

# CONTENTS

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FOREWORD .....	1
COMBINED SCIENCE .....	2
GCE Ordinary Level .....	2
Paper 5129/01 Multiple Choice .....	2
Paper 5129/02 Theory.....	5

## FOREWORD

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This booklet contains reports written by Examiners on the work of candidates in certain papers. **Its contents are primarily for the information of the subject teachers concerned.**

# COMBINED SCIENCE

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## GCE Ordinary Level

Paper 5129/01  
Multiple Choice

<i>Question Number</i>	<i>Key</i>	<i>Question Number</i>	<i>Key</i>
1	<b>C</b>	21	<b>D</b>
2	<b>C</b>	22	<b>B</b>
3	<b>D</b>	23	<b>A</b>
4	<b>C</b>	24	<b>B</b>
5	<b>B</b>	25	<b>C</b>
6	<b>A</b>	26	<b>D</b>
7	<b>D</b>	27	<b>C</b>
8	<b>B</b>	28	<b>A</b>
9	<b>D</b>	29	<b>B</b>
10	<b>B</b>	30	<b>C</b>
11	<b>D</b>	31	<b>B</b>
12	<b>C</b>	32	<b>D</b>
13	<b>B</b>	33	<b>D</b>
14	<b>C</b>	34	<b>D</b>
15	<b>A</b>	35	<b>B</b>
16	<b>C</b>	36	<b>B</b>
17	<b>C</b>	37	<b>D</b>
18	<b>D</b>	38	<b>C</b>
19	<b>D</b>	39	<b>A</b>
20	<b>B</b>	40	<b>B</b>

### General comments

Physics - No question proved to be very easy, although **Questions 4** and **11** posed no problem to the majority of candidates; the most difficult question was **Question 12**. The mean, was 17.34 with a standard deviation of 4.67. This year individual marks covered the complete 0-40 range!

### Comments on specific questions

#### **Question 1**

Half the candidates, including some of the more able, appear not to have read the question carefully enough and chose option **D**. The majority of the remaining half correctly chose option **C**.

#### **Question 2**

The nature of the beam balance was not well known with uncertainty being shown even among the more able candidates for which option **D** proved to be a positive distractor.

**Question 3**

Good discrimination although option **A** attracted some of the better candidates.

**Questions 4 and 11**

These were well known by the majority of candidates.

**Question 5**

Good discrimination with the less able candidates divided equally between options **A** and **D**.

**Question 6**

The qualitative difference in the thermal expansion of solids, liquids and gases does not normally prove difficult. On this occasion, however, there was uncertainty, even among the more able, with only a quarter of candidates correctly choosing option **A**, an almost equal number option **C** and many more option **B**!

**Question 7**

The majority of candidates were almost equally divided between the incorrect option **C** and the correct one, option **D**. Options **A** and **B** appeared to attract small numbers of the better candidates.

**Question 8**

The magnetic properties of iron and steel and their use in magnets is still a source of confusion, particularly among the less able, with only 55% of candidates correctly choosing option **B**; the remainder were equally divided among the three incorrect ones.

**Question 9**

An example of calculation 'lottery' - to multiply or divide the two numbers? In total, more candidates opted for either **A** or **B** as the answer, of which **A** was the most popular, than did the correct option, **D**.

**Question 10**

It is pleasing to note that the majority of the candidates know how to position an ammeter and voltmeter but their identification of the lamp was not as good with 30% of candidates, including some of the more able, choosing option **A**.

**Question 12**

This demonstrated widespread uncertainty and guessing among all candidates with each option attracting an almost equal number of responses.

**Question 13**

Well known by the majority of the candidates.

**Question 14**

The majority of candidates knew that the molecules in a gas are not arranged in a regular pattern.

**Question 15**

A majority of the candidates thought that a measuring cylinder is capable of measuring a volume to a two decimal place accuracy and chose option **B**. A burette is the only piece of apparatus capable of this sort of accuracy.

**Question 16**

A large number of candidates were unaware that the nucleon number of an atom is the total number of particles in the nucleus and is the same as the mass number of the atom.

