ANATOMY & PHYSIOLOGY

Contents

CLASSROOM GUIDE

STUDENT EDITION

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FAQs
ABOUT ANATOMY & PHYSIOLOGY

Who Should Use Anatomy and Physiology?

This *Anatomy and Physiology* worktext has not been written for any specific program or syllabus. Its application is therefore highly flexible and it can be used by students studying anatomy and physiology at a range of levels. This includes grade 10-12 school students enrolled in elective or honors anatomy and physiology programs, and also students in undergraduate life science or anatomy and physiology courses.

This worktext provides a well rounded exploration of traditional anatomy and physiology content through analysis of each of the body systems. When designing the worktext we incorporated four themes to provide engaging contexts for student learning. The themes of disease, aging, exercise, and medicine and technology allow students to study anatomy and physiology through a variety of lenses and demonstrate connections to other branches of science. This approach provides opportunities for teachers to introduce contemporary issues into the course, such as recent discoveries, application of new technologies and treatments, and updated disease data.
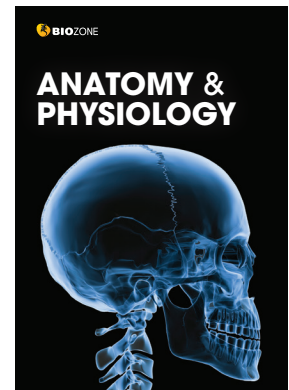
Exploration Through the Four Themes

Anatomy and Physiology consists of 12 chapters. The first chapter, Cells and Tissues, provides background information to students who may need a refresher or introduction to the fundamentals of cells and tissues. The remaining 11 chapters each cover a specific body system. As well as providing comprehensive structural and functional detail for each body system, students explore how the system interacts with other body systems and look at specific case studies through the four themes (below right). Each body system is presented as a dedicated chapter, making navigation through the content very easy.
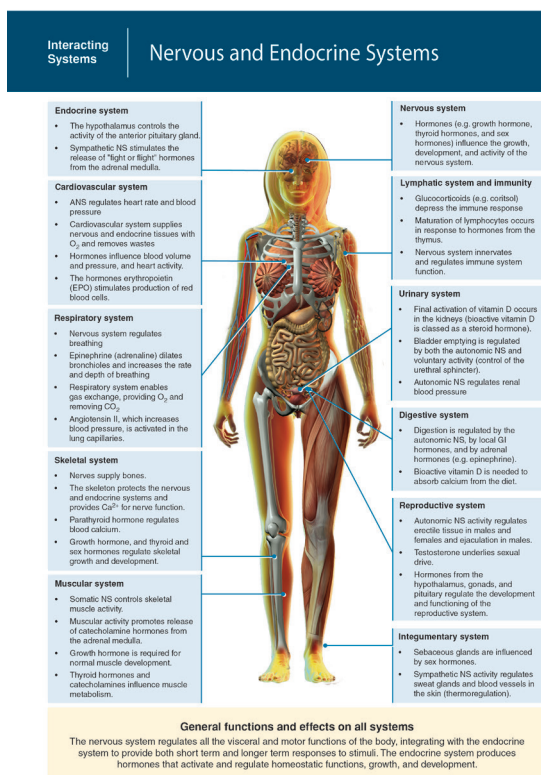
Interacting body systems
A simple graphic prefaces each body system, or pair of related body systems. This highlights key interactions with other body systems. Encourage students to interact with this graphic and understand that the body systems do not act as lone entities, but are interconnected with the other systems. Changes in one body system can affect another.
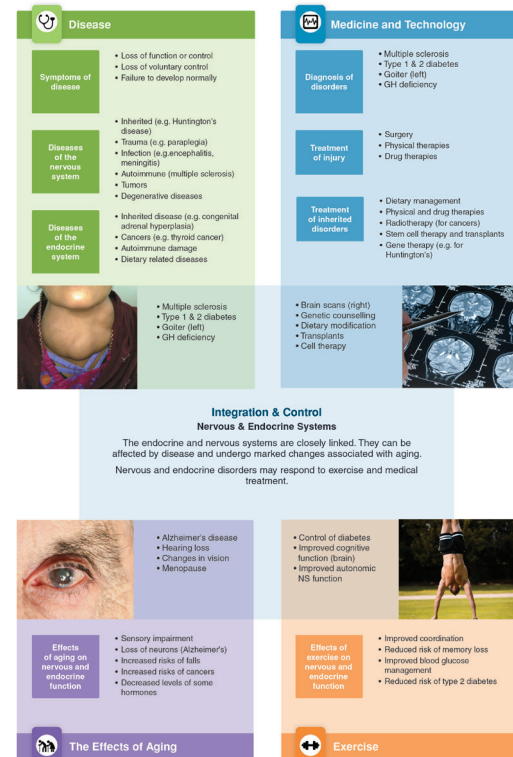
The four themes
This page provides an overview of how a body system can be affected by disease, aging, and exercise. Students can also explore how medicine and technology can be used to diagnose and treat disorders of the body system. The summary points in the four color-coded panels are covered in more detail within the chapter.

