Science exam information and revision support

The exams AQA

We run two different courses, GCSE Combined Science Trilogy (double) and GCSE Single Sciences (triple).

The exam structure is very similar between the two courses:

Combined science	Single Science (triple)
6 x 1 hour 15 minute exams	6 x 1 hour 45 minute exams
Biology 1 Biology 2 Chemistry 1 Chemistry 2 Physics 1 Physics 2	
All 6 exams added together and 2 GCSEs awarded	The 2 exams of each subject are added together and 3 GCSEs awarded

The exam dates for 2020 are:

Exam	Date
Biology paper 1	12. May 2020
Biology paper 2	1. June 2020
Chemistry paper 1	14. May 2020
Chemistry paper 2	10. June 2020
Physics 1	20. May 2020
Physics 2	12. June 2020

What they require for the exams

- Pens
- Pencils
- Calculator
- Ruler
- Protractor
- Compass
- Rubber

Provided in the exams

- Periodic table
- An equation sheet

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The Periodic Table of Elements

1	2											3	4	5	6	7	0
		Key					1 H hydrogen 1										4 He helium 2
7 Li lithium 3	9 Be beryllium 4	relative atomic mass / atomic symbol / name / atomic (proton) number										11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
23 Na sodium 11	24 Mg magnesium 12											27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[98] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54
133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	[285] Cn copernicium 112	[286] Nh nihonium 113	[289] Fl flerovium 114	[289] Mc moscovium 115	[293] Lv livermorium 116	[294] Ts tennessine 117	[294] Og oganesson 118

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Physics Equations Sheet
GCSE Combined Science: Trilogy (8464)
GCSE Combined Science: Synergy (8465)

1	(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance	$v^2 - u^2 = 2\,a\,s$
2	elastic potential energy = 0.5 × spring constant × (extension)^2	$E_e = \frac{1}{2}\,k\,e^2$
3	change in thermal energy = mass × specific heat capacity × temperature change	$\Delta E = m\,c\,\Delta\theta$
4	$\text{period} = \frac{1}{\text{frequency}}$	
5	**force on a conductor (at right angles to a magnetic field) carrying a current = magnetic flux density × current × length**	$F = B\,I\,l$
6	thermal energy for a change of state = mass × specific latent heat	$E = m\,L$
7	potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil	$V_p\,I_p = V_s\,I_s$

The equation sheet does <u>not</u> contain all the equations they need to know!

Equations to learn

Pupils have a list of 22 equations they will be asked to recall in the exam.

Grade 5 and higher questions will require them to:

- Recall an equation
- Rearrange an equation
- Convert units
- State the units for the answer

Equation number	Word equation	Symbol equation
1	weight = mass × gravitational field strength (g)	$W = m\ g$
2	work done = force × distance (along the line of action of the force)	$W = F\ s$
3	force applied to a spring = spring constant × extension	$F = k\ e$
4	distance travelled = speed × time	$s = v\ t$
5	acceleration = $\frac{\text{change in velocity}}{\text{time taken}}$	$a = \frac{\Delta v}{t}$
6	resultant force = mass × acceleration	$F = m\ a$
7 HT	momentum = mass × velocity	$p = m\ v$
8	kinetic energy = 0.5 × mass × (speed)^2	$E_k = \frac{1}{2} m\ v^2$
9	gravitational potential energy = mass × gravitational field strength (g) × height	$E_p = m\ g\ h$

An example

There are two resources produced by the science department to help with this - they can be found in this google drive folder:

Http://tiny.cc/Sciencerevision

- Equations cards

Power =	Energy transferred ÷ time

- Equation posters - stick them around your bedroom

0 1 . 4 Write the equation that links current, potential difference, and resistance.

[1 mark]

_____

0 1 . 5 The potential difference across a piece of wire is 2.1 V

The current in the wire is 0.30 A

Calculate the resistance of the wire.

Write any equation that you use.

[3 marks]

_____

_____

_____

Resistance = _____ Ω

Required practicals

There are 21 practicals that the students should be able to describe in detail.

This includes:

- Describing a method to carry it out
- Identifying variables
- Analysing results

Once again the science department have made a resource for learning these

They can be found in the same google drive folder:

http://tiny.cc/Sciencerevision

We also have some simulation software found here:

http://tiny.cc/Sciencepracticals

Amylase activity

10.2.4 Required practical activity 4 Investigate the effect of pH on the rate of reaction of amylase enzyme

Equipment:

Water bath

Spotting tile

Boiling tubes

Amylase solution

Starch solution

5 buffers at pH 3,5,7,9,11

Syringes

Pipette

Iodine

Stop clock

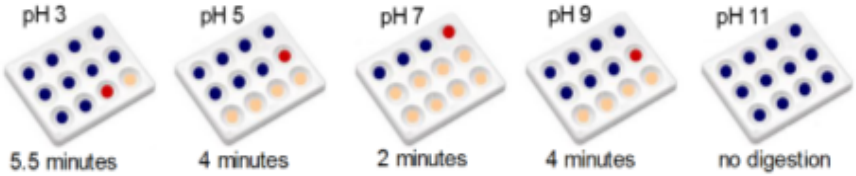
Independent variable:	The pH of the buffer
Dependent variable:	The time taken forstarch to break down
Control variables:	Temperature
	Concentration and volume of starch
	Concentration and volume of amylase

You could increase the precision of this experiment by taking samples more often than every 30 seconds

Extremes of pH cause the 3 dimensional shape of the amylase enzyme to change, this means the **substrate** (starch) doesn't fit in the **active site** properly, this reduces the rate of reaction. The enzyme may even **denature**, this means the bonds holding the active site together break, if this happens the enzyme is permanently broken.

Method:

- Place the beakers of amylase, starch and buffers into the water bath at 35 °C
- Get a spotting tile and add a drop of iodine into each well
- Using several syringes, mix 1 cm^3 of pH buff, 1 cm^3 of amylase and 5 cm^3 of starch in a boiling tube, keep the boiling tube in the water bath.
- Start a stop clock
- Remove a couple of drops from the boiling tube every 30 seconds and drop them into a well on the spotting tile
- Repeat this every 30 seconds
- Record the time when the iodine does not change colour
- Repeat this for the other pH buffers 5, 7, 11 and 13



Remember iodine tests for starch, when the iodine stops going blue-black then the amylase has broken down the starch

Maths in science

Pupils are expected to be able to carry out simple mathematical functions.

The common questions involve:

- Percentages
- Averages
- Rearranging equations
- Using significant figures
- Draw and read graphs

AQA have some resources here
http://www.aqa.org.uk/resources/science/gcse/teach/maths-skills-in-GCSE-sciences

There are pages in the revision guide that cover this topic.

Ways to revise

- Learn keywords and definitions - Look say cover write check
- Practice using EMU for equations - Set all equations out the same
- Equation: F = ma Maths: F = 15x3 Unit: F = 45 N

- Describe processes - Ask your child to describe how something works - use the revision guide yourself to guide them if they get stuck.
- Ask questions - Similar to above but interrupt and ask other relevant questions

- Practice exam papers - http://tiny.cc/Foundationpastpapers
  - http://tiny.cc/Higherpastpapers

Revision guides

We recommend CGP.

All pupils have the opportunity to buy a revision guide – letters were sent home via email on Friday 18. October. Deadline for return of the reply slip is 4. November 2019