WESTMINSTER SCHOOL
THE CHALLENGE 2016

BIOLOGY

Thursday 28 April 2016

Time allowed: 30 minutes

Write your answers in the spaces provided.

Please write in black or blue ink.

For examiner use only

Total Mark	

Answer **all** the questions.

B1 Complete the following table by inserting the correct terms or definition. The first one is done for you.

site of aerobic respiration in the cell	mitochondrion
disease caused by a lack of vitamin D in the diet	
enzyme found in seeds, used during germination	
name given to the first organism in a food chain	
	gene
	limewater

[5]

B2 **Figure 1.1** shows the changes to the uterus lining during the menstrual cycle. Lines **A** and **B** represent the concentrations of two important hormones involved in controlling the menstrual cycle.

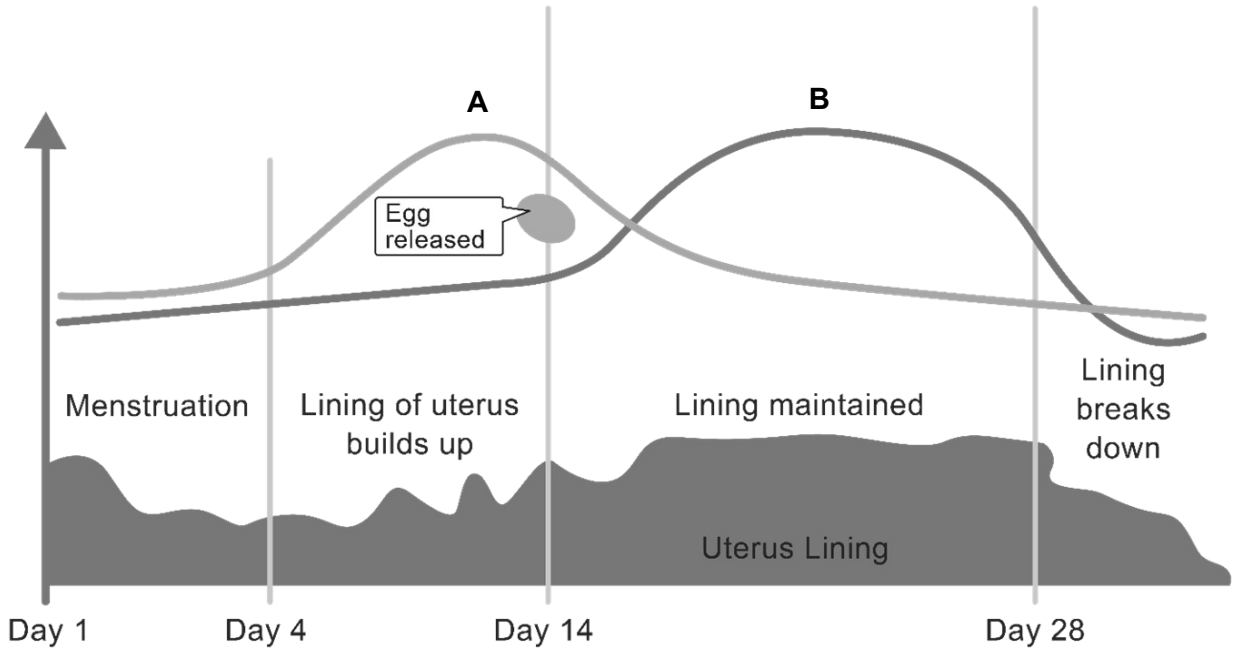


Figure 1.1

(a) Which of the hormones is responsible for each of the following events?

i) Maintaining the uterus lining ……

ii) Building up the uterus lining ……

iii) Triggering the release of an egg …… [2]

(b) State where, in the female human reproductive system, fertilisation occurs.

…… [1]

(c) Many cells are specialised and adapted to their function. Sperm cells and egg cells are two such examples. Explain how both of these cell types are adapted for their specific functions.

