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The Haberdashers' Aske's Boys' School
Elstree, Herts

13+ Entrance Examination 2016

BIOLOGY

Please follow these instructions

- The Science paper is divided into three sections (Biology, Chemistry and Physics). The time for the Science paper is 1 hour. You should spend no more than 20 minutes on each section.
- Answer the questions in the spaces provided. Long answers are not expected.
- You may use your calculator in any of the numerical questions.
- Rough work should be done on the paper but do not write in the margins.
- Write your name and school in the box below.

Name	
School	
Exam number	

For the examiner's use only

Question	1	2	3	4	5	Total
Max						33
Mark						

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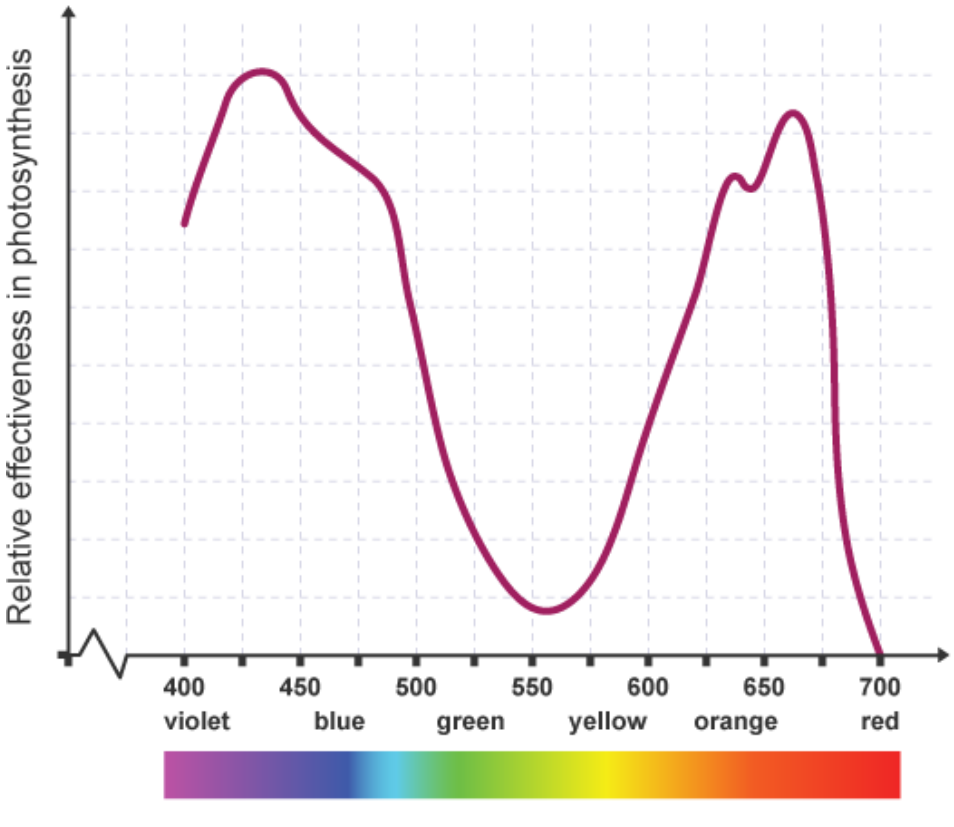
1.



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To answer parts of this question you should use information taken from the graph. The photograph shows lettuce plants growing under artificial lighting

a) What wavelength of light would be the best to maximise the growth of the lettuce?

……

(1 mark)

b) Explain your answer

……

……

(1 mark)

c) Suggest two other factors in the room that could be increased to maximise the growth of the lettuce.

……

……

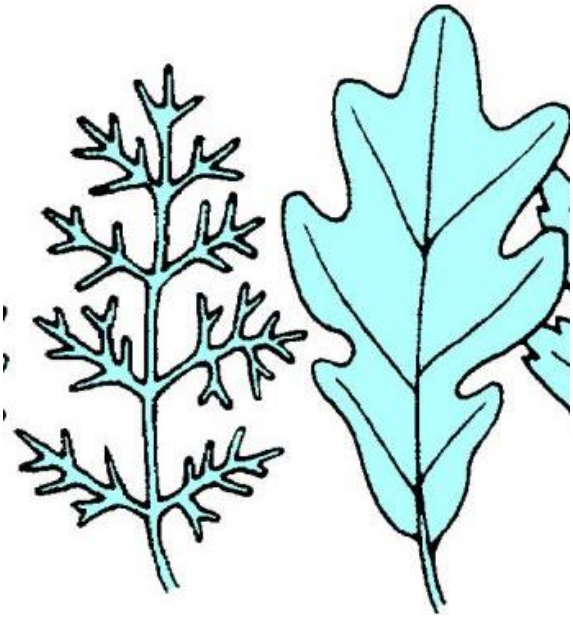
(2 marks)

