

Unit 1 Biology

Introduction

ORGANISM



SYSTEM



ORGAN



TISSUE



CELL



ORGANELLE

AREA OF STUDY 1

How do organisms function

Key knowledge

Cell size, structure and function

- cells as the basic structural feature of life on Earth, including the distinction between prokaryotic and eukaryotic cells
- surface area to volume ratio as an important factor in explaining the limitations of cell size and the need for internal compartments (organelles) with specific cellular functions
- the ultrastructure of plant and animal cells in terms of their organelles and identification of these organelles using the light microscope and electron micrographs.

Crossing the plasma membrane

- the characteristics of the plasma membrane as a semi-permeable boundary between the internal and external environments of a cell
- modes of transport of soluble substances across the plasma membrane including simple diffusion, facilitated diffusion, osmosis and active transport.

Energy transformations

- the distinction between photosynthetic autotrophs, chemosynthetic autotrophs and heterotrophs
- photosynthesis as a chemical process in which solar energy is captured and transformed to chemical energy by fixing carbon to produce a carbohydrate and releasing oxygen as a by-product
- aerobic and anaerobic cellular respiration as a chemical process that commonly uses glucose to produce energy for the cell in both autotrophs and heterotrophs.

Functioning systems

- a study of one selected vascular plant with reference to how its cells are specialised and organised (cells into tissues, and tissues into organs) for the intake, movement and loss of water from the plant
- a study of one selected mammalian system (circulatory, digestive, excretory or respiratory) with reference to how cells in the system are specialised and organised (cells into tissues, tissues into organs and organs into systems), how a specific malfunction can lead to biological consequences and how the system is interconnected to other systems for the survival of the organism.

AREA OF STUDY 2

How do living systems sustain life

Key knowledge

Survival through adaptations and regulation

- the structural, physiological and behavioural adaptations that enhance an organism's survival and enable life to exist in a wide range of environments
- successful adaptations as models for biomimicry to solve human challenges
- how regulation of factors is needed to maintain a relatively constant internal environment, explained by the stimulus-response model and the use of homeostatic mechanisms including feedback loops
- factors regulated by homeostatic mechanisms in humans, including temperature, blood glucose and water balance
- malfunctions in homeostatic mechanisms that result in diseases, including Type 1 diabetes and hyperthyroidism in humans.

Organising biodiversity

- classification of biodiversity, past and present, into taxonomic groups based on shared morphological and molecular characteristics, and naming using binomial nomenclature
- strategies for managing Earth's biodiversity to support the conservation of species and as a reservoir for the bio-prospecting of new food sources and medicinal drugs.

Relationships between organisms within an ecosystem

- the beneficial, harmful and benign relationships between species including amensalism, commensalism, mutualism, parasitism and predation
- interdependencies between species as represented by food webs, including impact of changes to keystone species
- the distribution, density and size of a population of a particular species within an ecosystem and the impacts of factors including available resources, predation, competition, disease, chance environmental events, births, deaths and migration.

AREA OF STUDY 3

Practical investigation

Key knowledge

- the biological concepts specific to the investigation and their significance, including definitions of key terms, and biological representations
- the characteristics of scientific research methodologies and techniques of primary qualitative and quantitative data collection relevant to the investigation: laboratory work (microscopy), fieldwork (quadrats, transects and field guides) and/or observational studies of animal behavior; precision, accuracy, reliability and validity of data; and minimisation of experimental bias
- ethics and issues of research including identification and application of relevant health, safety and bioethical guidelines
- methods of organising, analysing and evaluating primary data to identify patterns and relationships including sources of error and limitations of data and methodologies
- observations and experiments that are consistent with, or challenge, current biological models or theories
- the nature of evidence that supports or refutes a hypothesis, model or theory
- options, strategies or solutions to issues related to organism or species survival
- the key findings of the selected investigation and their relationship to cytological and/or ecological concepts
- the conventions of scientific report writing including biological terminology and representations, standard abbreviations and units of measurement.

