OCR
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A LEVEL

Examiners' report

BIOLOGY B
(ADVANCING BIOLOGY)

H422
For first teaching in 2015

H422/02 Summer 2023 series

Contents

Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. A selection of candidate answers is also provided. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

Where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.

A full copy of the question paper and the mark scheme can be downloaded from OCR.

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Paper 2 series overview

H422/02 is one of three components of the GCE A Level Biology B specification assessed during this examination session. For H422/02 candidates needed to demonstrate knowledge and scientific literacy skills across all modules (1 to 5). There is an Advance Notice Article (ANA) for candidates to study and use to answer Question 1. Two level of response questions are included in the 100 marks.

Mathematical and practical skills continue to be embedded within the questions throughout the exam paper. The exam paper appeared challenging in certain aspects to candidates although some questions were accessible across all ability range. There was no evidence to suggest that candidates were under any time constraints towards the end of the paper.

Overall, candidates demonstrated a wide range of ability with more successful candidates giving succinct responses. Candidates appeared more adept with the demands of the paper's mathematical and practical content which allowed them to gain higher level marking points. There is evidence that candidates are making good use of the ANA and showed confidence in tackling level of response questions. Disruption to education during COVID 19 pandemic possibly still had an impact on candidate performance for questions requiring practical skills. Most candidates were able to demonstrate their ability to learn and recall facts.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
- used information in the ANA to apply knowledge and formulate good responses to Question 1 - applied knowledge to new contexts - demonstrated knowledge of challenging concepts such as immunity and infertility - demonstrated ability to complete calculations and statistical analyses - demonstrated sound practical skills where possible - evaluated conclusions effectively to give balanced arguments.	- used information to describe scientific terms and recall definitions - could complete part of a calculation - found difficulty in evaluating and performing complex calculations - performed less well in questions based on practical activities.

Question 1 (a) (i)

1   This question is based on the Advance Notice Article **'Development of therapeutic antibodies for the treatment of disease'**.

   (a) (i)   State what is meant by the term **antigen**.

   ....

   .... **[1]**

Most candidates offered part of the definition. In order to gain credit it was important to include the fact that an antigen would stimulate or trigger an immune response, which was often omitted.

Question 1 (a) (ii)

   (ii)   Scientists can combine antibody fragments using phage display to produce many different antibodies, each specific to a different antigen.

   Using the abbreviations from **Fig. 1** in the Advance Notice Article, explain how combining antibody fragments allows scientists to produce many different antibodies, each specific to a different antigen.

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   .... **[2]**

Candidates achieved both marks, realised the concept of V_L and V_H as variable regions and offered good explanations using abbreviations from **Fig. 1.** Some candidates did not use abbreviations, as instructed in the stem of the questions and this limited the marks available.

Question 1 (a) (iii)

(iii) The B cell receptor is an IgG molecule with the same structure as the human IgG shown in **Fig. 1** in the Advance Notice Article.

Use an abbreviation from **Fig. 1** to identify the part of the B cell receptor that will be attached to the cell surface membrane of a B cell.

.... **[1]**

This question was generally well answered by most candidates. Differences in formatting, such as CH3, were ignored although most formatted correctly as C_H3.

Question 1 (b) (ii)

(ii) Explain why the Fab and scFv antibody fragments shown in **Fig. 1** are effective as neutralizing or agglutinating antibodies but are less effective as opsonins or in activation of complement.

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.... **[2]**

This question required the interpretation of information in **Fig. 1** of the ANA and then apply their knowledge to complete an explanation as to the effectiveness of antibody fragments. Most candidates achieved 1 mark for recognising that they would lack a constant region. A common error was linking opsonisation and phagocytes to both the variable and constant regions.

OCR support
(i) Our delivery guide on 'The immune system' has a range of resources to support with teaching the structure and function of the antibody.

Question 1 (c) (i)

(c) (i) Describe how therapeutic mAbs can be used in cancer treatment.

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.... **[3]**

Good responses to this question were able to describe antibody specificity with relation to cancer cell antigens, mAbs attached to drugs or enzymes and how cells could be targeted for destruction.

Question 1 (c) (ii)

(ii) The cost of treating a patient with advanced cancer using therapeutic mAbs can be extremely high. In some cases, the treatment can increase survival time by just a few months.

Pharmaceutical companies justify the high cost of treatment based on the high costs of developing and testing therapeutic mAbs.

Discuss whether the use of therapeutic mAbs to treat cancer justifies the high costs.

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.... **[3]**

Most candidates wrote a full response to this question, but few gained more than 1 mark. Good responses were able to write concise statements with appropriate ethical statements, such as, the fact that they may not be affordable to everyone. It was common to see statements directly from the question stem, e.g. 'increase survival time for a few months' so costs could be justified.

Misconception

?   Common misconceptions were that mAbs are cheaper than chemotherapy, have more side effects and are not effective in treating some cancers.

