

VICTORIAN CURRICULUM

SCIENCES

YOURS TO DISCOVER

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INTRODUCTION

Sciences: Yours to Discover is a brand new series written for the Victorian Curriculum 7 – 10. Your students will be amazed by how things work as key science concepts are explored in a clear and interesting way. Through engaging content and design, they will build their scientific knowledge while developing an understanding of science's contribution to society. Put the enjoyment back into science with this great resource!

KEY FEATURES

- A brand new series written for the 2017 Victorian Curriculum
- Well-crafted pedagogical framework
- Clean, uncluttered and logical student-friendly design
- Assessment and practical activities that have an authentic educational purpose
- Engaging and accurate information that is appropriately detailed and levelled
- Online worksheets, interactives and quizzes to engage your students
- Online answers, teaching plans, curriculum mapping, assessment items and test generator available.

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Your portal to access the following digital resources:*

- | | |
|------------------------------------|---------------------------|
| Teacher resources: | Student resources: |
| • All of the student resources | • Activity sheets |
| • Chapter tests and answers | • Workspaces |
| • ExamView question bank | • Checklists |
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| • Mappings to Victorian Curriculum | • Review quizzes |

* Resources may vary depending on title purchased.

Each chapter begins with learning outcomes for that chapter.

Are you ready? activities are designed to gauge student readiness to enter the chapter.

Experiments enable students to gain and practise Science Inquiry Skills.

LIVING SYSTEMS

2

SHOWCASE: TOUR THROUGH A SYSTEM

The purpose of this showcase is for you to display your knowledge of one plant or animal system at the cell, tissue and organ levels. Create a travel guide through one of the plant or animal systems studied in this chapter. Imagine you are guiding tourists through the system you choose and explaining each part and what happens there. Consider the color, structure and functions of the main cells, tissues and organs in the system. What happens in each organ that you pass through? What are the inputs and outputs of the organ? How do the organs work together as a system to fulfil a function? What other systems interact with this system? You could present your tour as a travel brochure, a narrated PowerPoint, Press or in some other format.

By the end of this chapter you will be able to:

- recall that cells make up tissues, tissues make up organs and organs make up systems
- understand why multicellular organisms need systems to survive
- explain how the structures of cells, organs and systems are related to their functions, in relation to the digestive, respiratory and circulatory systems in animals
- compare and contrast one mammalian system with the same system in one other animal.
- understand that multicellular organisms have a number of systems that work together
- explain how the structures of cells, organs and systems are related to their functions, in relation to plant systems

The Showcase is designed to assess student achievement of the skills and understandings presented in the chapter. It appears at the beginning of the chapter so students can plan their time to complete the task.

2.2 THE SMALL INTESTINE AND THE RECTUM

Sometimes the absorbed nutrients provide more energy than is required by the body. Excess energy is stored as fat for use later, when nutrients are not available. Fat is a complex chemical that contains a lot of energy.

Figure 2.13 A magnified view of the wall of the small intestine show them to be lined with villi. Villi increase the surface area that is available for absorption of nutrients, and also bring the circulatory system close to absorbed nutrients.

Any material that has not yet been absorbed remains in the small intestine and continues along the digestive tract to the large intestine.

The large intestine

The small intestine joins the large intestine near the appendix. The large intestine is only 1.5 m long. It gets its name from being much wider than the small intestine. You can see in Figure 2.14b that there are many blood vessels in the walls of the large intestine. The organs of the large intestine – caecum, caecum and caecum from digested food – are absorbed into villi that line the walls. These substances move into the circulatory system so they can be distributed around the body. Bacteria live in this part of the digestive system and can digest food within the tract, producing some essential vitamins (vitamins K, and B12) and gas.

Figure 2.14 a) The location of the large intestine, surrounding the small intestine. b) The inside of the large intestine has a large number of blood vessels.

All figures have a purpose and important diagrams are magnified to show greater detail.

