualifications/gcse-combined-science-trilogy-specification)

Biology

- 1. Cell biology
- 2. Organisation
- 3. Infection and response
- 4. Bioenergetics
- 5. Homeostasis and response
- 6. Inheritance, variation and evolution
- 7. Ecology

Chemistry

- 8. Atomic structure and the periodic table
- 9. Bonding, structure, and the properties of matter
- 10. Quantitative chemistry
- 11. Chemical changes
- 12. Energy changes
- 13. The rate and extent of chemical change
- 14. Organic chemistry
- 15. Chemical analysis
- 16. Chemistry of the atmosphere
- 17. Using resources

Physics

- 18. Energy
- 19. Electricity
- 20. Particle model of matter
- 21. Atomic structure
- 22. Forces
- 23. Waves
- 24. Magnetism and electromagnetism

Assessments

There are six papers: two biology, two chemistry and two physics. Each of the papers will assess knowledge and understanding from distinct topic areas.

Follow this link to download and print past papers and mark schemes:

[AQA | GCSE | Combined Science: Trilogy | Assessment resources](https://www.aqa.org.uk/qualifications/gcse-combined-science-trilogy-specification)

Biology Paper 1

What's assessed

Biology topics 1–4: Cell Biology; Organisation; Infection and response; and Bioenergetics.

How it's assessed

- Written exam: 1 hour 15 minutes
- Foundation and Higher Tier
- 70 marks
- 16.7% of GCSE

Questions

Multiple choice, structured, closed short answer, and open response.

Biology Paper 2

What's assessed

Biology topics 5–7: Homeostasis and response; Inheritance, variation and evolution; and Ecology.

How it's assessed

- Written exam: 1 hour 15 minutes
- Foundation and Higher Tier
- 70 marks
- 16.7% of GCSE

Questions

Multiple choice, structured, closed short answer, and open response.

Chemistry Paper 1

What's assessed

Chemistry topics 8–12: Atomic structure and the periodic table; Bonding, structure, and the properties of matter; Quantitative chemistry; Chemical changes; and Energy changes.

How it's assessed

- Written exam: 1 hour 15 minutes
- Foundation and Higher Tier
- 70 marks
- 16.7% of GCSE

Questions

Multiple choice, structured, closed short answer, and open response.

Chemistry Paper 2

What's assessed

Chemistry topics 13–17: The rate and extent of chemical change; Organic chemistry; Chemical analysis; Chemistry of the atmosphere; and Using resources.

How it's assessed

- Written exam: 1 hour 15 minutes
- Foundation and Higher Tier
- 70 marks
- 16.7% of GCSE

Questions

Multiple choice, structured, closed short answer, and open response.

Physics Paper 1

What's assessed

Physics topics 18–21: Energy; Electricity; Particle model of matter; and Atomic structure.

How it's assessed

- Written exam: 1 hour 15 minutes
- Foundation and Higher Tier
- 70 marks
- 16.7% of GCSE

Questions

Multiple choice, structured, closed short answer, and open response.

Physics Paper 2

What's assessed

Physics topics 22–24: Forces; Waves; and Magnetism and electromagnetism

How it's assessed

- Written exam: 1 hour 15 minutes
- Foundation and Higher Tier
- 70 marks
- 16.7% of GCSE

Questions

Multiple choice, structured, closed short answer, and open response.

Useful Revision Links – Foundation Tier

| |
|--|
| <p>Biology paper 1: duration: 1h 15m</p> <p>4.1 Cell Biology</p> <ul style="list-style-type: none"> • 9-1 GCSE Biology Paper 1 Cell Biology - YouTube • Seneca Learning • Physics and maths tutor: Notes, definitions, mind maps, and practice questions - PMT • BBC Bitesize • Quick fire questions https://youtu.be/E9ZiTAaRC-E • Whole topic summary https://youtu.be/sdpmVQooYS4 |
| <p>4.2 Organisation</p> <ul style="list-style-type: none"> • 9-1 GCSE Biology Paper 1 Organisation - YouTube • Seneca Learning • Physics and maths tutor: Notes, definitions, mind maps, and practice questions - PMT • BBC Bitesize • Quick fire questions https://youtu.be/QnsRz0Xhup8 • Whole topic summary https://youtu.be/DJ0lZGkDx6A |
| <p>4.3 Infection and Response</p> <ul style="list-style-type: none"> • Freesciencelessons - YouTube • Seneca Learning • Physics and maths tutor: Notes, definitions, mind maps, and practice questions - PMT • BBC Bitesize • Quick fire questions https://youtu.be/pq3B_sozPCo • Whole topic summary https://youtu.be/m7pxdTJ9NPI |
| <p>4.4 Bioenergetics</p> <ul style="list-style-type: none"> • Freesciencelessons - YouTube • Seneca Learning • Physics and maths tutor: Notes, definitions, mind maps, and practice questions - PMT • BBC Bitesize • Quick fire questions https://youtu.be/1nuYpKaQ3jA • Whole topic summary https://youtu.be/1KIAWiHQ4sM |
| <p>Required practical's</p> <ul style="list-style-type: none"> • Freesciencelessons • GCSE Biology Required Practicals - YouTube • https://www.physicsandmathstutor.com/biology-revision/gcse-aqa/practical-skills |

Biology paper 2: duration: 1h 15m

4.5 Homeostasis and Response

- [9-1 GCSE Biology 2 Homeostasis - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/EMf0FbJI9BU>
- Whole topic summary <https://youtu.be/xOfqw7MbU8k>

4.6 Inheritance, Variation and Evolution

- Freesciencelessons - [Inheritance](#)
- Freesciencelessons - [Variation and Evolution](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/iL-dUnKmksY>
- Whole topic summary <https://youtu.be/npl10a6p8jQ>

4.7 Ecology

- Freesciencelessons - [9-1 GCSE Biology 2 Ecology - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/NorHSgd7Yyc>
- Whole topic summary <https://youtu.be/SKDn90HK98Q>

Required Practical's

- [Freesciencelessons](#)
- [GCSE Biology Required Practicals - YouTube](#)
- <https://www.physicsandmathstutor.com/biology-revision/gcse-aqa/practical-skills>

Chemistry Paper 1: duration: 1h 15m

5.1 Atomic Structure and the Periodic Table

- [Freesciencelessons - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions https://youtu.be/mjIIPJ_c018
- Whole topic summary <https://youtu.be/bgyuXU97jal>

5.2 Bonding, Structure and the Properties of Matter

- [9-1 GCSE Chemistry Paper 1 Structure and Bonding - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/9bbCFUyluWg>
- Whole topic summary <https://youtu.be/YpEQ-NWxKBc>

5.3 Quantitative Chemistry

- [Freesciencelessons - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/8uqWdmIKd7c>
- Whole topic summary <https://youtu.be/eAibVvhmsK0>