d) What is the name of the pigment in plants that is involved in converting light energy to sugar?

……

(1 mark)

2 The diagram below shows the leaves of two types of lettuce. Both leaves are the same length and width.



a) Suggest which variety would grow fastest.

……

(1 mark)

Leave blank

b) Explain why.

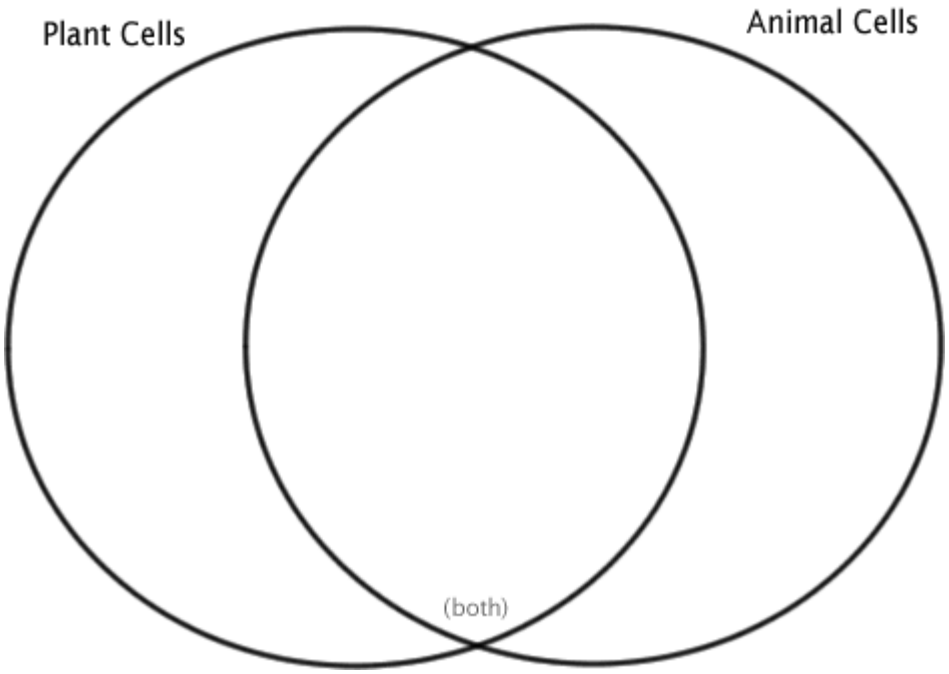
……

……

(1 mark)

3a) Complete the Venn diagram below showing which structures from the following list are found in plant and animal cells:

chloroplast, mitochondria, nucleus, cytoplasm, cell membrane, vacuole, cell wall



(3 marks)

b) Which structure in the list above contains the genetic information?

……

(1 mark)

