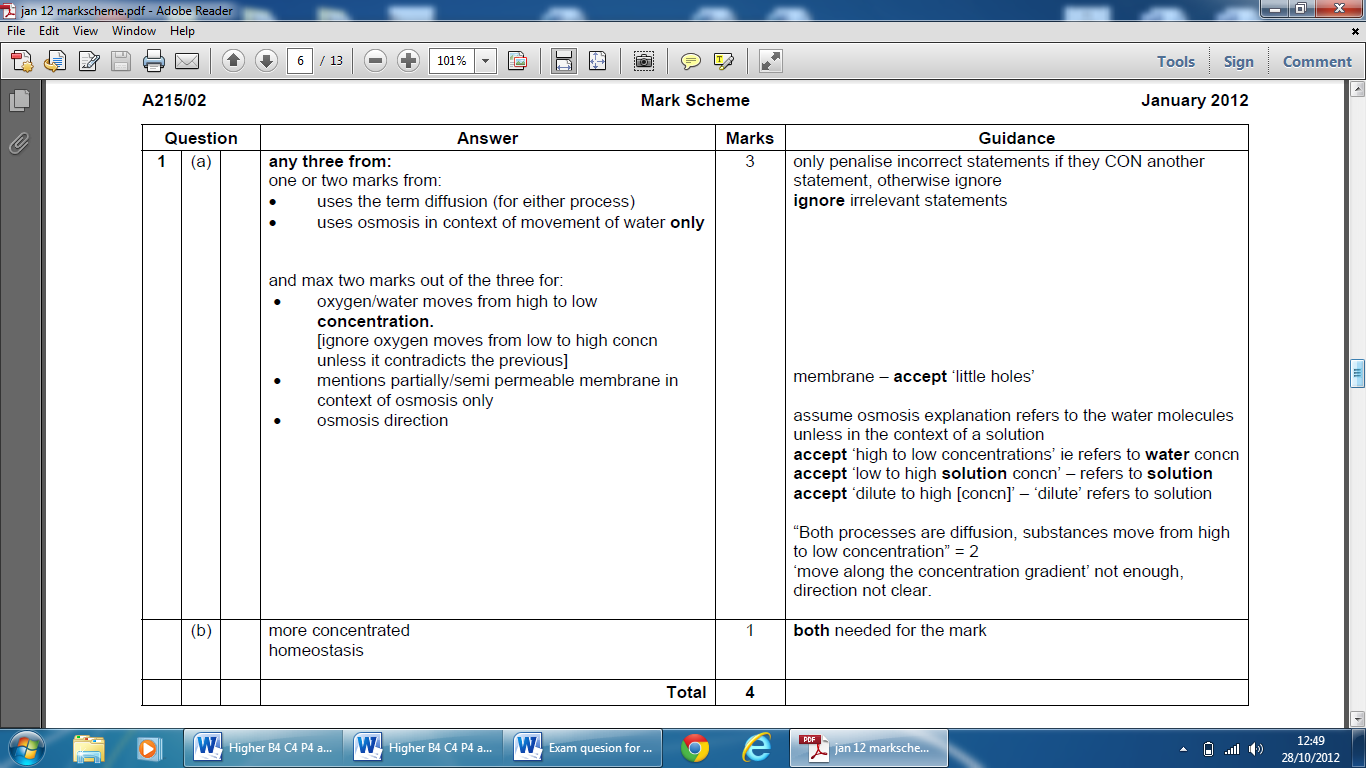
**Higher paper B4 C4 P4 Jan 2012 (amended for new spec)**