5.4 Chemical Changes

- [9-1 GCSE Chemistry Paper 1 Chemical Reactions - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/7Nrma6v0A8I>
- Whole topic summary https://youtu.be/KTmXEliU_Go

5.5 Energy Changes

- [Freesciencelessons - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/PQtjfRoIMAE>
- Whole topic summary <https://youtu.be/L7829UGifpM>

Required Practical's

- [Freesciencelessons](#)
- [GCSE Chemistry Practicals - YouTube](#)
- <https://www.physicsandmathstutor.com/chemistry-revision/gcse-aqa/practical-skills>

Chemistry Paper 2: duration: 1h 15m

5.6 The Rate and Extent of Chemical Change

- [Freesciencelessons - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/C-tHYZwisNs>
- Whole topic summary <https://youtu.be/7i90fiz9SmY>

5.7 Organic chemistry

- [9-1 GCSE Chemistry Paper 2 Organic Chemistry - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/sE2DP0x48kE>
- Whole topic summary <https://youtu.be/ZeUNWY7YDAo>

5.8 Chemical analysis

- [9-1 GCSE Chemistry Paper 2 Chemical Analysis - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/vMKAHdoc-g0>
- Whole topic summary <https://youtu.be/YyUQiUddBA4>

5.9 Chemistry of the Atmosphere

- [Freesciencelessons - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/DznhhA2QHUG>
- Whole topic summary <https://youtu.be/gxCRsqXZzeU>

5.10 Using Earth's Resources

- [Freesciencelessons - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/xBUXqfa2gHo>
- Whole topic summary <https://youtu.be/KyVf2bVLI08>

Required Practical's

- [Freesciencelessons](#)
- [GCSE Chemistry Practicals - YouTube](#)
- <https://www.physicsandmathstutor.com/chemistry-revision/gcse-aqa/practical-skills>

Physics Paper 1: duration: 1h 15m

6.1 Energy

- [Freesciencelessons - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/q5CwATii60A>
- Whole topic summary <https://youtu.be/tDkBhy-Y1Z8>

6.2 Electricity

- [9-1 GCSE Physics Paper 1 Electricity - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/62RyyfKZoYg>
- Whole topic summary <https://youtu.be/jSA4WaLSVEA>

6.3 Particle Model of Matter

- [Freesciencelessons - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/z9L6zfMVk3U>
- Whole topic summary <https://youtu.be/cZz9oGgJOL0>

6.4 Atomic Structure

- [9-1 GCSE Physics Paper 1 Atomic Structure and Radioactivity - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/bRzRjfvoU-E>
- Whole topic summary <https://youtu.be/YFVYUSvUBoo>

Required Practical's

- [Freesciencelessons](#)
- [GCSE Physics Required Practicals - YouTube](#)
- <https://www.physicsandmathstutor.com/physics-revision/gcse-aqa/practical-skills/>

Physics Paper 2: duration: 1h 15m

6.5 Forces

- [Freesciencelessons - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/jfjb1pnH8zw>
- Whole topic summary <https://youtu.be/Rz4XBSKNGXg>

6.6 Waves

- [9-1 GCSE Physics Paper 2 Waves - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/AEFwEDC6DkQ>
- Whole topic summary https://youtu.be/9JPNVJ_LC3E



















6.7 Magnetism and Electromagnetism

- [Freesciencelessons - YouTube](#)
- [Seneca Learning](#)
- Physics and maths tutor: Notes, definitions, mind maps, and practice questions - [PMT](#)
- [BBC Bitesize](#)
- Quick fire questions <https://youtu.be/LyflUYL4FvM>
- Whole topic summary <https://youtu.be/mnigg3MGsLY>

Required Practical's

- [Freesciencelessons](#)
- [GCSE Physics Required Practicals - YouTube](#)
- <https://www.physicsandmathstutor.com/physics-revision/gcse-aqa/practical-skills/>

GCSE Practice Papers, video solutions and grade boundaries (2019)

| Exam | Question paper | Mark scheme | Video solution |
|-------------------|---|--|---|
| Biology paper 1 |  Link |  Link |  Link |
| Biology paper 2 |  Link |  Link |  Link |
| Chemistry paper 1 |  Link |  Link |  Link |
| Chemistry paper 2 |  Link |  Link |  Link |
| Physics paper 1 |  Link |  Link |  Link |
| Physics paper 2 |  Link |  Link |  Link |

Grade boundaries

| Per paper | |
|------------|-------|
| Marks / 70 | Grade |
| 41 | 5-5 |
| 37 | 5-4 |
| 33 | 4-4 |
| 29 | 4-3 |
| 24 | 3-3 |
| 20 | 3-2 |
| 16 | 2-2 |
| 11 | 2-1 |
| 7 | 1-1 |

| Overall (all papers) | |
|----------------------|-------|
| Marks / 420 | Grade |
| 243 | 5-5 |
| 221 | 5-4 |
| 200 | 4-4 |
| 173 | 4-3 |
| 146 | 3-3 |
| 119 | 3-2 |
| 93 | 2-2 |
| 67 | 2-1 |
| 41 | 1-1 |

The grade boundaries above are for the 2019 paper.

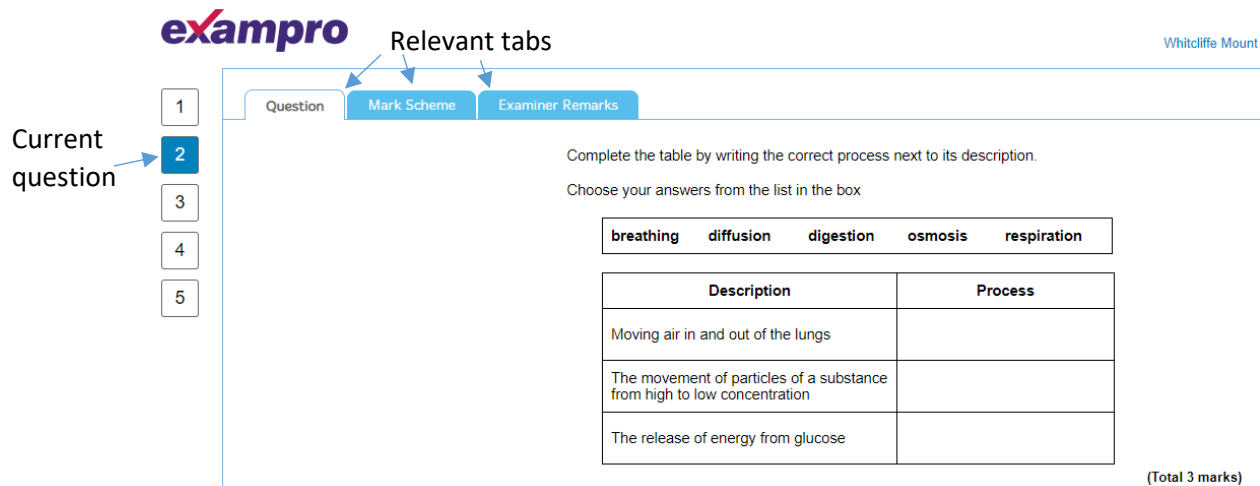
Grade boundaries do change each year and will be different this year.

| Exam | Score | Grade |
|-------------------|-------|-------|
| Biology paper 1 | / 70 | |
| Biology paper 2 | / 70 | |
| Chemistry paper 1 | / 70 | |
| Chemistry paper 2 | / 70 | |
| Physics paper 1 | / 70 | |
| Physics paper 2 | / 70 | |
| Overall | / 420 | |

Together, we are proud to be our best'

GCSE Practice Questions

These links will take you to a practice paper for each topic that features on each test. The link will take you to the exampro viewer where you will be able to attempt each question (in your book/scrap paper). You also will be able to click on the 'Mark Scheme' tab, please use this to self-assess. On some questions you will be able to click the 'Examiner Remarks' tab, this will give you an insight into how other students have done on this question and any common misconceptions.