Assessment for learning

Make sure thorough research of the topics included in the Advanced Notice Article (ANA).

Exemplar 1

Yes:

- Because a human life or the value of one is qualitatively measured, and it could be argued that this extra time justifies the high cost

- Because it can be applicable to many different cancers, and offers hope for treatment if surgery/other methods aren't available.

No:

- Reduces access to people who cannot afford it / false hope **[3]**

The exemplar above shows a good response to Question 1 (c) (ii) with a balanced discussion gaining 3 marks.

Question 1 (d)*

(d)* Describe the role of T and B lymphocytes in the development of long-term immunity.

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.... **[6]**

This level of response question provided candidates with an opportunity to demonstrate their knowledge of the concepts surrounding immunity specifically involving the role of lymphocytes. Good responses achieved Level 3 (6 marks) by applying their knowledge coherently and were able to describe primary and secondary immune responses, linking to antigen presenting cells at the start.

Omissions that often resulted in Level 2 were lack of scientific detail or mention of clonal selection, clonal expansion, or differentiation. Some candidates showed misconception of these processes. Level 1 answers often used some of the correct terminology (like B lymphocyte or plasma cell) in isolation.

Misconception

? Clonal selection, clonal expansion and differentiation are important terms. Candidates appear to confuse these processes particularly clonal expansion and differentiation. It is important to note that clonal expansion is **coupled** with differentiation to form large quantities of, e.g. memory cells. Clonal expansion follows clonal selection and is when the cytokines from the T-helper cells enable the activated B cells to proliferate thousands of clones.

Clonal expansion alone does not result in differentiation of the lymphocytes and vice versa.

OCR support

i Our delivery guide on 'The immune system' has a range of resources to support with teaching clonal selection.

Exemplar 2

- During the first infection, when a macrophage encounters the foreign antigen, it engulfs it via phagocytosis, with ~~lysosomes~~ lysosomes, and displays the antigen on it's cell surface, so on antigen-presenting cell

- It then undergoes clonal selection, where it circulates the blood until it meets an helper T cell ~~with~~ ^{that is} complementary to the antigen

- The T-helper cell rapidly divides by mitosis, and ~~releases~~ releases many cytokines that activate B cells (clonal expansion.)

- The B cells differentiate into plasma cells, which are antibody factories

- A small proportion will then turn into T-memory cells on B-memory cells, and circulate the blood for a very long time

- Here, when the antigen is encountered again, this initiates a secondary response

- Where clonal selection and clonal expansion occur much more rapidly

- B cells can produce ~~larger~~ ^{larger} quantities of antibodies at a quicker rate

- Which destroys the pathogen before they can cause symptoms **[6]**

Additional answer space if required.

- Hence giving you immunity.

The exemplar above shows a Level 3 response for this LoR question. The response includes details of the roles of both T and B lymphocytes in long term immunity using correct terminology.

Question 2 (a) (i)

2 Aerobic fitness and muscle mass decrease as humans age. Both of these changes have an adverse effect on our general health.

 (a) VO_2 max is a measure of aerobic fitness.

  (i) State the definition of VO_2 max.

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   .... **[1]**

Good responses to this question gave a full definition for VO_2 max. However, some candidates only partially defined the term often omitting 'maximum' and/or 'rate'. Some using 'maximum volume' needed to include the fact that this would be in a given time period, e.g. in one minute.

Question 2 (a) (ii)

  (ii) Describe how VO_2 max is measured.

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   .... **[3]**

Candidates found this question challenging. Most candidates achieved 1 mark for increasing exercise intensity. However, few candidates linked this to measuring oxygen and carbon dioxide in inhaled and exhaled air.

Question 2 (b) (i)

(b) In older people (over 60 years) resistance training (lifting or pulling against a resistance) is a way of increasing muscle mass and improving bone strength. These changes reduce the risks associated with osteoporosis, falls and bone fractures.

Aerobic training might not be advisable in some older people and can also inhibit the development of muscle mass through resistance training.

A group of scientists reviewed published studies of the effect of resistance training on aerobic fitness in both young people and older people. They calculated the percentage increase in VO_2 max after a course of resistance training.

Because the different studies used training courses of different lengths, they expressed their results as 'percentage change in VO_2 max per session'. Their results are shown in **Fig. 2.1**. Each symbol in **Fig. 2.1** represents the result of one study.

Fig. 2.1

The scientists concluded that resistance training increases aerobic fitness in subjects of all ages who had a low starting level of aerobic fitness.

(i) Evaluate this conclusion.

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.... **[3]**

Evaluating data or conclusions is one of the most difficult tasks for A Level candidates and this question proved challenging. Good responses recognised the negative correlation between initial values and percentage change in VO_2 max and also noticed that all statistically significant increases had low initial VO_2 max. However, few candidates achieved the maximum 3 marks. Candidates often misinterpreted 'low VO_2 max' as 30-40 cm^3 kg^{-1} min^{-1}. However, most of the data points fell between 20-50 cm3 kg-1 min-1 which would make 20-30 cm^3 kg^{-1} min^{-1} 'low'. In this sector of the graph there were no 'young' subjects so any reference to young participants was ignored.