The Contents: A Planning Tool

The contents pages are not merely a list of the activities in the student edition. Encourage your students to use them as a planning tool for their program of work. Students can identify the activities they need to complete and then tick them off when they have finished. Teachers can see at a glance how quickly the student is progressing through the assigned material.

Contents

Ticking off the activities as they are completed gives students a sense of progression and helps them to be more personally organized in their work and time management.

Students can mark the check boxes to indicate the activities they should complete. This helps them to quantify the work to be done and plan their work.

2. The Integument and Homeostasis

3. The Skeletal System

The teacher can see at a glance how this student is progressing through this unit of work. Any concerns with progress can be addressed early.

4. The Muscular System

5. The Nervous System

Section breaks introduce the content and help to navigate through the body systems.

Identifying Learning Intentions and Goals

The chapter introductions provide a concise list of **learning objectives** that students should be able to demonstrate knowledge of by the time they complete the chapter. Note that the introduction also contains key idea and key term panels (see the example page below). Encourage students to interact with the chapter introductions as they work through the material as this will help them to understand key learning points The **key ideas** provide a summary of the main points that students should take away from this chapter. Students can elaborate on the key idea using the knowledge they have gained from completing the activities, and by applying examples of the four themes, where applicable. The **key terms** draw student attention to the language they should be using when studying anatomy and physiology. Encourage your students to use these terms regularly in their writing and oral communications to build scientific literacy. Definitions for the key terms can be found in the glossary section of both the student and teacher edition. As students complete each activity in a chapter, they can mark off their progress by ticking the relevant check box on the chapter introduction page.

The chapter number is identified for easy navigation.

CHAPTER 2
The Integument and Homeostasis

KEY IDEAS

- Homeostasis is maintained using hormonal and nervous mechanisms via negative feedback.
- Thermoregulation enables maintenance of an optimum body temperature for metabolism.
- The integument plays an important role in thermoregulation and other homeostatic processes.
- Modern medical technology enables the diagnosis of homeostatic imbalances.

Key Ideas
These provide the main ideas for the chapter and help students focus on important areas of study.

LEARNING OBJECTIVES

Activity number

☐ 1 Explain the need for homeostasis and understand the stimulus response model.

☐ 2 Understand the difference between a positive and negative feedback loop and give examples of each.

☐ 3 Review and correctly refer to the location of anatomical parts using the terms proximal, distal, medial, superficial, anterior (or ventral), posterior (or dorsal), superior, inferior, and lateral. Describe the ventral and dorsal body cavities and their roles in enclosing and protecting organs. Describe the structures and locations of the different types of membranes found in the body. Understand the relationship between membranes and cavities.

☐ 4 Understand the mechanisms by which the body's organ systems maintain homeostasis in response to regular fluctuations. Understand how the body repairs itself in response to pathogens and injuries.

☐ 5 Understand some technologies used in diagnostic med principles behind each technology described, and situa to their use.

☐ 6 Understand the functions of the integumentary system and the structure of the skin. Understand that the subcutaneous tissue is not part of the skin but is closely associated with it. Name some diseases that affect the integumentary system, and their causes.

Learning objectives
These summarize the learning objectives for each activity or group of activities.

The activity in the worktext related to this learning objective.

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25-28

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Key Ideas
These provide the main ideas for the chapter and help students focus on important areas of study.

KEY TERMS

- Dermis
- Epidermis
- Epithelium
- Homeostasis
- Hyperthermia
- Hypothalamus
- Hypothermia
- Integumentary system
- Membrane
- Negative feedback loop
- Positive feedback loop
- Thermoreceptor
- Thermoregulation

Key Terms
These are important terms students should know and understand. They are defined in the glossary.

Check boxes
Students can mark the check boxes to indicate the outcomes they should complete. They can check them off as they finish.

RESOURCE HUB

Scan the QR code to access:
- weblinks
- videos
- 3D models
- interactives

Resource Hub
Resources to support the content of the activities can be found on **BIOZONE's Resource Hub**. Scan the QR code for quick and easy access to the content.

Structure of an Activity Page

The activity pages have been carefully designed to provide high quality information to students in an easily accessible format. They include a number of features designed to engage students and help them unpack and understand the information. Features include short blocks of text so that students do not feel overwhelmed with too much reading, high quality informative graphics, and links to 3D models (following page) that provide another dimension to student engagement and learning. Question and answer sections allow students to demonstrate their understanding of the content. By having the stimulus material and their answers in one place, students can easily revise for assessments. Teachers should guide students through the features of the activity pages to ensure that they make the most of the features on offer.

Introductory paragraph: Provides background information and an introduction to the activity.

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33 The Limb Girdles

Key Idea: Summarizes the primary focus of the activity and provides a clear take-home message for the student.

Key Idea: The pectoral (shoulder) and pelvic girdles attach the limbs to the axial skeleton and allow for the free and wide-ranging movement of the arms and legs.

