

# Science Parental Forum

January 16, 2019

## Support so far....

 Focused revision sessions on specific topics

• Opportunity to purchase revision guides at a discounted price

 Friday drop-in session with HLTA in B2 – all Sciences







## Grades?

#### New GCSE grading structure



Ofqual

## AQA – Triple Science



## AQA-Trilogy (Double Science)



# Science Grades

- Two tiers available:
  - Foundation (1 5)
  - Higher (4 9)



#### **Combined Science (Double)**

- The qualification will be graded on a 17-point scale: 1–1 to 9–9 where 9–9 is the best grade.
- A student taking Foundation Tier assessments will be awarded a grade within the range of 1– 1 to 5–5.
- A student taking Higher Tier assessments will be awarded a grade within the range of 4–4 to 9–9.





### **TIERS OF VOCABULARY**

Beck, McKeown, and Kucan



Low-frequency words, domain-specific

#### TIER 2

High-frequency words, found in many content areas

#### TIER 1

Words of everyday speech, familiar to most students

www.communicationwindow.wordpress.com

to life: robust vocabulary

# Tier 2

Tier 3

Give Define Describe Determine Estimate Suggest Calculate Evaluate

**Balanced** Refuel Compared **Experimental** Trends Associated Limiting Yield **Batch** 

Acids lons Formula Compounds Protons **Neutrons Elections** 

Transition metal Electrode Alkaline Isotopes Endothermic Electrolysis Gas Oxidation

# Chemistry at GCSE

# Topics covered:

- C1 Atomic Structure
- C2 The Periodic Table
- C3 Structure and Bonding
- C4 Chemical Calculations
- C5 Chemical Changes
- C6 Electrolysis
- C7 Energy Changes
- C8 Rates and Equilibrium
- C9 Crude Oil and Fuels
- C10 Organic Reactions (TRIPLE only)
- C11 Polymers (TRIPLE only)
- C12 Chemical Analysis
- C13 The Earth's Atmosphere
- C14 The Earth's Resources
- C15 Using Our Resources (TRIPLE only)

# To do well in the exam students should:

- •Learn the content needed
- Ensure that they understand the content
- Ensure they have good examination technique

# An example of exam technique practice:

 Comparing and explaining the properties of diamond and graphite (both made of carbon atoms only).

•GCSEPod <u>Allotropes of carbon podcast</u>

## **Giant covalent substances**

**Carbon forms different structures** Allotropes: (allotropes) due to how carbon bonds, Different forms of the same element the properties are therefore different. Carbon Diamond Weak atoms intermolecular forces Strong covalent bond <u>Graphite</u> When the weak intermolecular forces Diamond is the hardest naturally occurring mineral (10 on the Moh break the layers can slide over each scale). Useful for cutting glass and other in making jewellery. Useful for pencils and as a lubricant.

Lots of strong covalent bonds means high melting & boiling points.

DO NOT conduct electricity.

except graphite



Any electrons carbon atoms don't want are dumped between layers.

These are free to move around between the layers.

- Graphite and diamond are different forms of the element carbon. Graphite and diamond have different properties.
- The structures of graphite and diamond are shown below.





Graphite

7 (a) Graphite is softer than diamond.

Explain why.

7 (b)	Graphite conducts electricity, but diamond does not.
-------	--

xplain why.
(3 marks)

A typical exam question about this topic – used with GCSE students.