Question 2 (b) (ii)

(ii) Suggest why an increase in muscle mass might lead to an increase in VO_2 max.

....

.... **[1]**

This question was generally well answered linking increased muscle mass/VO_2 max to oxygen consumption, more mitochondria or more aerobic respiration.

Question 2 (c) (i)

(c) High intensity interval training (HIIT) can increase VO_2 max to a greater extent than traditional, long aerobic exercise.

Fig. 2.2 shows the oxygen dissociation curve of an adult male at rest.

Fig. 2.2

Percentage saturation with oxygen

Partial pressure of oxygen (kPa)
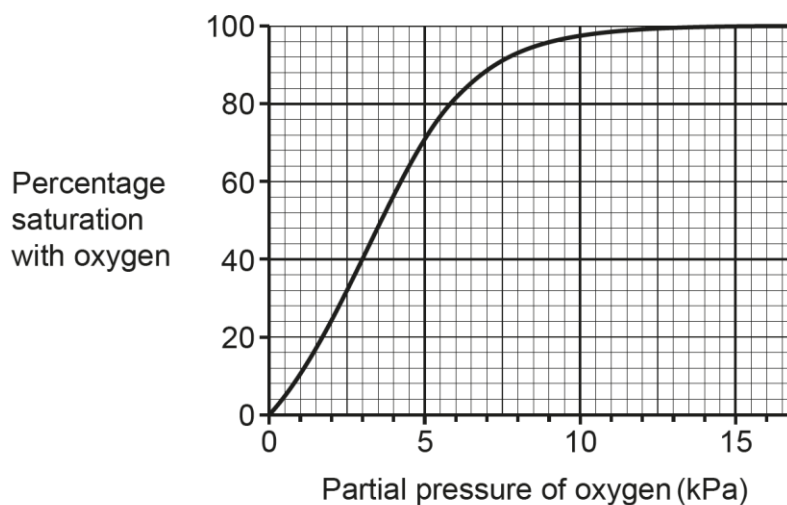
(i) Sketch the curve you would expect when the same person is undergoing a period of HIIT.

Answer on Fig. 2.2. **[1]**

Most candidates correctly drew the sigmoid curve to the right. A common error was drawing the oxygen dissociation curve for myoglobin to the left. Some candidates completed the curve at oxygen saturations less than 100% so were not given marks.

Question 2 (c) (ii)

(ii) Explain how the curve you have sketched on **Fig. 2.2** helps improve this person's performance.

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.... **[2]**

Good responses explained how greater dissociation of oxygen at low partial pressures of oxygen would provide more oxygen for more aerobic respiration. A common error was using incorrect terminology or for thinking that there would be a higher affinity for oxygen possibly due to an incorrect response to sketching the curve in Question 2 (b) (ii).

OCR support

ⓘ   Our topic exploration pack on 'Oxygen dissociation curves' include a learner activity together with teacher's instructions to support teaching on this topic.

Question 3 (a) (ii)

3   TLRs are receptors found on macrophages and are involved in the non-specific immune response.

Gram-negative bacteria have lipopolysaccharide (LPS) in their cell walls.

When Gram-negative bacteria infect a host, such as a human, they release LPS which binds to TLRs on macrophages. This causes the macrophages to release cytokines.

(a)   **Fig. 3.1** shows a section of the plasma membrane of a macrophage.

   Fig. 3.1
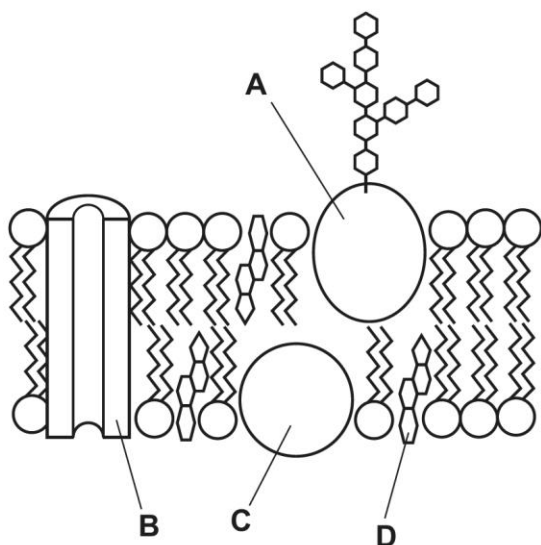
(ii)   Explain why the membrane is described as a fluid mosaic.

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.... **[2]**

Good responses to this question were shown by candidates who applied the concepts of 'components moving laterally in the bilayer' and 'proteins are arranged in a random pattern' thereby achieving 2 marks.