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…… [4]

(d) The sex of an organism is whether it is classed as biologically “male” or “female”. In mammals, the sex is determined by the organism’s DNA. In some reptiles it is determined by the temperature at which an egg is incubated.

Suggest definitions for “male” and “female” which take into account the type of gametes which an organism produces

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…… [1]

B3 Plankton live in the sea. The diagram shows plant plankton and animal plankton drawn to the scales shown.

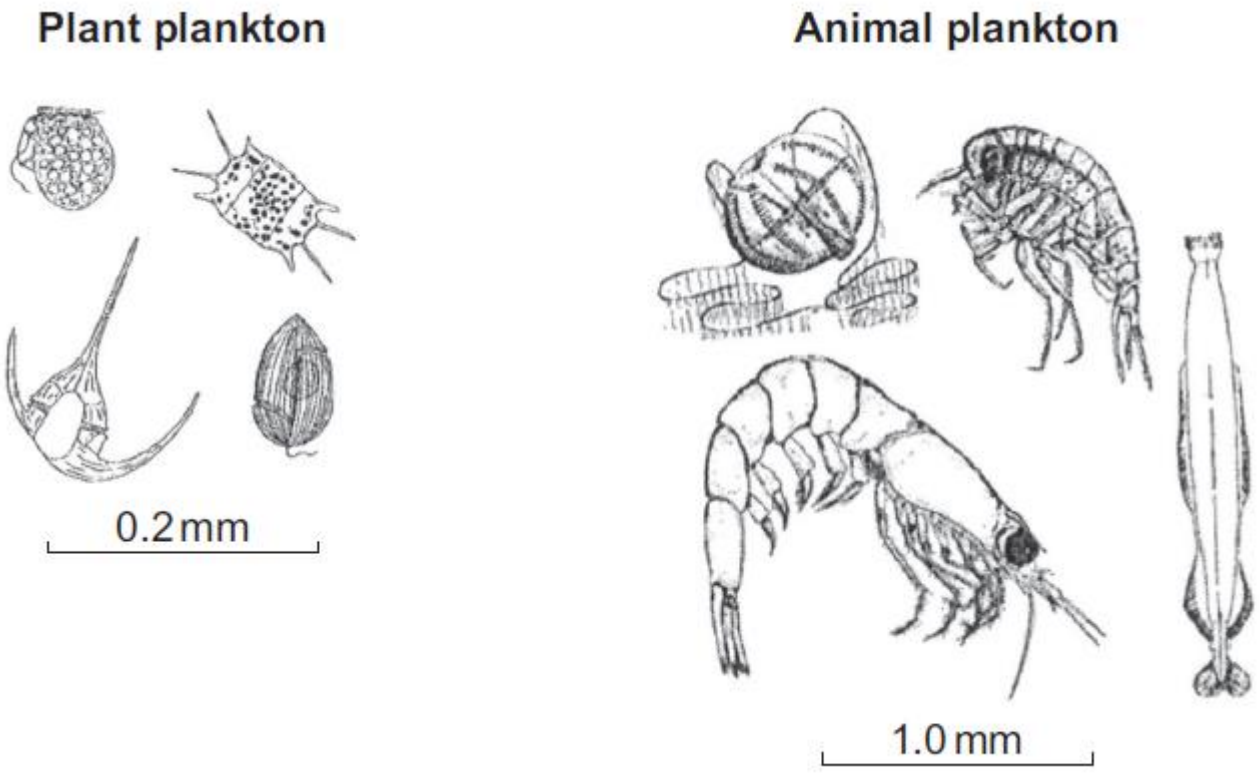
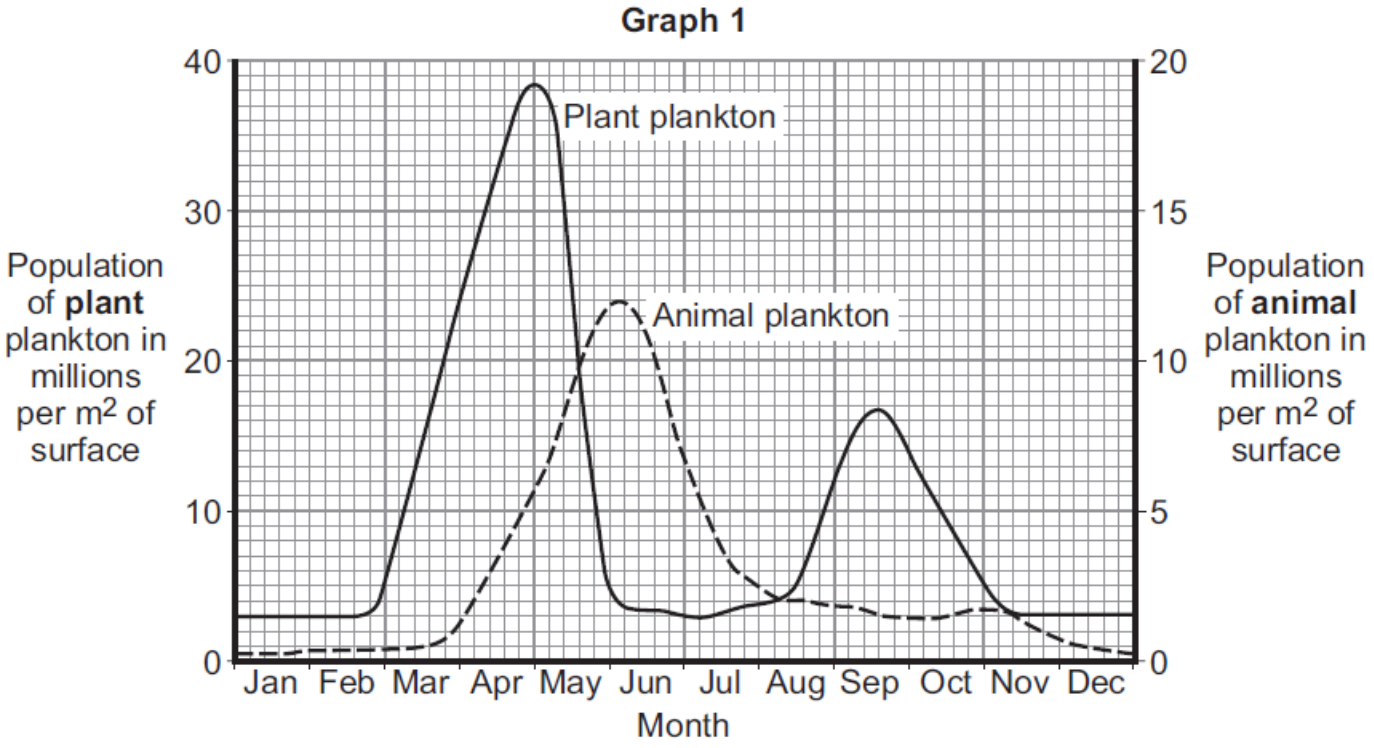