The shoulder girdle, also called the pectoral girdle, consists of two scapulae (shoulder blades) and two clavicles (collar bones). T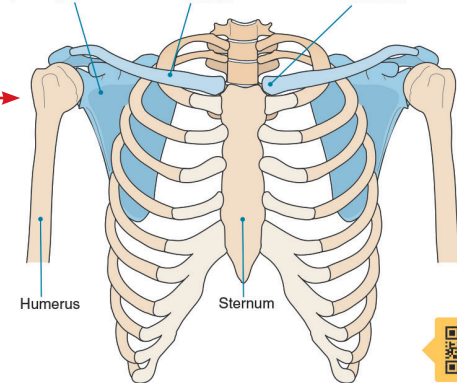he clavicles are joined (articulate) with the sternum (breastbone) so that the girdle forms an incomplete ring around the thorax. The pelvic (hip) girdle is formed of two hip bones (also called pelvic, innominate, or coxal bones) connected anteriorly at the pubic symphysis and posteriorly by the sacrum. Each hip bone arises by fusion of three **bones**: the ilium, ischium, and pubis.

The shoulder girdle

The scapula is attached to both the clavicle and the humerus. It is held in place by muscles.

The clavicle acts as a brace to keep the top of the arm away from the top of the thorax.

The sternoclavicular joint on each side joins the shoulder girdle and axial skeleton.

Key Terms: Words in **bold** are key terms. Definitions for these can be found in the glossary at the back of the worktext. Encourage students to understand and use these term to develop their scientific literacy.

Diagrams: Full color diagrams and photos help students visualize important information or concepts.

Scapula

Humerus

Sternum

QR codes: Scanning the QR code takes students directly to a 3D model.

1. (a) What is the function of the shoulder girdle? _____
_____

   (b) Identify the single point of attachment of shoulder girdle to the axial skeleton: _____
_____

2. What is the relationship between the range of movement of the arms and the shoulder girdle structure? _____
_____

Questions: Students input their answers directly onto the page to help reinforce the learning moment. This approach also makes revision easy because the stimulus material and answers are in one place.

_____
_____

Tab system: The grey hub tab alerts students that this activity has material on **BIOZONE's Resource Hub** to support the activity content. The colored tabs indicate one (or more) of the four main themes is covered in this activity.

X-ray of dislocated shoulder

98 Arteries

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Key Idea: Arteries are thick-walled blood vessels that carry blood away from the heart to the capillaries within the tissues. In humans, arteries are the blood vessels that carry blood away from the heart to the capillaries within the tissues. The large arteries that leave the heart divide into medium-sized (distributing) arteries. Within the tissues and organs, these distributing arteries branch to form arterioles, which
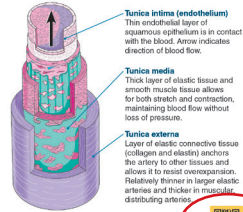
deliver blood to capillaries. Arterioles lack the thick layers of arteries and consist only of an endothelial layer wrapped by a few smooth muscle fibres at intervals along their length. Blood flow to the tissues is altered by contraction (vasoconstriction) or relaxation (vasodilation) of the blood vessel walls. Vasoconstriction increases blood pressure whereas vasodilation has the opposite effect.
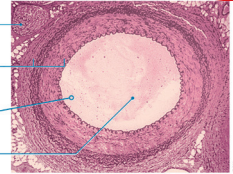
Arteries

Arteries, regardless of size, can be recognized by their well-defined rounded lumen (internal space) and the muscularity of the vessel wall. Arteries have an elastic, stretchy structure that gives them the ability to withstand the high pressure of blood being pumped from the heart. At the same time, they help to maintain pressure by having some contractile ability themselves (a feature of the central muscle layer). Arteries nearer the heart have more elastic tissue, giving greater resistance to the higher blood pressures of the blood leaving the left ventricle. Arteries further from the heart have more muscle to help them maintain blood pressure. Between heartbeats, the arteries undergo elastic recoil and contract. This tends to smooth out the flow of blood through the vessel. Arteries comprise three main regions (right):

1. A thin inner layer of epithelial cells called the tunica intima (endothelium) lines the artery.
2. A thick central layer (the tunica media) of elastic tissue and smooth muscle that can both stretch and contract.
3. An outer connective tissue layer (the tunica externa) has a lot of elastic tissue.

Structure of an artery

Tunica intima (endothelium)
Thin endothelial layer of squamous epithelium is in contact with the blood. Arrow indicates direction of blood flow.

Tunica media
Thick layer of elastic tissue and smooth muscle tissue allows for both stretch and contraction, maintaining blood flow without loss of pressure.