The screenshot shows the exampro interface. On the left, there is a list of questions numbered 1 to 5. Question 2 is highlighted and labeled 'Current question'. At the top, there are three tabs: 'Question', 'Mark Scheme', and 'Examiner Remarks'. The 'Mark Scheme' and 'Examiner Remarks' tabs are highlighted and labeled 'Relevant tabs'. The main content area shows a question: 'Complete the table by writing the correct process next to its description. Choose your answers from the list in the box'. Below the question is a list of processes: breathing, diffusion, digestion, osmosis, respiration. Below that is a table with two columns: 'Description' and 'Process'. The table has three rows of descriptions. At the bottom right, it says '(Total 3 marks)'.

| breathing diffusion digestion osmosis respiration | |
|---|---------|
| Description | Process |
| Moving air in and out of the lungs | |
| The movement of particles of a substance from high to low concentration | |
| The release of energy from glucose | |

Combined Science Biology Paper 1 – Foundation Tier

Topic 1: Cell Biology <https://HUJUJYR.exampro.net>

Topic 2: Organisation <https://OUSIGOE.exampro.net>

Topic 3: Infection and response <https://OUFEMUU.exampro.net>

Topic 4: Bioenergetics <https://XEXYTIY.exampro.net>

Combined Science Chemistry Paper 1 – Foundation Tier

Topic 1: Atomic Structure and the Periodic Table <https://RULOMYF.exampro.net>

Topic 2: Bonding, Structure and the Properties of Matter <https://ZEQUXIY.exampro.net>

Topic 3: Quantitative Chemistry <https://YIUycOG.exampro.net>

Topic 4: Chemical Changes <https://XOFUEYR.exampro.net>

Topic 5: Energy Changes <https://EAMIYYX.exampro.net>

The first three topics from chemistry paper 1 may also be tested on chemistry paper 2: Atomic Structure and the Periodic Table, Bonding Structure and the Properties of Matter, and Quantitative Chemistry. These are known as the fundamentals of chemistry.

Combined Science Physics Paper 1 – Foundation Tier

Topic 1: Energy <https://FUOAKEW.exampro.net>

Topic 2: Electricity <https://OAHOLUF.exampro.net>

Topic 3: Particle Model of Matter <https://UOKOXIP.exampro.net>

Topic 4: Atomic Structure and Radioactivity <https://NIRABUB.exampro.net>

Combined Science Biology Paper 2 – Foundation Tier

Topic 5: Homeostasis and response <https://WUWASOF.exampro.net>

Topic 6: Inheritance, Variation, and Evolution <https://KOUICUB.exampro.net>

Topic 7: Ecology <https://EOZUUAD.exampro.net>

Combined Science Chemistry Paper 2 – Foundation Tier

Topic 6: Rate and Extent of Chemical Change <https://REIYWER.exampro.net>

Topic 7: Organic Chemistry <https://JUUITIM.exampro.net>

Topic 8: Chemical Analysis <https://SOHOLEL.exampro.net>

Topic 9: Chemistry of the Atmosphere <https://SOHOLEL.exampro.net>

Topic 10: Using Resources

Combined Science Physics Paper 2 – Foundation Tier

Topic 5: Forces <https://HEKEWEV.exampro.net>

Topic 6: Waves <https://ZOSAREU.exampro.net>

Topic 7: Magnetism and Electromagnetism <https://LIPETOU.exampro.net>



Physics Equations Sheet

GCSE Combined Science: Trilogy (8464) and GCSE Combined Science: Synergy (8465)

FOR USE IN JUNE 2022 ONLY

HT = Higher Tier only equations

| | |
|--|--------------------------------|
| kinetic energy = $0.5 \times \text{mass} \times (\text{speed})^2$ | $E_k = \frac{1}{2} m v^2$ |
| elastic potential energy = $0.5 \times \text{spring constant} \times (\text{extension})^2$ | $E_e = \frac{1}{2} k e^2$ |
| gravitational potential energy = $\text{mass} \times \text{gravitational field strength} \times \text{height}$ | $E_p = m g h$ |
| change in thermal energy = $\text{mass} \times \text{specific heat capacity} \times \text{temperature change}$ | $\Delta E = m c \Delta \theta$ |
| power = $\frac{\text{energy transferred}}{\text{time}}$ | $P = \frac{E}{t}$ |
| power = $\frac{\text{work done}}{\text{time}}$ | $P = \frac{W}{t}$ |
| efficiency = $\frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$ | |
| efficiency = $\frac{\text{useful power output}}{\text{total power input}}$ | |
| charge flow = $\text{current} \times \text{time}$ | $Q = I t$ |
| potential difference = $\text{current} \times \text{resistance}$ | $V = I R$ |
| power = $\text{potential difference} \times \text{current}$ | $P = V I$ |
| power = $(\text{current})^2 \times \text{resistance}$ | $P = I^2 R$ |
| energy transferred = $\text{power} \times \text{time}$ | $E = P t$ |

| | | |
|----|--|--------------------------|
| | energy transferred = charge flow × potential difference | $E = Q V$ |
| HT | potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil | $V_p I_p = V_s I_s$ |
| | density = $\frac{\text{mass}}{\text{volume}}$ | $\rho = \frac{m}{V}$ |
| | thermal energy for a change of state = mass × specific latent heat | $E = m L$ |
| | weight = mass × gravitational field strength | $W = m g$ |
| | work done = force × distance (along the line of action of the force) | $W = F s$ |
| | force = spring constant × extension | $F = k e$ |
| | distance travelled = speed × time | $s = v t$ |
| | acceleration = $\frac{\text{change in velocity}}{\text{time taken}}$ | $a = \frac{\Delta v}{t}$ |
| | (final velocity) ² – (initial velocity) ² = 2 × acceleration × distance | $v^2 - u^2 = 2 a s$ |
| | resultant force = mass × acceleration | $F = m a$ |
| HT | momentum = mass × velocity | $p = m v$ |
| | period = $\frac{1}{\text{frequency}}$ | $T = \frac{1}{f}$ |
| | wave speed = frequency × wavelength | $v = f \lambda$ |
| HT | force on a conductor (at right angles to a magnetic field) carrying a current = magnetic flux density × current × length | $F = B I l$ |

