

**SAMPLE TEXTBOOK ANSWERS****Chapter 5 Tissues**

The following are sample answers only. Other answers to the same questions may also be correct.

**Science inquiry****Activity 5.1 Looking at tissues***What to do**I Epithelial tissues*

- 1 Draw a few of the cells and write a description of them.

*Answer:* Drawings will vary. The cheek cells appear to be flattened, have irregular shapes and fit together very closely.

- 2 Estimate the size of an individual cell.

*Answer:* Actual cell sizes and estimates will vary, but the diameter of the cells should be between approximately 50  $\mu\text{m}$  and 100  $\mu\text{m}$ .

- 3 Explain how the structure of the cells is suited to their function of providing a smooth lining to the inside of the cheek.

*Answer:* The cheek cells are thin and flat and fit together very closely to produce a smooth lining.

*II Connective tissues*

- 4 In what ways does cartilage tissue differ from the cheek cells that you observed?

*Answer:* Cartilage cells do not fit closely together. Neighbouring cells are separated by a large amount of matrix.

- 5 How is the structure of cartilage suited to its function of providing structural material that is firm but flexible?

*Answer:* The matrix between the cartilage cells is firm but flexible.

- 6 Draw a few cells from adipose tissue and write a description of them.

*Answer:* Adipose tissue cells have a large globule of fat inside them. The cytoplasm forms a thin layer around the fat globule. The nucleus can be seen within the thin layer of cytoplasm.

- 7 Estimate the diameter of one adipose cell.

*Answer:* Adipose cells vary in size depending on the amount of fat they contain. An average size would be approximately 100  $\mu\text{m}$ .

- 8 How is the structure of adipose tissue related to its function of fat storage?

*Answer:* The cells of adipose tissue contain a large droplet of fat and have only a thin layer of cytoplasm, which makes them ideal for fat storage.

### III Muscular tissue

- 9 Draw part of a skeletal muscle fibre and write a description of it.

*Answer:* Drawings will vary. Skeletal muscle fibres are long and thin (cylindrical) with striations (stripes) across the fibre. In each fibre, several nuclei can be seen at the edge of the fibre.

- 10 Why are muscle cells known as fibres?

*Answer:* Skeletal muscle cells are known as fibres because they are very long and thin.

- 11 How many nuclei are present in the fibre that you have drawn?

*Answer:* Many nuclei will be visible. There may be several hundred nuclei in a single fibre.

- 12 Why is skeletal muscle sometimes known as striped or striated muscle?

*Answer:* Skeletal muscle fibres have distinct lines across them when viewed with a light microscope. For this reason skeletal muscle may be called striped, or striated, muscle.

### Studying your observations

- 13 List the cells that you have seen in order from smallest to largest.

*Answer:* The probable order of size would be as follows:

- a Cartilage cells
  - b Cheek cells
  - c Adipose tissue (fat storage) cells
  - d Skeletal muscle (average length of a cell [fibre] is 3 cm but in some muscles may be up to 30 cm)
- 14 Write a brief paragraph explaining the relationship between the structure and function of tissues.
- Answer:* Each tissue has a specific function and the structure of the cells that make up the tissue enables them to contribute to the overall function of the tissue. For example, adipose tissue is fat storage tissue and the cells that make up the tissue are able to contain a large globule of fat; the epithelium that lines the inside of the cheek must be continuous and smooth so the cheek cells are flat and fit closely together.

### Activity 5.2 Touring the tissues

*Answer:* The tour should describe the following:

- Epithelium: Covering or lining tissue; cells very closely joined together; cells may be flattened, cubical or column shaped.
- Connective tissue: Cells separated by a lot of non-cellular matrix; provide support for other tissues and organs
- Muscle tissue: Cells long and thin; able to shorten
- Nervous tissue: Cells have long projections; able to conduct messages

### Review questions

- 1 Describe the levels of structural organisation in the human body.

*Answer:* Cells → Tissues → Organs → Systems → Whole organism

- 2 a What is a tissue?

*Answer:* A tissue is a group of similar cells that work together to carry out a common function.

- b** List the four basic tissue types and give an example of each.

*Answer:*

- i** Epithelium: Cells lining the alimentary canal
- ii** Connective tissue: Bone, cartilage, tendons, ligaments, fat storage tissue
- iii** Muscular tissue: Skeletal muscle, smooth muscle, cardiac muscle
- iv** Nervous tissue: Tissue found in the brain, spinal cord, nerves

- 3 a** What is the function of epithelial tissues?

*Answer:* Epithelial tissues act as covering or lining tissues. They cover the outside of the body and line body cavities and hollow organs.

- b** Give examples of where epithelial tissues are found.

*Answer:* Epithelial tissues are found in the outer layer of the skin, lining the alimentary canal, lining the inside of the heart, lungs and kidneys.

- 4 a** What is the function of connective tissues?

*Answer:* Connective tissues provide support and hold body parts together.

- b** Give examples of connective tissues and their locations in the body.

*Answer:* Bones of the skeleton; cartilage at joints and in the outer ear; tendons joining muscles to bone, ligaments joining bones; fat storage tissue under the skin

- 5** Explain the differences in function between the three types of muscle tissue.

*Answer:* Skeletal muscle is attached to the bones and is responsible for movement of body parts by pulling on the bones.

Involuntary muscle is found in organs that are not under voluntary control, such as the walls of the alimentary canal, walls of blood vessels, the uterus and the iris of the eye.

Cardiac muscle forms the heart and is responsible for contractions of the heart.

- 6** Describe the function of nervous tissue.

*Answer:* Nervous tissue is specialised for carrying messages, in the form of nerve impulses, from one part of the body to another.

## Apply your knowledge

- 1** List all the types of tissue that would be present in one of your fingers. For each tissue explain the function it has in the finger.

*Answer:*

- Skeletal muscle: Movement of fingers
- Epithelium: Outer layer of skin
- Connective tissue: Bones, tendons, ligaments and blood
- Nervous tissue: Nerves connected to muscles and receptors for touch, pain, temperature and pressure

- 2 Choose two body systems and list the organs that are a part of each of those systems.

*Answer:* The following examples use the digestive, circulatory and respiratory systems.

- Digestive system: Mouth, oesophagus, stomach, pancreas and small and large intestines
- Circulatory system: Heart, veins, arteries and capillaries
- Respiratory system: Trachea, bronchi, bronchioles, lungs, diaphragm and intercostal muscles

- 3 Although cells are the functional units of the human body, there are levels of organisation below the cell. Suggest what these lower levels of organisation might be.

*Answer:* The cell is made up of functioning units such as the cell membrane, nucleus, mitochondria and all the other organelles.

- 4 Sketch a large outline of the human body. On your sketch draw the major organs in each of the systems listed in Table 5.1.

*Answer:*

- Digestive system: Oesophagus, stomach, and small and large intestines
- Respiratory system: Trachea, bronchi, lungs, diaphragm and intercostal muscles
- Circulatory system: Heart
- Excretory system: Kidneys and bladder
- Nervous system: Brain and spinal cord
- Endocrine system: Pancreas and thyroid
- Skeletal system: Skull, spinal column and limb bones
- Muscular system: Limb muscles
- Reproductive system: Ovaries, uterus and testes