Tunica externa
Layer of elastic connective tissue (collagen and elastin) anchors the artery to other tissues and allows it to resist overexpansion. Relatively thinner in larger elastic arteries and thicker in muscular, distributing arteries

**Cross section through a large artery**

(a)
(b)
(c)
(d)

1. Using the information above to help you, label the photograph (a)-(d) of the cross section through an artery (above).

2. Why do the walls of arteries need to be thick with a lot of elastic tissue? _____

3. What is the purpose of the smooth muscle in the artery walls? _____

4. How do arteries contribute to the regulation of blood pressure? _____

Encourage students to scan the **QR codes** on the activity pages. These link directly to informative and engaging 3D models. All models can be rotated and zoomed, and some contain informative annotations. Use this tool to help students visualize body parts or processes.
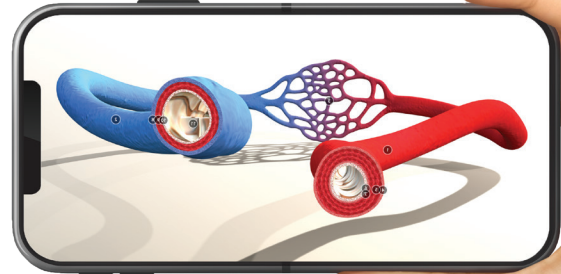
Carrying Out Independent Research

Throughout *Anatomy & Physiology,* the four themes of disease, aging, exercise, and medicine and technology provide a relevant and contemporary lens through which to explore the subject matter.

At the end of the worktext (Appendix 1), students are presented with a research activity designed to support and develop their research skills while they explore a topic which interests them in more detail. They are encouraged to present their findings as a slide show presentation, a poster, or report. This research project provides an invaluable opportunity for students to develop research, communication, and presentation skills. Encourage students to select a topic that interests them or to which they have a personal connection.

Some guidance is provided to help students carry out their research (right). While not exhaustive, it does provide key information on how to find reliable information and how to reference it. Some guidelines on what each type of presentation (poster, slide presentation, or report) should include is also covered.

How should I set this assignment?
There are several approaches to how you could set this assignment:

• A student could carry out all four investigations independently.

• Small groups of students could carry out all four investigations together.

• A student (or group of students) could investigate one theme and report back to the class. Assign the topics so all of the four themes are covered by the class as a whole.

A-1 **Researching and Reporting**

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In the activities on the following pages, you will carry out a literature search on one aspect of each of the four themes on this book: disease, medicine and technology, exercise, and the effects of aging. You will need to choose appropriate sources of information and present your findings in a professional and attractive delivery style. It is important that you can critically evaluate and interpret a range of published material in both scientific publications and popular media. To analyze and evaluate the science you read about or see online you must think critically and have a good understanding of the concepts, theories, and models involved.

Opinion or evidence
As you read information to inform your study, consider carefully the source of the information. Is it a website produced by a commercial company that wants to sell specific treatments/drugs? Is it a university or research website? Is it a newspaper article? Is it someone's opinion?

ANECDOTAL EVIDENCE	SCIENTIFIC EVIDENCE
Claim from memory	Claim from data
Small sample size	Large sample size
Exceptional stand-out cases reported	Everything is reported
Uncontrolled, susceptible to bias	Controlled for subject & experimenter bias
Vague outcomes	Defined outcomes

Presentation type
Below are some features to consider for the type of presentation that you choose for your study. You may have to carry out some reading research before deciding on what type of presentation best suits the subject that you choose.

POSTER	SLIDES & NARRATIVE	REPORT
Large title that can be read from a distance	Visually appealing	Clearly structured into logical sections
Visually attractive, with large, bold images hat catch the eye of the reader	All images, especially graph axes, can be read from a distance	If including images such as graphs or tables, ensure they are labelled and numbered sequentially, e.g. Figure 1, Figure 2 etc
Logical and obvious flow from one section to the next so that the reader is led from one section to the next	No distracting animations, such as text flying on to the screen	Appropriate length to cover the necessary content.
Use font that is large and easy to read at a distance	Accompanying narrative text must make sense to the reader	Clear, easy to read font chosen.

Writing a bibliography
Your bibliography should use a consistent style of presentation and be organized alphabetically according to author name or, if no author, as in a government or company website, by the name of the organization. Some common examples are given below. The key is to be consistent in the order in which you present information. You will need:
• Author
• Year of publication
• Title of the work, in italics
• Pages, issue, volume (for journal, magazine)
• Location, e.g. a URL for a website
• Publisher, for book, magazine, journal article

Book: Whitmore, SJ. 1985. *The Aging Body: Physiological Changes and Psychological Consequences.* Springer.

Website: Bazemore, N. 2022. *What's Normal Aging?* Compass, by WebMD. https://www.webmd.com/healthy-aging/guide/normal-aging.

Journal: Barnes, TL et al. 2022. Loneliness, Social Isolation, and All-Cause Mortality in a Large Sample of Older Adults. *Journal of Aging.* Vol 34, iss. 6-8. pp. 883-892 https://doi/10.1177/08982643221074857 Sage Journals.

Two page instructions are provided for each investigation (see below). These serve two main purposes:
1. Provide a list of examples from the worktext for each body system to help students choose an example to study.
2. Provide a series of questions and working spaces to help students plan their investigation.

Encourage students to use these pages to plan their work. This will help ensure their research and delivery is robust.

Evaluating Student Performance

Chapter Summary tasks conclude each chapter in *Anatomy & Physiology*. These activities have been designed to be used as assessment tools to gauge student understanding of the chapter's content. If you already have your own test resources, these activities can be used as formative assessment to provide practice before a more formal testing moment. Alternatively, they can be used as the main test to gauge student understanding of the chapter's content.