(4 marks)

7

question	answers	extra information	mark	
7(a)	Graphite: because the layers (of carbon atoms) in graphite can move / slide	it = graphite	1	
	this is because there are only weak intermolecular forces or weak forces between layers	accept Van der Waals' forces allow no <u>covalent</u> bonds between layers	1	
	Diamond: however, in diamond, each carbon atom is (strongly / covalently) bonded to 4 others so no carbon / atoms able to	allow diamond has three dimensional / tetrahedral structure allow so no layers to slide or so	1	The exam board's mark scheme.
	move / slide	diamond is rigid		
7(b)	because graphite has delocalised electrons / sea of electrons	allow free / mobile / roaming electrons	1	
	which can carry charge / current or move through the structure		1	
	however, diamond has no delocalised electrons	accept however, diamond has all (outer) electrons used in bonding	1	

# Student 1 Answer

Exam guestion

Graphite is softer than diamond because in a diamond each carbon atom 15 Covalently bonded to 4 others in a Rorahedral struct making them very hard Stowever in graphile each carbon atom is bond to three others and has weak intermoloular fires between the layers, which need little energy to break, therefore making it soft \* (\$35 no carbon aboms cible to move Attenause the layers of carbon atoms in graphile can move Graphile conducts electricity, but diamond does not because diamond does not have delocalised electrons that are needed to conduct electricity, Graphile however conducts electricity because each certain atom has a 4m electron that is not used in bonding and combutes to delocalised claid between the layers that moves twhen a voltage is applied & moves through the structure

# Student 2 Answer

Exampluestion: Graphite is softer than diamond. Explain why.

Graphite is softer than dramond because each carbon atom is only bonded to 3 other carbon atoms. However, dramond's carbon atoms are bonded to 4 other carbon atoms, meaning that they are stronger, resulting in a harder physical state Graphite is also in layers, held together by intermolecular forces which can also be broken when force is applied of

Graphite conducts electricity but diamond daisn't. Explain why

Riamond doesn't conduct electricity because there are no delocalised electrons Graphite havener conducts electricity because each carbon atom has a 4th electron net used in bonding and this contributes to delocalised clauds that makes when voltage is applied. Decause graphite has delocal which can carry charge/current or more through the structure /Itawever, diamond has no delocalised electrons.

## Student 3 Answer

Graphile is softer than diamond. Explain why. (4 marks).

Because unlike in diamond, the carbon atoms have only 3 covariant bonds and one bond is free. It also has intermolecular forces which are easy to break whereas diamond has 4 covariant bonds which are harder to break. I Graphice can slide, diamond cannot. 2/

Graphite Conducts electricity but diamond does not. Why? (3 mane) Graphite only has 3 covalent bonds per carbon atom so there is a free electron that contributes to the delocalised cloud between layers that move when a voltage is applied. Diamond has no free electrons 2/3



# **Biology Topics**

- 1.Cell Biology
- 2.Organisation
- 3.Infection and Response4.Bioenergetics





- 5.Homeostasis and Response
- 6.Inheritance, Variation and Evolution
- 7.Ecology

# Mathematical Requirements



Maths has always been a component of Biology exams, but we are expecting this to increase significantly in the new qualification

- A minimum of 10% of marks will test maths skills in GCSE Biology;
- 20% in GCSE Chemistry;
- 30% in GCSE Physics

15% of GCSE marks will be for practical skills

# Mathematical Requirements

## What Type of Maths?

There will be a variety of question types testing maths skills, including multistep and open calculations.

Some skills will be tested more than others such as use of decimals and translation of graphs.

## How Hard Will The Maths be?

Maths skills will be tested up to KS3 standard in Foundation Tier papers and Level 1 GCSE in Higher Tier papers.

# **Example Questions - Foundation Tier**

Each arrow on Figure 9 shows the date of discovery of each new type of antibiotic.



Each arrow on Figure 9 shows the date of discovery of each new type of antibiotic.





0 6 . 2 In which 10 year period were most new types of antibiotic discovered? [1 mark] 1945-1955

Each arrow on Figure 9 shows the date of discovery of each new type of antibiotic.

Figure 9

1910 1920 1950 1960 1970 1980 1990 2000 1930 1940 2010 ..... ..... հասհայիս 1111 **Step 1: read the data off the figure** Figure 9 shows 22 new types of antibiotic. These were discovered before 2010. Number of new antibiotics between Determine the percentage of types of antibiotic that have been discovered between 1980 and 2010 = 21980 and 2010. Total number of new antibiotics = 22 Use information from Figure 9.