**Question 17**

Many candidates recognised that nitrogen has five electrons in the outer shell but did not know that in a nitrogen molecule electrons are shared so that each nitrogen atom has a full outer shell of electrons. Most candidates chose the option with a single covalent bond, option **B**, rather than the option with a triple covalent bond, option **C**.

**Question 18**

An easy question for the majority of candidates.

**Question 19**

There was evidence of widespread guesswork in this question. Only the better candidates knew that the metallic oxides, sodium oxide and magnesium oxide, are basic and non-metallic oxides, sulphur dioxide and carbon dioxide, are acidic whilst aluminium oxide is amphoteric.

**Question 20**

Once again there was evidence of guesswork particularly amongst the weaker candidates. Many candidates did not recognise that an element with seven electrons in the outer shell is in Group 7, the halogens, of the periodic table and therefore forms a covalent compound with hydrogen, *negative* ions and *ionic* compounds with Group 1 elements.

**Question 21**

Many candidates had difficulty interpreting the information to obtain the reactivity series. Candidates should know that a more reactive metal will displace a less reactive metal from an aqueous solution of its salt.

**Question 22**

Over 50% of the candidates thought that calcium produces calcium oxide when it reacts with cold water and chose option **A**.

**Question 23**

There was evidence of guesswork amongst even the better candidates. A significant number of candidates chose option **C**, which shows that  $80\text{cm}^3$  of the air reacted with the phosphorus. The gas remaining in the tube is nitrogen and therefore the final volume is  $80\text{cm}^3$  because it is the oxygen that reacts with the phosphorus.

**Question 24**

This proved to be an easy question for the majority of the candidates.

**Question 25**

A large number of candidates recognised that a balanced fertiliser contains similar percentages by mass of the three elements nitrogen, potassium and phosphorus.

**Question 26**

Another easy question for many of the candidates.

**Question 27**

The majority of the candidates chose option **A**, where only one atom of bromine is added to the propene. Bromine is a diatomic molecule and the two atoms add across the double bond with one bromine being added to each carbon atom in the double bond.

**Question 28**

While the better candidates knew this, about half of all candidates nevertheless believed that it is the cell wall, rather than the membrane, that controls what enters or leaves the cell.

**Question 29**

A significant number of candidates had this exactly the wrong way round - not realising that a “weak” solution has a high concentration of water.

**Questions 30 and 31**

Many candidates were apparently guessing at the answers here.

**Question 32**

A large proportion of candidates, knowing that oxygen diffuses out of leaves, chose **B**. More careful inspection of the diagram would have shown them that water is moving out of the xylem cells and into the palisade layer.

**Question 33**

Many candidates were guessing between the artery and the vein. Slightly more guessed wrong than guessed right.

**Question 34**

This was an easy question.

**Question 35**

Again, there was evidence of guessing here. Candidates needed to recognise this as a question about the pupil reflex.

**Question 36**

This question was fairly easy, but the wording deceived some candidates. Of course, a decrease in reaction time means that the reactions are faster.

**Question 37**

It was pleasing to see that nearly all candidates could answer this question on food chains correctly.

**Question 38**

This question showed that many of the weaker candidates believe that plant respiration uses up carbon dioxide.

**Question 39**

Many candidates were guessing here.

**Question 40**

Only about one-third of candidates know that fertility is at its maximum around day 14 of the menstrual cycle.

**Paper 5129/02**

**Theory**

**General comments**

Most candidates could make an attempt at all the questions. The calculations on the paper were answered better than in previous years but the units still cause problems for a large number of the candidates. A number of the Biology questions proved difficult for a large number of the candidates. The candidates appeared to be unfamiliar with the vocabulary and biological terms. In the Chemistry questions, candidates had difficulty with the Organic Chemistry question on alkenes.

**Comments on specific questions****Question 1**

- (a) A majority of the candidates could state the features found in both plant and animal cells.
- (b) There was evidence of a degree of guess work amongst the weaker candidates but the vast majority of the candidates were able to correctly identify the cell in the diagram as a plant cell.