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18 Chapter Summary

1. Explain how the properties of the phospholipid molecule result in the bilayer structure of membranes:
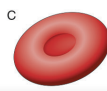_____
_____
_____
_____

2. The diagrams below depict what happens when a red blood cell is placed into three solutions with differing concentrations of solutes. Describe the tonicity of the solution (in relation to the cell) and describe what is happening:
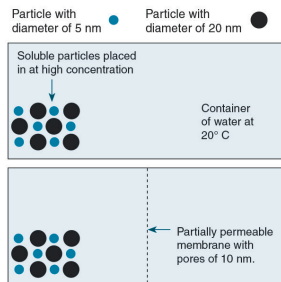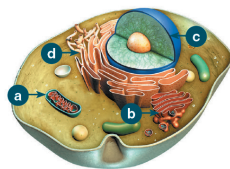
A   B   C
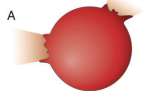
(a) _____   (b) _____
_____   _____
_____   _____

3. Consider the two diagrams below. For each, draw in the appropriate box what y

● Particle with diameter of 5 nm   ● Particle with diameter of 20 nm

Soluble particles placed in at high concentration

Container of water at 20° C

Partially permeable membrane with pores of 10 nm.

4. Identify the four organelles shown in the image of the cell below:

d   c
a   b

a: _____
b: _____
c: _____
d: _____

5. An observation of epithelial cells under a microscope shows the cells are arran narrow, with the nucleus located close to the basal side (base) of the cell. Ident

6. What three essential components is connective tissue made of? _____
_____

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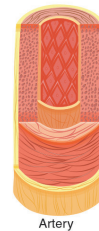## 119 Chapter Summary

1. Explain why blood cells are constantly being produced, when some other cells (e.g. neurons) are not: _____
_____

2. Compare and contrast the structure of veins and arteries, linked to their functions within the cardiovascular system:
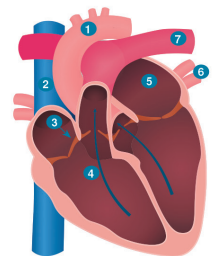_____
_____
_____
_____
_____
_____
_____
_____

Artery   Vein

3. Summarize the key functions of blood, linked to the blood specific blood component(s) involved: _____
_____
_____
_____
_____
_____

4. Identify and name the numbered features in the heart diagram, (right):
(a) 1: _____
(b) 2: _____
(c) 3: _____
(d) 4: _____
(e) 5: _____
(f) 6: _____
(g) 7: _____

5. What stage of the cardiac cycle is the heart (right) showing, and what evidence can you provide for your answer?
_____
_____
_____

6. Distinguish between the mechanisms for the intrinsic and extrinsic control of the heart rate: _____
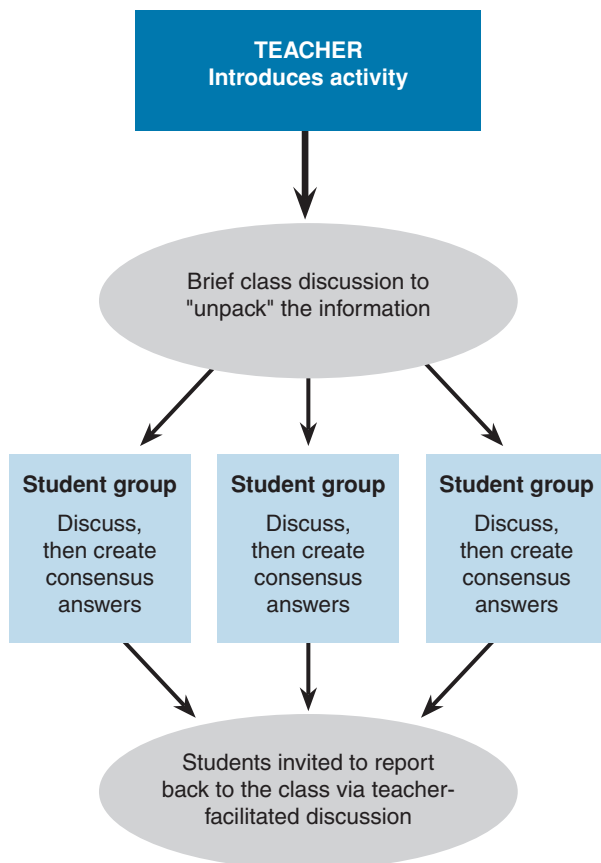_____
_____
_____
_____

Teaching Strategies for Classroom Use

Achieving effective differential instruction in classes is a teaching challenge. Students naturally have mixed abilities, varying backgrounds in the subject, and different language skills. Used effectively, BIOZONE's student worktexts and supporting resources can make teaching a mixed ability class easier. Here, we suggest some approaches for differential instruction.

MAKING A START

Regardless of which activity you might be attempting in class, a short introduction to the task by the teacher is a useful orientation for all students. For collaborative work, the teacher can divide the class into appropriate groups, each with a balance of able and less able students. Depending on the activity, the class may regroup at the end of the lesson for discussion.