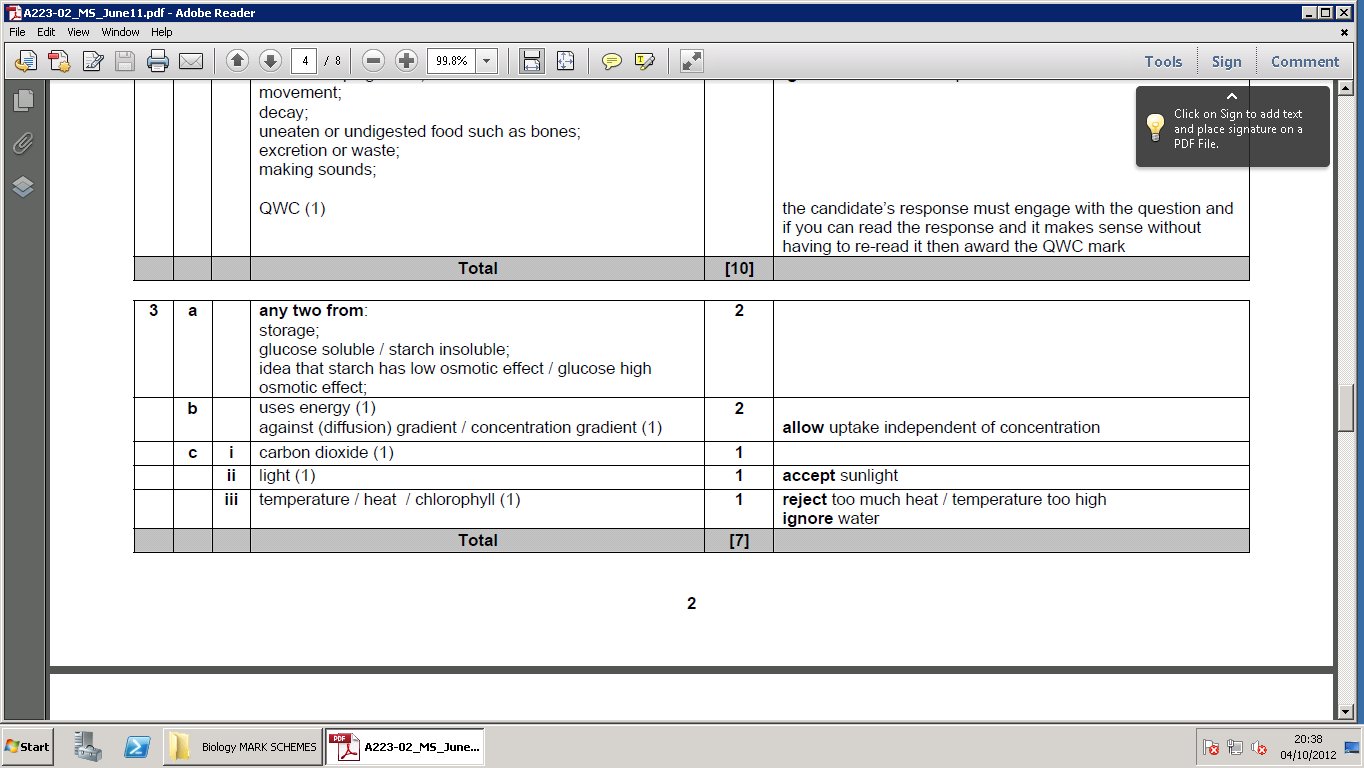
**Markscheme**

**1**

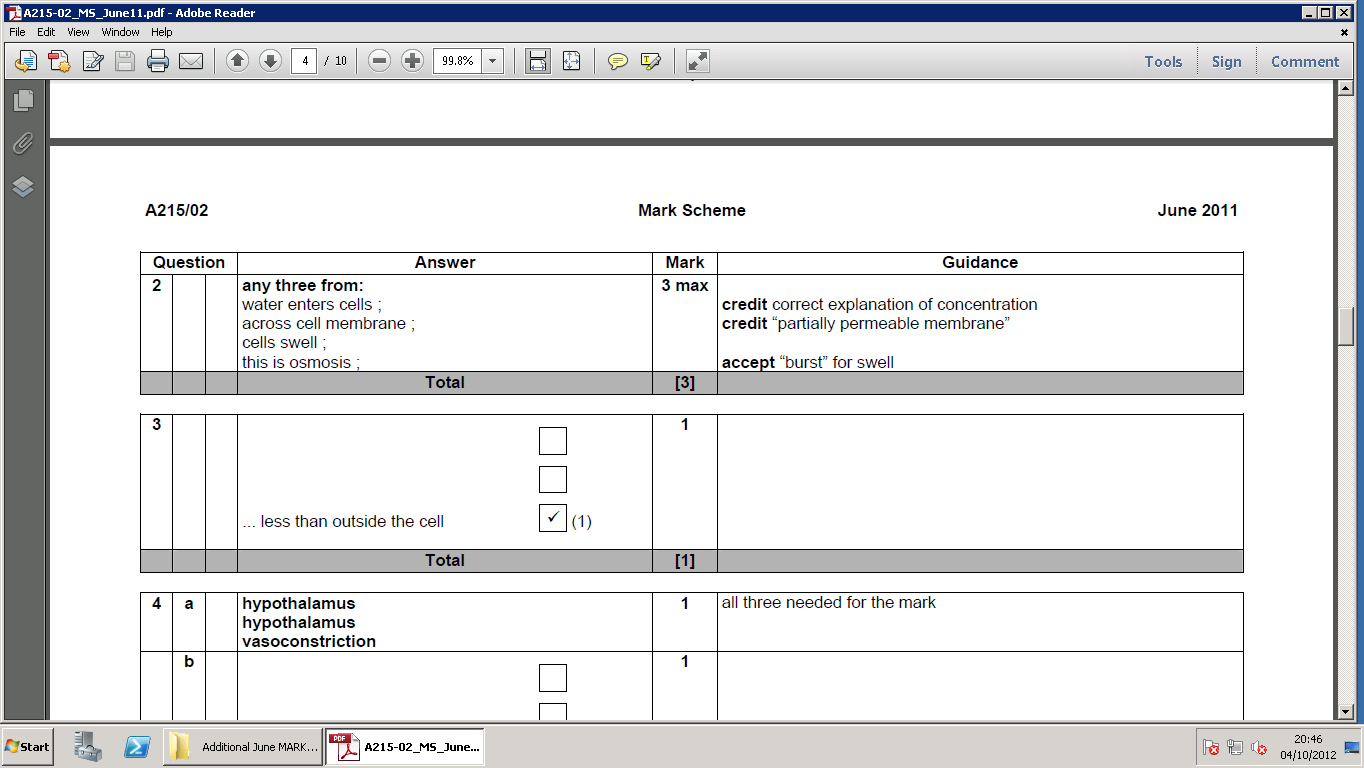


**[Total: 3]**

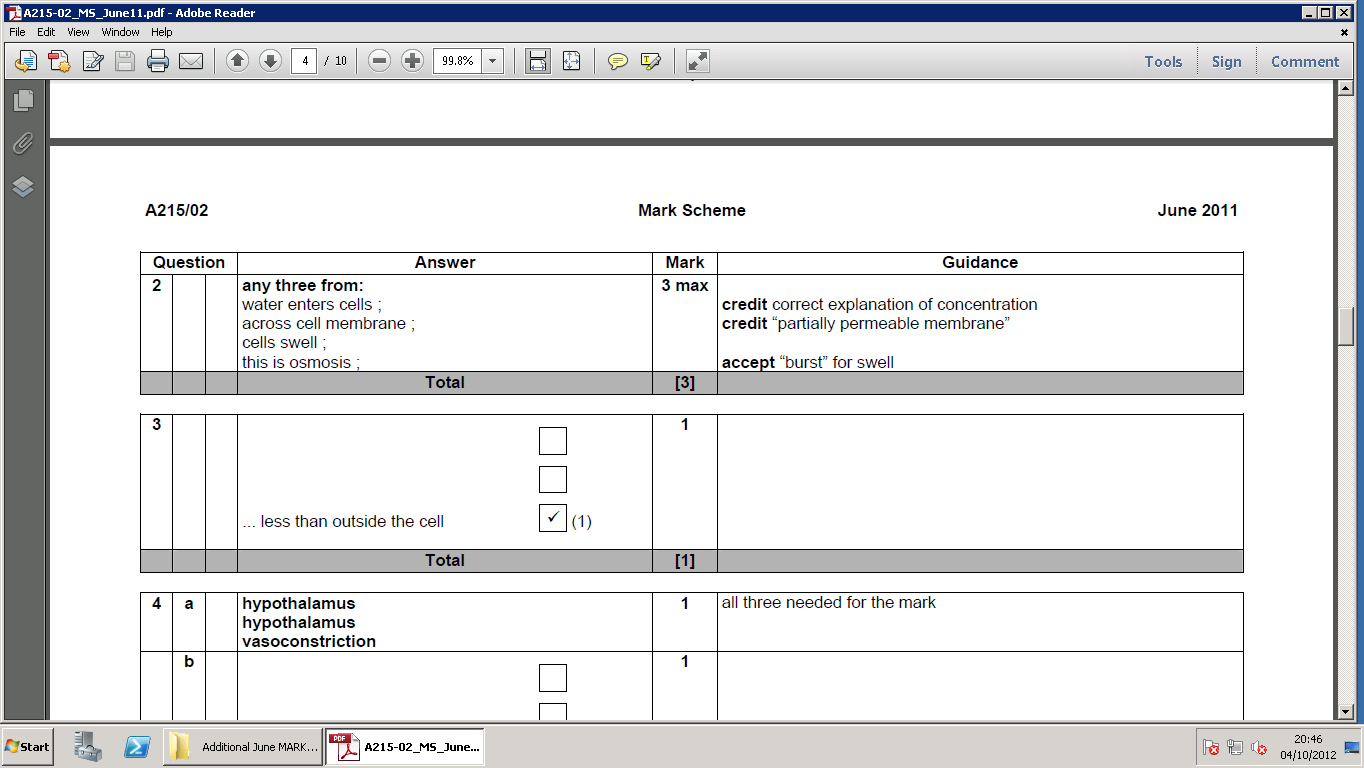
**2**



**3**



**4**



**5 (6 Mark Question)**

**Relevant Points**

* Anaerobic respiration occurs without oxygen
* Word equation for anaerobic respiration in humans given
* Word equation for anaerobic respiration in microorganisms given
* Energy is produced from anaerobic respiration in both humans and microorganisms
* Lactic acid produced in humans is a waste product, and is toxic in large amounts
* Ethanol produced by microorganisms can be used for things such as alcoholic drinks
* Anaerobic respiration in yeast can produce bioethanol that can be used to fuel car engines
* Anaerobic respiration in bacteria produces biogas that can be used as a fuel

**Level 3 (5-6 marks)**

Answer correctly and clearly identifies the difference between anaerobic respiration in humans and microorganisms. Candidate shows lactic acid is produced by humans, and ethanol and carbon dioxide is produced by microorganisms. At least two uses of the products of anaerobic respiration are described, and lactic acid is identified as a waste product. Points are presented in a clear, coherent and organised format. Few, if any, errors in grammar, punctuation and spelling.