Chemistry – periodic table



The Periodic Table of Elements

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 0 | | |
|--|--|---|--|--|---------------------------------------|--|--|--|---|--|
| 7 | Li lithium 3 | 9 Be beryllium 4 | 11 Na sodium 11 | 12 Mg magnesium 12 | 13 B boron 5 | 14 C carbon 6 | 15 N nitrogen 7 | 16 O oxygen 8 | 17 F fluorine 9 | 18 Ne neon 10 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| K potassium 19 | Ca calcium 20 | Sc scandium 21 | Ti titanium 22 | V vanadium 23 | Cr chromium 24 | Mn manganese 25 | Fe iron 26 | Co cobalt 27 | Ni nickel 28 | Cu copper 29 |
| 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 |
| Rb rubidium 37 | Sr strontium 38 | Y yttrium 39 | Zr zirconium 40 | Nb niobium 41 | Mo molybdenum 42 | Tc technetium 43 | Ru ruthenium 44 | Rh rhodium 45 | Pd palladium 46 | Ag silver 47 |
| 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 |
| Cs caesium 55 | Ba barium 56 | La* lanthanum 57 | Hf hafnium 72 | Ta tantalum 73 | W tungsten 74 | Re rhenium 75 | Os osmium 76 | Ir iridium 77 | Pt platinum 78 | Au gold 79 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 |
| Tl thallium 81 | Pb lead 82 | Bi bismuth 83 | Po polonium 84 | At astatine 85 | Rn radon 86 | Fr francium 87 | Ra radium 88 | Ac* actinium 89 | [226] Ra radium 88 | [227] Ac* actinium 89 |
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 |
| Rf rutherfordium 104 | Rf rutherfordium 104 | Db dubnium 105 | Sg seaborgium 106 | Bh bohrium 107 | Hs hassium 108 | Mt meitnerium 109 | Ds darmstadtium 110 | Rg roentgenium 111 | Cn copernicium 112 | [285] Cn copernicium 112 |
| 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 |
| Fl flerovium 114 | Mc moscovium 115 | Lv livermorium 116 | Ts tennessine 117 | Og oganeson 118 | [286] Nh nihonium 113 | [286] Fl flerovium 114 | [289] Mc moscovium 115 | [289] Lv livermorium 116 | [293] Ts tennessine 117 | [294] Og oganeson 118 |
| 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 |
| Cs caesium 55 | Ba barium 56 | La* lanthanum 57 | Hf hafnium 72 | Ta tantalum 73 | W tungsten 74 | Re rhenium 75 | Os osmium 76 | Ir iridium 77 | Pt platinum 78 | Au gold 79 |
| 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 |
| Hg mercury 80 | Tl thallium 81 | Pb lead 82 | Bi bismuth 83 | Po polonium 84 | At astatine 85 | Rn radon 86 | [222] Rn radon 86 | [210] At astatine 85 | [209] Po polonium 84 | [208] Po polonium 84 |
| 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 |
| [281] Rg roentgenium 111 | [281] Cn copernicium 112 | [281] Ds darmstadtium 110 | [281] Rg roentgenium 111 | [281] Cn copernicium 112 | [286] Nh nihonium 113 | [286] Fl flerovium 114 | [289] Mc moscovium 115 | [289] Lv livermorium 116 | [293] Ts tennessine 117 | [294] Og oganeson 118 |

| | |
|---|---------------------------|
| 1 | H hydrogen 1 |
|---|---------------------------|

Key

| |
|------------------------|
| relative atomic mass |
| atomic symbol |
| name |
| atomic (proton) number |

* The Lanthanides (atomic numbers 58 – 71) and the Actinides (atomic numbers 90 – 103) have been omitted. Relative atomic masses for **Cu** and **Cl** have not been rounded to the nearest whole number.

Insert for GCSE Chemistry (8462), Combined Sciences: Trilogy (8461), and Combined Sciences: Synergy (8466) papers v4

14 Essential Revision Tips

1. Start revising early – i.e. months, not days before the exam.
2. Plan your revision using a timetable - Planning out your revision means you can spend more time revising and less time worrying you've forgotten something. There's one found at the back of this booklet.
3. Don't spend ages making your notes look pretty - This is just wasting time. For diagrams, include all the details you need to learn, but don't try to produce a work of art.
4. Set up a nice, tidy study space - You'll need somewhere with good lighting, your pens close by, your phone out of sight and your TV unplugged. Try not to revise on your bed.
5. Vary your revision with different activities - Try a variety of different revision techniques – answering practice questions, writing down notes from memory, and using Revision Guides, Flash Cards, Exam Practice Workbooks etc.

6. Stick revision notes all around your house - So in the exam you think, "Aha, atomic structure, it was on the fridge..."

7. Do lots of practice papers and questions - You'll find it far easier to answer questions in the exam if you've tried similar ones at home beforehand.



https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464/assessment-resources?f.Resource+type%7C6=Question+papers&f.Tier%7CO=Higher&sort=title&num_ranks=10

8. Set aside time to do fun things – Don't totally stop yourself from having fun. This'll help you stay motivated, relax, and allow you to keep up with your favourite hobbies.

9. Keep your phone and other distractions away. - Phones are great, but they're a one-stop shop for procrastination. Heed our warnings and stick it in a drawer while you're revising.

10. Don't just read your notes - You have to WRITE STUFF DOWN. This is really basic "how to revise" stuff.

11. Take your revision wherever you go

12. Sleep and eat properly - Sleep is more important than you'd imagine – it helps your brain store all the juicy information you've learned throughout the day. Drinking plenty of water and eating healthy foods will also boost your concentration throughout the day.

13. On exam day, make sure you arrive in plenty of time - Nothing adds extra pressure to exam day like the fear of being late. Just make sure you set off at a little earlier than usual. While you wait, if people around you seem stressed about the exam, try to relax and not let their worries affect you.

14. Dress as a medieval knight and demand ale - This is an old tradition, which states that anyone attending an examination in full knight's costume has the right to demand a tankard of ale. Unfortunately, you need to be carrying a sword and if you try this you'll be arrested and sent to prison.