TEACHER
Introduces activity

↓

Brief class discussion to "unpack" the information

↓

Student group

Discuss, then create consensus answers

Student group

Discuss, then create consensus answers

Student group

Discuss, then create consensus answers

↓

Students invited to report back to the class via teacher-facilitated discussion

Using collaboration to maximize learning outcomes

- The structure of *Anatomy & Physiology* allows for a flexible approach to unpacking the content with your students.

- The content can be delivered in a way to support collaboration, where students work in small groups to share ideas and information to answer and gain a better understanding of a topic, or design a solution to a problem.

- By working together to ask questions and evaluate each other's ideas, students maximize their own and each other's learning opportunities. They are exposed to ideas and perspectives they may not have come up with on their own.

- Collaboration, listening to others, and voicing their own ideas is valuable for supporting English language learners and developing their English and scientific vocabularies.

- Use a short, informal, collaborative learning session to encourage students to exchange ideas about the answer to a question. Alternatively, collaboration may take a more formal role that lasts for a longer period of time.

The teacher introduces the topic. They provide structure to the session by providing background information and setting up discussion points and clear objectives. Collaboration is emphasized to encourage participation from the entire group. If necessary, students in a group can be assigned specific tasks.

Students work in small groups so that everyone's contribution is heard. They collaborate, share ideas, and engage in discourse. The emphasis is on discussing questions and formulating a consensus answer, not just sharing ideas.


At the end of the session, students report back on their findings. Each student should have enough knowledge to report back on the group's findings. Reporting consists primarily of providing answers to questions, but may involve presenting a report, model, or slide show, or contributing to a debate.

Peer to peer support

- **Peer-to-peer learning** is particularly valuable for more challenging activities in which the content is more complex or the questions require students to draw on several areas of their knowledge to solve a problem.

- Stronger students can assist their peers and both groups benefit from verbalizing their ideas. Students who are non-native English language speakers can ask their classmates to explain unfamiliar terms, which benefits the understanding of both parties.

Student A is capable. He helps to lead the discussion and records the discussion in a structured way.

Students B and C are also capable but less willing to lead discussion. They will add ideas to the discussion but need a little direction from A to do so.

Student D is less able but gains ideas and understanding from the discussion of students A, B, and C. She may add to the discussion as she gains confidence in the material being studied.

Interactive revision of tasks in class

- The **Digital Teacher's Edition** provides a digital rights managed (DRM) version of the student book as PDF files. It features useful HIDE/SHOW answers, which can be used to review activities in class using a screen or interactive whiteboard (right).

- Students benefit from the feedback in class, where questions can be addressed, and teachers benefit by having students self-mark their work and receive helpful feedback on their responses.

- This approach is particularly suited to activities with questions requiring a discussion, as students will be able to clarify some aspects of their responses. Stronger students can benefit by contributing to the explanatory feedback and class discussion.

How are Language Skills Supported?

BIOZONE has several support mechanisms in place to support the development of language skills, including support for English Language Learners (ELLs) in your classroom. A **glossary** of important key terms is provided in English. In the digital versions of the worktext, **text to speech** (read aloud) and **translation** functions support ELLs in their learning journey. More information on these features is provided below.

Glossary

Encourage all students to use the **glossary** to build scientific literacy and become comfortable with using the terms appropriately. Key terms, which have been **bolded** within an activity, are included in the glossary. Key terms are only bolded the first time they appear within an activity.

Read aloud and translation functions

BIOZONE eBooks provide support to students who have difficulty reading, as well as ELLs. Simply highlight a passage of text and the text will be **read aloud** when the listen button is activated (**A**). Select the **translate function** and the selected text will translated into one of 21 languages (including Spanish). Students can have the translated text read out loud in their selected language too (**B**). Please note that these features do not currently work on mobile devices.

The Teacher Toolkit

BIOZONE's **Teacher Toolkit** is a suite of resources specifically developed to help you plan and deliver an engaging program. A brief description of the tools is provided below and in the following pages.
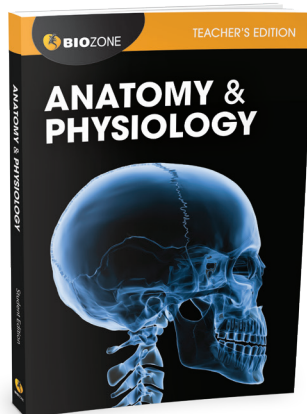
TEACHER'S EDITION - PRINT

The *Anatomy & Physiology* Teacher's Edition is the teacher's companion to the student worktext. Use this resource to gain insight into the features of *Anatomy & Physiology* and how to use them in your planning and delivery. The Teacher's Edition follows the same flow as the Student Edition for easy navigation.

Features of the Teacher's Edition include:

- Suggested **model answers** in place for each activity.
- A **Classroom Guide** at the beginning of the Teacher's Edition provides a guide to the best use of BIOZONE's resources. It includes strategies for teaching in a differentiated classroom, information about the assessment tools, and the benefits of collaborative learning.
- An overview of the **Teacher Toolkit**, resources to support the delivery of the *Anatomy & Physiology* program, is provided.