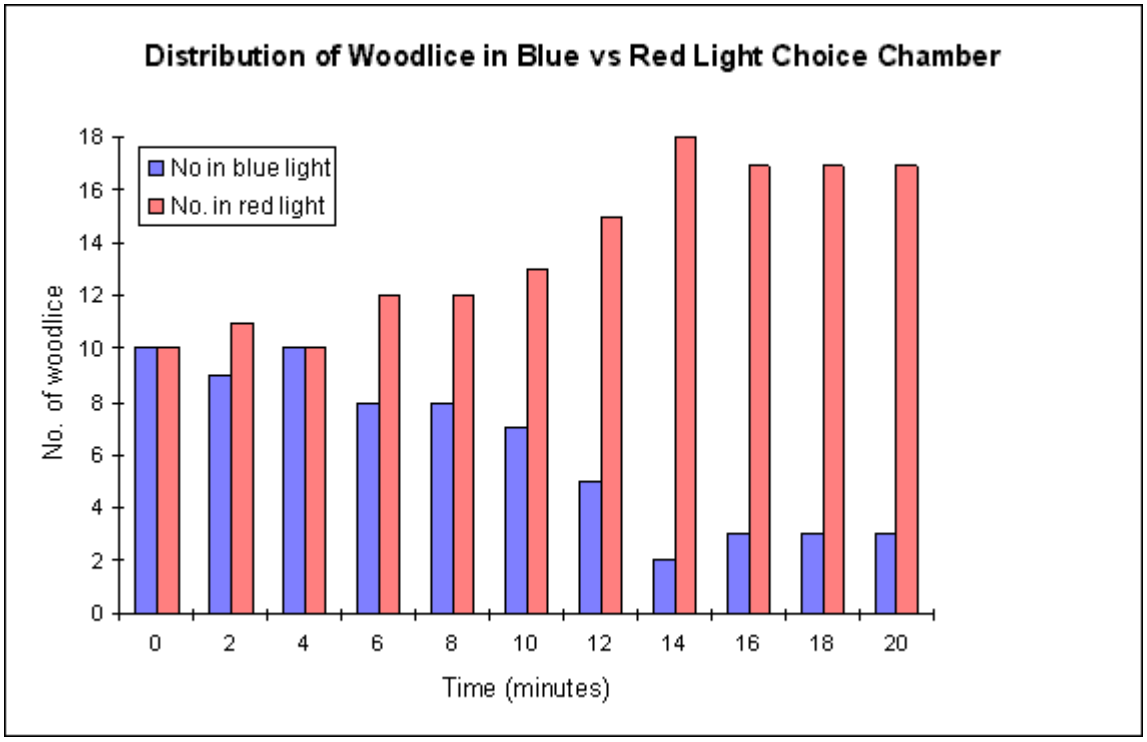
c) Which structure in the list controls what can enter and leave the cells?

……

(1 mark)

Leave blank

4. In an experiment 20 woodlice (a small animal) were placed in the centre of a piece of apparatus called a choice chamber. One side of the chamber was illuminated with red light and the other with blue light. In a choice chamber the woodlice are free to move to either the red or blue side. Every two minutes the number of woodlice in both the red and blue light were counted.



a) At what time are there 16 more woodlice in the red light compared to the blue light?

……

(1 mark)

b) Select three variables from the list below that should be keep the same during the experiment:

time, temperature, air pressure, light intensity, number of woodlice, type of woodlice

……

……

……

(3 marks)

c) Name the two characteristics of living things that the woodlice are demonstrating in this experiment.

……

……

(2 marks)

Leave blank

d) What results would you expect if woodlice were colourblind?

……

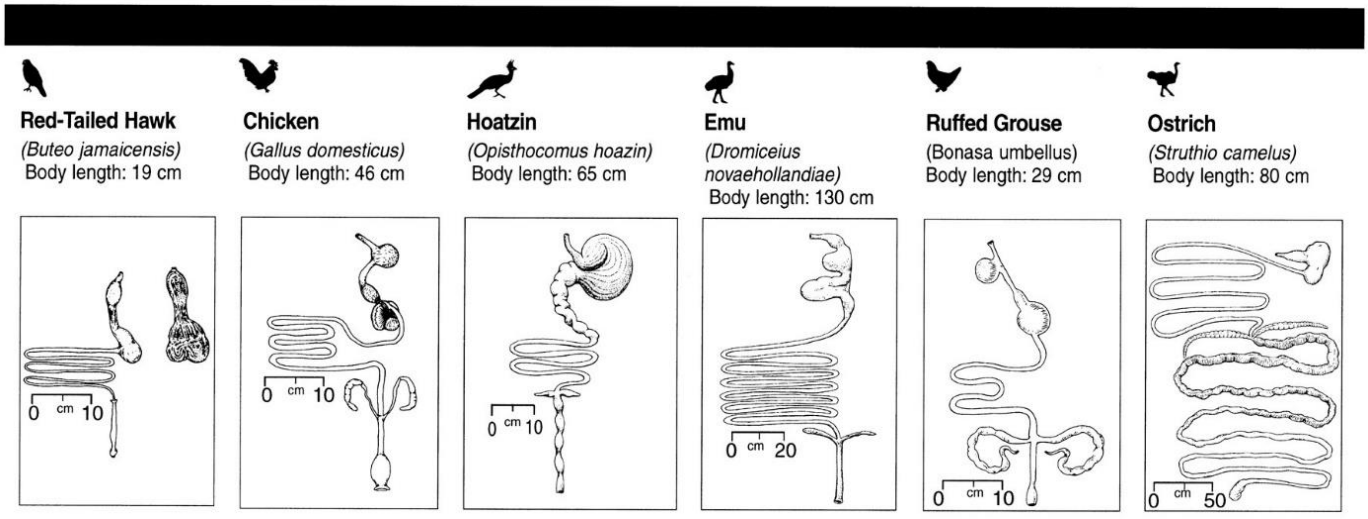
(1 mark)

