

# Human Biology.

## Unit: F224: Energy, Reproduction and Populations: Medium banded candidate style answer.

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### Introduction

OCR has produced these candidate style answers to support teachers in interpreting the assessment criteria for the new GCE specifications and to bridge the gap between new specification release and availability of exemplar candidate work.

This content has been produced by senior OCR examiners, with the input of Chairs of Examiners, to illustrate how the sample assessment questions might be answered and provide some commentary on what factors contribute to an overall grading. The candidate style answers are not written in a way that is intended to replicate student work but to demonstrate what a “good” or “excellent” response might include, supported by examiner commentary and conclusions.

As these responses have not been through full moderation and do not replicate student work, they have not been graded and are instead, banded “good” or “excellent” to give an indication of the level of each response.

Please note that this resource is provided for advice and guidance only and does not in any way constitute an indication of grade boundaries or endorsed answers.

<b>1 The growing concern over the increase in obesity has made adequate exercise an important issue.</b>	
<b>(a) Explain the term <i>aerobic exercise</i>.</b> <span style="float: right;"><b>[2]</b></span>	
<i>Candidate style answer</i>	<i>Examiner’s commentary</i>
<i>This is when a person does exercise that requires aerobic respiration e.g. marathon running Over a period of time this will improve a persons overall fitness and their body will use their. lungs and heart more efficiently</i>	As a key term highlighted in the specification, candidates should be able to quote succinct definitions. This would gain some marks. More detail regarding the effect on the different systems in the body is generally required for such a definition.

(b) Fig 1.1 shows the effect of a short period of exercise on blood pressure. With reference to Fig 1.1, describe the effects of exercise on the cardiovascular system which would result in the changes to blood pressure shown in Figure 1.1.

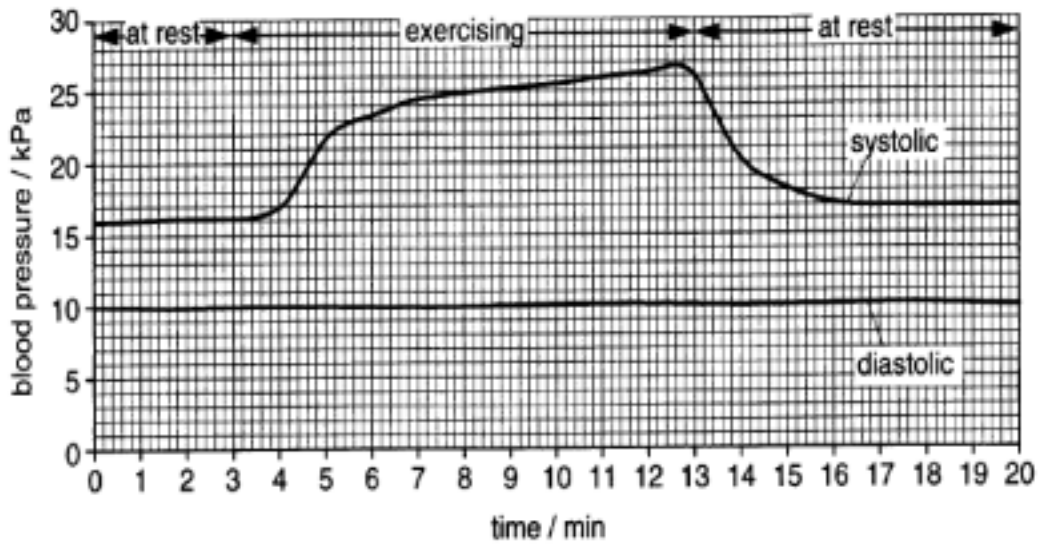


Fig 1.1

[4]

*Candidate style answer*

*Exercise causes the systolic blood pressure to increase but the diastolic pressure remains nearly the same. Between 4 and 13 mins the systolic blood pressure increases from 16 to 27 kPa then between 13 and 17 mins the pressure drops from 27 back to 17 kPa. This is due to the body changing as a result of the person exercising aerobically*

*Examiner's commentary*

This candidate has missed the main command word of the question. Whilst the description is appropriate and enables some marks to be awarded, the candidate has concentrated on describing the graph rather than explaining the changes in the CVS that would cause these changes in SBP to occur.