**Question 2**

- (a) Most candidates could read the correct value of the extension from the graph.
- (b) This question was answered disappointingly. A large number of the candidates did not realise that the extension on the rubber band is found by subtracting the length of the rubber band without load from the length of the rubber band with the load. The value of the load is found by reading the number from the graph. A number of candidates simply extrapolated the graph to an extension of 14 cm and did not take into account the original length of the rubber band.
- (c) A large proportion of the candidates could represent the rubber band and the load in a diagram but very few indicated on their diagram how the extension is measured. Some candidates were penalised for not labelling the diagram.

Answers: (a) 2.5N; (b) 3.0N.

**Question 3**

This question was poorly answered. The majority of the candidates could not interpret the diagrams. Diagrams which represent the particles in a substance are not well understood.

**Question 4**

- (a)(i) A large number of candidates could draw the reflected ray.
- (ii) Only the best candidates were able to position the image correctly. A large number of candidates thought that the image was on the surface of the mirror.
- (b) A majority of the candidates correctly calculated the angle of incidence but only a small proportion of the candidates identified angle **B** as the angle of refraction. Angle **B** was most commonly identified as the angle of reflection. Candidates should be aware of the difference between refraction and reflection.

**Question 5**

- (a) Many candidates identified, B, as the region where the coloured dye would be seen but only a small number of candidates could name the region.
- (b)(i) The chemical process for which the leaf uses water was only rarely identified as photosynthesis. A number of candidates gave transpiration as their answer, not recognising that transpiration is physical process and not a chemical process.
- (ii) The other uses of water in a plant were not well known. A number of candidates recognised that water is used to maintain turgor but its use as a solvent and for transport of nutrients was only mentioned by the very best candidates.
- (c)(i) The effect of lack of water on a seedling were not well known. Many candidates simply stated that the seedling would die which received no credit. A number of candidates answered the question in terms of a seed rather than a seedling.
- (ii) The idea that water is lost from the seedling by transpiration at a greater rate than the uptake of water by the roots was not well understood by the majority of the candidates. A significant number of candidates simply restated the question by stating that the seedling does not get enough water.

**Question 6**

- (a) The calculation was quite well done but a number of the candidates seemed unfamiliar with the word "moment".
- (b) A large number of candidates calculated the distance of the weight from the knife edge.

Answers: (a) 3.0Nm; (b) 15.0 cm.

**Question 7**

- (a) Many candidates are aware that coke is put into a blast furnace but limestone was less well known.
- (b)(i) Many candidates were able to balance the equation successfully.
- (ii) The concept of a reducing agent was not well known. Candidates were required to state that a reducing agent removes oxygen from a substance in a chemical reaction.
- (c)(i) A majority of candidates knew that the two substances that cause iron to rust are water and oxygen.
- (ii) Galvanising was not well known by the candidates. The majority of candidates simply stated that the iron should be painted or covered in grease. Candidates should know that galvanising involves coating the iron with zinc, which provides a protective coat preventing contact with oxygen and water.

**Question 8**

- (a) The blood vessel in the diagram was frequently identified as an artery followed by a correct reason for a vein.
- (b) The differences between arteries and veins were not well known. Candidates who stated the same difference in part (b) as in part (a) did not gain credit for their answer as the question asked for two other differences between arteries and veins.
- (c) Candidates do not appear to understand the changes in the content of the blood in the small intestine during digestion. Candidate's answers indicated that there was a significant amount of guesswork.

**Question 9**

- (a) The way in which heat is transferred in solids by the molecules was not well known by the majority of the candidates.
- (b) Many candidates drew a large number of arrows on the diagram and some arrows contradicted one another, which meant that these candidates did not receive credit. All that was required was an upward arrow from the convector heater and a downward arrow on the other side of the diagram. A significant number of the candidates had the arrows the wrong way round.

**Question 10**

- (a) This part of the question was quite well done.
- (b) The majority of the candidates correctly calculated the number of neutrons in the nucleus of the isotope.
- (c) The vast majority of candidates know that argon is in group 0 of the periodic table, which is not an explanation of why argon has no chemical reactions. Candidates were expected to state that argon has a complete outer shell of electrons and therefore does not gain or lose electrons in chemical reactions.
- (d) The uses of argon are not well known.

Answer: (b) 22.