Question 3 (a) (iii)

   (iii)   Describe **two** effects of cytokine release by macrophages.

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.... **[2]**

Responses were often well structured and mentioned activation of lymphocytes and the fact that cytokines would attract phagocytes, achieving 2 marks. Some candidates focused on general inflammation, particularly mast cells which was a common error.

Question 3 (b) (i)

  (b)   TLRs have been used to study the evolutionary relationships between ungulates, a group of mammals. Many species of ungulate have hooves.

      Fig. 3.2 shows the evolutionary relationships in ungulates.

      Fig. 3.2
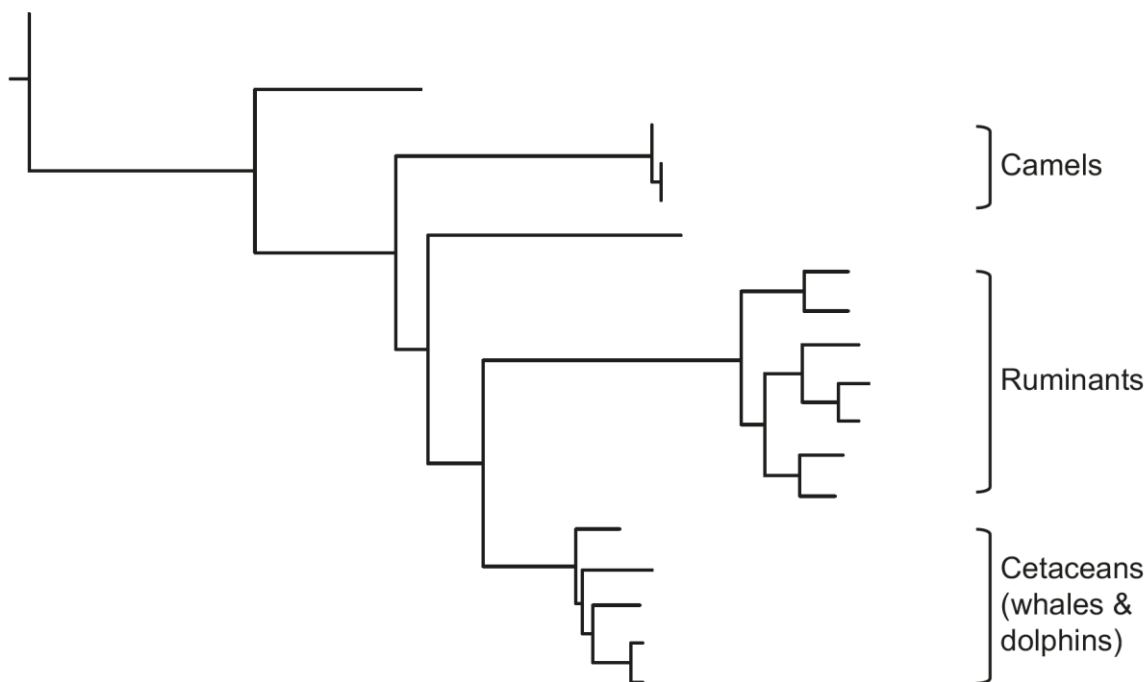
   (i)   State the name given to the study of evolutionary relationships.

.... **[1]**

This was generally well answered with phylogeny and phylogenetics the most common correct responses. Some candidates could not recall these terms and stated classification or taxonomy which were not acceptable and not given.

Question 3 (b) (ii)

(ii) Explain how the relationships shown in **Fig. 3.2**, based on TLRs, could have been worked out.

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.... **[2]**

This question proved challenging to candidates. Good responses could identify that biological molecular sequences were required (e.g. DNA/mRNA/amino acids). However, most candidates could not explain the data used to create phylogenetic trees. Some attempted to apply immune responses but these were often incorrect. The concept of sequence similarity suggesting a close relationship was often omitted.

Question 3 (b) (iii)

(iii) Camels and ruminants are herbivores and both groups have an even number of toes. This led a student to conclude that camels and ruminants are the most closely related groups of ungulates.

Discuss whether the results support the student's conclusion.

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.... **[3]**

Most candidates demonstrated the ability to identify that ruminants and cetaceans had a most recent common ancestor and were then able to link this to the idea that these were therefore the 'most closely related'. Arguments supporting the conclusion were rarely seen.

Misconception	
?	Common misconceptions included 'camels are extinct' and 'aren't ungulates' for any of the named ungulates.

| OCR support	
i	Our topic exploration pack on 'The development of species' include a learner activity together with teacher's instructions to support teaching on this topic. Teacher's instructions: The development of species Learner activity: The development of species

Question 4 (a) (i)

4   The knee jerk reflex is used to identify disorders of nervous conduction. The kneecap is struck with a rubber hammer and the lower leg responds by flexing in a kicking action.