(a) Fig. 1.1 shows a metabolic pathway that occurs in muscle tissue.

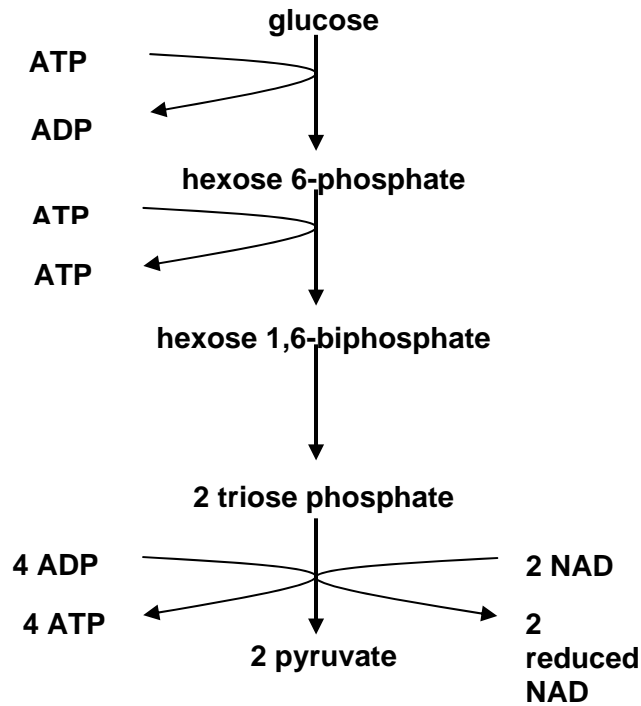


Fig. 1.1

(i) Name the metabolic pathway shown in Fig. 1.1.

 In your answer, you should use the appropriate technical term, spelled correctly.

[1]

*Candidate style answer*

*Examiner's commentary*

*Respiration*

Incorrect answer.

(ii) Calculate the theoretical net yield of ATP when one molecule of glucose is metabolised by this pathway.

[1]

*Candidate style answer*

*Examiner's commentary*

*2 ATP*

Correct answer.

(iii) Outline what happens to the pyruvate formed in this pathway in the absence of oxygen.

[1]

*Candidate style answer*

*Examiner's commentary*

*It will enter the Krebs's cycle*

No marks are awarded as the candidate has not focussed on the correct aspect of the question.

(d) Fig. 1.2 is a photomicrograph of a sarcomere from a skeletal muscle fibre.

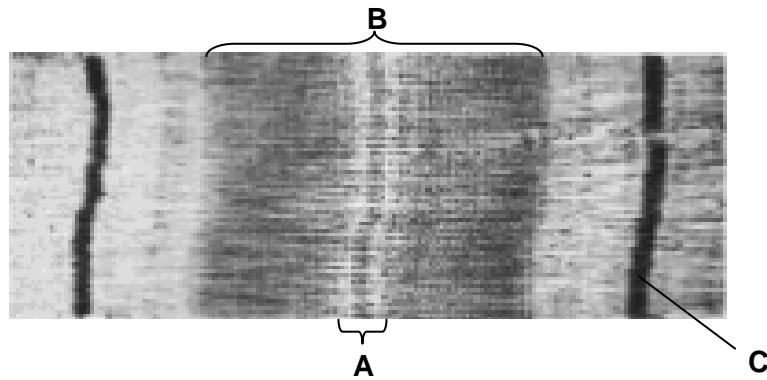


Fig. 1.2

(i) Name A to C in Fig. 1.2.

[3]

Candidate style answer	Examiner's commentary
<p><b>A</b> <i>H zone</i></p> <p><b>B</b> <i>Myosin</i></p> <p><b>C</b> <i>Z zone</i></p>	<p>Some marks are awarded. No mark is given for structure C. Candidates should be able to interpret electron micrographs as well as manipulate scale bars/magnification data.</p>

(ii) The sarcomere shown in Fig. 1.2 is in a relaxed state.  
State one feature that gives evidence to support this.