Science Command Words

| Command word | Definition |
|--------------|--|
| Describe | Candidates should recall some facts, events or process in an accurate way - for example an experiment they have done. They may need to give an account of what something looked like, or what happened, e.g. a trend in some data. (Hint: don't confuse with 'Explain') |
| Explain | You may be asked how or why something happens. Write a detailed answer that covers how and why a thing happens. The points in the answer must be linked coherently and logically. (Hint: don't confuse with 'Describe'. Students often miss out on marks because they've given a description rather than an explanation) |
| Compare | Write about the similarities and differences between two things. |
| Evaluate | You will be given some facts, data or other information. Write about the data or facts and provide your own conclusion or opinion on them. |
| Determine | 'Determine' is a specific calculation question where students need to refer to, or use, data and information taken from a table or graph. Students often miss out on marks because they don't understand that they need to refer to the source data in their answer |
| Suggest | 'Suggest' sometimes trips students up, because these questions are set in an unfamiliar context to which students need to apply their knowledge and understanding. |
| Write down | Give a short answer, without a supporting argument. |
| Outline | Give only the key facts of the topic. You may need to set out the steps of a procedure or process make sure you write down the steps in the correct order. |
| Calculate | Work out a number. You can use your calculator to help you. You may need to use an equation. The question will say if your working must be shown. (Hint: don't confuse with 'Estimate' or 'Predict') |
| Predict | Look at some data and suggest a realistic value or outcome. You may use a calculation to help. Don't guess - look at trends in the data and use your knowledge of science. (Hint: don't confuse with 'Calculate' or 'Estimate') |
| Estimate | Suggest an approximate (rough) value, without performing a full calculation or an accurate measurement. Don't just guess - use your knowledge of science to suggest a realistic value. (Hint: don't confuse with 'Calculate' and 'Predict') |
| Show | Write down the details, steps or calculations needed to prove an answer that you have been given. |
| Justify | Give some evidence or write down an explanation to tell the examiner why you gave an answer |
| Discuss | Write about the issues related to a topic. You may need to talk about the opposing sides of a debate, and you may need to show the difference between ideas, opinions, and facts |

Revision techniques

Many students feel they are working as hard as they can. However, this booklet is hopefully going to show you, or remind you of some techniques which will help you work smarter.

Not everyone learns in the same way so choose what works for you, not a friend! Use this booklet alongside your subject notes, intervention sessions, study websites and apps.

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Read, cover, write & check

Simple, good to use with spellings, defining key words and remembering facts.

Read the knowledge
Cover up
the knowledge

Write down what is remembered in 1 colour

Check to see if it is correct, make any improvements in a different colour

Quizzing

For example:

Question: In what year was George V's coronation?

Answer: 1910

Ask a parent, carer, study partner to write you questions (or answers) and you write the answer (or possible question that would correspond to that answer).

You can also write your own questions, but if you do this leave it at

least a day until you answer them to see what you can remember after a while.

Or write 10 questions that your teacher could use as a starter activity next lesson.

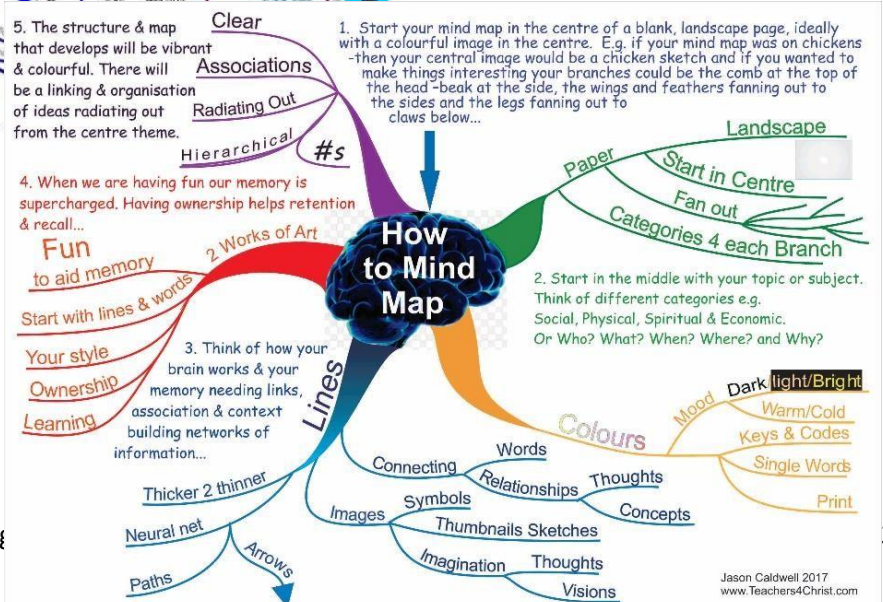
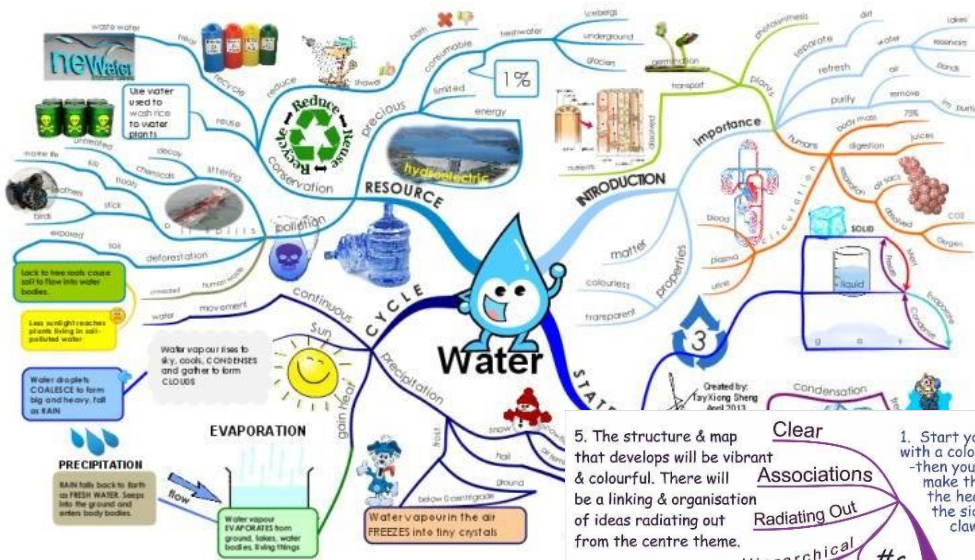
(include the answers for your teacher too!)

Mind Mapping

Mind Mapping is a process that involves a distinct combination of imagery, colour and visual-spatial arrangement. The technique maps out your thoughts using keywords that trigger associations in the brain to spark further ideas.

1. Start with the theme in the centre of the page and work outwards.
2. Then develop your main idea.
3. Each branch must relate to the branch before it.
4. Use only key words and images.
5. Key words must be written along the branches.
6. Print your keywords to make them more memorable.
7. Use highlighters and coloured markers to colour code the branches.
8. Make things stand out on the pages so they stand out in your mind.
9. Brainstorm Ideas. Be creative.
10. Design images you can relate to which will help you remember key information.

Once you have made your map, cover it and test yourself on different strands.