   (a)   The neurones involved in the knee jerk reflex are shown in the diagram.
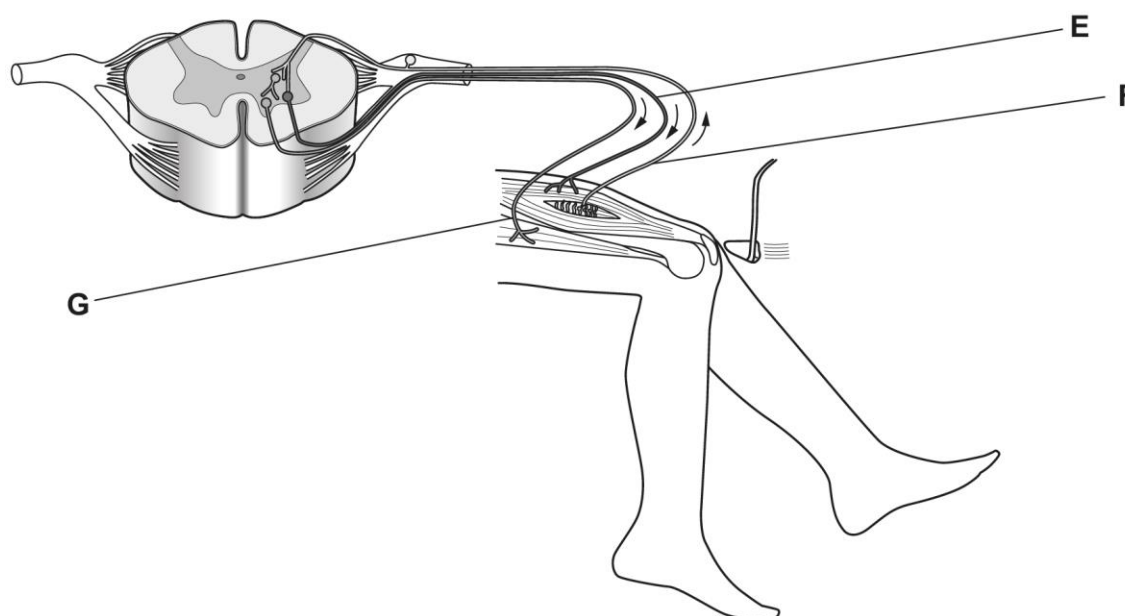
   (i)   Identify structures **E** and **F** on the diagram.

   E ....

   F ....

                                                                                                                    [2]

This question was generally well answered with the most common error being where candidates reversed motor and sensory neurone.

Question 4 (b) (i)

(b) Physiotherapists use the knee jerk reflex to identify possible nerve damage in patients.

Based on the physiotherapist's assessment of the speed of response, the knee jerk reflex responses are categorised as:

- Level 0: No evidence of contraction
- Level 1: Decreased, but still present (hyporeflexia)
- Level 2: Normal
- Level 3: Super-normal (hyperreflexia)
- Level 4: Clonus (repetitive shortening of the muscle after a single stimulation).

(i) Explain the limitations of this method for collecting data.

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.... **[2]**

This question was generally well answered with most candidates recognising that the method was qualitative and subjective.

Question 4 (b) (ii)

(ii) Suggest improvements to this method for collecting data for analysis.

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.... **[3]**

This question proved challenging. Good responses were those that understood the need to provide a quantitative method such as timing the response, and suggesting that certain variables, such as strength of hammer blow, has to be controlled.

Exemplar 3

- Ensure patient is relaxed and have them look away from knee.
- use a video Record response using a camera and use
- Record response and use resulting video to quantitively one determine speed of response
- Repeat reflex many times and average results.
- Repeat reflex on both knees. **[3]**
- Control strength force of impact of rubber hammer

Few candidates were able to gain 3 marks for this question. The exemplar shows a response with 2 marking points credited. The candidate was awarded MP1 for their second bullet point, where they mentioned to determine speed of response. MP3 was also awarded for the '*idea of*' hammer strength being the same.

Question 4 (c) (i), (ii) and (iii)

(c) An investigation into reaction times was performed in a school laboratory.

The subjects sat in front of a laptop computer with a touchscreen. A blue square was shown on the screen. The subject was told to tap the screen as soon as the square changed colour to green. The computer measured the subject's reaction time as the time between the change of colour and the screen being tapped.

The study tested three groups, with 10 participants in each group:
- group 1 were all 16 – 18 year old male students
- group 2 were all 16 – 18 year old female students
- group 3 was a mixture of male and female staff members.

The results are shown in **Table 4.1**.

Table 4.1

	Reaction time (ms)		
	Group 1	**Group 2**	**Group 3**
	150	170	150
	158	225	275
	174	220	280
	186	205	350
	196	210	220
	205	195	195
	202	185	205
	188	206	320
	195	222	160
	179	199	153
Mean	183.3	203.7	230.8
Standard deviation	18.2640	17.2694	77.1303

A *t*-test was carried out to compare the reaction times of male and female students.