ASSESSMENT

For this unit students are required to demonstrate achievement of the three outcomes. As a set these outcomes encompass all areas of study in the unit.

Suitable tasks for assessment may be selected from the following:

For Outcomes 1 and 2

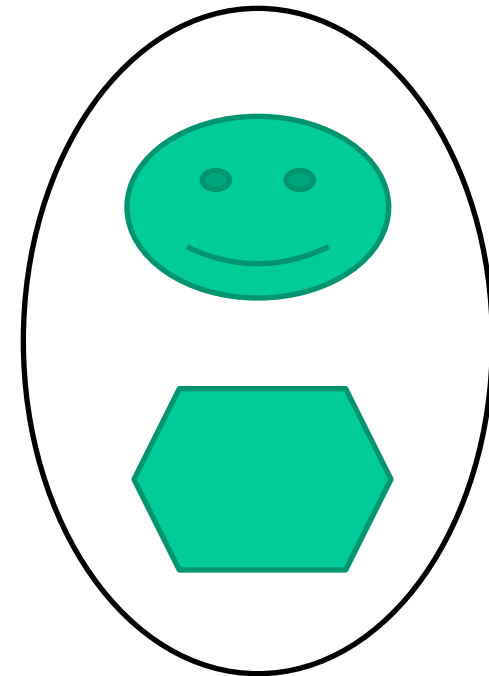
- a report of a fieldwork activity
- annotations of a practical work folio of activities or investigations
- a bioinformatics exercise
- media response
- data analysis
- problem solving involving biological concepts, skills and/or issues
- a reflective learning journal/blog related to selected activities or in response to an issue
- a test comprising multiple choice and/or short answer and/or extended response.

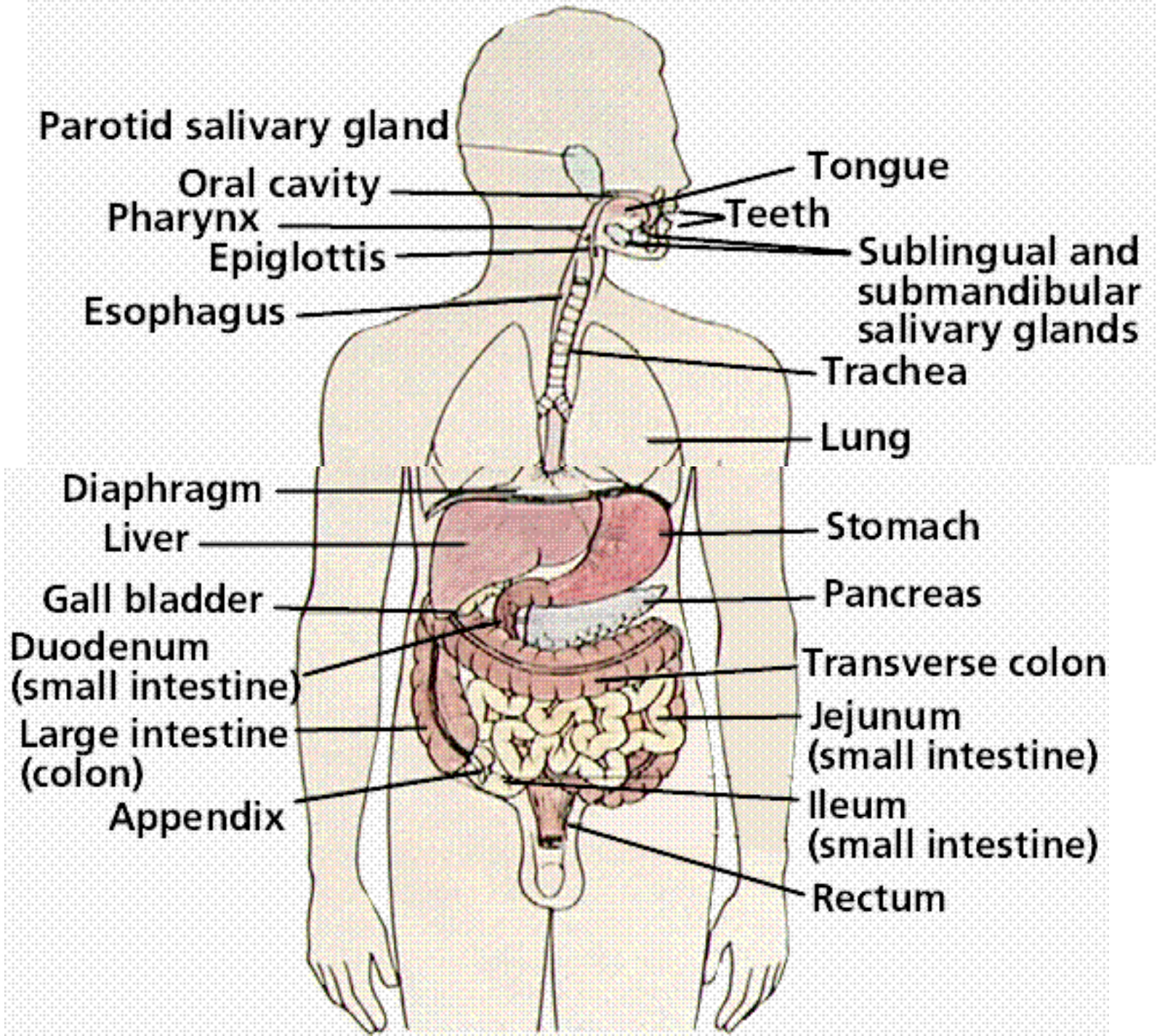
There will be a Unit 1 examination at the conclusion of outcomes 1 and 2.