To

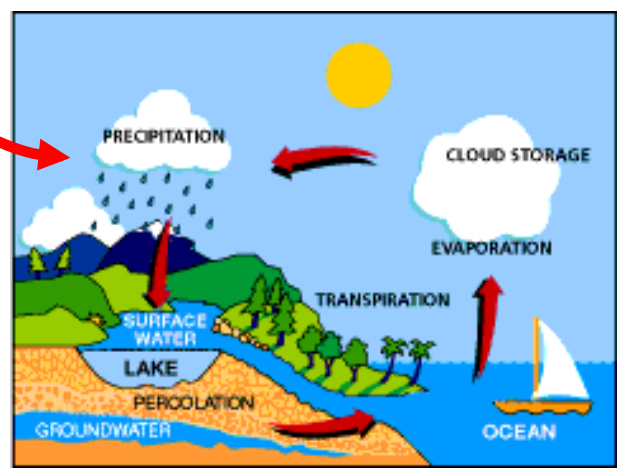
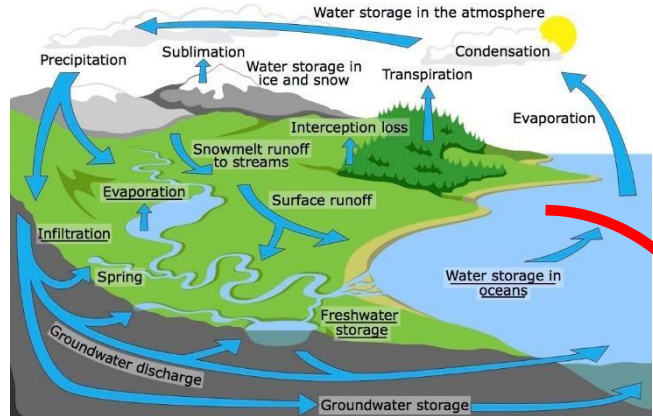
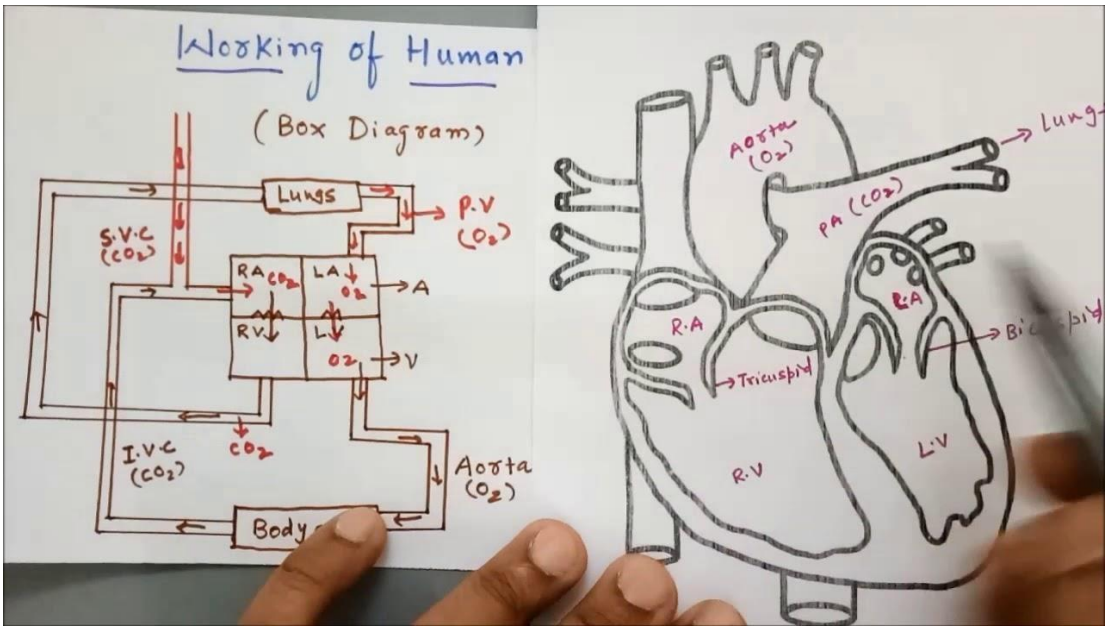
3

Diagram

Creating a visual diagram for key facts, ideas or just larger chunks of knowledge is an effective way of making knowledge 'stick' in your brain.

Key words with some small images that link to the knowledge are important for the diagrams to be effective.

Simplifying a complex diagram into something more straight-forward.

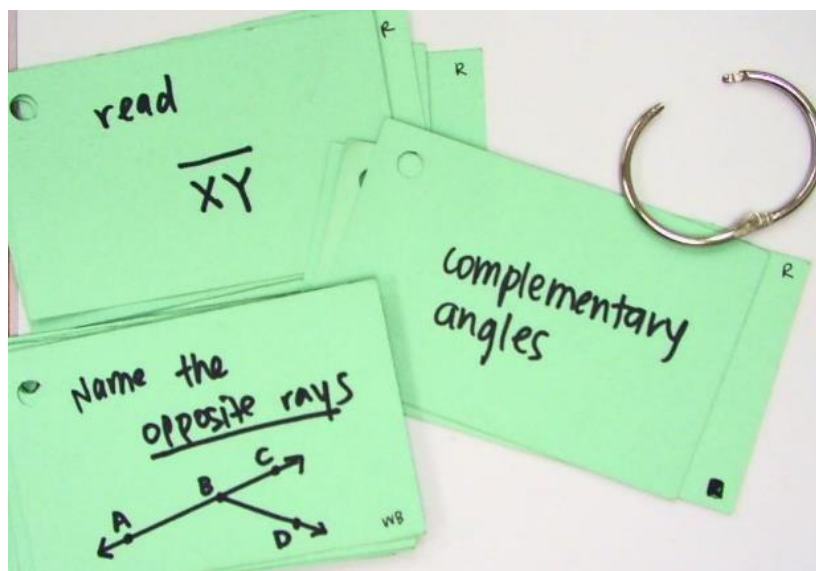
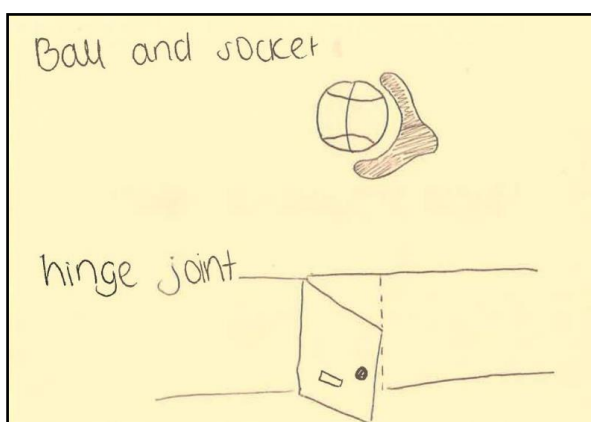
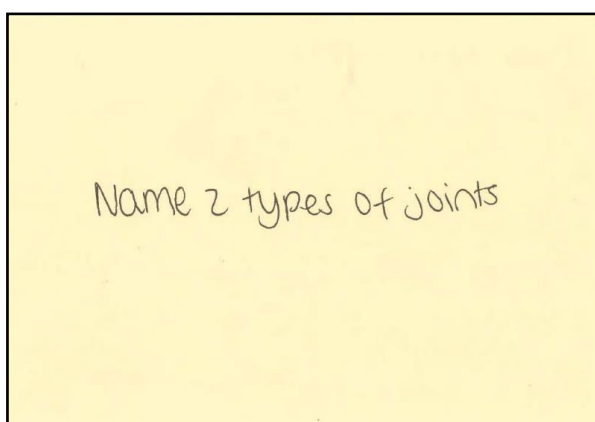


'Together, we are proud to be our best'

Flashcard

These are a very good and simple self-testing tool. They can be physical or electronic. Quizlet's cards are good as they prioritise cards you have previously got wrong.