**Level 2 (3-4 marks)**

Answer correctly outlines the difference between the products of anaerobic respiration between microorganisms and humans. At least one use of the products of anaerobic respiration in microorganisms is described. Technical terms are used for the most part appropriately. There are occasionally errors in grammar, punctuation and spelling.

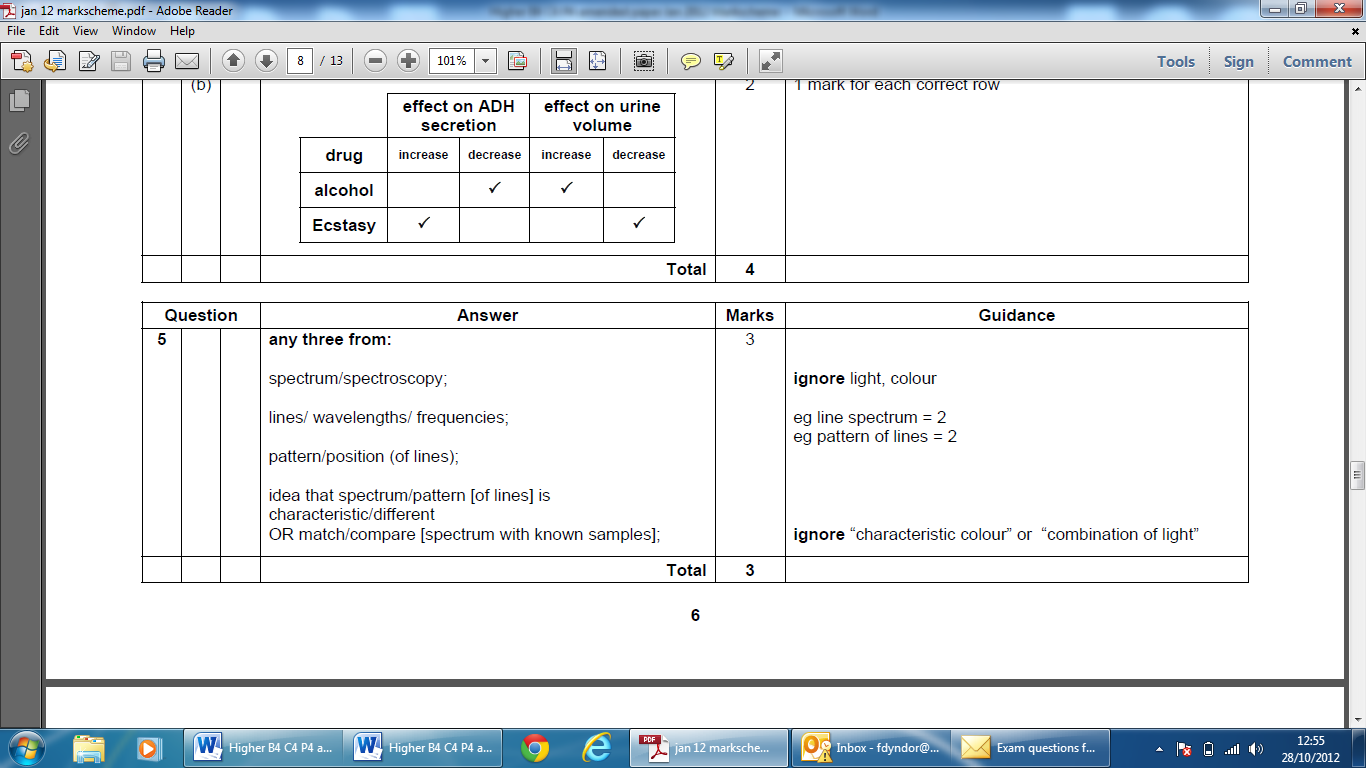
**Level 1 (1-2 marks)**

Answer describes what anaerobic respiration is, but does not fully identify what the products of anaerobic respiration in microorganisms and humans are. Candidate may identify one use of the products of anaerobic respiration. Answer may be simplistic with limited use of technical terms. Communication is hampered by errors of grammar, punctuation and spelling