EBOOK VERSIONS

BIOZONE eBooks provide a digital replica of the printed worktext, allowing students and teachers to seamlessly transition between both formats in a hybrid delivery situation. eBook material can be incorporated into several learning management systems. You can direct students to the required activity and provide notes and guidance about what you want them to do.

A significant feature of the BIOZONE eBooks are the **read aloud** and **text to translation features**. Please note this functionality is currently limited to laptop and desktop devices and is not available on tablets or mobile phones. These features support students who require help with reading and language skills and also English language learners (see CG12). Enlarging the text or using the read aloud function can help students with visual impairments or help reluctant readers to engage with the content. The translation feature, into 21 languages, helps those students who are learning English as an additional language.

BIOZONE eBook products also contain tools that allow students to make notes, highlight text, bookmark pages, and make some simple drawings.

Some eBook products have icons, allowing direct interaction with the **Resource Hub**, and in the Teacher's eBook edition (free with a classroom set), answers are also in place.

Learn more about how to use the eBooks:

https://ebookshelp.biozone.com/

https://www.biozone.com/ebooks/training/
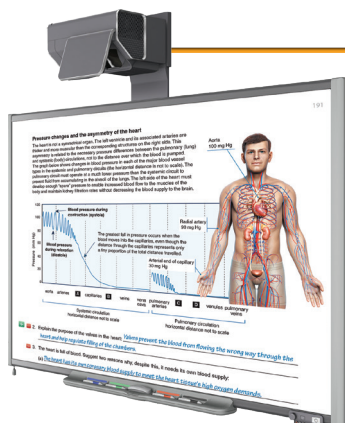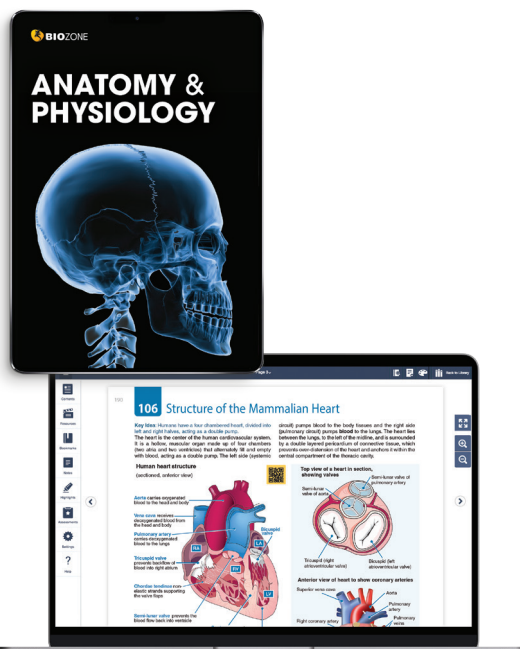
DIGITAL TEACHER'S EDITION

This teacher's resource includes a non-printable PDF version of the Teacher's Edition, with a useful feature to hide and display the suggested answers. The Digital Teacher's Edition is a digital rights managed product, and is sold separately.

Material in the Digital Teacher's Edition can be displayed to students through an interactive whiteboard or shared screen. This resource is an excellent way to introduce an activity to the class before having students work on the activity.

Many teachers use the show/hide answer feature to review answers with the class after a group discussion. If you are running short of time you can efficiently review the answers with the entire class to save time. See more about the Digital Teacher's Edition on page CG16.

RESOURCE HUB

The **Resource Hub** is a **free resource** available to both students and teachers. It offers a curated collection of Open Educational Resources (OER) specially chosen to support the content of the worktext. Resources include videos, animations, games, 3D models, spreadsheets, and source material.

The **Resource Hub** is an effective tool to engage students of all abilities within a differentiated classroom. Most resources can be used by students of all abilities. 3D models, videos, games, and simulations are great tools for engaging students in a topic, or for supporting striving students in their learning journey.
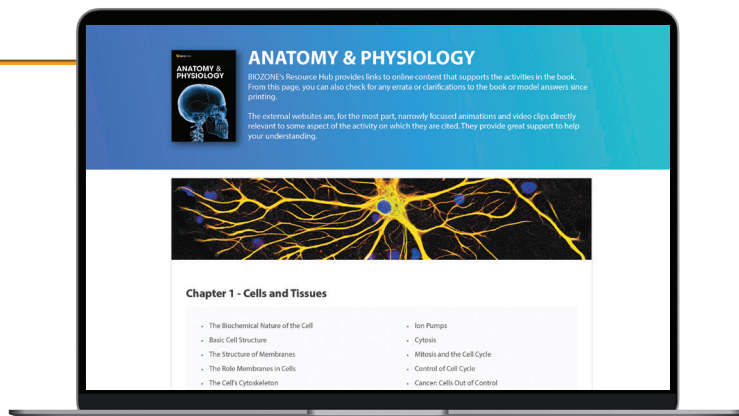
Resource Hub content is easily shared with your students through your LMS. You can provide notes and guidance about what you want students to do with the resource. The **Resource Hub** can be accessed directly through the icons (left, top) in some eBook products, through the QR code (left, bottom) or bookmark the following link:
www.BIOZONEhub.com and the enter the code
ANP3-4085
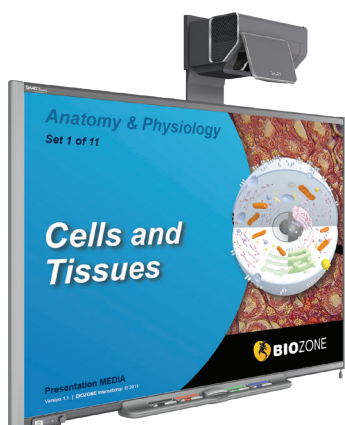
PRESENTATION MEDIA (SLIDES)