Working on your showcase scaffolds the progressive completion of the showcase.

2.4 Questions

Remembering

- Define the following glossary terms: heart, chambers, ventricle, septum, right, left, atrium, deoxygenated, pulmonary artery, pulmonary vein, oxygenated, aorta, valve, coronary, coronary vessels, epiglottis, pharynx, red blood cell, white blood cell, plasma, immune system, leucocyte and haemoglobin.
- State the function of the circulatory systems.
- Recall the three components that make up the circulatory systems.
- List all the structures the blood passes through in the heart, starting at the twin ovals and ending in the aorta.

Understanding

- Describe the similarities and differences between the structure and function of:
 - a) the atria and ventricles of the heart;
 - b) arteries, veins and capillaries;
 - c) vessels in the heart to vessels in veins.
- Explain how the one-way valves in the heart maintain blood flow in the correct direction.
- Match the blood vessel to its function:

Constrict	Pulsation
Flexion	Impulse factories
Red blood cells	Fluid medium
White blood cells	Blood clotting
Plasma	Carries oxygen bound to haemoglobin
- List three differences between red and white blood cells.
- Outline the role of the blood in supplying your body with the requirements and removing waste.

Applying

- Match the blood vessel to its function.

2.5 Plant systems

Plants, like animals, are made up of systems of organs. A plant has two systems – the shoot system and the root system (Figure 2.36). The aim of these two systems, as it is with animal systems, is to provide the plant with the requirements necessary for it to survive.

Figure 2.36 A plant is made up of systems of organs. The shoot system is above the ground and the root system is in the soil below the ground.

End of section questions summarise the chapter and link back to the learning outcomes identified at the start.

Activities reinforce student learning.

Signposts show the learning outcomes covered in each section.

Review Quiz and Checklist assist students in revising for the end of chapter test.

Experiment 2.4.1

The effect of exercise on the heart rate

Background

You can feel a person's pulse in their neck. This is where the carotid artery is located. One beat of a pulse is equivalent to one beat of the heart. Find your pulse by placing the index and middle fingers just to the side of the Adam's apple, in the soft hollow area. Press gently until you locate the pulse (Figure 2.30). Count the number of pulses for 30 seconds and then double them to get their heart rate for 1 minute.

Aim

To determine if the heart and breathing rates are changed by exercise.

What risks are associated with this experiment? How do you minimise the risk?

Exercise could worsen a medical condition. If you have asthma, a heart condition or other medical issue, take the safe route.

Materials

- stopwatch
- space to exercise

Method

- Work in groups of three. Allocate the roles of subject, recorder (heart rate), recorder (breathing rate).
- As a group, determine what exercise your subject is going to perform for 1 minute. It could be star jumps, push ups, running, step ups or some other agreed exercise.
- Determine a baseline measure for heart rate and breathing rate for your subject by counting pulse and breathing for 30 seconds. Double each and record in results table.
- Get the subject to perform 1 minute of exercise and repeat the measurements of heart rate and breathing rate.
- Repeat step 4 until the subject has performed a total of 4 minutes of exercise. Take measurements at the end of every minute of exercise.

Results

Copy the results table into your exercise book. Record your results.

	Heart rate (beats per minute)	Breathing rate (breaths per minute)
Baseline		
1 minute exercise		
2 minute exercise		
3 minute exercise		
4 minute exercise		

- Graph the results using two line graphs on the same set of axes.

Discussion

- Why did you take a baseline measurement for both heart and breathing rates?
- What errors could there be in your results?
- What trends do you see in your graph?
- Are the trends for heart and breathing rates the same or different?
- What trends did other groups show for heart and breathing rate?
- Knowing what you know about the respiratory system and the circulatory system, how do you explain your results?
- Explain why you did not combine the results from the whole class.

Conclusion

Write a conclusion that answers your aim and summarises your results.

Chapter review contains higher and lower order thinking questions classified under remembering, applying, analysing, evaluating, creating and reflecting.