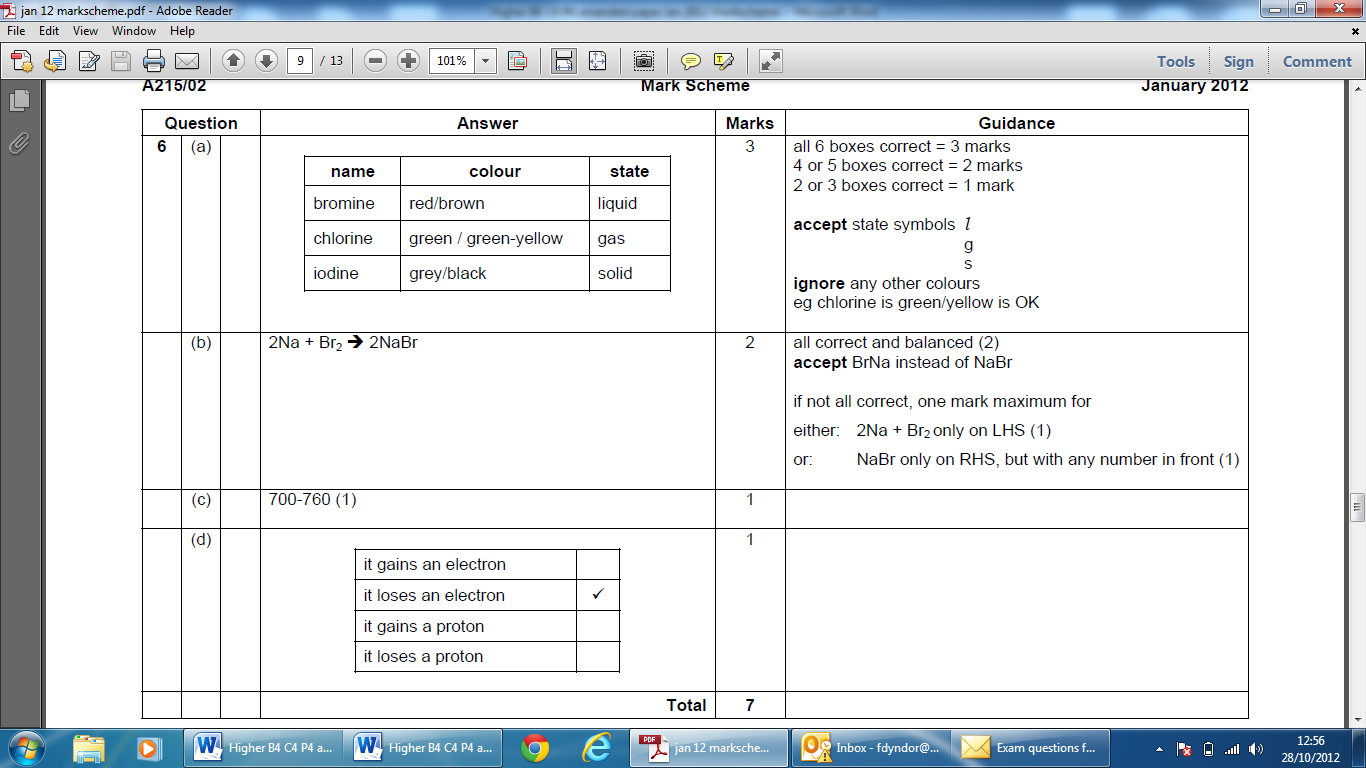
**Level 0**

Insufficient or irreverent science. Answer not worthy of credit

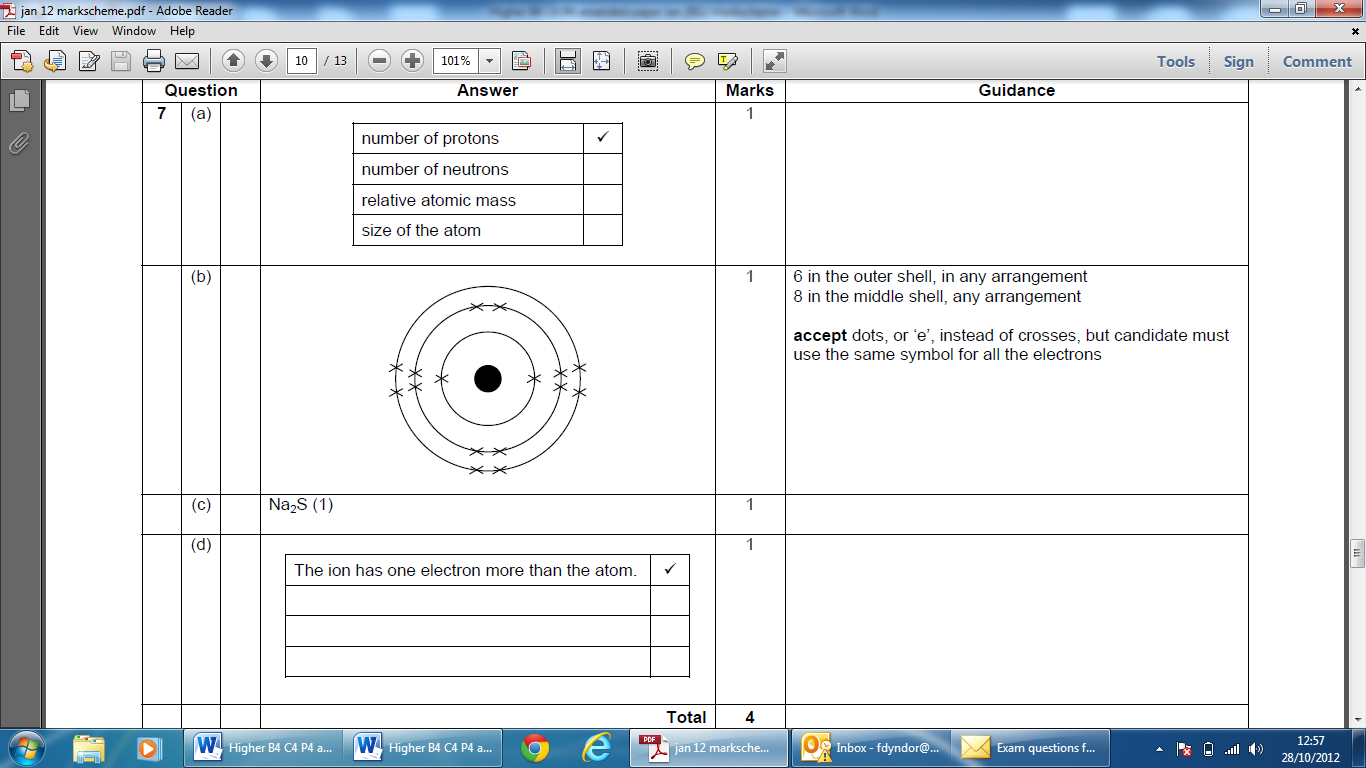
**6**



**7**



**8**



**9 (6 Mark Question)**

Any mention of 6 of the following:

Caesium and Rubidium are group 1 metals / alkali metals.

Group 1 metals are highly reactive.

