TONBRIDGE SCHOOL

Specimen Entrance Paper for Year 12 Entry

Biology

Time allowed : 45 min

You should spend 5 minutes reading the paper (during which you should do no writing) and 40 minutes answering the questions.

Total Marks : 40

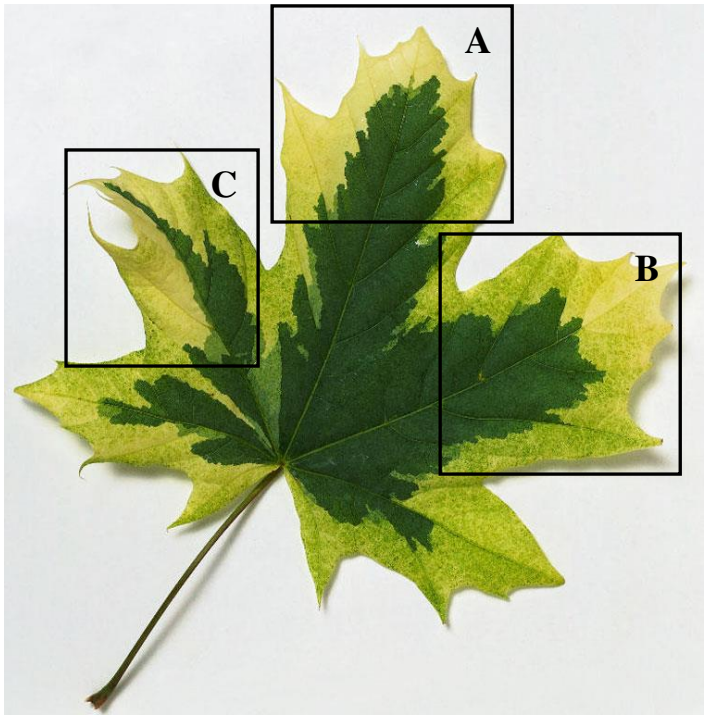
Answer ALL the questions on the lined paper provided, except for 1(e).

In all questions the marks given for each part reflect how many separate points you are expected to make in your answer.

In order to test your ability to think, you will be asked some questions about things which *you have not already studied or are not on your syllabus*. In these cases, use your biological knowledge to help you attempt answers to the questions.

1 The leaf shown below is from a "variegated" type of tree called a Maple. Only the central parts of each leaf are green.

During a complicated experiment on this leaf, three different areas of it were differently treated, after the leaf had been initially destarched. These treatments are indicated by the labelled boxes **A**, **B** & **C**.



The untreated parts of the leaf were supplied with all normal requirements to allow them to photosynthesise.

Area A of the leaf was covered top and bottom with black card.

Area B was deprived of CO_2.

Area C was lit only with a mixture of red and blue light.

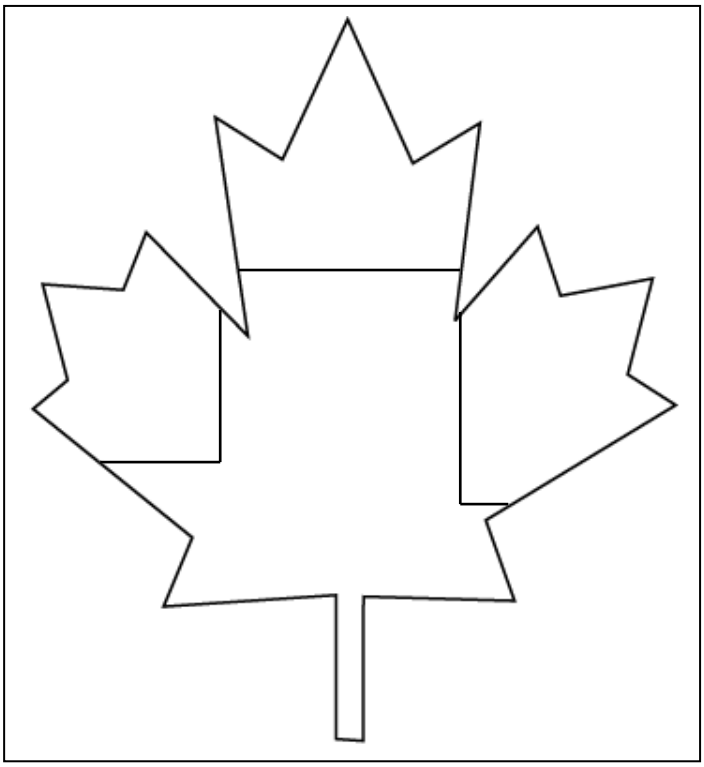
(a) How and why was the plant initially **destarched**? [2]

