Medicine/Biological Natural Sciences

What are the logistical challenges of multicellularity and how do organisms overcome them?

Premise

Most living things on Earth are single-celled organisms. Only eukaryotes are capable of forming complex organisms made of many cells; broadly, these separate into plants and animals. To achieve complexity, cells have had to suppress the innate tendency to 'do their own thing' and co-operate with each other. How is this achieved? As organisms get bigger, there are additional problems to contend with, and there are general similarities in how plants and animals have overcome them (and one fundamental difference!).

Things to consider at the outset

The question is deliberately open-ended to allow innovative and creative thinking – there is no 'right or wrong' answer here. You could start by thinking about some of the characteristics that multicellular organisms have, that single celled organisms do not. You might then think about what plants and animals have in common, and how they differ. You will almost certainly have covered topics in science lessons at school that provide insight into the answer to this question (albeit unintentionally). Clearly, communication between cells will be important and you might want to consider how it is that the cells of a complex organism do not all look the same, in spite of their all sharing the same genetic information.

Structuring your piece of writing

Consider structuring your work like a short scientific paper, with an abstract – a short paragraph that summarises the whole answer – followed by a main body of text comprising separate paragraphs that expands your argument. It is quite all right to use subheadings if you think that they will be useful. This may be different to how you have been used to writing – you are essentially starting with your conclusion – however, scientists are busy people and like to see a concise summary of the main argument before deciding whether to read the rest of the paper. It is worth looking at a short review article (on anything) to see how a scientific paper is written.

Do include diagrams, tables and lists (collectively known as figures) if you think that these will be useful. They are often a more efficient way of presenting information than prose. All figures should have a legend summarising the information that they are conveying.
It is important to reference your sources of information throughout the text, with a reference section at the end.