

# Epsom College — 13+ Biology Scholarship 2019

Hearthprep practice paper · 5 questions

1. [6 marks]

Ivy plants can grow up trees and walls. Figure 1 shows two ivy leaves. One leaf is from an ivy plant growing up a tree in the centre of a shady woodland area. The other leaf is from an ivy plant growing up a tree in a sunny area at the edge of the woodland. [Diagram: Figure 1 shows two ivy leaves side by side. The left leaf, labelled 'Ivy leaf from shady woodland area (centre of woodland)', is noticeably larger with broader lobes. The right leaf, labelled 'Ivy leaf from sunny area (edge of woodland)', is smaller with narrower lobes.] A student makes the following hypothesis: 'The size of ivy leaves decreases as light intensity increases.' How would you use the apparatus shown in Figure 2 to test this hypothesis? You should include details of how you would make sure the results are valid. [Apparatus shown in Figure 2: a 100 m tape measure, a ruler, and a light meter.]

2. [2 marks]

Read the information below and use it to answer the following questions. In 2012 approximately 32 million tonnes of waste plastic was discarded in the UK. Most went to landfill but 25% was recycled. [Image: A truck tipping plastic waste at a landfill site.] Waste plastics at landfill sites produce chemicals called phthalates which are toxic. Scientists have discovered bacteria which can break phthalates down into useful substances. Calculate the mass of waste plastic which was not recycled in the UK in 2012.

3. [3 marks]

Scientists investigated how quickly bacteria broke down samples of phthalates at 15 degrees C and 25 degrees C. The results for 25 degrees C are shown in the table below and the results for 15 degrees C are on the graph opposite. Results for 25 degrees C: time = 0 h, phthalates remaining = 100 a.u.; time = 10 h, 96 a.u.; time = 20 h, 92 a.u.; time = 30 h, 60 a.u.; time = 40 h, 33 a.u.; time = 50 h, 5 a.u. Complete the graph opposite by plotting the results for 25 degrees C and drawing a line using a ruler/curve to join your plots. [Graph axes: x-axis 'Time (hours)' from 0 to 50; y-axis 'Phthalates remaining in samples (a.u.)' from 0 to 100. The 15 degrees C line is already plotted.]

4. [2 marks]

From this graph, describe how temperature affects the breakdown of phthalates by bacteria and suggest a reason for the difference in the results seen at 15 degrees C and 25 degrees C.

5. [2 marks]

About 1 in 10000 people has a condition called situs inversus. People with this condition have their organs reversed so they are a 'mirror image' of the usual arrangement. For most people with situs inversus, there are no harmful effects on their health. However, doctors need to know if someone has the condition if they are going to successfully treat them if they are ill or injured. The diagram (Figure 3) shows the heart from someone with situs inversus, viewed from the front. [Diagram: Figure 3 shows a heart with four chambers labelled. The two upper (smaller) chambers are A (top-left of diagram) and B (top-right). The two lower (larger, ventricle) chambers are D (bottom-left of diagram) and C (bottom-right). Because situs inversus is a mirror image, the labels D and C correspond respectively to the left and right ventricles of a normal heart, but their left/right positions on the page are reversed.] Look at the diagram of the heart. Which part pumps blood around the body? Choose from A, B, C or D, and explain your choice.

Answers are in the Answer Book at [hearthprep.com](http://hearthprep.com) (paid).