(b) Explain why the whiter areas of the leaf were unable to photosynthesise. [2]

(c) Explain if it is correct to argue that this experiment has a suitable built-in 'control' test. [1]

(d) Suggest one way of making the conclusions which might be drawn from this experiment **more reliable**. [1]

(e) Use the outlines of the leaf shown below (or redraw the diagram onto your answer paper) to indicate the results of testing the variegated leaf after the experiment for the presence of starch by roughly **shading in** parts which **would have contained starch**, and leaving blank those without. The positions of the edges of boxes A, B and C have also been indicated to help you. [4]



(f) Explain the result you have suggested for **Area C** of the leaf. [1]

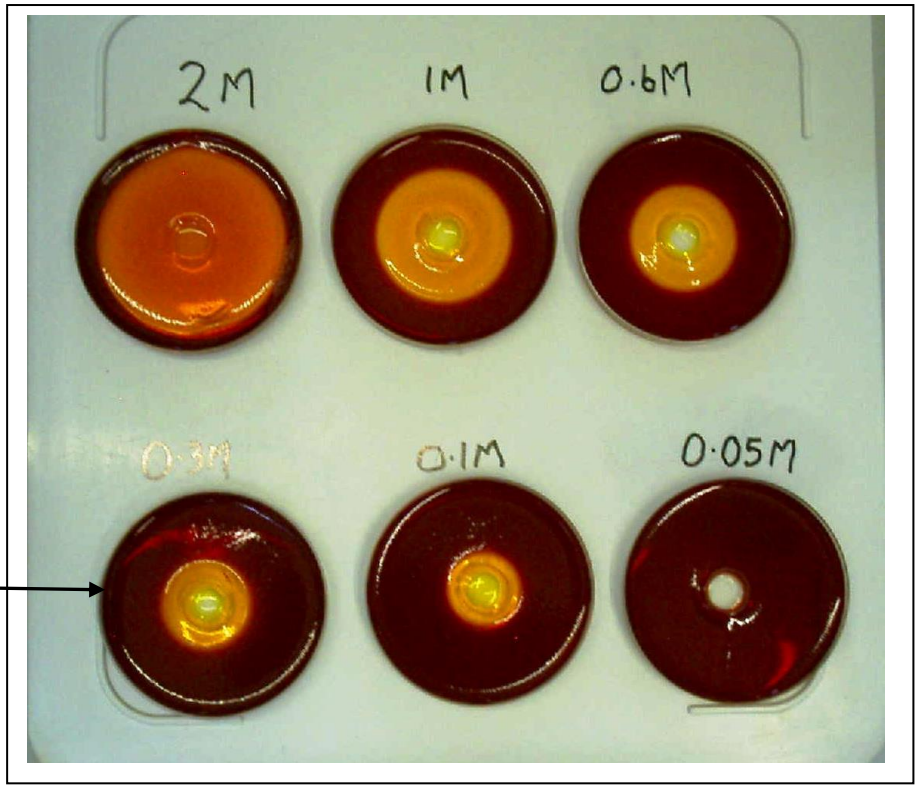
(g) Explain why photosynthesis is such an important process to life on Earth. [2]

2 Starch is a large, "polysaccharide" carbohydrate. Using a list of bullet points, describe what happens to it during digestion in as much detail as you can. [3]

3 **Diffusion**, **active transport** and "**mass flow**" by pumping are all methods of moving substances used in bodies.

(a) **Diffusion** is very important in a lot of biological structures. It involves the random movement of particles/molecules, the rate of diffusion being affected by a number of different factors.

The picture below shows the results of an experiment using acid and some jelly which was kept in petri dishes. The jelly was red to start with but is turned yellow in the presence of acid. Equal volumes of the acid were placed into a hole cut into the centre of each of the jellies. In this experiment, *different concentrations of acid* (represented by the "M" [=molarity]) were used, and the set-up was left for about 24 hours.