Presentation Media (slides) are a very popular way for teachers to deliver a lesson in a presentation style format, or have students review material in their own time. Presentation Slides are a useful delivery tool for both face to face or remote teaching.

The Presentation Slides are a sizeable collection of **fully editable slides** specifically designed to support and enhance the content of the worktext. A set of slides is available for each chapter of *Anatomy & Physiology.* In some instances, the slide sets contain extra material or examples not contained within the worktext, and are excellent for providing new scenarios for students to work on.

As the slides are fully editable, teachers can customize them for specific lessons or to suit student ability. You can add your own text or images and delete, add, or move slides around. The slides can be printed for students to annotate with their own notes which they can then review in context with the material. Presentation Slides are easily ingested into your LMS.

The Presentation Slides are purchased separately and are provided in both PowerPoint and Keynote formats.

Please note that Presentation Slides cannot be uploaded into the public domain or shared on "slide-share" platforms.

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QUESTION LIBRARY

The Question Library provides all of the questions from the Student Edition worktext in a format which can be ingested into a range of LMS or other digital delivery tools. Access is limited to large adoptions and multiyear purchases.

Questions within the worktext are generally scaffolded: easier questions are asked first, to build student confidence then questions may become more complex or difficult as students progress through an activity.

The Question Library content is **fully editable**, providing teachers with flexibility and control in assigning questions within a differentiated classroom. The questions can be customized to match a student's learning ability or reading level.

10 Ion Pumps

Questions

1. Why is ATP required for membrane pump systems to operate?

2. (a) Explain what is meant by co-transport.

   (b) How is co-transport used to move glucose into the intestinal epithelial cells?

   (c) What happens to the glucose that is transported into the intestinal epithelial cells?

3. Describe two consequences of the extracellular accumulation of sodium ions.

BIOZONE WORLD

Coming in 2023
BIOZONE World is our new content delivery platform. Titles will be rolled out on Biozone World from 2023.

This title: Anatomy & Physiology will be available digitally on this new platform.

This innovative platform places a digital version of the worktext and relevant Teacher Toolkit resources in one easy to use location, making lesson creation a breeze!

What are the benefits of BIOZONE World?

- Teachers can assign activities to the class as a whole, groups of students, or individual students.
- Students can input their answers directly onto the page, creating a record of work which both students and teachers can access and review.
- Students can make notes, highlight text, and make simple drawings on the page.
- Teachers can add their own resources, e.g. files and links, to customize their lesson.
- Teachers can access the model answers at the click of a button.
- BIOZONE World allows direct access to the Teacher Toolkit resources, including:
  - Presentation Slides
  - Videos
  - 3D models
  - Links to our curated list of Open Educational Resources
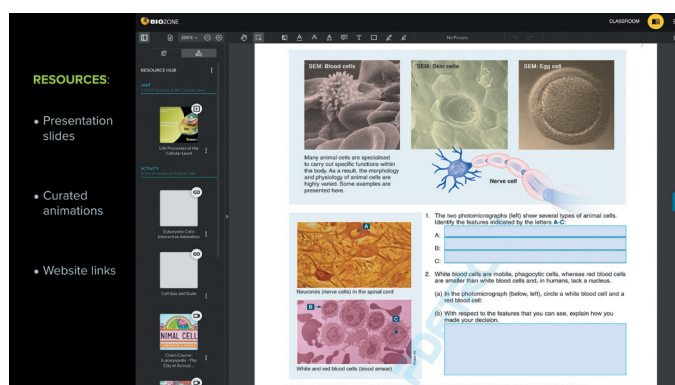
The Digital Teacher's Edition

The *Digital Teacher's Edition* is a digital rights managed product, sold separately, and aimed primarily at extending the pedagogical tools at a teacher's disposal. Many of the features of this resource have been developed in response to requests from teachers themselves.

A digital (PDF) version of the Teacher's Edition (non-printable) is provided. Use the interactive buttons to HIDE or SHOW the answers.

The **Classroom Guide** is provided as a printable PDF.

A **BONUS** sample from the planned presentation slides for *Anatomy and Physiology*. It is fully editable.

Access BIOZONE's **Resource Hub** directly from this link for a range of resources to support the activities.

Show/hide answers

The Digital Teacher's Edition allows you to share the page on a screen. Clicking the interactive answer buttons allows you to reveal the answers in part (below left) or in their entirety (below right). This is a powerful feature for reviewing answers with the class as you work through an activity.

Use the interactive buttons to reveal the answers as you work through the activity on-screen.