Figure 1.2

Animal plankton eat plant plankton. **Graph 1** shows how the populations of the plant plankton change through the year in the seas around the UK. Animal plankton is eaten by predators such as basking sharks.



(a) Describe and explain, using **Graph 1**, how the animal plankton population changes between January and the end of July.

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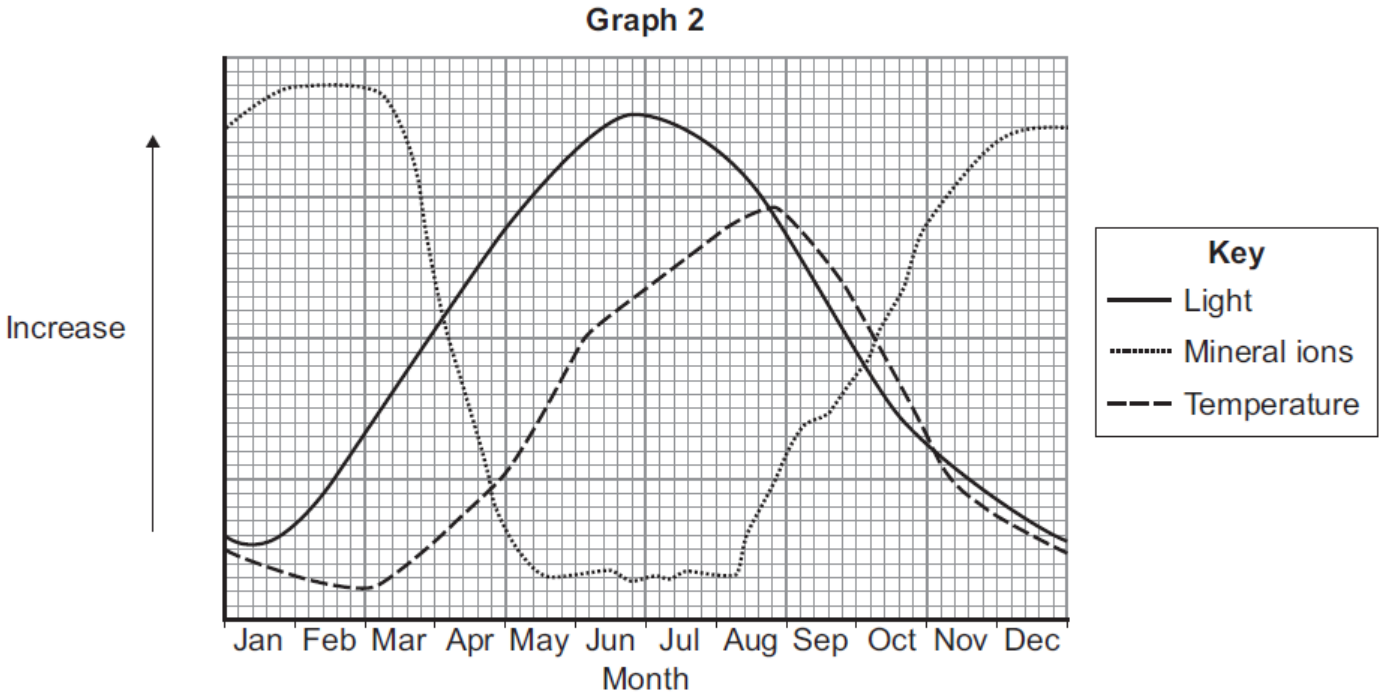
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..... [4]

Graph 2 shows changes in some of the conditions in the upper layers of the sea around the UK over the same time period.



(b) Using the information in **Graph 1** and **Graph 2**, and your knowledge of photosynthesis, suggest why the plant plankton population increases between March and the start of May and then again from mid-August to October.

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..... [2]

(c) A fish farmer wants to grow his own populations of plant plankton to feed to his fish. Suggest two mineral ions that he should add to the water to promote growth, and state what the plankton would use them for.

Mineral 1: .....

Use: .....

Mineral 2: .....

Use: ..... [2]

(d) Another class of microscopic aquatic organisms common in the UK is that of algae. **Figure 1.3** is a diagrammatic representation of a *Chlamydomonas* algae, a genus of green algae consisting of unicellular organisms, found in stagnant water and on damp soil, in freshwater, seawater, and even in snow.