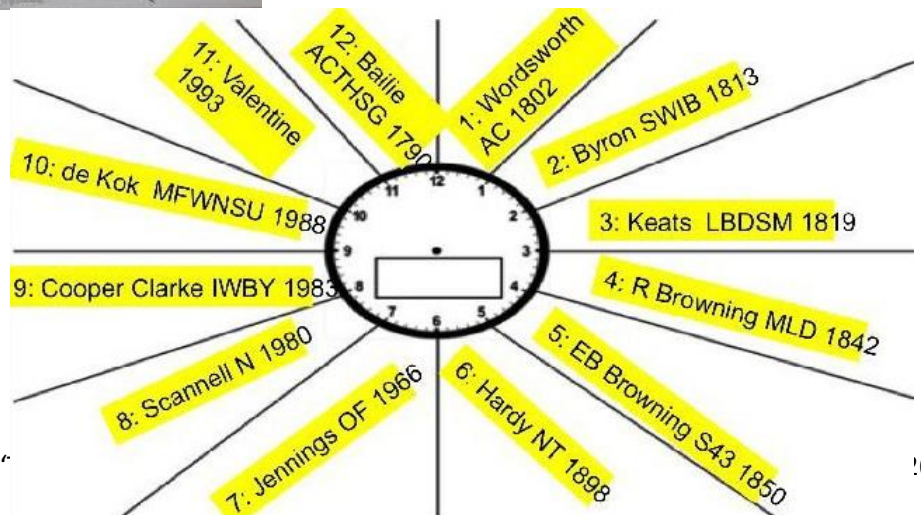
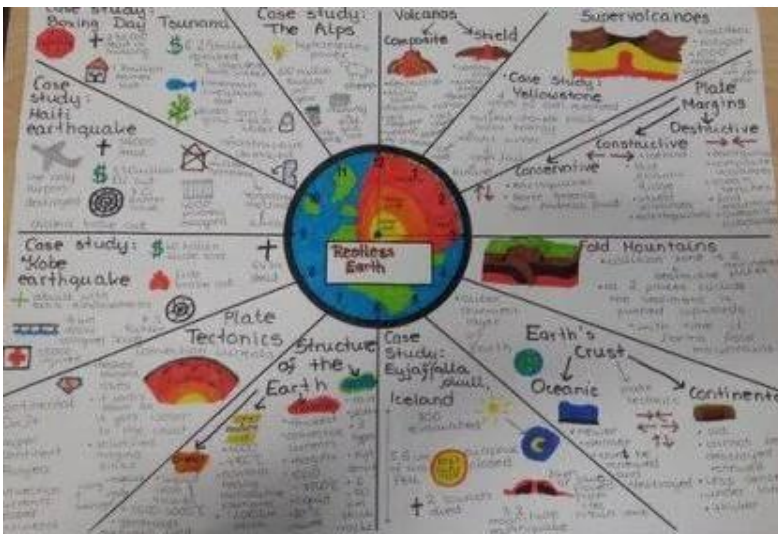
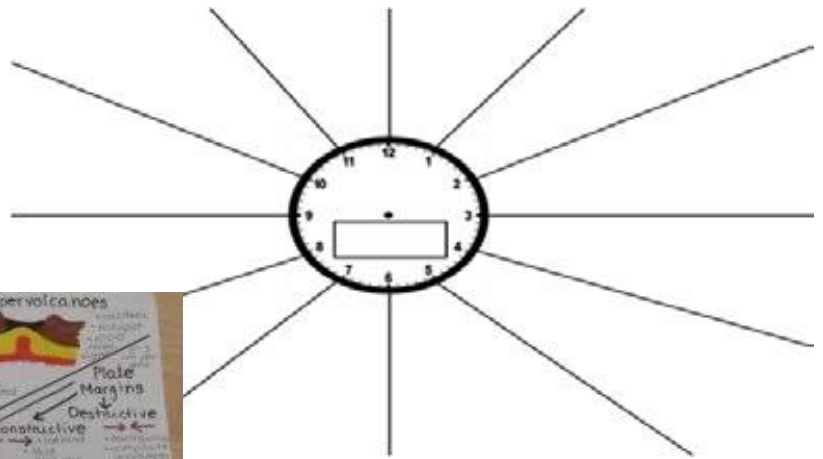
To make your own, take some card and cut into rectangles roughly 10cm x 6cm. You then write the keyword on one side and the definition on the other. Then go through your cards looking at one side and seeing if you can remember the keyword/definition on the other side. You can put your flashcards in an envelope stuck into your workbook.



Clock Learning

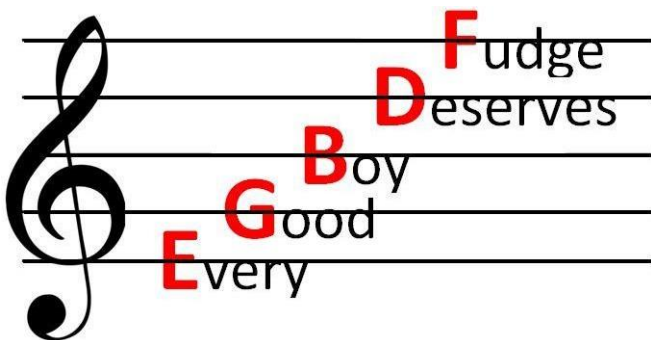
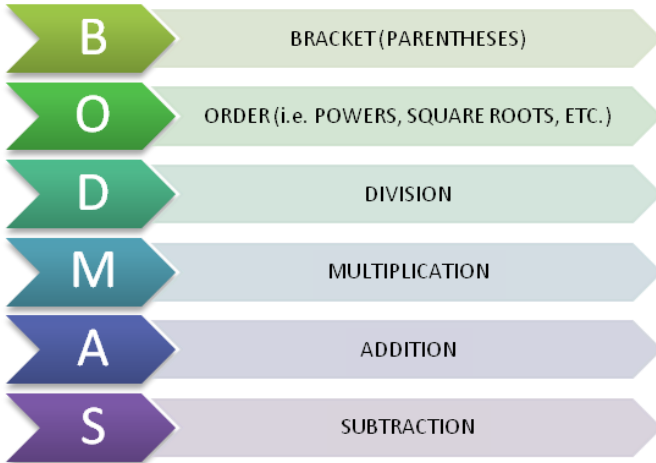
For this technique you draw a basic clock.

