

GCSE Science Hub: Schools network meeting

Autumn 2019





This meeting will be recorded

Exam boards have an Ofqual requirement to record event audio.

Recordings are kept for the lifetime of the specification and are not shared as an accompaniment to session resources.

The recording will begin now.

Agenda

- Provisional results for GCE and GCSE: National data
- Insight into summer GCSE papers
- Assessing equations at different levels of demand
- Using the Paper 1s as mocks
- Updates
- Focus for spring hubs

Provisional national GCE results summer 2019

	Entries	Grade E	Grade C	Grade A
AS Biology	16 499 (21 850)	84.7 (83.6)	54.9 (50.4)	19.4 (17.2)
A-level Biology	69 196 (63 819)	96.1 (96.6)	67.3 (69.8)	24.1 (25.9)
AS Chemistry	13 886 (18 084)	85.1 (83.7)	58.1 (53.9)	23.3 (20.1)
A-level Chemistry	59 090 (54 134)	96.1 (96.6)	72.2 (74.3)	29.1 (31.1)
AS Physics	9892 (13 007)	83.9 (83.7)	57.0 (53.4)	23.8 (22.1)
A-level Physics	38 958 (37 806)	95.3 (95.8)	70.5 (70.1)	27.9 (29.6)

jcq.org.uk/examination-results/a-levels/2019

GCE Sciences: National headline information

- Science entries now count for 20.9% of all A-levels.
- Female entries for science have overtaken male entries.
- Increase in female entries for Chemistry and Physics larger than increase in male entries.
- A*-A outcomes have fallen across all sciences.
- Reductions in A*-A outcomes greater for males.

jcq.org.uk/examination-results/a-levels/2019

GCE Sciences: AQA practical endorsements

- **Cycle 2** (2018/2019) initial centre visits: 1378.
- Centres passing endorsement first time: 1223.
- Updated report on Cycle 2 available on e-AQA (Secure Key Materials).
- **Cycle 3** [timeline](#).
- Refreshed endorsement [training](#).
- Contact us if you have switched from another board so we can arrange a visit.

Provisional GCSE results summer 2019

GCSE	Total entries	Grade 1	Grade 4	Grade 7
Combined Science	778 626 (740 916)	97.9 (98.2)	55.5 (54.8)	7.5 (7.4)
Biology	165 318 (164 408)	99.3 (99.1)	89.6 (89.2)	42.3 (41.4)
Chemistry	159 082 (157 664)	99.4 (99.3)	90.0 (89.7)	43.9 (43.1)
Physics	157 819 (155 994)	99.4 (99.3)	90.8 (90.6)	43.8 (42.5)

icq.org.uk/examination-results/gcses/2019

*Combined Science numbers are double-counted

GCSE Sciences: National headline information

- At Grade 7, girls improved slightly more than boys in Physics (+2.1% vs +0.4%) and in Chemistry (+1.1% vs +0.5%).
- In Biology, boys improved more at Grade 7 than girls (+1.1% vs +0.6%).

jcq.org.uk/examination-results/gcses/2019

GCSE Sciences: Question paper delivery

- No security breaches this summer.
- No question paper errors.
- Allowances made last year to prevent large proportions of Higher Tier students from failing are no longer in place.
 - The Higher Tier allowed Grade 3 (separate sciences) and Grade 4-3 (combined sciences) were set as intended this summer.
 - No Grade 3-3 on Higher Tier Combined Science.

AQA GCSE entry patterns 2019

GCSE	Total entries	Foundation (%)	Higher (%)
Combined Trilogy	303 207 (285 671)	63 (58)	37 (42)
Combined Synergy	6138 (5898)	79 (73)	21 (27)
Biology	130 938 (130 020)	15 (13)	85 (87)
Chemistry	126 276 (124 785)	15 (11)	85 (89)
Physics	125 656 (123 820)	15 (12)	85 (88)

GCSE Sciences: Grade boundaries 2019

- Grade boundaries set to maintain standards.
- Grade boundaries vary from one year to the next.
- Separate sciences:
 - Biology: Boundaries increased on both tiers
 - Chemistry: Higher Tier boundaries decreased slightly
 - Physics: Boundaries increased at top of Higher Tier.
- Combined sciences:
 - Trilogy: All boundaries lower than 2018
 - Synergy: Decreased at top Higher Tier.
- Notional grade boundaries all quite similar.