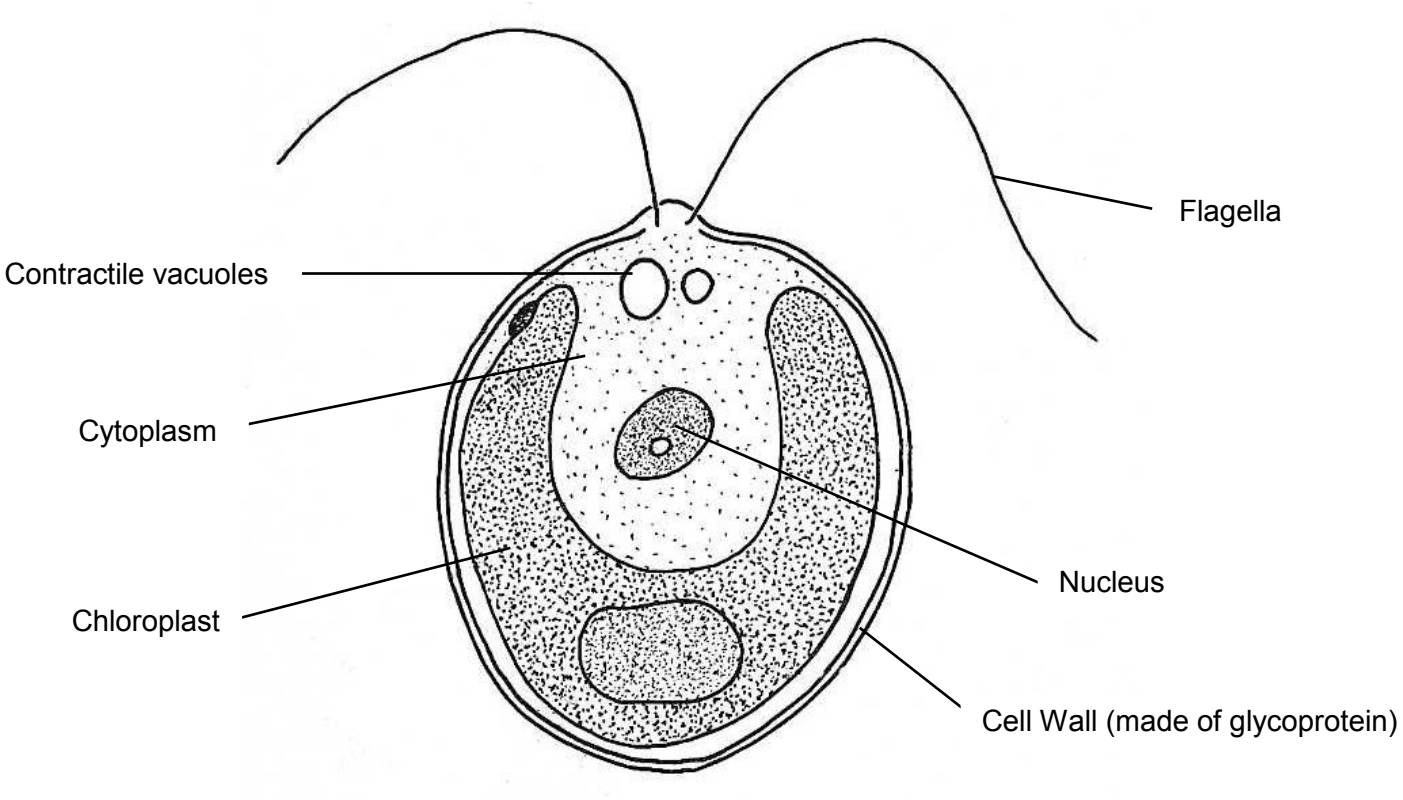


Figure 1.3

When classifying this algae scientists disagreed as to whether it can be classed as a member of the Plant kingdom. Using **Figure 1.3**, give one piece of evidence to support *Chlamydomonas* being classified as a plant and one piece of evidence against this.

In support

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……

Against

……

…… [2]

B4 Smoking is known to be associated with many health problems, such as cardiovascular disease and lung cancer. A scientist was interested in investigating whether smoking during pregnancy had any impact on early development of the baby, such as the point at which they crawl, walk, or say their first word.

(a) Design an experiment to investigate whether smoking during pregnancy might affect early development in babies born to mothers who smoke.