[1]

[Total: 13]

Candidate style answer	Examiner's commentary
<p><i>It is quite wide</i></p>	<p>Incorrect answer.</p>

2 Haemoglobin is a pigment which can combine with oxygen and is found in red blood cells.

Fig. 2.1 shows the oxygen dissociation curve for adult haemoglobin.

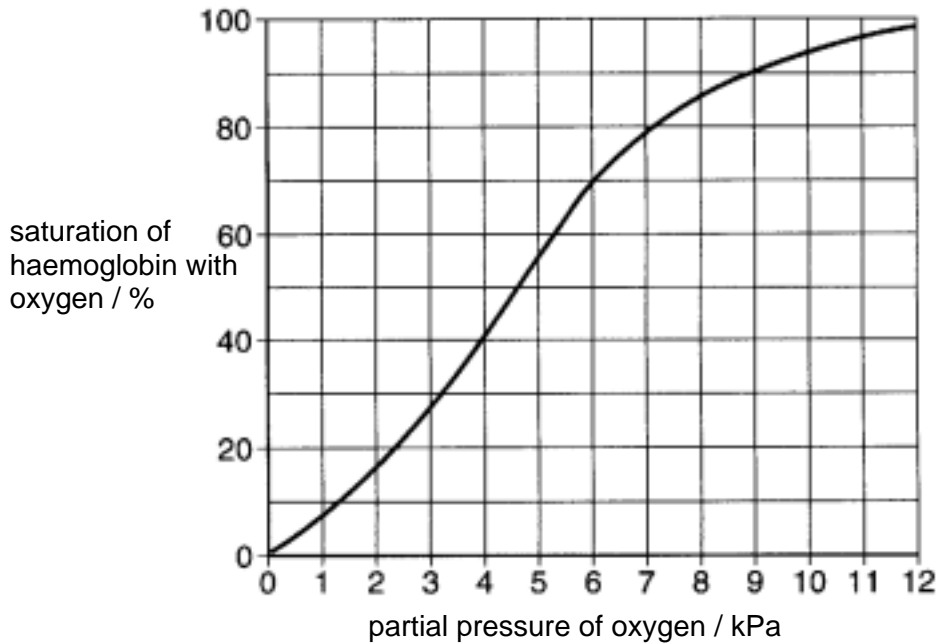


Fig 2.1

(a) Using Fig. 2.1, calculate the difference in % saturation of haemoglobin with oxygen between oxygen partial pressures of 11 k Pa and 2 k Pa.

[2]

Candidate style answer

Examiner's commentary

80%

Correct answer.

(b)(i) On Fig. 2.1, sketch a curve to show the effect of an increase in carbon dioxide concentration on the dissociation of oxy-haemoglobin.

[1]

Candidate style answer

Examiner's commentary

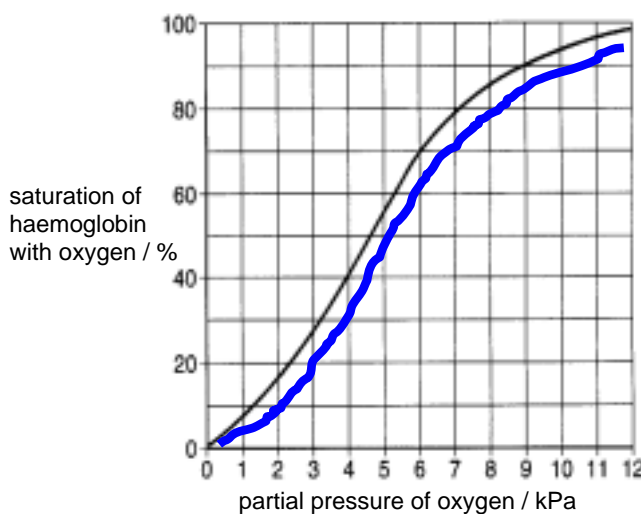


Fig 2.1

Correct answer.