Grade boundaries

How we set grade boundaries:

- [Overview](#)
- [Separate sciences](#)
- [Combined Science](#)

AQA Insight Reports

- Highlight key points for each paper.
- Headlines only.
- Common areas of weakness across all subjects:
 - applying practical skills
 - applying maths skills
 - extended response
 - vague and unscientific language
 - gaps in knowledge.
- More detail in Feedback meetings.
- Use ERA to analyse student performance.

Applying maths skills

- Unit conversions.
- Percentage calculations (particularly at lower demand).
- Constructing graphs:
 - bar charts vs line graphs
 - lines of best fit.
- Interpreting and explaining patterns on graphs.
- We will be exploring aspects of maths skills in the Spring 2020 Hubs.

Extended response

- Students generally performing poorly in extended response questions eg Trilogy Biology 1F Q6.5/1H Q1.5 (example 1)
- Explore further examples back in school.

Applying practical skills

- Identifying variables (Examples 2 and 3):
 - confusion dependent/independent
 - what a control variable is.
- Types of error (Example 4).
- Setting up and using equipment correctly (Example 5).
- Understanding the purpose of method steps (Example 6).
- Applying the science behind the required practical (Examples 7, 8, 9).

Assessing equations at different demand levels

- Recall
- Application
- Recall and application
- Use of Physics Equations Sheet

Assessing equations at Low demand (1)

- To address AO1 students may be asked to recall an equation (eg by multiple choice, link boxes). Likely to only be worth 1 mark.
- Example: **Trilogy Physics 1F Q1.6.**

0	1
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.

6

 Which other equation can be used to calculate the power dissipated by a resistor? [1 mark]

Tick (✓) **one** box.

Power = (current)² × resistance

☐

Power = $\frac{\text{current}}{(\text{resistance})^2}$

☐

Power = current × (resistance)²

☐

Assessing equations at Low demand (2)

- To address AO2 students will be given the equation. Simple equations with substitution of two numbers, no transformations.
- Example: **Trilogy Physics 1F Q1.8.**

0 1 . 8

There was a current of 0.020 A in the resistor for 180 seconds.

Calculate the charge flow through the resistor.

Use the equation:

charge flow = current $\times$ time

[2 marks]

$$\begin{array}{r} 0.020 \times 180 \\ = 3.6 \\ \hline \end{array}$$

Charge flow = 3.6 C

Assessing equations at Standard demand (1)

- To access AO1, students will be given the prompt 'Write down the equation that links...'. Terms will be given in alphabetical order. Example: **Trilogy Physics 1F Q6.5.**

0 6 . 5 Write the equation which links current, potential difference and resistance. [1 mark]
Current x potential difference x resistance.

0 1 . 5 Write the equation which links current, potential difference and resistance. [1 mark]
~~current~~ current = potential difference x resistance

0 1 . 5 Write the equation which links current, potential difference and resistance. [1 mark]
potential difference = current² x resistance

- What strategies might you use with your students to help in recall?

Assessing equations at Standard demand (2)

- Calculations will involve something 'extra' (eg simple transformation or unit conversion).
- Example: **Synergy 3F Q8.6/3H Q2.6.**

0 8 . 6 The mass of the paper clip is 0.0012 kg

Calculate the acceleration of the paper clip when the resultant force on it is 0.000168 N

Give the unit.

