2.1.8 - Explain that cells in multicellular organisms differentiate to carry out specialised functions by expressing some of their genes but not others

Multicellular organisms are large and need to have **specialised parts** to their structure so that all the necessary functions of life can be performed.

Differentiation - The cells can become specialised to perform their function. These cells switch on, or express, particular genes that correlate with these specific functions. The expression of these genes will influence the shapes, functions and adaptations with that cell. For example, a muscle cell will only express muscle genes, but not nerve cell genes.

Specialisation in multicellular organisms is more efficient for organisms competing for a specific resource. Movement of nutrients, water, etc, can happen faster and more effectively than passing between cells through diffusion.

2.1.9 - State that stem cells retain the capacity to divide and have the ability to differentiate along different pathways

Stem cells can divide, however they have **not yet expressed any of their genes** so that they might specialise in a particular function. They will express particular genes under the right conditions and differentiate into a particular type of cell.

They can be obtained from a variety of places including blastocyte, or even the placenta. Children possess more stem cells than adults.

Stem cells used for research are usually human embryonic stem cells, which come from embryos only a few days old. These are more flexible, and can grow into any type of mature cell. The techniques are controversial, thus there are international principles regarding this work.