<b>(ii) Describe how an increase in carbon dioxide concentration causes this effect.</b>		<b>[3]</b>
<i>Candidate style answer</i>	<i>Examiner's commentary</i>	
<i>This is the Bohr shift. It happens because the carbon dioxide reacts with the water and makes carbonic acid. This then splits and makes hydrogen ions which are acidic. The ions then attach to haemoglobin and make it let go of the oxygen</i>	The candidate has provided a good response but fails to concentrate on the main focus of the question, which is the effect on the haemoglobin rather than the biochemical details of the process. The candidate could have answered this by means of a flow diagram.	

<b>(iii) Comment on the significance of this effect in leg muscles during exercise.</b>		<b>[2]</b>
<i>Candidate style answer</i>	<i>Examiner's commentary</i>	
<i>When muscles are exercising they will make more carbon dioxide so this will make the haemoglobin let go of the oxygen which they can use for respiration.</i>	Candidates should be encouraged to always discuss the <i>increased</i> rate of aerobic respiration and the <i>increased</i> demand for oxygen and <i>increased</i> production of carbon dioxide when discussing the effects of exercise.	

<b>(c) Sickle cell anaemia is a disease caused by a gene mutation which affects the structure of haemoglobin.</b>		
<b>(i) Describe how a gene mutation can cause a change in the structure of haemoglobin.</b>		<b>[3]</b>
<i>Candidate style answer</i>	<i>Examiner's commentary</i>	
<i>A gene mutation is a change in the DNA which can occur if it is exposed to X-rays. This mutation can change the order of the bases in the DNA which then makes different amino acids in the codons join together in the protein. If this happens then the protein may fold up in different ways. This then will stop the protein from carrying out its proper job and it will not be able to carry the oxygen in the red blood cells.</i>	The candidate has failed to give sufficient detail in this answer but some marks can be awarded. As is common with candidates of medium ability, there is muddling of the terms base / codon / amino acids and also between polypeptide chain/protein.	

<b>(ii) Describe how the changed haemoglobin can affect the role of the red blood cells.</b>		<b>[2]</b>
		<b>[Total: 13]</b>
<i>Candidate style answer</i>	<i>Examiner's commentary</i>	
<i>The red blood cells become paler as there is not as much correct haemoglobin and they are also sickled and look like sythes. This means they have a smaller surface area to volume ratio</i>	This candidate has not picked up the main context of the question which is the <i>role</i> of the red blood cells. Instead they have concentrated on the structure of the red blood cells. Underlining key words in the question can help focus the student e.g. <u>Describe how</u> the changed haemoglobin can affect the <u>role</u> of the red blood cells.	

	There is also confusion in the difference between surface area and SA:volume.
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**3 The early detection of pregnancy is important so that routine antenatal tests may be conducted to monitor the health of the mother and the foetus.**

**As the zygote implants, human chorionic gonadotrophin (hCG) is secreted by the developing cells of the zygote.**

**(a)(i) Describe how the secretion of hCG may be detected, using monoclonal antibodies, in a pregnancy test.**

**[5]**

<i>Candidate style answer</i>	<i>Examiner's commentary</i>
<i>The woman has to collect a sample of her urine and then dip a test stick in it. If she is pregnant then the strip will change colour and a blue line appears in the window. There is also another line which tells her if the test has worked properly. The blue line appears because the monoclonal antibodies stick to the hCG</i>	This answer would gain high marks. The lack of detail means that it is not gaining full credit. Candidates can again be encouraged to tackle difficult concept areas by the use of flow diagrams or annotated diagrams.

**(ii) Suggest why monoclonal antibodies are particularly suited to detect the presence of hCG.**

**[2]**

<i>Candidate style answer</i>	<i>Examiner's commentary</i>
<i>They are soluble which means they can react with the urine and they can be attached to the test strip.</i>	No marks are awarded in this question. As a higher standard targeted question, it requires candidates to apply their knowledge and understanding to new contexts and propose a plausible reason. These questions are designed to stretch and challenge candidates and as such can not be 'taught' but developed as a principle through classroom activities.

**(iii) Describe the role of hCG in maintaining a pregnancy.**

**[2]**

<i>Candidate style answer</i>	<i>Examiner's commentary</i>
<i>hCG is important in keeping the corpus luteum properly. Without this no progesterone will be made and then the lining gets thicker to make the fertilised ovum stick to it</i>	Correct answer.