**Question 11**

- (a) This question was quite well done. Candidates were not penalised for stating the incorrect units.
- (b)(i) A number of candidates were penalised for stating the incorrect units despite calculating the correct potential difference.
- (ii) Candidates who correctly calculated the potential difference in part (i) frequently obtained credit for this part. Many candidates realised that the potential difference between **X** and **Y** was twice the potential difference between **X** and **Z**.

Answers: (a) 0.2A; (b)(i) 0.8V, (ii) 1.6V.

**Question 12**

- (a) The names of the parts of the female reproductive system were quite well known by the majority of the candidates but their function was less well known.
- (b)(i) The label, **X**, was rarely shown in the correct place. Many candidates thought that sperm were deposited in the fallopian tube.
- (ii) The label, **Y**, was more frequently correct but a large number of candidates thought that fertilisation occurred in the ovary.
- (c) The better candidates knew when ovulation occurred, but the weaker candidates frequently guessed at the answer.

**Question 13**

- (a) Many candidates were unaware of the difference between magnetic and non-magnetic materials. Some candidates simply gave an example of each rather than state the difference between them. A significant number of candidates thought that magnetic material would be attracted to iron rather than a magnet. Only a small number of candidates knew that magnetic materials can be magnetised.
- (b)(i) Many candidates knew that the core of an electromagnet was made of iron.
- (ii) Many candidates could state that the strength of an electromagnet is increased by increasing the number of turns on the coil but the fact that increasing the current or voltage increases the strength of the electromagnet was less well known.

**Question 14**

- (a) A disappointingly small number of candidates could name two gases that pollute the atmosphere. The expected gases were carbon monoxide, sulphur dioxide and nitrogen oxides. A large number of candidates incorrectly named carbon dioxide as a pollutant gas. The answers to the sources of the gases were not well known. Many candidates simply stated that the gases are produced by factories or industry. Candidates are expected to be more specific in their answers to the source of the pollutant, for example, carbon monoxide is produced by the incomplete combustion of fuel in cars, although the answer from car exhausts was acceptable or sulphur dioxide is produced by the combustion of fossil fuels.
- (b) In this part of the question candidates frequently knew of an effect of one of the gases on the environment but spoilt their answer by failing to state to which gas they were referring.

**Question 15**

- (a) The types of radiation emission were rarely identified correctly. The better candidates knew which type was the most penetrating and the most ionising.
- (b) Only a small number of candidates could state what was meant by the half life of a radioactive material. Many candidates thought that it was the half the time taken for the sample to completely decay rather than the time taken for the activity of the sample to halve.



- (c) Most candidates found the calculation of the half life difficult. Candidates were required to calculate the time for 400 particles emitted in one second to decrease to 200 particles emitted in one second. Those candidates who recognised that the data given showed two half lives found the calculation easy.

Answer: (c) 12 hours.

#### Question 16

- (a) The majority of candidates were unable to explain what is meant by unsaturated with reference to the alkene homologous series. A large number of candidates gave an explanation in terms of solubility.
- (b) The general formula of alkenes was not well known. Many candidates simply restated the formula of ethane.
- (c)(i) The conditions for the hydration of ethane were not well known. Candidates should be aware that the process requires a temperature of between 250-400°C and a catalyst (phosphoric acid).
- (ii) The better candidates were able to deduce the equation for the hydration of ethane.
- (d) The structure of the poly(ethane) molecule was poorly answered by the majority of the candidates. Candidates are expected to draw the repeat unit of the polymer in brackets followed by a subscript n.

#### Question 17

- (a) The products of the digestion of protein was recognised as amino acids by only the better candidates.
- (b) The uses of protein in the body were not well known. Some candidates knew that proteins were used to repair tissue but far too many candidates thought that protein was used to build strong bones and teeth.
- (c)(i) The organ which changes unwanted products of digestion of protein, the liver, was only known by the better candidates.
- (ii) A large number of candidates knew that the urea was excreted by the body as urine but some were penalised because it was thought that the urea was lost in faeces or was excreted through the anus.

#### Question 18

- (a) Acid **B** and liquid **C** were identified correctly by a number of candidates but black powder **A** was less frequently identified as copper oxide.
- (b) The colour of Universal Indicator in water, liquid C, was not known as green by many candidates.
- (c) Many candidates did not identify the type of reaction as oxidation.