You can then take a subject or topic and break it down into 12 sub- categories. Make notes in each chunk of the clock. Revise each slot for 5 minutes, turn the clock over and then try to write out as much information as you can from one of the segments. Eg. All the information in the 2-3pm segment.



Keyword Mnemonics

Make up a sentence where each word starts with the same letter as the words you need to remember.



'Never Eat Shredded Wheat'

OR

'Naughty Elephants Spray Water'



Chatterbox

Making a chatterbox helps you test yourself on important topics.



Start with an A4 sheet of paper.



Fold in half to make a triangle.



Fold again to make a smaller triangle.



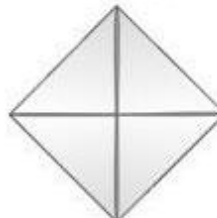
Cut off extra paper.



Unfold paper. You should have a square.



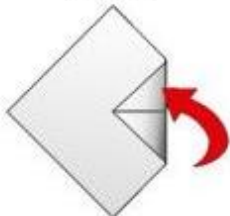
Fold all corners in to the centre.



It should look like this.



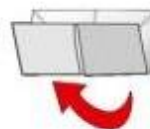
Turn your paper over.



Fold all corners in to the centre again.



It should look like this.



Crease in half both ways.



Use your fingers to pinch it together.

Add key words on the outside

Add questions and answers under the flap



Add topics on the inside

'Together, we are proud to be our best'

Image Chain

Create a cartoon-like image in your mind. Make it colourful, lively and fun. The more unusual, the more you will remember it.

Let's say you're at a party and you've been introduced to some new people and want to remember their names.

You've just met David, Jack, William, Gemma, Sophie and Hannah.

In your imagination, you need to create a link to that person and their name. The pictures you think up have to be memorable, so make them colourful, funny, lively and strange.

David → (Wearing a football shirt aka Beckham)



Jack → (Climbing up a bean stalk)



William → (Prince William wearing a crown)



Gemma → (Wearing lots of jewellery with shiny gems)



Sophie → (Is sat on the sofa singing)



Spellings

Ask a parent, carer, brother, sister or study partner to test you on some key spellings

Write a song, rap or poem

How often does a song get into your head and you end up singing it all day? Why not find some of your favourite tunes and change the words. Write a poem that tells a story or includes particular keywords

Some more ideas...

Memory challenge - Look at a labelled version of a text for 30 seconds. Then cover it up and try to draw what you have seen.

Dominoes - Create cards with a definition on one end and a keyword on the other. You then have to complete the domino train. Time yourself completing it and try beat your friend.

Jeopardy - Write lots of answers/ keywords down then challenge your partner to write the question.

Guess who - Stick Post-It notes to your foreheads and try guess the keywords by asking yes/no questions.

Text - How many text messages do you send a day or week? Make a plan with your friends to add a fact to the end of every text message you send to build up your knowledge and add to your revision efforts.

Games - Making a popular game into a study aid is fun. Even making the game makes you revise your work. Trivial pursuit, bingo, blockbusters and battleships work really well. You can learn with a group of friends and have fun doing it.

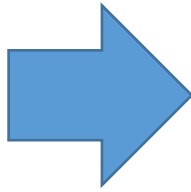
Revision timetable

How to create a revision timetable

1. List all the subjects that you need to do revision for.
2. Now rank them in order, with the first being the subject in which you need to do the most revision. Think about your target grades and current attainment to work this out. Discuss with teachers if you need to.
3. See example on next slide.

Subjects to revise for:

- Maths
- English
- Science
- Geography
- RE
- Music
- Business Studies



Rank order (most revision needed)

1. Science
2. Maths
3. Geography
4. English
5. Business Studies
6. Music
7. RE

So this student needs to make sure that they spend more time revising subjects like science, maths and geography.

Now it's time for you to think about planning your own timetable.

- Try colour-coding your subjects so that your timetable is easy to read and you can glance at it quickly and know what you're doing.
- Make sure you put sessions in that allow you to relax and unwind. Try to find time to see friends and family and do the things that you enjoy.
- Be realistic! For example: Don't plan to revise maths for 12 hours solid on a Saturday, because it won't happen and you won't benefit from it. Break the day up into manageable pieces and do spend hours trying to do the same thing – it won't help you.
- Have your revision timetable somewhere where you will see it everyday, so it acts as a reminder of what you need to do.
- Put a copy on your phone or set alarms/reminders that will help you stick to your plan.

Example Timetable

| Day | 8:30 – 10:00 | 10:00 – 11:00 | 11:00 – 12:00 | 12:00 – 1:00 | 1:00 – 2:35 | 2:35 – 4:00 <small>(Revision / Intervention)</small> | 4:00 – 5:00 | 5:00 – 6:00 | 6:00 – 7:00 | 7:00 – 8:00 | 8:00 – 9:00 | 9:00 – 10:00 |
|------------------|--------------|---------------|---------------|--------------|-------------|---|-------------|-------------|------------------|-------------|------------------|--------------|
| Monday | | | | | | English | RE | Break | Music | English | Relax | Relax |
| Tuesday | | | | | | Science | Break | Break | Maths | Geography | Relax | Relax |
| Wednesday | | | | | | Break | Geography | English | Break | Maths | Music | Relax |
| Thursday | | | | | | Maths | Science | Break | Business Studies | Relax | Relax | Relax |
| Friday | | | | | | Play football | Break | English | Break | Maths | Business Studies | Relax |
| Saturday | Science | Maths | Geography | Science | Football | Football | Football | Football | Relax | Relax | Relax | Relax |
| Sunday | Geography | Football | Football | Relax | Relax | Science | maths | Break | Geography | RE | Relax | relax |

| Day | 8:30 – 8:55 | 9:00 – 10:00 | 10:05 – 11:05 | 11:25 – 12:25 | 1:00 – 2:00 | 2:00 – 3:00 | 3:00 – 4:00 Achieve | 4:00 – 5:00 | 6:00 – 7:00 | 7:00 – 8:00 | 8:00 – 9:00 |
|-----------|-------------|--------------|---------------|---------------|-------------|-------------|------------------------|-------------|-------------|-------------|-------------|
| Monday | | | | | | | | | | | |
| Tuesday | | | | | | | | | | | |
| Wednesday | | | | | | | | | | | |
| Thursday | | | | | | | | | | | |
| Friday | | | | | | | | | | | |
| Saturday | | | | | | | | | | | |
| Sunday | | | | | | | | | | | |

***Remember: make sure you give yourself breaks and allow time to relax and do the things your want to do and enjoy doing.

*** revise little and often. 20 minute sessions followed by breaks