[4 marks]

Resultant force = mass $\times$ acceleration

Resultant force $\div$ mass = acceleration.

$$\frac{0.000168}{0.0012} = 0.14$$

Acceleration = 0.14 Unit m/s^2

Assessing equations at High demand

- No prompt given about which equation to use.
- There are no marks simply for writing the equation down without doing something with it (so no AO1).
- Questions will involve transformations or 'something extra'.
- At highest demand (target grades 8–9) questions will include complex equations, transformations and multiple steps.

Student responses to HD questions (1)

Example: Trilogy Physics 2H Q4.3

0 4 . 3 The length of the wire in the magnetic field is 0.050 m

The force on the wire is 0.072 N

magnetic flux density = 360 mT

Calculate the current in the wire.

Use the Physics Equations Sheet.

[4 marks]

$$F = B i L$$

$$0.072 \text{ N} = 0.36 \text{ T} \times i \times 0.05 \text{ m}$$

$$\begin{aligned} 0.36 \times 0.05 \\ = 0.018 \end{aligned}$$

$$\frac{0.072}{0.018} = 4$$

$$\begin{aligned} 0.36 \text{ T} \times 4 \times 0.05 \text{ m} \\ = 0.072 \text{ N} \end{aligned}$$

Current =

4

A

Student responses to HD questions (2)

Example: Trilogy Physics 1H Q5.5

0 5 . 5 The power of the kettle was 2.6 kW 2600 W

The kettle took 120 seconds to heat 0.80 kg of water from 18 °C to 100 °C

Calculate the specific heat capacity of water using this information.

Give your answer to 2 significant figures.

[6 marks]

2.6 kW = 2600 W

power = $\frac{\text{energy transferred}}{\text{time}}$ energy = power $\times$ time

energy = 2600 $\times$ 120

energy = 312,000

specific heat capacity = $\frac{\text{thermal energy}}{\text{mass} \times \text{temperature change}}$

= $\frac{312,000}{(0.8 \times 82)} = 4756$

Specific heat capacity = 4756 J/kg °C

Teachit resource on equations

Physics equations

11 resources

Order by: Most recent ▼

Which equation?

A set of equation cards to help students select the correct ... [read more](#)

♥ (2) 💬 (1) 🔍

KS4 | Physics

DOC PDF

Physics units match up

Use as a quick revision activity of common units used. ... [read more](#)

♥ (0) 🔍

KS4 | Physics

DOC PDF

Units word game

A quick spot check of students knowledge of the different units ... [read more](#)

♥ (0) 🔍

KS4 | Physics

Equation flashcards

This resource is a series of equations required for GCSE physics. ... [read more](#)

♥ (0) 🔍

KS4 | Physics

DOC PDF

Physics equations – units summary

GCSE Physics scientific units summary table covering all values ... [read more](#)

♥ (2) 🔍

KS4 | Physics

DOC PDF

Physics equations sheet

This can be used in a variety of ways for the 9–1 GCSE, in preparation ... [read more](#)

♥ (6) 💬 (3) 🔍

KS4 | Physics

Physics formulae and calculations

This is as a handy reference resource to have available for students ... [read more](#)

♥ (2) 🔍

KS4 | Physics

DOC PDF

Physics equations flashcards

Use as a reference resource for students or to check students ... [read more](#)

♥ (4) 💬 (4) 🔍

KS4 | Physics

DOC PDF

Maths skills in Science - physics equations

A useful set of cards to reinforce students recall of equations. ... [read more](#)

♥ (2) 💬 (4) 🔍

KS3 KS4 KS5 | Physics

Feedback meetings autumn 2019

- From 28 October to 15 November.
- Events for separate sciences (four each), Combined Science: Trilogy (eight sessions), Combined Science: Synergy (two sessions).
- Cover question types with student exemplars and examiner's commentaries.
- All online (two hours), cost £110.
- No face-to-face feedback meetings this year.
- To [book](#) click here.