(i) State the null hypothesis that should be used.

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....

.... **[1]**

(ii) Use the data in **Table 4.1** to calculate a value for t.

Use the formula: $t = \dfrac{\left| \overline{x}_A - \overline{x}_B \right|}{\sqrt{\dfrac{s_A^2}{n_A} + \dfrac{s_B^2}{n_B}}}$

$t = $ .... **[3]**

(iii) **Table 4.2** shows the critical values for t.

Table 4.2

Degrees of freedom	p values			
	0.10	0.05	0.01	0.001
1	6.31	12.71	63.66	636.60
2	2.92	4.30	9.92	31.60
4	2.13	2.78	4.60	8.61
6	1.94	2.45	3.71	5.96
8	1.86	2.31	3.36	5.04
10	1.81	2.23	3.17	4.59
16	1.75	2.12	2.92	4.02
18	1.73	2.10	2.88	3.92
20	1.72	2.09	2.85	3.85

Use your value for t and **Table 4.2** to explain the conclusions the researchers would have reached when comparing the reaction times of males and females.

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.... **[2]**

Some candidates did not recognise the 't-test' part of the question; often omitting 'mean' from their hypothesis which should have been included to gain credit.

Most candidates were able to substitute and then calculate a value for t to gain all 3 marks. Common errors were not counting n (10) correctly (9 or 11) or forgetting to square standard deviation.

Most candidates were able to compare their calculated *t* value with critical value and error carried forward for an incorrect calculation was accepted. Some candidates did not calculate degrees of freedom correctly or did not read the critical values table at p 0.05. Most were able to achieve the mark for rejecting the null hypothesis.

OCR support

i

We have a range of resources available to support you and your students on maths skills focused on statistics:

Maths for Biology resources

Include tutorials and student activities for all the statistical skills that candidates need to know for the course.

Statistics for Biologists

Guidance for teachers on the statistical skills that candidates need to have.

Mathematical skills Handbook

Provides guidance on the statistical skills and explains how they can be used within a biology context.

Question 4 (c) (iv)

(iv) State the conclusion that can be drawn about group 3 compared with groups 1 and 2, based on the standard deviations shown in **Table 4.1**.

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.... **[1]**

This question was not well answered. Most candidates did not offer an appropriate conclusion, e.g. that there would be a 'larger variation in reaction time data'. A common response was 'greater range of data' which was ignored.

Question 4 (c) (v)

(v) Suggest an explanation for the difference between group 3 and the other two groups.

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.... **[1]**

Most candidates correctly suggested that this was likely due to 'age'. Good responses that gained credit went on to clarify that there would be a 'wider range of ages' in Group 3.


Question 5 (a) (i)

5   Ovulation lateral flow test kits are used by women who are trying to become pregnant.

The kits work on the same principle as pregnancy test kits. They show the presence of LH in urine, which coincides with ovulation.

The base of the test strip contains monoclonal antibodies specific to LH.

The test strip is dipped into a urine sample, and the results are read after a few minutes.

(a)   The diagram shows the possible results of ovulation lateral flow tests.
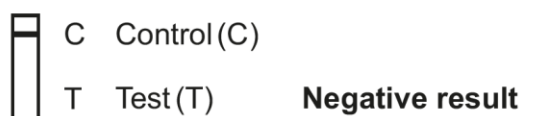
(i)   The control and test lines also have monoclonal antibodies attached.

State what would bind to the antibodies on each line.

Control line ....

Test line ....

[2]

Good responses identified that the antibodies to LH were not bound to LH in the 'control' and bound to LH in the 'test'. However, some candidates did not achieve the marks as their expression lacked clarity. A common mistake was quoting hCG as the hormone rather than LH.

Question 5 (a) (ii)

(ii) Explain why no lines means that the result is **not** valid.

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.... **[1]**

There were few correct responses to this question. Most candidates could not explain that antibodies not moving up the test strip was the likely cause of the failure.

Question 5 (c)*

(c)* Discuss the different treatments for infertility.

You should include the ethical issues **and** draw conclusions based on risks and benefits associated with the different treatments in your answer.