The concentration used here was **0.3M**

(i) Suggest two ways in which this experiment could properly be described as being a "fair test". [2]

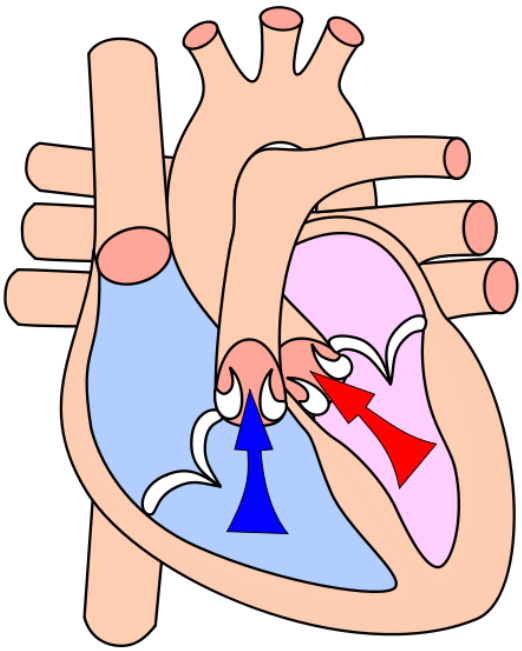
(ii) Use a ruler to measure some of the central yellow areas of jelly and describe the results of the experiment. [2]

(iii) Explain the results. [2]

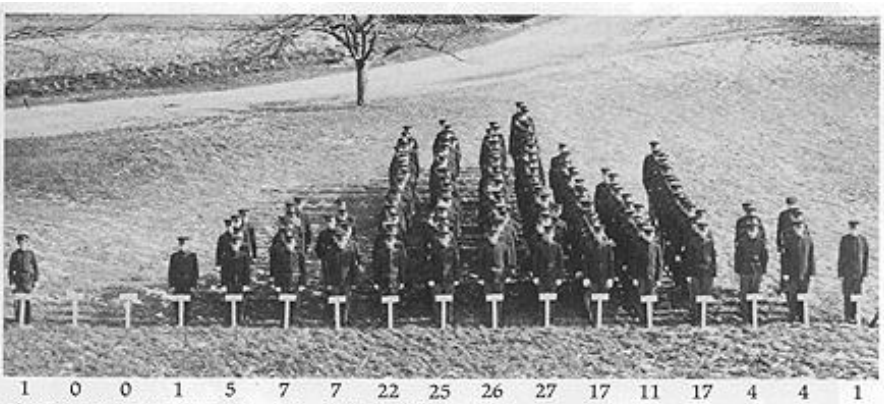
(iv) Describe the importance of diffusion in human lungs. [2]

(b) **Active transport** (or "active uptake") is used by cells lining the human intestines, and by cells lining plant roots to take up nutrients of different sorts into the body of the animal or plant. How does active transport differ from diffusion? [3]

(c) **Mass flow** or 'pumping' is used to move blood around the body of a mammal. Label some of the structures in the picture below (which shows the heart during one phase of the pumping cycle). Then explain the function of the heart valves. [5]



4 The picture below shows a group of young men who were joining the British army during the First World War. They are lined up behind posts which indicate their heights (in feet and inches, so 5'3" means 5 foot 3 inches).



1	0	0	1	5	7	7	22	25	26	27	17	11	17	4	4	1
4'10"	4'11"	5'0"	5'1"	5'2"	5'3"	5'4"	5'5"	5'6"	5'7"	5'8"	5'9"	5'10"	5'11"	6'0"	6'1"	6'2"

Figure 1.5
Differences in height in the same population: heights of conscripts over 60 years ago. (From A. Blakeslee, *Journal of Heredity*, vol. 5, 1914.)

(a) Suggest two possible causes of the variation you can see in these men. [2]

(b) If these men had been born in 1990, how and why might we have expected their heights to differ? [2]

(c) Why might two fully grown siblings (e.g. brothers) raised together differ in height whereas monozygotic ("identical") twins raised together are normally the same height? [2]

(d) Suggest why monozygotic or cloned animals may be especially useful for testing the effects of medical drugs before they are used widely. [2]

[40 marks]

END OF PAPER