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(b) Explain why smoking during pregnancy is dangerous.

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(c) Explain how the changes to the lung tissue can lead to breathing difficulties in long term smokers.

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…… [2]

B5 **Figure 1.4** shows two microscope images of the human intestine. '**A'** depicts a normal, healthy intestine, and '**B**' is from a person with coeliac disease, in which the intestine is damaged due to an allergic reaction to gluten, a protein found in many grains.

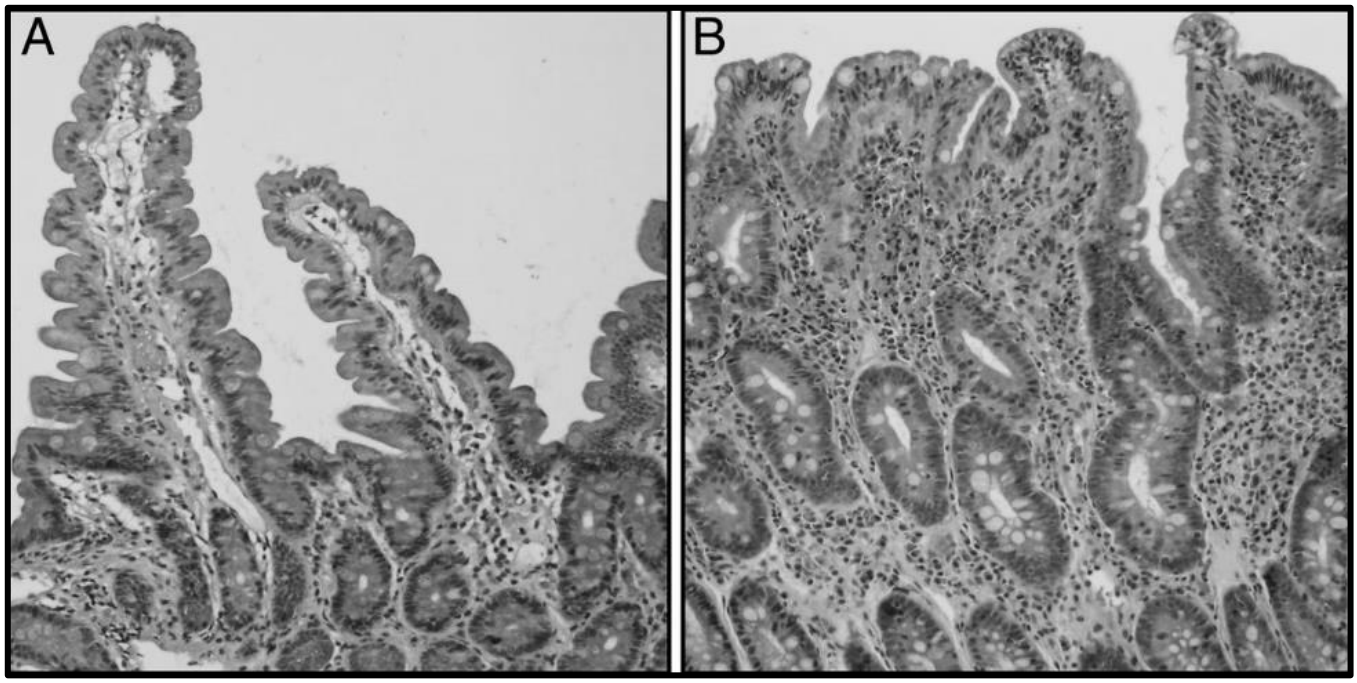


Figure 1.4

(a) Using Figure 1.4, suggest what symptoms someone suffering from coeliac disease may suffer.

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…… [2]

(b) A person diagnosed with coeliac disease will have to follow a strict diet which prohibits them from eating any grain-based foods such as bread, pasta and cereals. What is the most likely nutritional deficiency from following such a diet?

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…… [1]

[Total marks: 33]