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.... **[6]**

Candidates were often able to achieve Level 1 for a basic description of fertility treatment and risk. Level 2 responses were more detailed and often had very clear ethical arguments. The main reason why Level 3 was often not supported was a lack of benefits to contrast with the risks. Responses that did not achieve the higher marking bands often concentrated on hormones.
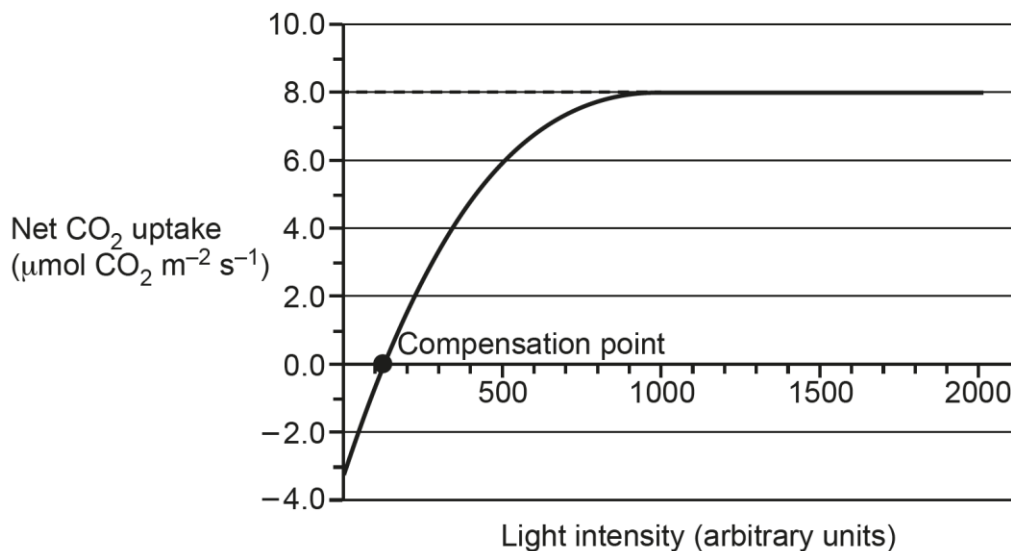
> **OCR support**
>
> (i) Our delivery guide on 'Fertility and assisted reproduction' has a range of resources to support with teaching of fertility treatments.

Question 6 (a) (i)

6 (a) **Fig. 6.1** shows the relationship between light intensity and the net rate of photosynthesis, measured as net CO_2 uptake, in a plant growing at atmospheric CO_2 concentration (0.04%).
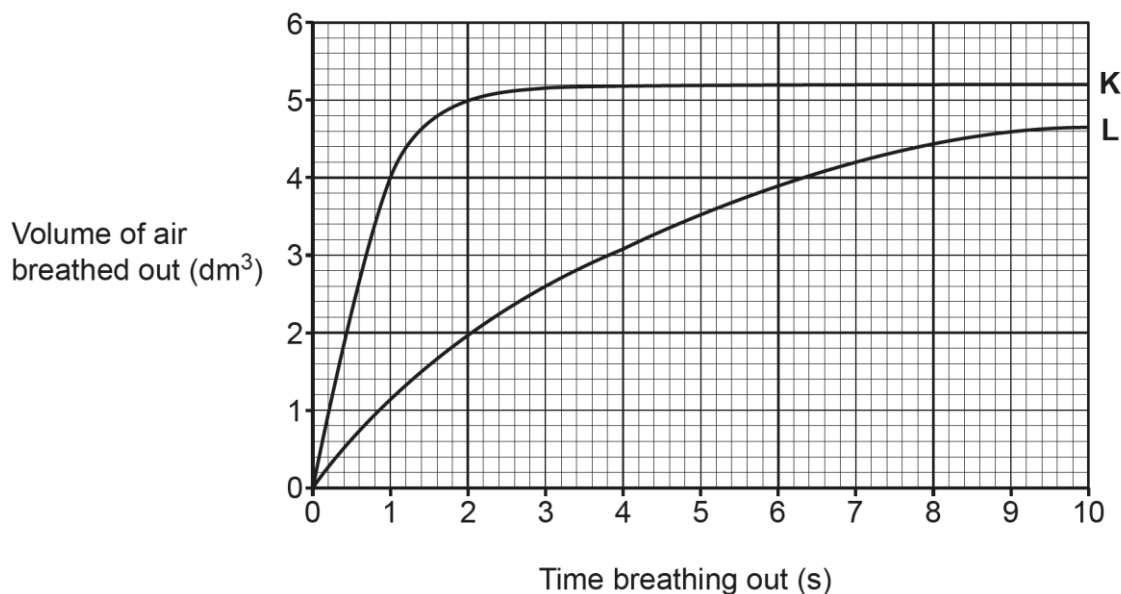
Fig. 6.1

(i) Explain the significance of the compensation point shown on **Fig. 6.1**.

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.... **[1]**

This was generally well answered with most correct responses describing that it was the point at which the rate of respiration was equal to the rate of photosynthesis.

Question 6 (a) (ii)

(ii) Use the data in **Fig. 6.1** to explain why crops growing in greenhouses during the winter months are often grown under artificial lights.

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.... **[3]**

Most candidates correctly identified that there was low(er) light intensity in winter and were able to correctly quote a data point (with units). Few candidates extended their responses further to link this with compensation point, e.g. 'rate of photosynthesis must be higher than rate of respiration for a plant to grow' and 'in artificial light the rate of photosynthesis is above the rate of respiration'. Often growth was unqualified although good responses correctly explained that it would provide 'more sucrose for growth'.

Question 6 (b) (i)

(b) A student used hydrogen carbonate indicator solutions to investigate the compensation point in leaf samples from two different species of crop plant.