<b>(b) Describe the role of prolactin.</b>	
<b>(i) during pregnancy;</b>	
<b>[2]</b>	
<i>Candidate style answer</i>	<i>Examiner's commentary</i>
<i>Prolactin makes the breasts grow which are essential at the end of pregnancy to enable the mother to breastfeed her baby</i>	Evidence is present to support the awarding of one mark.

<b>(ii) following the birth of the baby.</b>	
<b>[2]</b>	
<i>Candidate style answer</i>	<i>Examiner's commentary</i>
<i>The mother needs to be able to breastfeed her baby so it is important that her breasts have enlarged. As the baby feeds it stimulates the glands to produce milk. It is better to breastfeed as the mothers milk is better quality than baby milk.</i>	Benefit of the doubt can be given to the implication of milk production in this answer. The candidate should focus on structuring their answers in more concise language with key scientific terms.

<b>(c) Prolactin also inhibits the release of FSH and LH.</b>	
<b>Comment on the possible effects of prolactin on menstruation and fertility</b>	
<b>[4]</b>	
<b>[Total: 17]</b>	
<i>Candidate style answer</i>	<i>Examiner's commentary</i>
<i>If a woman has prolactin it will stop her periods and also stop her fertility as she will not release any ova or ovulate properly.</i>	No marks would be awarded. Common misunderstandings are evident in this answer such as: <i>the prevention of ovulation</i> (rather than the reduced chance of ovulation)the use of the term <i>period</i> rather than menstruation <i>stopping fertility</i> (rather than reducing her fertility levels)



4 Fig. 4.1 shows some of the events during the first stage of protein synthesis.

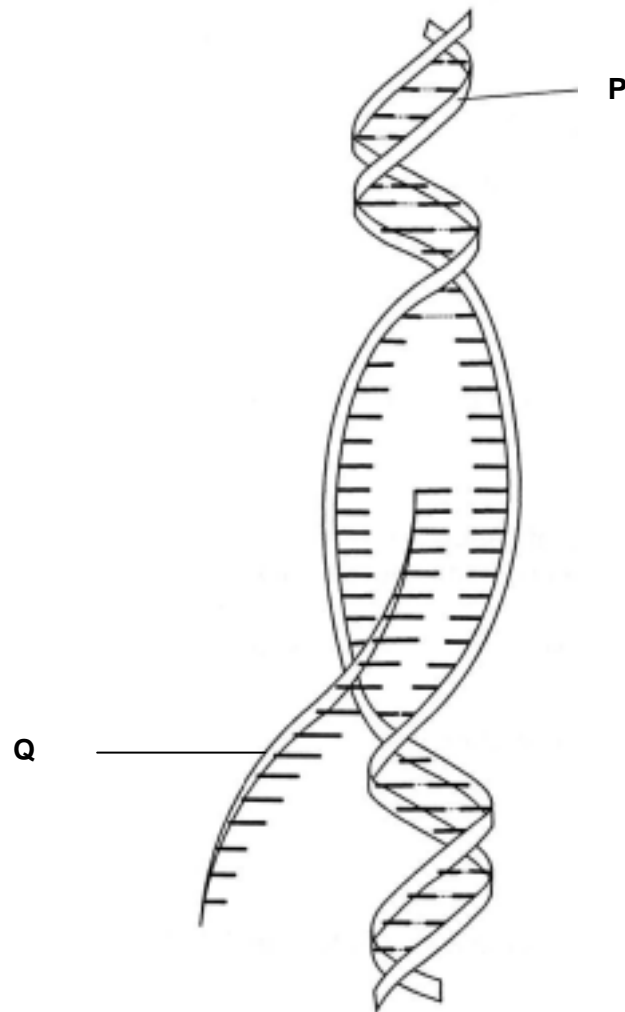


Fig. 4.1

(a)(i) Name the molecules labelled P and Q on Fig. 4.1.

[2]

Candidate style answer	Examiner's commentary
<b>P</b> DNA <b>Q</b> RNA	The lack of specific type of RNA prevents the full marks being awarded.