Updates

- Updates to GCSE specifications on website:
 - minor corrections and clarifications
 - copy of amendments list given in booklet.
- Assessment resources on Exampro:
 - 2018 papers now in question bank
 - 2019 Extended response question highlights
 - MERiT analysis for 2019 mocks
 - KS3-4 transition tests.
- A-level Environmental Science Practical Handbook.
- GCSE Science modular training materials

Paper 1 Mocks 2019

- Using key questions for mock analysis to drive focused intervention.
- Identify skills:
 - Working scientifically
 - Maths
 - Required practicals
 - Graphs
 - Formulas.

Analysis 2019 Paper 1 Foundation

Mock analysis Combined Trilogy

B1F		C1F		P1F	
2.2	Surface area: volume ratio	2.1	Electrolysis RP	1.4	Repeatability
3.5	RP using a microscope	2.2		1.5	Formula calculate
3.6		2.3		1.6	Formula recall
3.7		2.4		1.8	Formula calculate
4.3	Magnification calculation	2.5	Calculating gradient of a line	2.1	Control variables
4.4	Independent variables	4.2	Chemical calculations	2.3	Anomalous results
		5.3	Use of sig figs	2.2	Types of errors
		6.2	Control variables	2.5	Formula calculate
		6.3	Independent variable	2.7	Formula calculate & sig fig
		6.5	Chemical calculations concentration	4.2	Line graph
		7.5	Chemical calculations %by mass	4.6	Quality of evidence
				5.3	Formula calculate
				5.5	Formula recall (SD)
				5.6	Formula calculate
				6.5	Formula recall (SD)
				6.6	Formula calculate
				7.2	Formula apply (Equations sheet)
				7.4	Extended response - explain

Key to colours used in grid

Green: questions assessing Working scientifically

Purple: questions assessing maths skills

Red: questions assessing practical skills

Blue: questions assessing graphing skills

Yellow: questions assessing recall and application of equations

Analysis 2019 Paper 1 Higher

B1H		C1H		P1H	
3.4	Draw line graph	1.2	Control variables	1.5	Formula recall (SD)
4.6	SA:vol ratio applied	1.3	Independent variable	1.6	Formula calculate
5.1	Magnification calculation	1.5	Chemical calculations concentration	2.2	Formula apply (Equations sheet)
5.2	RP using a microscope	2.5	Chemical calculations %by mass	3.2	Formula unit conversion
		4.6	Multiplying using standard form	5.2	Control variables
		5.1	Electrolysis RP	5.5	Formula recall, apply, sig figs (HD)
		5.2			
		5.3			
		5.4			
		5.5	Gradient of a line		
		5.6			
		5.7	Gradient of a line		

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Green: questions assessing Working scientifically

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Areas of development

- What is the focus for this term with the run-up to mocks?
- How are you going to analyse your mock?
- 32 marks between a 4-3 and a 4-4 on the Higher Tier.
- EAL support for extended response – how can students tackle these questions (seven extended response questions across the papers)?
- Low demand formulas – plugging in numbers:
 - 10 marks Paper 1
 - 4 marks Paper 2.

Focus for spring 2020 meetings

- Focus on maths. Some problem areas and where teachers could reinforce teaching of these particular points:
 - significant figures versus decimal places
 - use of standard form
 - percentages
 - plotting graphs.
- Examine where in a scheme of work could reinforce the skills to tackle these areas.

Resources

The electronic materials from this event will be made available to you in the customer portal of our online booking system.

Once we receive notification that you have attended the course, you will be sent a certificate of attendance by email. When you receive your certificate, please log in to your account and the materials will be available on the my resources tab from the welcome screen.

How did we do?

Please take a moment to complete a brief evaluation form for today's event. Your feedback is very important to us as it helps us improve and plan future training.

You should have been emailed the evaluation form. Please check your inbox (possibly your junk mail folder). If you haven't received it please give your trainer your name, centre name/number and email address so that we can look into it for you.

Thank you.

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