OCR (A) Biology A-level

Module 1: Development of practical skills in Biology

PAG 2: Dissection

Please note: You only need to do one from each PAG, and you don't need to do the PAGs listed here, as long as you show the same skills that these are testing (see 5f of the specification for more information). However, you need to at least be able to design your own method for most of these experiments in the exam.

Dissection of fish gills, insects, human heart, plants

Health and safety:

- Take care when using the sharp dissecting instruments.
- Wear non-latex gloves to protect hands from harmful chemicals (e.g. disinfectant) and potentially harmful bacteria
- Wear goggles to protect eyes from harmful chemicals
- Wear an apron
- Dispose of waste responsibly and safely

Heart dissection – method:

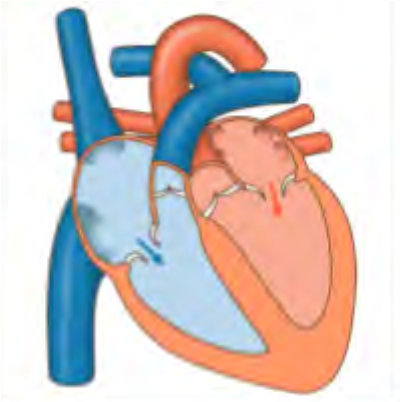
1. Place heart on dissecting tray

External examination:

2. Place your fingers inside the 4 chambers to **feel the differences in the thicknesses of the walls**. Identify the left and right atria, and left and right ventricles (the left will be thicker than the right, and the ventricles will be thicker than the atria). **Do not make any cuts at this stage.**
3. Identify the **four main vessels attached to the heart**. **Arteries are thick and rubbery, whereas veins are thinner.**
4. Identify the **coronary artery** on the external surface. Locate where the **coronary artery connects to the aorta**.
5. Draw a sketch of the external structure and label it.

Internal examination:

6. Using a clean scalpel, carefully cut along lines to look inside the left ventricle, and use scissors to cut through the wall of the left atrium. Follow the cut down to the apex of the left ventricle.
7. Open up the left atrium and left ventricle to examine them. Look for **tendinous cords** (heart strings), observe how they are **attached to the atrioventricular valve.**
8. Look at the **atrioventricular (AV)** and **semilunar (SL) valves**. The AV valve has two flaps so is called the bicuspid valve. The SL valve has a half-moon shape, hence its name.
9. Make a similar cut down the right side of the heart to open up the right atrium and ventricle. Examine the wall and internal structures.
10. Look for the AV valve on this side. It has three flaps so is called the tricuspid valve. Look for the SL valve.
11. Use a ruler to measure the thicknesses of the walls of the left and right ventricles and atria.
12. Draw a scientific annotated drawing to show all the identified structures. Include detail about each structure beside each label (see PAG1 – drawings for how to draw a scientific drawing).



This image is annotated – click on the link!

Plant dissection – method:

For this example, a stick of celery is used, but other plants can be substituted into this method.

1. On a white tile, **use a scalpel to cut a cross-section of a stem**. Cut the sections as perpendicular to the length of the stem as possible and as thinly as possible.
2. Use tweezers to gently **place the transverse sections in tap water for 2 minutes** (or until it's time to use them). This stops them from drying out.
3. Set up the microscope as shown in PAG 1.
4. Use tweezers to lift the sections of stem into a watch glass containing a **stain** (such as **toluidine blue**) and leave them in the stain for 1 minute.
5. Use tweezers to **transfer the sections back into tap water to rinse off excess stain**.
6. Place a transverse section on a microscope slide, add a drop of water and a coverslip. Repeat for the three thinnest transverse sections.
7. View under light microscope under the **lowest magnification** (x4 objective lens) (see PAG 1 for how to use a microscope).
8. Position so you can clearly see a variety of structures and draw an annotated scientific diagram (see PAG 1).
9. View under a **higher magnification** (x10 objective lens) and find the clearest view of one vascular bundle.
10. Produce an annotated scientific diagram.
11. You could repeat these steps to view a longitudinal section as well.

When using **Toluidine blue** as the stain, in general, non-lignified tissue should be pink/purple and lignified tissue should be green/blue. Both colours may appear dark blue if the sample is over-stained. The following colours should be expected:

- **Phloem** – red
- **Xylem** – green/blue-green
- **Sclerenchyma** – blue-green/sometimes green
- **Collenchyma** – red-purple
- **Parenchyma** – red-purple

Kidney dissection – method:

External examination:

1. Look at the outside of the kidney – it's covered in a **renal capsule**.
2. Beneath the renal capsule is the **cortex**.
3. Part of the kidney is indented – this is the **renal hilum**.
4. The tubes are the **renal vein**, **renal artery** and the **ureter**. The wall of the artery is thicker than the wall of the vein. The ureter is likely to have the most adipose (fatty) tissue around it.
5. Draw an annotated scientific diagram of the outside of the kidney (see PAG 1 for how to draw a scientific diagram).

Internal examination:

1. **Cut the kidney in half lengthways** from one side. Split it open and have a look at the structures inside.
2. **The cortex appears dense and grainy** and is a lighter shade than the medulla.
3. In the **medulla**, there will be many **cone-shaped structures** – these are **renal pyramids**. They appear stripy because they contain straight sections of the nephrons (loops of Henle and collecting ducts).
4. In between the pyramids are **renal columns**.
5. Hollow cavities may be visible leading from the base of the renal pyramids – these are **renal calyces** (renal calyx singular).
6. These lead to a larger hollow structure called the **renal pelvis**, which connects to the ureter.
7. Draw an annotated scientific diagram.