Give your answer to 2 significant figures.

[2 mar Step 2: Calculate percentage = $2/22 \times 100$ = 9.09%

> **Step 3: Convert to 2 significant figures** = 9.1%

# Example Questions – Higher Tier

Figure 5 shows data for people diagnosed with cancer in 1961 and 2001.





Calculate the percentage increase in the survival rate of people diagnosed with skin cancer in 1961 compared to 2001.

Give your answer to three significant figures.

Survival rate increase =

[2 marks]

%

#### 1961 – 48 people diagnosed

2001 – 89 people diagnosed

Difference between 1961 and 2001 = **41 people** 

**Step 2: Calculate percentage difference** 

 $Percentage \ difference = \frac{Difference}{Original} \times 100$ 

 $= 41/48 \times 100$ = 85.416%

**Step 3: Convert to 3 significant figures** = 85.4%

# Take home message



- As with all of the Sciences, the Biology exam will test maths skills
- Students should bring a scientific calculator to all lessons and all science exams
- During revision, as in lessons, attention should be paid to the maths skills appropriate to each topic.
- Students should not be fearful of the maths, it should be no harder than their GCSE maths exams









- Conservation and Dissipation of Energy
- Energy Transfer by Heating
- Energy Resources
- Electric Circuits
- Electricity in the Home
- Molecules and Matter
- Radioactivity
- Forces in Balance
- Forces and Motion (+ *Forces and Pressure*)
- Wave Properties
- Electromagnetic Waves (+ Light)
- Electromagnetism
- Space

All Yr11 Students have covered these topics.

These are all the equations you need to remember for Yr10	W=mg	P= <u>E</u> t	P=I <sup>2</sup> R
Q=lt	W=Fs	P= <u>W</u> t	E=Pt
V=IR	E <sub>k</sub> = ½ mv²	E=QV	Efficiency = <u>useful output energy</u> total input energy
P=VI	E <sub>p</sub> = mgh	ρ= <u>m</u> V	Efficiency = <u>useful power output</u> total power input

What do the letters stand for?	W is weight m is mass W=mg g is gravitational field strength (10N/kg)	P is power P= <u>E</u> t E is energy t is time	P is power P=I <sup>2</sup> R I is current R is resistance	
Q is charge Q=It I is current t is time	W is work done W=FS F is force s is displacement	P is power W is work done P= <u>W</u> t is time	E is energy P is power E=Pt t is time	
V is potential difference V=IR I is current R is resistance	E is energy (kinetic) $E_k = \frac{1}{2} mv^2$ m is mass v is velocity	E is energy E=QV Q is charge V is potential difference	Efficiency = <u>useful output energy</u> total input energy	
P is power P=VI I is current V is potential difference	E is energy (gravitational potential) h is height $E_p = mgh$ g is gravitational field strength (10N/kg) m is mass	$\rho$ is density m is mass $\rho = m$ V V is volume	Efficiency = <u>useful power output</u> total power input	

SI Units for each quantity	W in Newtons W=mg m in kg g in N/kg	P in Watts E in Joules $P=\underline{E}$ t in seconds	P = W P=I <sup>2</sup> R I in Amps R in Ohms	
Q in Coulombs	W in Joules or Nm	P = W W = J	E = J P = W	
Q=lt	W=Fs	P= <u>W</u>	E=Pt	
I = A t = s	F = N s in metres	<b>t</b> t = s	t = s	
I = A V=IR V in Volts R in Ω	$E = J = \frac{m = kg}{E_k} = \frac{1}{2} \frac{mv^2}{v = m/s}$	Q = C E = J $E = QVV = V$	E = J Efficiency = <u>useful output energy</u> total input energy E = J	
P = W I = A P=VI V = V	$E = J \qquad m = kg$ $E_p = mgh$ $g = N/kg \qquad h = metres$	$\rho = kg/m^3$ m = kg $\rho = \frac{m}{V}$ $V = m^3$	P = W Efficiency = <u>useful power output</u> total power input P = W	