Highly reactive elements are not found in their elemental form in nature.

Spectroscopy gives line spectra

Line spectra are different for each element

The position or colour of the line depends on the energy level of the electrons in the element.

Bohr explained the line spectra from atoms.

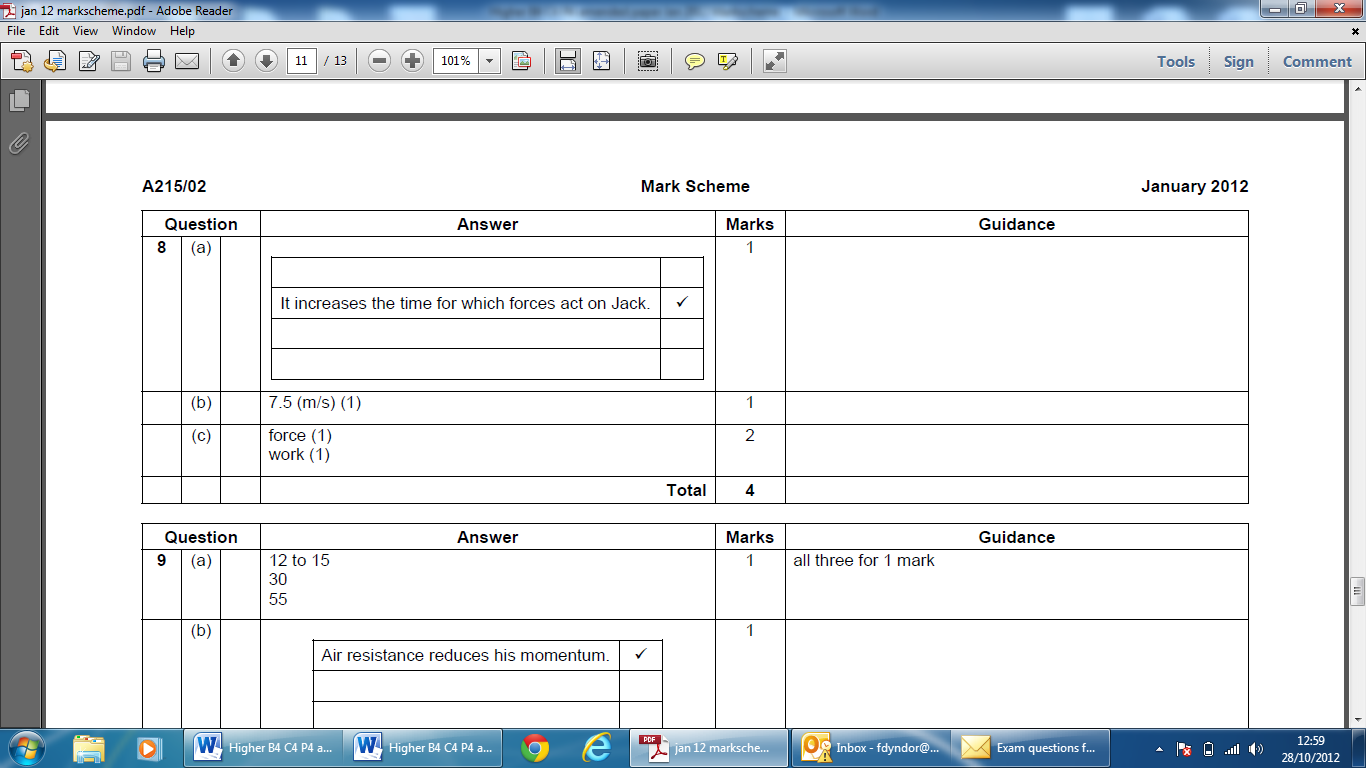
Mention of electron shells or energy levels

