Exam escape

This resource is part of the Escape the classroom series from *Education in Chemistry,* which offers a range of chemistry-related puzzles, find the full set at: **rsc.li/3UcqUpr**. Also available for this activity: student sheet with clue cards and PowerPoint presentation.

Materials

You will need (per group):

- One set of the multiple-choice sections of the 2017, 2018, 2019, 2022 and 2023 SQA Higher chemistry past papers (either paper copies or on digital devices).

Teaching outside Scotland? You can adapt this activity to use your own exam papers – use the same clues and update the answer grid ahead of the lesson.

- One digital device (depending on which option is chosen above).
- One set of downloadable clues printed and cut up (see student sheet). You can laminate these for repeated use.
- At least one chemistry data booklet.
- One set of printed student instructions or display the instructions using the 'Escape the exam room' presentation.

Plus:

- One set of downloadable teacher notes with answers (for you).

Instructions

1. Ask each group to log onto a device and open up the multiple-choice sections of the following SQA Higher Chemistry Past Papers (or provide paper copies): 2017, 2018, 2019, 2022, 2023.
2. Give them clue number 1, which reads 'How many pieces of fruit and veg are recommended per day? (2019 paper)'. The answer, 5, corresponds to question 5 of the multiple-choice section of the 2019 Higher Paper, which learners then have to answer.
3. Once a group brings you the correct answer for both the clue (5) and past paper (B), give them clue 2.
4. Continue the above until one group solves all 16 clues and all 16 past paper questions. They are the winners!

Answers

Clue number	Numerical answer	Past paper year	Past paper answer	Key area assessed	Skill assessed	Common misconceptions/mistakes
1	5	2019	B	Alcohols	Identifying a tertiary alcohol.	
2	12	2022	B	Soaps/detergents	Identifying a step in the cleansing action of detergents.	Mixing up the identification/definition of hydrophobic and hydrophilic sections of the molecule.
3	4	2018	C	Periodicity	Calculating the value of ionisation energy associated with $Al^{+} \rightarrow Al^{3+}$	Incorrect number of values used from the table provided – learners incorrectly use all three values rather than two.
4	19	2022	A	Getting the most from reactants	Calculation of total gas volume (molar volume).	Learners do not notice that water is in the gaseous state so do not include it in the answer total – a good time to point out that learners should always check for any leftover reactant gases.
5	7	2018	A	Systematic carbon chemistry	Naming carboxylic acids.	Incorrectly mistake the end carbon as a CH_3 branch.
6	9	2023	C	Structure and bonding	Identifying structures never found in compounds.	
7	19	2018	B	Oxidising and reducing agents (REDOX)	Writing/balancing ionic equations.	Incorrect balancing of charges so electrons often appear on the incorrect side of the equation.

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8	8	2019	B	Oxidation of food	Identifying the original reactant in the oxidation of carbon compound.	Learners automatically assume a ketone (no reaction with Fehling's solution) without reading the full question and do not consider the first step of oxidation.
9	11	2023	C	Proteins	Identifying the bonds broken in a condensation reaction forming a peptide link.	Learners incorrectly identify that two carboxyl groups join together on the omission of water instead of amide/carboxyl.
10	25	2019	D	Problem solving	Identifying the bonds broken/formed in unknown carbon chemistry to identify the starting material.	
11	4	2023	A	Controlling the rate	Calculating the activation energy of a reverse reaction.	Incorrect use of 'enthalpy change' formula instead of E_A, leading to an incorrect answer.
12	16	2022	C	Chemical analysis	Correct method of filling and using a burette.	Misconception of rinsing the glassware with deionised water instead of the substance being used to fill the burette.
13	10	2019	D	Fragrances	Identifying molecules derived from terpenes.	

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14	7	2023	B	Chemical energy	Enthalpy of combustion – scaling down from one mole.	Learners start with the number in question and incorrectly scale up to the gram formula mass, not realising the value for one mole is already given.
15	9	2017	A	Skincare	Identifying the steps in free radical chain reactions.	
16	20	2022	C	Equilibrium	Identifying the effect of neutralisation on equilibrium.	Learners do not recognise that although OH^- ions are not present in the original reaction, when NaOH is added the OH^- ions in the alkali will react with the H^+ ions that are present; although they may guess the correct answer by a process of elimination. Ask learners to explain their final answer to check for full understanding