## How many grams in a kilogram?



### How many metres in a kilometre?

Kilo is the prefix that tells us it's **1000** of something





What other prefixes are there?

mega, M giga, G tera, T centi, c milli, m micro, μ nano, n pico, p

## What do they mean?

kilo, k	1,000	x10 <sup>3</sup>
mega, M	1,000,000	x10 <sup>6</sup>
giga, G	1,000,000,000	x10 <sup>9</sup>
tera, T	1,000,000,000,000	x10 <sup>12</sup>
centi, c	0.01	x10 <sup>-2</sup>
milli, m	0.001	x10 <sup>-3</sup>
micro, μ	0.000,001	x10 <sup>-6</sup>
nano, n	0.000,000,001	<b>x10</b> -9
pico, p	0.000,000,000,001	x10 <sup>-12</sup>

Write these as numbers in SI units.

 5km
 3cm³

 60MW
 32μA

 15mm
 9mV

 20cm
 2GJ

Write these as numbers in SI units.

5km = 5000m or 5 x 10 <sup>3</sup> m	3cm <sup>3</sup>
60MW	32µA
15mm	9mV
20cm	2GJ

Write these as numbers in SI units.

 $5km = 5000m \text{ or } 5 \times 10^3 \text{ m}$   $3cm^3$ 

 $60MW = 60,000,000W \text{ or } 6 \times 10^7 \text{ W}$   $32\mu\text{A}$ 

15mm	9mV
20cm	2GJ

Write these as numbers in SI units.

 $5km = 5000m \text{ or } 5 \times 10^3 \text{ m}$   $3cm^3$ 

 $60MW = 60,000,000W \text{ or } 6 \times 10^7 \text{ W}$   $32\mu\text{A}$ 

15mm = 0.015m or 1.5 x 10<sup>-2</sup> m 9mV

20cm 2GJ

Write these as numbers in SI units.

 $5km = 5000m \text{ or } 5 \times 10^3 \text{ m}$   $3cm^3$ 

 $60MW = 60,000,000W \text{ or } 6 \times 10^7 \text{ W}$   $32\mu\text{A}$ 

15mm = 0.015m or 1.5 x 10<sup>-2</sup> m 9mV

20cm = 0.2m 2GJ

Write these as numbers in SI units.

 $5km = 5000m \text{ or } 5 \text{ x } 10^3 \text{ m}$   $3cm^3 = 0.0003 \text{ m}^3 \text{ or } 3 \text{ x } 10^{-4}\text{m}^3$ 

 $60MW = 60,000,000W \text{ or } 6 \times 10^7 W$   $32\mu A$ 

15mm = 0.015m or 1.5 x 10<sup>-2</sup> m 9mV

20cm = 0.2m

2GJ

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 $60MW = 60,000,000W \text{ or } 6 \times 10^7 \text{ W}$   $32\mu\text{A} = 0.000032\text{A} \text{ or } 3.2\times 10^{-5}\text{A}$ 

15mm = 0.015m or 1.5 x 10<sup>-2</sup> m 9mV

20cm = 0.2m

2GJ

Write these as numbers in SI units.

 $5km = 5000m \text{ or } 5 \text{ x } 10^3 \text{ m}$   $3cm^3 = 0.0003 \text{ m}^3 \text{ or } 3\text{ x} 10^{-4} \text{m}^3$ 

 $60MW = 60,000,000W \text{ or } 6 \times 10^7 \text{ W}$   $32\mu\text{A} = 0.000032\text{A} \text{ or } 3.2\times 10^{-5}\text{A}$ 

15mm = 0.015m or 1.5 x 10<sup>-2</sup> m 9mV =

 $9mV = 0.009V \text{ or } 9x10^{-3}V$ 

20cm = 0.2m

2GJ

Write these as numbers in SI units.