Drawing of an atom, illustrating electron arrangement.

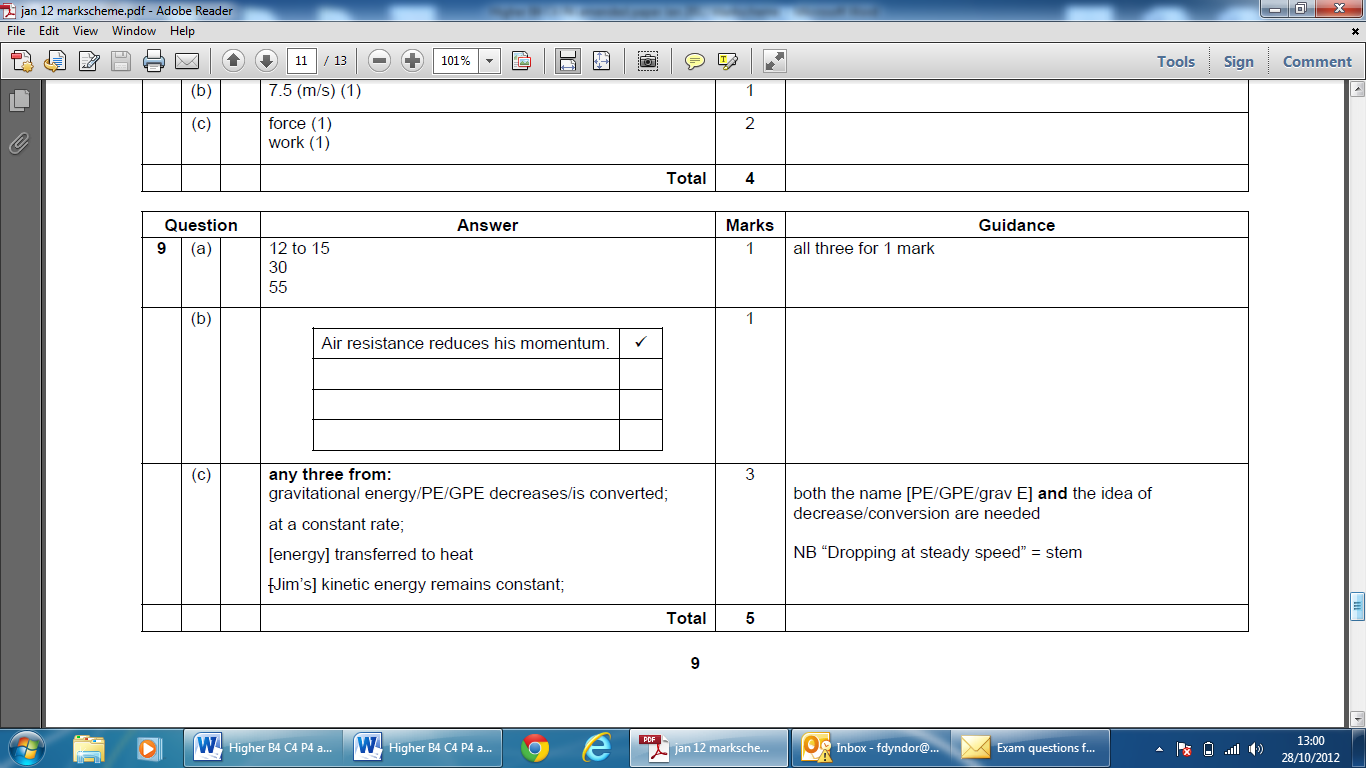
Drawing of an emission spectra.

-Or any 5 of the above and well written gains 6 marks with 1 mark awarded for spg.