(ii) Name this stage of protein synthesis.

 In your answer, you should use the appropriate technical term, spelled correctly.

[1]

Candidate style answer	Examiner's commentary
Transcription	Correct answer..

(b)(i) Describe what is happening during this stage of protein synthesis.

[4]

Candidate style answer	Examiner's commentary
The DNA unzips and forms two single strands. Then an enzyme called RNA	Some marks can be awarded for this fair attempt at the question. It may be easier for weaker candidates to annotate a diagram and

<p><i>polymerase travels up the sense strand. As it does this it joins together the free nucleotides to make a strand of RNA. This is then small enough to fit through the pores in the nuclear membrane to travel to the cytoplasm. Then translation occurs and the protein is then made by the ribosomes.</i></p>	<p>this is acceptable. The specific type of nucleotides was not evident i.e. RNA nucleotides rather than DNA nucleotides. The additional detail from the AS specification, such as condensation reactions, would also have been credited. Students should remember that the synoptic aspects of the specification will be assessed on both F224 and F225. It is important that these synoptic links are highlighted by teachers throughout the course as individual topics are being taught and not just covered as a bolt on at the end of the course ahead of the exams.</p>
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<p><b>(ii) Describe what happens next to the molecule labelled Q.</b></p>		<p><b>[1]</b> <b>[Total: 8]</b></p>
<p><i>Candidate style answer</i></p>	<p><i>Examiner's commentary</i></p>	
<p><i>Q is the RNA which moves out of the nucleus into the cytoplasm through the pores in the nuclear membrane.</i></p>	<p>Correct answer.</p>	

<p><b>5 Human activity has a considerable impact on the environment.</b></p>		
<p><b>(a) Explain the term succession.</b></p>		<p><b>[2]</b></p>
<p><i>Candidate style answer</i></p>	<p><i>Examiner's commentary</i></p>	
<p><i>This is when at the start there is bare ground such as after a fire and over time different plants start to grow. At the beginning they are pioneer plants and then more specialised plants grow after the land has been fertilised. Eventually there will be oak trees.</i></p>	<p>Correct answer.</p>	

<p><b>(b) Fig. 5.1 shows a primary succession in a temperate climate. X represents an example of deflected succession.</b></p>		
<p><b>Fig. 5.1</b></p>		
<p><b>(i) Suggest how the deflected succession X could be caused.</b></p>		<p><b>[2]</b></p>
<p><i>Candidate style answer</i></p>	<p><i>Examiner's commentary</i></p>	
<p><i>Deflected succession usually happens as a result of humans. They make the ground bare because they burn crops or</i></p>	<p>Correct answer.</p>	

<i>cut down forests</i>	
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<b>(ii) Explain how biomass changes during primary succession.</b>		<b>[1]</b>
<i>Candidate style answer</i>	<i>Examiner's commentary</i>	
<i>It will get bigger as more specialised plants are bigger.</i>	Correct answer.	

<b>(c) A farmer intends to change from keeping turkeys free-range, in fields, to keeping them inside large sheds. Explain how this change will affect the sustainability of production.</b>		<b>[4]</b>
		<b>[Total: 9]</b>
		<b>[Paper Total 60]</b>
<i>Candidate style answer</i>	<i>Examiner's commentary</i>	
<i>The production will be improved as the conditions will be more controlled but it will cost a lot of money to set it up. This type of farming is called intensive farming and usually means that the animals are fed on more artificial foods than the natural food they would have in the outdoors.</i>	Some marks are awarded. Mark point 7 is not awarded as there is insufficient detail about the type of conditions that will be improved within the sheds.	

**Overall Banding:** Medium standard.

This candidate has demonstrated ability typical of a middle ability candidate.

There are key areas in which this candidate can improve;

- Use of more specific key terms.
- Increased detail.
- Underlining command questions and key words in the question to focus the answer in the correct area.
- More use of synoptic knowledge (see comments under question 4(b) (i)).
- Use of bullet points and flow diagrams to aid the construction of clear and concise answers, especially in areas which are conceptually hard to visualise and learn e.g. pregnancy testing, respiration.