Leaf extracts were prepared and placed in glass bottles containing hydrogen carbonate indicator solution. The bottles were exposed to light for a fixed period of time, and the colours were compared with a set of standards, shown in **Fig. 6.2** on the Insert.

(i) Explain **two** steps that the student should take to ensure an accurate comparison of compensation points.

1 ....

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2 ....

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[4]

Most candidates only achieved 2 marks here for stating two steps such as using 'same light intensity' and 'same volume of indicator'. Further marks were restricted as candidates did not explain why these steps were necessary.

Question 6 (b) (ii)

(ii) The colour of the hydrogen carbonate indicator after each plant extract was exposed to light is indicated by the labels **H** and **J** in **Fig. 6.2** on the Insert.

On the basis of this result, the student concluded that crop plant **J** would be more suitable for growing in the winter months than crop plant **H**.

Evaluate the student's conclusions.

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.... **[4]**

Few candidates interpreted the hydrogen carbonate results correctly but were not able to describe the result, as an imbalance of CO_2 such as **J** taking in more CO_2 than it releases or **H** releasing more CO_2 than it takes in. Only a few candidates were able to link this with 'compensation point'. Often descriptions of growth could not be supported as the candidate stated **J** was more suitable (a repeat of the question stem), rather than that **J** would grow faster in winter. Some candidates were able to identify that temperature in winter could mean that the results would not be replicated in situ.

Question 7 (a) (i)

7 **(a)** The graph shows data recorded during forced expiration (breathing out) in two subjects, **K** and **L**. One subject is a patient with chronic obstructive pulmonary disease (COPD) and the other is a normal control.

The table shows the effects of COPD on the vital capacity and forced expiratory volume in one second (FEV_1).

Measurement	Normal range	COPD
Vital capacity	$3 - 5.5\,dm^3$	May be reduced
FEV_1	Calculation based on height and age	Reduced
Ratio of FEV_1 to vital capacity	Approximately $0.7 - 0.8$	<0.7

(i) A student said that it was not possible to estimate vital capacity for subject **L** on the basis of the graph.

Evaluate the student's conclusion.

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.... **[2]**

Most candidates were able to provide the supporting statement that the plateau has not yet been reached but only very good responses suggested the idea that it would be possible to gain an estimate by extrapolation.

Question 7 (a) (ii)

(ii) With the aid of a calculation, show that it is possible to identify which of the two curves, **K** and **L**, is the normal control and which is the patient with COPD.

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.... **[3]**

Some candidates could extract FEV_1 and VC from the data. Often these students went on to perform a calculation (although some calculated the ratio incorrectly). Most made a comment about which patient had COPD although this mark could not be supported if there was no evidence of attempting a calculation.

Question 7 (b) (i)

(b) Asthma is another obstructive respiratory disease in which breathing out can be difficult. A severe asthma attack can lead to respiratory arrest, where the person stops breathing.

The first aid treatment for respiratory arrest is to administer expired air resuscitation (EAR).

(i) Explain the reasons for the following aspects of EAR.

1. Gloves and a mask should be worn.

   ....

   ....

2. The patient's head should be held back.

   ....

   ....

3. Watch to see if the chest rises whilst blowing into the mouth.

   ....

   ....

4. If there is no pulse after two breaths, you must perform cardiopulmonary resuscitation (CPR).

   ....

   ....

   [4]

Statements 1, 2 and 3 about EAR were answered well with reasons such as 'to protect the patient and the first aider', 'to open the airway' and 'to check air is getting to lungs'. However, a correct response to step 4 was often not supported as candidates did not link to oxygen delivery to the brain.

Question 7 (b) (ii)

(ii)   Suggest how EAR would differ if you were performing it on a small child.

....

....

....

....

.... **[2]**

Good responses included statements about the need to cover the nose and mouth and to provide shallower breaths. Any responses involving CPR were ignored as the question stem specifically referenced expired air resuscitation (EAR).

Question 7 (c)

(c)   Lung surfactant is a mixture of phospholipids and proteins that helps the alveoli stretch and expand during breathing in and prevents them collapsing when breathing out.

The following sentences compare the synthesis and secretion of lung surfactant proteins with other types of protein secreted by cells.

Complete the sentences using the most appropriate words or terms.

All secreted proteins are produced on .... attached to the rough

endoplasmic reticulum (RER). The assembled protein in the RER is then pinched off in

.... vesicles and moved to the .... where

it is processed and packaged into .... vesicles.

In alveolar epithelial cells these are known as lamellar bodies. These move to the cell

surface membrane and the surfactant is released by ....

Movement of these organelles requires motor proteins to move them along the

....

[4]

Most candidates gained marks here. Common errors were (gap 2) omission of a term for transport vesicle, (gap 4) transport vesicle or excretory vesicle and (gap 5) confusing exocytosis with endocytosis.

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