 $5km = 5000m \text{ or } 5 \text{ x } 10^3 \text{ m}$   $3cm^3 = 0.000003 \text{ m}^3 \text{ or } 3\text{ x } 10^{-6}\text{m}^3$ 

 $60MW = 60,000,000W \text{ or } 6 \times 10^7 \text{ W}$   $32\mu\text{A} = 0.000032\text{A} \text{ or } 3.2\times 10^{-5}\text{A}$ 

15mm = 0.015m or 1.5 x 10<sup>-2</sup> m

 $9mV = 0.009V \text{ or } 9x10^{-3}V$ 

20cm = 0.2m

2GJ = 2,000,000,000J or 2x10<sup>9</sup>J

# <u>Kerboodle</u>



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#### AQA GCSE Physics for Combined Sciences: Trilogy

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#### P 1 Conservation and dissipation of energy 1.1 Changes in energy stores

On the move

#### Learning objectives

After this topic, you should know:

- the ways in which energy can be stored
- how energy can be transferred
  the changes in energy stores that
- happen when an object falls

Resources

 the energy transfers that happen when a failing object hits the ground without bouncing back. Cars, buses, planes, and ships all use fuels as chemical energy stores. They carry their own fuel. Electric stains use energy transferred from fael in power stations. Electricity transfers energy from the power station to the train.



Figure 1. The French Train a Clande Vitesse electric train can reach speeds of more than 500 km/hour.

Energy can be stored in different ways and is transferred by heating, waves, an electric current, or when a force moves an object. Here are sume examples:

- Chemical energy storm include fuels, foods, or the chemicals found in futurelies. The energy is transferred during chemical reactions.
- Kinetic energy stores describe the energy an object has because it is moving.
- Gravitational potential energy stores are used to describe the energy stored in an object because of its position, such as an object above the ground.
- Elastic potential energy stores describe the energy stored in a springy object when you stretch or squash it.
- Thermal energy stores describe the energy a substance has because of its temperature.

Energy can be transferred from one store to another. In a torch, the torch's battery pushes a current through the bulb. This makes the torch bulb emit light, and also get hot (Figure 2).

When an electric lettle is used to boil water, the current in the lettle's bearing element transfers energy to the thermal energy store of the water and the lettle.

1

Д

#### #P1 Conservation and dissignation of energy

When an object is thrown into the air, the object slows down as it goes up. Here, energy is transferred from the ubject's kinetic energy store to its gravitational potential energy tone.

You can show the energy transfers by using a flow diagram:

chemical energy store in the bottery	-	electric current in the wires	energy transferred to the surroundings	<	light waves increase in the thermal energy store of the surroundings
---	---	-------------------------------------	--	---	---

#### Figure 2 Changes in energy stores in a terch lamp

#### Energy transfers

🕃 O 🖬 🖑 🔍 +

When an object starts to fail freely, it speeds up as it fails. The force of gravity acting on the object causes energy to be transferred from its gravitational potential energy store to its kinetic energy store.

Look at Figure 3. It shows an object that hits the floor with a stud. All of the energy in its kinetic energy store is transferred by heating to the themail energy store of the object and the floor, and by sound waves moving away from the point of impact. The amount of energy transferred by sound waves is much smaller than the amount of energy transferred by heating.



Figure 4. An energy transfer diagram for an object when it fulls and when it hits the ground



# Figure 3 An energetic drop. On impact. energy to consider the thermal energy are only in the thermal energy to consider of the thermal energy at the other thermal energy at the othermal energy at the othermal energy at the oth

sound waves

#### Key points

- Energy can be stored in a variety of different energy stores.
   Energy is transferred by heating, by
- waves, by an electric current, or by a force when it moves an object. When an object falls and gains speed, its store of gravitational potential energy decreases and its kinetic energy store increases. When a falling object hits the ground without bouncing back, its kinetic
- energy store decreases. Some or all of its energy is transferred to the surroundings – the thermal energy store of the surroundings increases, and energy is also transferred by sound waves.