For Outcome 3

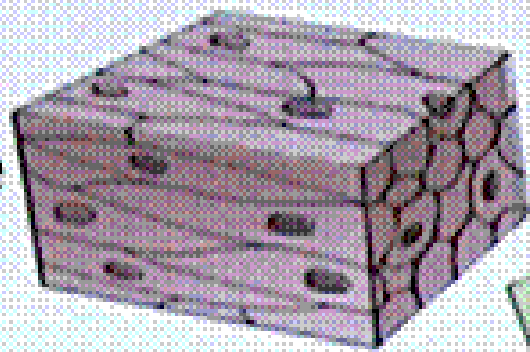
- a report of a student-designed or adapted investigation related to the survival of an organism or a species using an appropriate format, for example a scientific poster, practical report, oral communication or digital presentation.

Introduction

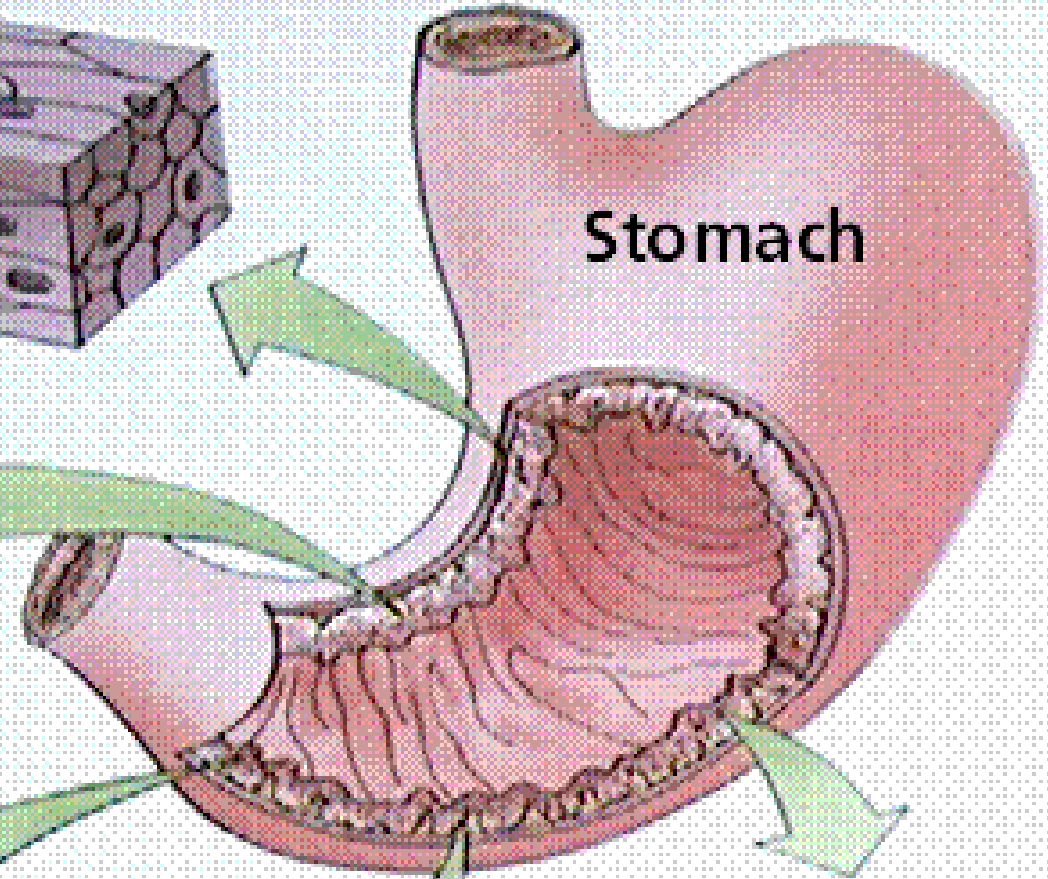




Smooth muscle tissue



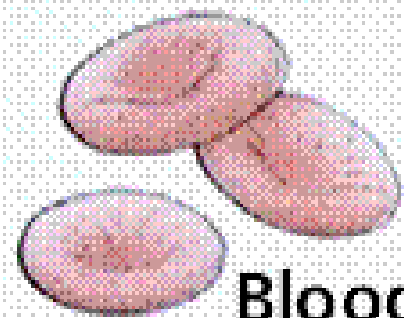
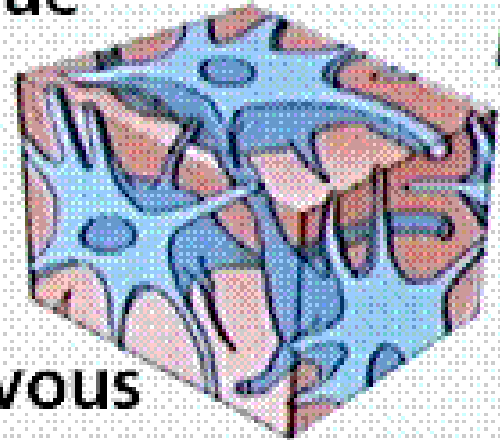
Stomach



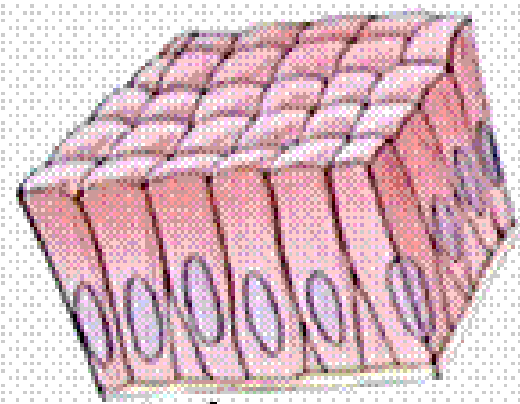
Loose connective tissue



Nervous tissue



Blood



Columnar epithelium