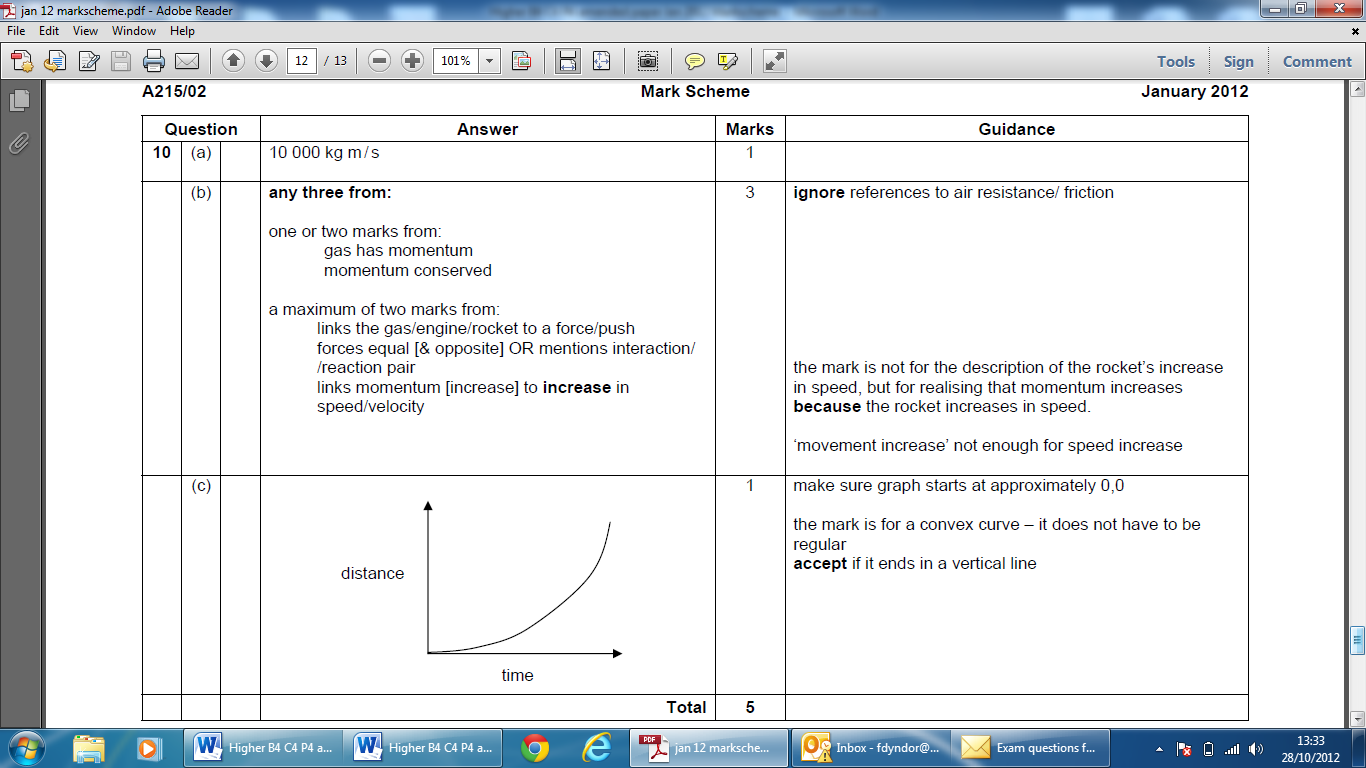
**10**



**11**



**12**



|  |  |  |  |
| --- | --- | --- | --- |
| **Q** | **Expected answers** | **Marks** | **Additional guidance** |
| **13** | **[Level 3]**  Includes most relevant points in each category in the answer. Describes the motion accurately, possibly calculating acceleration. Explains how the interaction pair arises and where the forward force comes from. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used appropriately. Few, if any, errors in grammar, punctuation and spelling.  (5 – 6 marks)  **[Level 2]**  Outlines the motion of the bicycle accurately but leaving out some details like timings or value of acceleration. Is able to identify where the interaction pair arises and that it is caused by friction but the correct language is likely to be absent. For the most part the information is relevant and presented in a structured and coherent format. Specialist terms are used for the most part appropriately. There are occasional errors in grammar, punctuation and spelling.  (3 – 4 marks)  **[Level 1]**  Outlines the basic motion of the bicycle with very little detail. Explanation of forces likely to be basic and coming from the foot rather than the tyre. There may be limited use of specialist terms. Errors of grammar, punctuation and spelling prevent communication of the science.  (1 – 2 marks)  **[Level 0]**  Insufficient or irrelevant science. Answer not worthy of  credit.  (0 marks) | **[6]** | **relevant points include;**  Describing the motion;   * From 0 – 7 seconds he his travelling at a constant velocity of 40 m/s * From 7 – 14 seconds he is decelerating (slowing down) at an average of 40/7 = 5.7 m/s/s * His deceleration is non-constant (deceleration is quick to start off with and then slows down)   Explaining how the forces allow him to cycle;   * The chain that is driven by the pedals turns the wheel * The tyre exerts a force backwards on the ground * If the friction between the ground and tyre is high enough * The ground will exert and equal and opposite force forwards on the tyre – this is the other force in the interaction pair * It is this force that enables the bicycle to move   **reject** discussion of weight and reaction force in forces |
|  | **Total** | **6** |  |