4 - 5

>

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Due this week Expired (incomplete submission)	C13 Checkpoint quiz	z: The Earth's Atmosphere		3	31 Dec	
	C9 Checkpoint quiz:	Crude oil and fuels		3	31 Dec	
	P4 Progress quiz: El	lectric circuits 1 – practice		2	26 Dec	
	P4 Progress quiz: El	lectric circuits 2 – practice		2	26 Dec	
	P4 Homework: Elect	tric circuits 2		1	19 Dec	
	P4 Progress quiz: El	lectric circuits 1 – test		1	19 Dec	
	P4 Progress quiz: El	lectric circuits 2 – test		1	19 Dec	
	P4 Checkpoint quiz:	Electric circuits		1	18 Dec	
	P7 Homework: Radio	oactivity		To	morrow	
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# This one is BLUE which means it's a new question to move you through the material!



As you start to answer questions, you'll notice that the question cards start to change colour...

past.







X

### A GREEN question is one that you have previously answered correctly.

fatty tissue

bony tissue

X

(LAST ANSWERED ZO MINUTES AGO)

Biology [AQA] / 02: Organisation / 2.2: The Heart & Blood Vessels

Blood flows from the heart to the organs through ---(1)--- and returns through ---(2)---.



4 OF 8

PURPLE questions are ones you haven't seen for a while. You have answered them correctly in the past so we're just making sure you still know it!

X

RED questions are the ones that you have not yet answered correctly. Biology [AQA] / 02: Organisation / 3.2: Plant Organ System

### In PLANTS, TRANSPIRATION is associated with the XYLEM, whilst TRANSLOCATION is associated with the...

X

phloem	leaves
waxy cuticles	stomata
	You've not had this right yet Take your time and choose carefully!



This bar shows how you whether you answered this question correctly or not.

# With this graph, teachers can see exactly which where you are doing well and where you are struggling.



Burford School 11 Set 6	1.7	9.7	18/10/2017	1265	847
Burford School 11 Set 1	1.3	7.1	18/10/2017	579	458
Burford School 11 Set 5	1.3	6	17/10/2017	508	370
Burford School 11 Set 1	0.7	4.5	17/10/2017	137	111
Burford School 11 Set 2	0.9	4.3	17/10/2017	258	204
Burford School 11 Triple	0.2	4	14/10/2017	317	254
Burford School 11 Triple	1.2	3.8	18/10/2017	277	208
Burford School 11 Set 1	0.5	3.8	18/10/2017	133	100
Burford School 11 Set 2	1.1	3.8	18/10/2017	282	220

• As of Monday, January 14 2019, Tassomai is now a formal homework.

 All students should be achieving a minimum of 5/7 of the weekly targets. This will move to 7/7 in a few weeks time.

### WEEKLY PARENT REPORTS

#### WHAT ARE PARENT REPORTS?

Parent reports are weekly emails that are sent to parents or carers informing them of their child's performance on Tassomai. These updates are a great way to engage parents with Tassomai and allow them to help encourage their child to complete their Daily Goals. We've found that engaging parents is the biggest change that can be made to raise attainment.

#### GET SET UP WITH PARENT REPORTS:

 Email admin@tassomai.com to request to be set up with parent reports
 We will send across a spreadsheet of your students names for you to populate with their parents'email address\*
 Once you have completed the spreadsheet and sent it back to us we will begin sending out the reports to parents the following week.

\*To ensure both your school and Tassomai remain GDPR compliant, please refer to our privacy policy tassomai.com/privacy and terms tassomai.com/terms

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