e) How could the reliability of the experiment be improved?

……

(1 mark)

5. The diagram below shows the digestive system of 6 bird species.



a) Look carefully at the diagrams and describe the difference between the red hawk and the other 5 species.

……

……

(1 mark)

b) In which organ of the digestive system is food temporarily stored and where proteins are digested?

……

(1 mark)

c) In which organ of the digestive system is water reabsorbed from the faeces?

……

(1 mark)

d) The ostrich has a particularly large one of these organs compared to the other birds. Suggest why.

……

……

(1 mark)

Leave blank

e) Two of the organs of the digestive system are the liver and gall bladder. Which substance is produced in the liver and stored in the gall bladder?

……

(1 mark)

f) In which part of the digestive system is digested food absorbed into the bloodstream?

……

(1 mark)

g) State one adaptation this organ processes that enables it to carry out its function effectively.

……

(1 mark)

h) Name one organ in the digestive system that secretes enzymes?

……

(1 mark)

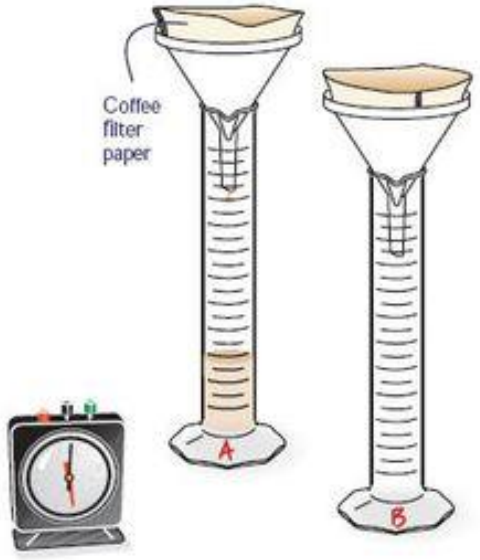
i) In which bird species in the diagram has the largest stomach compared to the rest of the digestive system?

……

(1 mark)

Leave blank

6. The diagram below shows an experiment to investigate the effect of an enzyme called pectinase. Pectinase increases the yield of apple juice that can be extracted from apple puree. An enzyme is a substance that catalysts a reaction in living cells without being used up in the reaction.



In apparatus A
In a 200cm^3 beaker the following were mixed together using a glass stirring rod: 50cm^3 apple puree, 5cm^3 pectinase enzyme, and were then left for 5 minutes at room temperature (20^{o}C). The contents of the beaker were then poured into the coffee filter paper in the funnel and after 2 minutes the volume of liquid in the measuring cylinder was recorded.

In apparatus B
In a 200cm^3 beaker 50cm^3 apple puree and 5cm^3 of a different concentration of pectinase enzyme were mixed together using a glass stirring rod and then left for 5 minutes at room temperature (20^{o}C). The contents of the beaker were then poured into the coffee filter paper in the funnel and after 2 minutes the volume of liquid in the measuring cylinder was measured. These are the results obtained:

Tube	Volume of apple juice (cm^3)
A	3
B	6

a) Suggest whether the pectinase solution in tube B was more or less concentrated than the pectinase solution in tube A

…… (1 mark)

b) The experiment as described does not contain a control. Suggest how you would set up a control for this experiment.

……

…… (1 mark)

c) Suggest why the contents of the beaker were left for 5 minutes at 20^{o}C for 5 minutes before being poured into the filter paper?

……

…… (1 mark)